RECOMMENDED CLINICAL PROTOCOLS AND GUIDELINES FOR THE PRACTICE OF CHIROPRACTIC

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The Committee would also like to express its thanks to Dr. Sid E. Williams for his input and critical review of this document throughout various stages of its development.

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GENERAL DISCLAIMER

These protocols and guidelines for the practice of chiropractic are intended to be flexible and the subject of ongoing review and periodic revision according to sound professional development and quality assurance procedures. They are not standards of care and compliance to guideline recommendations is voluntary. The International Chiropractors Association (ICA) recognizes that alternative practices and approaches are possible and may be preferable under certain clinical conditions. Nothing in these guidelines shall be taken as a legal or absolute clinical measure against which the behavior, activities or performance of any individual practitioner in any specific case should be held.

The ultimate judgement regarding the propriety of any specific procedure or clinical decision must be made by the attending doctor in light of the circumstances presented by each individual patient.

It is not the purpose of this document, which is advisory in nature, to take precedence over any federal, state or local statute, rule regulation or ordinance which may affect chiropractic practice, or over a rating or determination previously made by judicial or administrative proceeding.

FOREWORD

The International Chiropractors Association (ICA) recognizes, as do all realistic and responsible professional organizations, that in the current climate of accountability and concern for quality and appropriateness of care, clinical practice protocols and guidelines for all health professions are in the public interest. It is vitally important to recognize, however, that such protocols and guidelines are not a substitute for legal obligations and authorities, nor a replacement for the best clinical, ethical and professional judgement of the attending doctor.

All doctors of chiropractic must practice within the rules and procedures established in their respective states and jurisdictions, and within their best judgement. The protocols and guidelines presented here recognize and respect these immutable obligations on the doctor's part, also recognizing that no general guidelines can offer specific recommendations for care for any individual patient as each patient is not only different, but unique in their condition and need for care.

These practice protocols are a reflection of the growing consensus within the chiropractic profession on the general parameters of chiropractic science and practice. They are also offered to the profession and the public in the context of the Statement on the Chiropractic Paradigm first developed and adopted by the Association of Chiropractic Colleges and subsequently endorsed, approved or adopted by most of the major chiropractic organizations in the United States. This Paradigm Statement has been unanimously approved and adopted by the Board of Directors of the International Chiropractors Association, and the ICA heartily embraces and shares the core values reflected in this widely adopted position statement. These practice protocols seek to embody the spirit of this broadly supported position statement which reads, in part, as follows:

> *Chiropractic is a health care discipline which emphasizes the inherent recuperative power of the body to heal itself without the use of drugs or surgery.*
>
> *The practice of chiropractic focuses on the relationship between the structure (primarily the spine) and function (as coordinated by the nervous system) and how that relationship affects the preservation and restoration of health. In addition, Doctors of Chiropractic recognize the value and responsibility of working in cooperation with other health care practitioners when in the best interest of the patient.*

ICA has submitted this document for profession-wide and public examination and comment for a period of six months via the Internet and through widespread circulation of printed copies of this protocol in draft form prior to publishing this completed version. Over 200 comments and submissions were received from the chiropractic profession during that time. All of those comments were carefully reviewed and evaluated by the Clinical Practice Protocols and Guidelines Committee of the International Chiropractors Association and major revisions and corrections of the draft were made as a result of this extensive positive input. Over 100 comments were also received from members of the public. The nature of those public comments and inquiries assisted the committee in shaping this document to provide for better patient/consumer understanding of chiropractic procedures and practice protocols.

For a period of nearly two years, the draft of this document was subject to the critical review and input from the Board of Directors, Representative Assembly and postgraduate councils of the International Chiropractors Association. These organizational bodies are comprised of over l00 individuals from all parts of the United States and Canada, as well as many nations around the world. In many respects, this group fulfilled an organizational peer review function both before and after the document was submitted for profession-wide and public comment. The input from these people has had a significant impact on the nature and quality of the final version of these protocols.

ICA fully appreciates the likelihood of important improvements coming from the on-going research and review process and pledges full and objective consideration of all new clinical, scientific, and other relevant developments. ICA is committed to the maintenance of this document and pledges ongoing review and the issuance of a revised edition of these guidelines no less than every four years, or as dictated by research, legislative, legal or other developments.

The procedure and methodologies employed in the development of these guidelines were initially drawn from procedures developed by Herve Guillain, M.D., Senior Policy Analyst, with the Agency for Health Care Policy and Research, Washington, DC. However, these AHCPR procedures were developed to evaluate specific conditions and the effectiveness of the various treatments offered for those conditions. The reach of this document extends far beyond any one specific condition and attempts to deal with the practice of an entire profession. Therefore, other authorities, including state and federal statutes, educational standards and requirements, the judicial record, and professional consensus, have been consulted.

Furthermore, these protocols are intended to reflect the core values and policies of the International Chiropractors Association, as articulated in the above referenced Statement on the Chiropractic Paradigm.

The International Chiropractors Association understands that there are wide areas in chiropractic clinical practice where no concrete parameters will ever be possible and that there remains a wide area of discretion available to the individual practitioner. The judgement of the practitioner is vital in these areas, and it is hoped that these protocols offer any doctor of chiropractic support and guidance in these areas of discretion to help meet the needs of the patient in a clinically sound and ethical manner.

In a paper entitled, "*The Agenda for Health Care Policy and Research and the Development of Clinical Guidelines,"* Dr. Herve Guillain wrote:

> "The mission of the Agency is to enhance the quality, appropriateness, and effectiveness of health care services as well as to improve access to these services."

This is also the central mission of these chiropractic clinical practice protocols.

Chiropractic care has been evaluated to a greater degree than most medical interventions. A large and growing body of clinical research comprised of trials, observations, outcome assessments, etc. exist as a basis for evaluating chiropractic procedures. Overwhelmingly, regardless of methodology, chiropractic has been demonstrated to be safe and effective for patients of all ages. ICA also recognizes that the operational basis for many health care procedures rests on decades of clinical experience, and that "gold standard" research findings simply do not exist as a means to definitively evaluate most aspects of all health care practices.

ICA values and respects the great body of clinical experience collectively gained in over a century of clinical chiropractic practice. That body of knowledge and experience is a worthy basis on which to base procedural and clinical protocols until such time as replicated research findings offer a basis for changing prevailing thinking. The International Chiropractors Association is dedicated to fully exploring and understanding the potential of chiropractic science, and its limitations. The ICA urges the widest possible research on all aspects chiropractic science and practice and understands that such findings might certainly have a significant impact on the nature of these practice protocols.

After careful review of all literature and documents produced to date and an evaluation of the other sources of authority and experience, we are confident that the enclosed practice protocols offer a responsible and clinically sound guide to the practice of chiropractic worldwide.

Understanding These Practice Protocols:

A. Introduction

The majority of standard procedures utilized by all health providers, have not been validated by formal scientific methodology. Various sources have cited findings that indicate only about 15% of medical interventions are supported by valid evidence and many may have never been assessed objectively at all (Smith R, Eddy D). Thus, where possible valid evidence will be used and appropriately weighted. In those frequent situations where such studies do not exist, the cumulative weight of clinical experience will be the frame of reference and the validating mechanism for protocol components.

B. Format

These protocols and guidelines appear in topic chapters under the following headings:

Chiropractic Science and Practice; Authorities and Definitions; Basic Essential Care; Subluxation Guidelines; Chiropractic Child Care Protocols; Routine Check-ups, Prevention and Public Health; Collaborative Care; Consultation, History and Examination; Record Keeping and Patient Consents; Clinical Impression; Modes of Care; Frequency and Duration of Care; Reassessment; Outcome Assessment; Professional Development. Diagnostic Imaging; Instrumentation; and Contraindications and Complications.

Each chapter is organized according to a similar outline, namely: I. Overview; II. List of Subtopics; III. Literature Review; IV. Recommendations; V. Comments, Summary or Conclusion; and VI. References. There are instances, however, in which a slightly varied format is followed, depending on the nature of the information presented.

The "Recommendations" in each chapter are the guidelines. Subjects covered by guidelines in each chapter are indicated in the "list of subtopics."

Ratings Systems - Procedure Ratings (System I)

This system is suited to scientific/technical areas of practice:

1. Procedures are judged, in descending order of approval, established, promising, equivocal, investigational, doubtful and inappropriate.

2. The first three ratings (established, promising, and equivocal) are all positive.

The remaining three ratings (investigational, doubtful, and inappropriate) are negative. A procedure currently rated "investigational" has the potential to be raised to an acceptable level and a positive rating on the basis of future clinical and scientific evidence.

A specific procedure may have more than one current rating depending upon the circumstances in which it is used.

As noted previously, the rating chosen for a procedure is linked to the quality of evidence in support of utilization of that procedure.

Procedure Ratings (System II)

This system is suited to procedural/administrative aspects of practice. Accordingly it is used in chapters such as Collaborative Care, Consultation, History and Examination, and Record Keeping and Patient Consents .

1. Rating levels are: necessary, recommended, discretionary and unnecessary.
2. Rating is once again linked to quality of evidence - see Figure 2 for details.

Special Rating System for Complications

A special third rating system has been developed for the unique area of potential complications of high-velocity thrust procedures. - Contraindications and Complications) The basic rating is the level of contraindication, which may be:

- No identifiable contraindication
- Special circumstances: Situations in which clinical findings indicate the need for additional evaluation or in which high-velocity thrust procedures may be used with additional appropriate care and/or modification"
- Special circumstances situations to identifiable contraindication: "careful clinical judgment dictates whether special care is needed or an identifiable contraindication is present with each specific patient"
- Identifiable contraindication.

Chapter 17 lists the various potential complications and/or the need to adapt or modify high-thrust procedures under categories of:

- Articular Derangements
- Bone Weakening and Destructive Disorders
- Circulatory and Cardiovascular Disorders
- Neurological Disorders

Rating System (III)

A. Types

1. Strong positive recommendation: The doctor of chiropractic, under most circumstances, would employ the procedure.

2. Positive recommendation: The doctor of chiropractic, under many circumstances would employ the procedure.

3. Discretionary: The chiropractor under some circumstances would employ the procedure.

4. No recommendation: The circumstances within which this procedure would be appropriate have not been determined.

B. Support Categories:

1. E: Based on available expert opinion, clinical experience or effectiveness studies.

2. L: Based on available refereed literature or published monographs, legal decisions and/or authority,

statutory authority, statement of professional consensus.

3. C: Based on available controlled studies.

Procedure Ratings (System I)

Established: Accepted as appropriate by the practicing chiropractic community for a given indication in the specified patient population.

Promising: Given current knowledge, this appears to be appropriate for the given indication in the specified patient population. As more experience and long-term follow-up are accumulated, this interim rating will change. This connotes provisional acceptance, but permits a greater role for the current level of clinical use.

Equivocal: Current knowledge exists to support a given indication in a specified patient population, though value can neither be confirmed nor denied. As more evidence and experience accumulates this rating will change. Expert opinion recognizes a need for caution in general application.

Investigational: Evidence is insufficient to determine appropriateness. Further study is warranted. Use for a given indication in a specified patient population should be confined to research protocols. As more experience and evidence accumulate, this rating will change.

Doubtful: Given current knowledge, this appears to be inappropriate for the given indication in the specified patient population. As more experience and long-term follow-up are accumulated, this interim rating will change.

Inappropriate: Regarded by the practicing chiropractic community as unacceptable for the given indication in the specified patient population.

Quality of Evidence

Class I: Evidence provided by one or more well-designed controlled clinical trials; or well-designed experimental studies that address reliability, validity, positive predictive value, discriminability, sensitivity, and specificity.

Class II: Evidence provided by one or more well-designed controlled observational clinical studies, such as case-control, cohort studies, etc.; or positive predictive value, discriminability, sensitivity, and specificity; and published in refereed journals.

Class III: Evidence provided by expert opinion, descriptive studies or case reports.

Strength of Recommendation Ratings

Type A: Strong positive recommendations. Based on Class I evidence or overwhelming Class II evidence when circumstances preclude randomized clinical trials.

Type B: Positive recommendation based on Class II evidence.

Type C: Positive recommendation based on strong consensus of Class III evidence.

Type D: Negative recommendation based on inconclusive or conflicting Class II evidence.

Class E: Negative recommendation based on evidence of ineffectiveness or lack of efficacy based on Class I or Class II evidence.

Figure 2 Procedure Ratings (System II)

Necessary: Strong positive recommendation based on Class I evidence, or overwhelming Class II evidence when circumstances reflect compromise of patient safety.

Recommended: Positive recommendation based on consensus of Class II and/or strong Class III evidence.

Discretionary: Positive recommendation based on strong consensus of Class III evidence.

Unnecessary: Negative recommendation based on inconclusive or conflicting Class II, III evidence.

Quality of Evidence

The following categories of evidence are used to support the ratings:

Class I: A. Evidence of clinical utility from controlled studies published in refereed journals.

B. Binding or strongly persuasive legal authority such as legislation or case law.

Class II: A. Evidence of clinical utility from the significant results of uncontrolled studies in refereed journals.

B. Evidence provided by recommendations from published expert legal opinion or persuasive case law.

Class III: A. Evidence of clinical utility provided by opinions of experts, anecdote and/or by convention.

B. Expert legal opinion.

REFERENCES

Rachlis N, Kuschner C. *Second Opinion: What's Wrong with Canada's Health Care System and How to Fix It*, Toronto: Collins, 1989.

Smith R. (1001) Where is the Wisdom: The Poverty of Medical Evidence *BMJ* 303:793-799. Quoting David Eddy MD, Professor of Health Policy and Management, Duke University, NC.

CHAPTER 1

CHIROPRACTIC SCIENCE AND PRACTICE: AUTHORITIES AND DEFINITIONS

Chapter Outline

I. OVERVIEW

Chiropractic is a very specific health care science applied by doctors of chiropractic who practice under an extensive body of authorities. These authorities have evolved over more than a century of legislative and judicial development, educational growth, practical experience and professional consensus. Like other first professional degree holders, the doctor of chiropractic is a carefully regulated professional who must qualify on a number of levels to obtain the right to practice. This introductory chapter outlines the exact nature of the authorities under which contemporary doctors of chiropractic practice and sets out those basic definitions that explain and delineate the essential elements of chiropractic science and its practice.

Chiropractic science is an approach to human health that was developed through extensive anatomical study in which the elements of the human system, particularly the spine and nervous system continue to be examined in an effort to understand the relationship between the state of those anatomical elements and optimal human health. The basic premise of chiropractic science is that abnormalities and misalignments of the spine, defined as subluxation(s) in chiropractic science, can and do distort and interrupt the normal function of the nervous system and may create serious negative health consequences.

The correction and/or reduction of subluxation(s) through the adjustment of spinal structures can remove nervous system interference and restore the optimal function of the body. Essential to basic chiropractic theory is the concept of the inherent ability of the human body to effectively heal itself, comprehend the environment and function in a normal manner. This concept is important since chiropractic perceives spinal subluxation(s) as barriers to normal function and obstacles to the body's innate intelligence.

Chiropractic has enjoyed over a century of lively and serious scientific and conceptual debate. The chiropractic profession has benefited enormously from this on-going self-examination and reality testing based on the scientific and research record. The outcome of those years of critical evaluation and debate, which remain on-going, has been a strong consensus regarding the nature of chiropractic science and practice and the key definitions that set chiropractic apart as a distinct, unique health care science and practice. This consensus is best depicted by the unanimous adoption of a paradigm statement by the Association of Chiropractic Colleges, International Chiropractors Association, American Chiropractic Association, Federation of Chiropractic Licensing Boards, Council on Chiropractic Education, the National Board of Chiropractic Examiners and the Congress of Chiropractic State Associations. This paradigm statement reads as follows:

Chiropractic is a health care discipline which emphasizes the inherent recuperative power of the body to heal itself without the use of drugs or surgery.

> *The practice of chiropractic focuses on the relationship between the structure (primarily the spine) and function (as coordinated by the nervous system) and how that relationship affects the preservation and restoration of health. In addition, Doctors of Chiropractic recognize the value and responsibility of working in cooperation with other health care practitioners when in the best interest of the patient.*

II. THE CHIROPRACTIC PARADIGM

Purpose

The purpose of chiropractic is to optimize health.

Principle

The body's innate recuperative power is affected by and integrated through the nervous system.

Practice

The practice of chiropractic includes:

- establishing a diagnosis;
- Facilitating neurological and biomechanical integrity through appropriate chiropractic case management; and
- promoting health.

Foundation

The foundation of chiropractic includes philosophy, science, art, knowledge, and clinical experience.

Impacts

The chiropractic paradigm directly influences the following:

- education;
- research;
- health care policy and leadership;
- relationships with other health care providers;
- professional stature;
- public awareness and perceptions; and
- patient health through quality care.

The Subluxation

Chiropractic is concerned with the preservation and restoration of health, and focuses particular attention on the subluxation.

A subluxation is a complex of functional and/or structural and/or pathological articular changes that compromise neural integrity and may influence organ system function and general health.

A subluxation is evaluated, diagnosed, and managed through the use of chiropractic procedures based on the best available rational and empirical evidence.

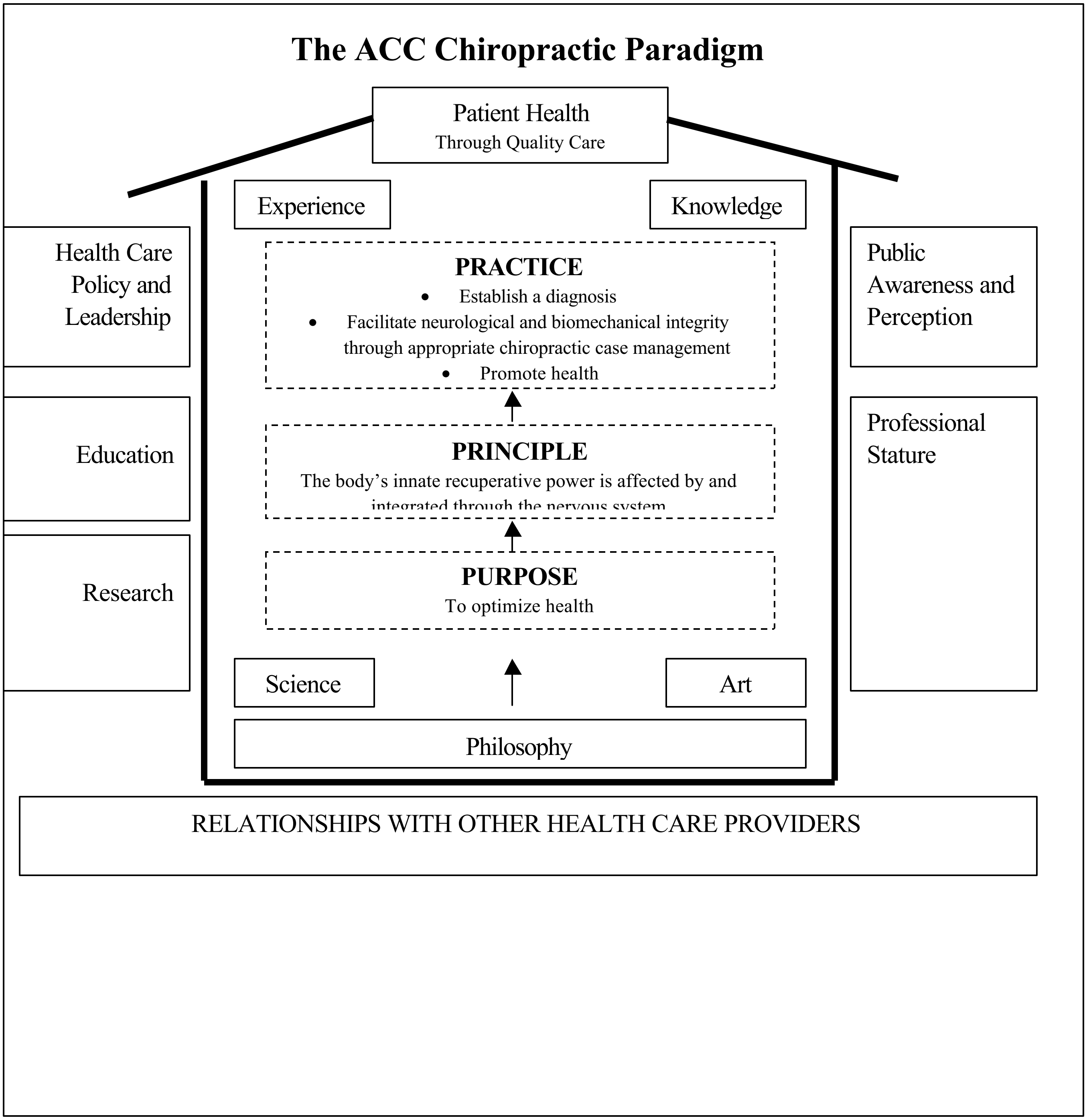
III. CHIROPRACTIC EDUCATION

To obtain a license to practice chiropractic in any of the 50 states requires the degree of doctor of chiropractic from an accredited chiropractic educational institution or program. Chiropractic educational standards are strict and demanding, requiring study in the basic sciences comparable to medical, dental and osteopathic curricula. This education consists of four or more years of full-time, in-residence study is required in human anatomy, physiology, biomechanics, chiropractic diagnosis/analysis, adjustive techniques, public health issues and chiropractic philosophy.

Chiropractic college students must complete a rigorous and uniquely specialized program of classroom and practical training that includes more than 2,000 hours of study of the anatomy, dynamics and biomechanics of the human spine and the nature and components of the spinal subluxation complex. No other health care professional devotes this level of serious scientific study to the human spine. A detailed examination of the curricula offered by federally accredited chiropractic institutions illustrates the uniqueness of chiropractic and the highly specialized nature of chiropractic professional education.

Chiropractic students are thoroughly trained in the appropriate use of sophisticated diagnostic technology including imaging procedures such as x-ray, thermography, video-fluoroscopy, magnetic resonance imaging and other state-of-the-art investigative technologies and procedures. The capacity to evaluate the health care needs of the chiropractic patient, including appropriate referrals to other health professionals when necessary, is an important objective of chiropractic education.

Chiropractic education is designed not only to impart scientific knowledge, but to develop clinical skills and proficiencies that "represent those minimal skills a candidate should demonstrate when presenting for



licensure after completing the educational program." These areas of clinical competency include the taking of patient histories, physical examinations, imaging studies, chiropractic analysis/diagnosis or clinical impressions, referral, care plans, spinal adjusting, case follow-up, record keeping and others.

Nearly 14,000 students attend the 16 chiropractic colleges accredited by the Commission on Accreditation of the Council on Chiropractic Education (CCE), according to 1999 data. The Commission on Accreditation is recognized by the U.S. Department of Education. The standards adopted by the Council on Chiropractic Education, "indicate the minimum education expected to be received in the accredited institutions that train students as chiropractic primary health care providers."

CCE standards were developed to reflect the needs of chiropractic professional education and as a measure of the quality of programs offered by chiropractic teaching institutions. Chiropractic education, even prior to the existence of the CCE, offered professional instruction sufficient to meet the requirements for licensure in the various states. The forward to the "Standards for Chiropractic Institutions" of the CCE defines the role of a doctor of chiropractic and his/her professional education as follows:

> *"A Doctor of Chiropractic is a physician whose purpose is to help meet the health needs of the public as a member of the healing arts. He/she gives particular attention to the relationship of the structural and neurological aspects of the body and is educated in the basic and clinical sciences as well as in related health subjects. Chiropractic science concerns itself with the relationship between structure (primarily the spine), and function (primarily coordinated by the nervous system), of the human body as that relationship may affect the restoration and preservation of health."*
>
> *"The purpose of his/her professional education is to prepare the doctor of chiropractic as a primary health care provider; to provide the students with a base of knowledge sufficient for the performance of his or her professional obligations as a doctor of chiropractic. As a portal of entry to the health delivery system, the doctor of chiropractic must be well educated to diagnose for chiropractic care, to provide chiropractic care, and to consult with, or refer to, other health care providers as indicated."*

Most CCE accredited chiropractic colleges have sought to further demonstrate their academic strength by qualifying for recognition and accreditation by regional accrediting agencies. For example, Life University in Marietta, Georgia, is accredited by the Southern Association of Colleges and Schools; and Palmer College of Chiropractic in Davenport, Iowa, is accredited also by the North Central Association of Colleges and Schools, etc.

IV. THE LEGAL ESTABLISHMENT OF CHIROPRACTIC

The practice of chiropractic is a privilege authorized by the legislatures of the various states under the authorities reserved to the states in the U.S. Constitution. The realities of chiropractic practice flow from this legal establishment, and, ultimately, in every instance, the doctor of chiropractic will be held accountable to such provisions, statutes and regulations as have been established by state law. Any attempt to encode professional practice guidelines for the chiropractic profession must begin with a thorough, objective examination of this legal establishment and reflect the realities, authorities and limitations contained therein.

The legal development of chiropractic began shortly after the initial articulation of chiropractic principles and, by the 1920s, chiropractic was well on the way to formal legal recognition and regulation through licensure in numerous states. The first law passed by a state legislature authorizing and regulating the practice of chiropractic as a separate and distinct health care profession was in Kansas on March 20, 1913. This action was followed in quick succession by the legislature of North Dakota in that same year, and by Arkansas, Oregon, Nebraska and Colorado, by 1915. This represented the beginning of a recognition process that was not completed until 1974 when Louisiana finally adopted a chiropractic licensure law.

The statutes governing the practice of chiropractic are worded similarly in every state. All states statutes have recognized chiropractic as a primary contact health care profession applying its unique science and procedural approach to health care. Common to all state statutes is an emphasis on the spinal adjustment procedure and such diagnostic activities as are necessary to properly perform this function and to protect the public. A second common thread running through the legal mechanisms establishing chiropractic is the drugless and non-surgical nature of chiropractic science. Chiropractic like podiatry, dentistry, and optometry exist as a legal exception to the practice of medicine with its own area of application and clinical expertise care of the articulations of the human frame, particularly the spine, through the application of chiropractic adjustments, etc. as a science and art.

The status of the doctor of chiropractic, as established by statute, training and experience, includes the ability and authority to evaluate the general health status of an individual for certification purposes, in the context of a required physical for school, employment, sports and, as federally authorized, approval to operate heavy transportation machinery. The U.S. Department of Transportation authorizes DC's to perform physical examinations for long-distance truck drivers, etc.

Such physicals are a routine part of chiropractic practice. The clinical competence to perform such evaluations and through standard health status measures such as blood pressure, heart rate, etc., make a statement about the general health of an individual does not necessarily include an obligation or authority to develop a full-body medical diagnosis or to perform procedures outside the recognized scope of chiropractic. In the presence of abnormal findings in the course of routine physical examinations for specific purposes, such as those cited above, the DC follows the standard chiropractic care pathways as described in chapter 2, making such care decisions (including referral) as are clinically indicated on an individual basis.

Doctors of chiropractic are also obligated to perform certain public health functions that are common to all primary contact, doctor level health care professionals. Many state laws obligate the doctor of chiropractic to report child abuse, spouse abuse, certain communicable diseases and other findings to public health authorities. Likewise, the doctor of chiropractic may have responsibilities under state laws and regulations to take action in the presence of substance abuse.

The process by which the several state legislatures developed statutory language and authority for the practice of chiropractic have been very specific in identifying chiropractic as a branch of the healing arts that is separate and distinct from all others. In particular, statutes tend to be especially clear and specific in identifying chiropractic as a practice apart from, distinct from and not the practice of medicine. The following citations from a number of current state statutes convey this distinct, "not medicine" element in chiropractic's legal establishment:

> **Idaho**: *Chiropractic practice, as herein defined is hereby declared not to be the practice of medicine...*(Idaho Code Title 54, Chapter 7: 54-704 Chiropractic practice, No. 3.)
>
> **Kentucky:** *The practice of chiropractic shall not include the practice of medicine or osteopathy...* (Kentucky Revised Statutes Annotated Title XXVI Chapter 312: 312.015 Definitions for Chapter, No. 5.)
>
> **Maine**: "*...and chiropractic is declared not to be the practice of medicine, surgery, dentistry or osteopathy."* (Maine Revised Statutes Annotated, Title 32 Chapter 9, Subchapter 1, 451.Definitions)

Maryland: *Except as otherwise provided in this title, "practice chiropractic" does not include the use of drugs or surgery, or the practice of osteopathy, obstetrics, or any other branch of medicine.* (Annotated Code of Maryland Title 3, Subtitle 1 section 3-101.Definitions, (f)(3).

Minnesota: *The practice of chiropractic is not the practice of medicine, surgery, or osteopathy.* (Minnesota Statutes Annotated Health Chapter 148, Sec. 148.01.Chiropractic, No. 2.)

An enormous body of judicial decisions and opinions, going back nearly 100 years, likewise identifies chiropractic as a practice different from medicine. Such decisions reflect the strong positions outlined in statutory languages regarding the separateness of chiropractic. This statutory and judicial record has clarified the status of chiropractic beyond dispute and/or doubt, and has established chiropractic as a science, art, philosophy and practice distinct and separate from medicine.

The other common theme is the legislative guarantee to the chiropractic professional of access to appropriate diagnostic technology. All jurisdictions in the U.S. authorize x-ray applications and a list of other technologies is common in state statutes. Also, there are common limitations, such as the prohibition of the use of x-ray technology for therapeutic, as opposed to diagnostic purposes. Many states have demonstrated through legislation a commitment to arm the DC with diagnostic technologies appropriate to actual practice needs, and to protect the patient.

State laws have clearly established chiropractic as a separate professional endeavor and spell out in considerable detail the parameters of chiropractic practice. The specialized nature of chiropractic is particularly evident when one contrasts chiropractic scope and licensure to the practice of medicine in all its branches.

The Statutory Establishment of Chiropractic Responsibility for Clinical Activity Related to the Nervous System

The scopes of practice established by state legislatures are, in most instances, quite specific. Among the core concepts embodied in law is the relationship between the chiropractic adjustment and/or manipulation and the functions of the nervous system.

Most states have enacted statutes that contain specific references to the neurological responsibility of the doctor of chiropractic, relating nerve interference to human dysfunction. This nerve interference is recognized by statute to have health consequences in the human body and constitutes the primary chiropractic diagnosis. No state statute requires a patient to present conditions or symptoms other than the finding of such nerve interference to fall within the realm of chiropractic professional competence.

Examples of state statutes that identify caring for the nervous system as a primary responsibility of the doctor of chiropractic include:

***Alabama**: The term" chiropractic," when used in this article, is hereby defined as the science and art of locating and removing without the use of drugs or surgery any interference with the transmission and expression of nerve energy in the human body. (Code of Alabama 1975 Title 34, Chapter 24, Article 4, Division 1 Section 34-24-120 (a)*

Colorado: *"Chiropractic" means that branch of the healing arts which is based on the premise that disease is attributable to the abnormal functioning of the human nervous system. It includes the diagnosing and analyzing of human ailments and seeks the elimination of the abnormal functioning of the human nervous system by the adjustment or manipulation, by* *hand, of the articulations and adjacent tissue of the human body, particularly the spinal column.* (Colorado Revised Statutes Annotated Title 12, Article 33 Part 1 Section 12-33-102(1)

Florida: *"Practice of chiropractic" means a noncombative principle and practice consisting of the science, philosophy, and art of the adjustment, manipulation, and treatment of the human body in which vertebral subluxations and other malpositioned articulations and structures that are interfering with the normal generation, transmission, and expression of nerve impulse between the brain, organs, and tissue cells of the body, thereby causing disease, are adjusted, manipulated, or treated, thus restoring the normal flow of nerve impulse which , produces normal function and consequent health by chiropractic physicians using specific chiropractic adjustment or manipulation techniques"*(West's Florida Statutes Annotated, Title XXXII, Chapter 460, 8a).

Indiana: *"Chiropractic" means the diagnosis and analysis of any interference with normal nerve transmission and expression, the procedure preparatory to and complementary to the correction thereof by an adjustment of the articulations of the vertebral column, its immediate articulation, and includes other incidental means of adjustments of the spinal column and the practice of drugless therapeutics.* (West's Annotated Indiana Code Title 25, Article 10 Chapter 1, 25-10-1-1, Sec 1 (1)

Maryland: *"Practice chiropractic" means to use a drugless system of health care based on the principle that interference with the transmission of nerve impulses may cause disease.*

"Practice chiropractic" includes the diagnosing and locating of misaligned or displaced vertebrae and, through the manual manipulation and adjustment of the spine and other skeletal structures, treating disorders of the human body. (Annotated Code of Maryland Title 3 Subtitle 1 Section 3-101 (f)(1)(2)

Tennessee: *"Chiropractic" means a system of healing based on the premise that the relationship between the structural integrity of the spinal column and function in the human body is a significant health factor and the normal transmission of nerve energy is essential to the restoration and maintenance of health.*

The practice and procedures used by the doctor of chiropractic shall include the procedures of palpation, examination of the spine and chiropractic clinical findings accepted by the board of chiropractic examiners as a basis for the adjustment of the spinal column and adjacent tissues for the correction of nerve interference and articular dysfunction. (Tennessee Code Annotated, Title 63 Chapter 4, 63-4-101(a)(b)

The Legislative Establishment of Subluxation as an Element in Chiropractic Practice

The concept of the subluxation has previously been defined via the consensus paradigm statement quoted earlier. This clinical element of chiropractic is recognized not only in chiropractic education, literature, philosophy and practice, it is strongly established in both state and federal legislation as a primary element of chiropractic clinical responsibility. These laws also identify the adjustment of the subluxation to restore normal nerve function as a unique service not provided by medicine, osteopathy or any other health care discipline.

Many states specifically identify the concept of subluxation in their chiropractic practice statutes. Most states imply an understanding of the subluxation complex by specifying the responsibility of the doctor of chiropractic for adjusting the spine and adjacent tissues for the elimination of nerve interference.

Examples of state statutes that expressly identify the detection of and caring for subluxation(s) as the core of chiropractic practice include:

Arizona: *A doctor of chiropractic is a portal of entry health care provider who engages in the practice of health care that includes:*

- *the diagnosis and correction of subluxations, functional vertebral or articular dysarthrosis or neuromuscular skeletal disorders for the restoration and maintenance of health.*
- *Treatment by adjustment of the spine or bodily articulations and those procedures preparatory and complementary to the adjustment including physiotherapy related to the correction of subluxations.* (Arizona Revised Statutes Annotated, Title 32, Chapter 8, Article 2 32-925(a), No. 1, 3)

Connecticut: *The practice of chiropractic means the practice of that branch of the healing arts consisting of the science of adjustment, manipulation and treatment of the human body in which vertebral subluxations and other malpositioned articulations and structures that may interfere with the normal generation, transmission and expression of nerve impulse between the brain, organs and tissue cells of the body, which may be a cause of disease, are adjusted, manipulated or treated.* (Connecticut General Statutes Annotated Title 20, Chapter 372, Section 20-24, (1)

District of Columbia: *"Practice of Chiropractic" means the detecting and correcting of subluxations that cause vertebral, neuromuscular, or skeletal disorder, by adjustment of the spine or manipulation of bodily articulations for the restoration and maintenance of health.* (District of Columbia Code 1981, Part 1, Title 2, Chapter 33, Subchapter I 2-3301.2(3)(A)

Delaware: *The practice of chiropractic includes, but is not limited to, the diagnosing and locating of misaligned or displaced vertebrae subluxation complex.* (Delaware Code Annotated, Title 24, Chapter 7, 701 b.)

Florida: *"Practice of chiropractic" means a noncombative principle and practice consisting of the science, philosophy, and art of the adjustment, manipulation, and treatment of the human body in which vertebral subluxations and other malpositioned articulations and structures that are interfering with the normal generation, transmission, and expression of nerve impulse between the brain, organs, and tissue cells of the body, thereby causing disease, are adjusted, manipulated, or treated, thus restoring the normal flow of nerve impulse which produces normal function and consequent health by chiropractic physicians using specific chiropractic adjustment or manipulation techniques*...(Florida Statutes Annotated Title XXXII, Chapter 460, Section 460.403 (8)(a)

Idaho: *"Adjustment" means the application of a precisely controlled force applied by hand or by mechanical device to a specific focal point on the anatomy for the express purpose of creating a desired angular movement in skeletal joint structures in order to eliminate or decrease interference with neural transmission and correct or attempt to correct subluxation complex.* (Idaho Code, Title 54 Chapter 7, 54-704 (1)(a.)

Maine: *Chiropractic. "Chiropractic" means the art and science of identification and Correction of subluxation and the accompanying physiological or mechanical abnormalities. The term subluxation, as utilized within the chiropractic health care system, means a structural* *or functional impairment of an intact articular unit. Chiropractic recognizes the inherent recuperative capability of the human body as it relates to the spinal column, musculo-skeletal and nervous system.* (Maine Revised Statutes Annotated, Title 32, Chapter 9, Subchapter 1 section 451 (1).

Massachusetts: *"Chiropractic", the science of locating, and removing interference with the transmission or expression of nerve force in the human body, by the correction of misalignments or subluxations of the bony articulation and adjacent structures, more especially those of the vertebra column and pelvis, for the purpose of restoring and maintaining health.* (Massachusetts General Laws Annotated Part I, Title XVI, Chapter 112, Section 89)

New York: *The practice of the profession of **chiropractic** is defined as detecting and correcting by manual or mechanical means structural imbalance, distortion, or subluxations in the human body for the purpose of removing nerve interference and the effects thereof, where such interference is the result of or related to distortion, misalignment or subluxation of or in the vertebral column.* (Consolidated Laws of New York, Chapter 16 Title VIII, Article 132, Section 6551 (1.)

Other state statutes that define and identify the subluxation specifically include Kentucky, Nevada, New Jersey, Texas, Utah, Vermont, and Washington. These statutes are accessible via the Internet web sites of the various states as well as the ICA website http://www.chiropractic.org

While the practice of various health professions is established and regulated by the states, federal statutes and regulations have a powerful and growing impact on health care organization and delivery. The concept of the subluxation is clearly and emphatically recognized in federal statutes in a number of contexts. Indeed, no federal program recognizes chiropractic outside the context of the subluxation.

The federal statutes governing the Medicare program, where chiropractic services have been included since the early 1970's, defines chiropractic and reimbursable chiropractic services as:

A chiropractor who is licensed as such by the State (or in a State which does not license chiropractors as such, is legally authorized to perform the services of a chiropractor in the jurisdiction in which he performs such services), and who meets uniform minimum standards promulgated by the Secretary, but only for the purpose of subsections (s)(1) and (s)(2)(A) of this section and only with respect to treatment by means of manual manipulation of the spine (to correct a subluxation demonstrated by X-ray to exist) which he is legally authorized to perform by the State or jurisdiction in which such treatment is provided. (42 USC Sec. 1395x (r)(5).

Medicare extends these concepts in the statute into the regulations governing the program with an express definition:

A chiropractor who is licensed by the State or legally authorized to perform the services of a chiropractor, but only with respect to treatment by means of manual manipulation of the spine to correct a subluxation demonstrated by x-ray to exist. (42 CFR 482 SubpartB Section 482.12 (7) (c)(1)(v)

Federal statutes establishing chiropractic participation in the Medicaid program employ the same terminology as in the general Medicare program. Federal Employee health Benefit Programs recognized chiropractic on terms negotiated between public employee representative committees and various insurance carriers but the federal workers compensation program identifies and defines chiropractic, once again, very specifically to include chiropractors and chiropractic services as follows:

> *The term "physician" includes chiropractors only to the extent that their reimbursable services are limited to treatment consisting of manual manipulation of the spine to correct a subluxation as demonstrated by x-ray to exist.*

Adjustment and/or Chiropractic Manipulation: The Core of Chiropractic Practice

Without question, the adjustment and/or manipulation of the spine and its adjacent structures represents the essence of chiropractic patient care as established by state statute. No less than 38 state statutes employ the term "adjustment" in reference to the procedures applied by the doctor of chiropractic. Most state statutes are very specific regarding the authority of the doctor of chiropractic to apply the adjustment and/or manipulation process to the area of the human spine and its articulations. State statutes recognize that chiropractic science is anatomically very specific to the spine but with broad body implications. No less than 18 state statutes include the concept of manipulation, and in almost every instance it is utilized in addition to the term "adjustment" Clearly, the terms are not meant to be synonymous.

> **Colorado**: *"Chiropractic"...includes ...the elimination of the abnormal functioning of the human nervous system by the adjustment or manipulation, by hand, of the articulations and adjacent tissue of the human body, particularly the spinal column.* (Colorado Revised Statutes Annotated, Title 12, Article 33, Part 1: 12-33-102 (1)

> **Connecticut**: *The practice of chiropractic means the practice of that branch of the healing arts consisting of the science of adjustment, manipulation and treatment of the human body in which vertebral subluxations and other malpositioned articulations and structures that may interfere with the normal generation, transmission and expression of nerve impulse between the brain, organs and tissue cells of the body...are adjusted.* (Connecticut General Statutes Annotated, Title 20, Chapter 372, 20-24 (1)

> **District of Columbia**: *"Practice of **Chiropractic"** means the detecting and correcting of subluxations that cause vertebral, neuromuscular, or skeletal disorder, by adjustment of the spine.* (District of Columbia code 1981, Part I, Title 2, Chapter 33, s2-3301.2 (3)(A)

> **Georgia**: *"Chiropractic" means the adjustment of the articulation of the human body, including ilium, sacrum, and coccyx...The adjustment referred to in this paragraph and subsection (b) of Code Section 43-9-16 may only be administered by a doctor of chiropractic authorized to do so by the provisions of this chapter.* (Code of Georgia, Title 43, Chapter 9; 43-9-1 (2)

> **Idaho**: *"Adjustment" means the application of a precisely controlled force applied by hand or by mechanical device to a specific focal point on the anatomy for the express purpose of creating a desired angular movement in skeletal joint structures in order to eliminate or decrease interference with neural transmission and correct or attempt to correct subluxation complex; "chiropractic adjustment" utilizes, as appropriate, short lever force, high velocity force, short amplitude force, or specific line-of-correction force to achieve the desired angular movement, as well as low force neuromuscular, neurovascular, neuro-cranial, or neuro-lymphatic reflex technique procedures*. (Idaho Code, Title 54, Chapter 7: 540-704 (1)(a).

Chiropractic: A Drugless Science

In the legislative process that established chiropractic and in the subsequent regulatory procedures that amplify and implement legislative directives, chiropractic is often defined by what is included within the professional scope of chiropractic practice as well as what is expressly prohibited. Among the prohibitions that characterize chiropractic is the absence of authority to prescribe or administer drugs. All fifty states expressly prohibit the prescription or administration of federally controlled substances by a doctor of chiropractic. No state authorizes the doctor of chiropractic to administer or prescribe anesthesia, vaccines or serums or radioactive substances for therapeutic purposes. State statutes tend to be quite specific in this area as is shown in the excerpts from state statutes presented below.

> **Alabama**: *...but chiropractors are expressly prohibited from prescribing or administering to any person any drugs included in materia medica* (Code of Alabama 1975 Title 34 Chapter 24 Article 4 Division 1, s 34-24-120 (c).
>
> **Arizona**: *A doctor of chiropractic licensed under this chapter shall not prescribe or administer medicine or drugs...*(Arizona Revised Statutes Annotated Title 32 Chapter 8 Article 2, 32-925 (b).
>
> **Connecticut**: *Practice chiropractic as defined in section 20-24, but shall not prescribe for or administer to any person any medicine or drug included in materia medica...*(Connecticut General Statutes Annotated Title 20 Chapter 372, 20-28 (b)(1).
>
> **District of Columbia**: *"Practice of Chiropractic" does not include the use of drugs,...*(District of Columbia Code 1981 Part 1, Title 2 Chapter 33 Subchapter 1, Section 2-3301.2 (3)(A).
>
> **Georgia**: *However, the term "chiropractic" shall not include the use of drugs...*(Code of Georgia, Title 43 Chapter 9, 43-9.1 (2).The status of the doctor of chiropractic, as established by statute, training and experience, includes the ability and authority to evaluate the general health status of an individual for certification purposes,
> **Louisiana**: *The practice of chiropractic does not include the right to prescribe, dispense, or administer medicine or drugs...*(West's Louisiana Statutes Annotated Title 37, Chapter 36 Part 1 Section 2801 (3)(c)
>
> **New Jersey**: *No licensed chiropractor shall use. . . or prescribe, administer, or dispense drugs or medicines for any purpose whatsoever...*(New Jersey Statutes Annotated Title 45 Subtitle 1, Chapter 9 Article 1 45:9-14.5)
>
> **New York**: *A license to practice **chiropractic** shall not permit the holder thereof...to prescribe, administer, dispense or use in his practice drugs or medicines...(*Consolidated Laws of New York Chapter 16, Title VIII Article 132, 6551. Definition of practice of chiropractic (3).
>
> **Tennessee**: *Nothing in this chapter shall be construed to authorize any of the following: Prescribing drugs...*(Tennessee Code Annotated Title 63, Chapter 4, 63-4-101 "Chiropractic" Defined-B Mandatory practices (d)(1).

The Implications for the Guidelines Process

The authorities established by law and the consensus that has evolved via such widely recognized bodies as the Council on Chiropractic Education and the Association of Chiropractic Colleges represent powerful elements that must be included in the development of any chiropractic practice guidelines. Legal requirements represent absolutes. Consensus statements, definitions and positions adopted by diverse and widespread professional bodies within the chiropractic profession are part of the self-defining, self-governing process that any serious, mature profession should expect to see emerge. Along with more specific literature and clinical studies, these bodies of "evidence" can and should be an integral part of the body of data on which guidelines are based.

V. THE ETHICAL CONTEXT OF CHIROPRACTIC PRACTICE

The most stringent statutory provisions and the strictest standards and guidelines for the practice of any profession gain a vital additional dimension when placed in a well defined and demanding ethical context. To foster this important state of professional awareness and to protect the profession and the public, the Board of Directors of the International Chiropractors Association established an extensive Code of Professional Ethics. This code is presented as an important element of the conditions and terms on which chiropractic should be practiced. It is the intent of these practice protocols and guidelines to reflect the values and objectives of this code of ethics in every aspect in its various components.

The International Chiropractors Association Code of Ethics

This Code of Professional Conduct was first developed by the International Chiropractors Association and officially adopted by its Board of Directors in 1985.
PREAMBLE

behavior and recommended for al l doctors of chiropractic and chiropractic assistants. The following basic principles should be guiding factors in the practice of chiropractic and upheld at all times.

- **Consider the well-being of the patient. The primary effort and ultimate goal should be for "the greatest good of the patient".**
- **Honor your profession, its history and tradition.**
- **Respect your patient's rights of confidentiality in the doctor-patient relationship.**
- **Recognize chiropractic's limitations and acknowledge the special skills of other health care professions in the prevention and care of disease.**
- **Let professional responsibility, integrity and high standards of competence and skill be your guiding tenets.**

The ICA Code of Ethics comprises a doctor of chiropractic's duties and obligations to his or her patients, the public and each other. The ethical foundations upon which these principles are based are established moral obligations that ensure the dignity and integrity of the profession.

The primary duty of every doctor of chiropractic is to abide by federal, state, provincial, and local statutes establishing the privileges of practicing chiropractic as well as the basic moral obligations imposed by this Code of Ethics.

1. DUTIES, OBLIGATIONS AND RESPONSIBILITIES OF DOCTORS OF CHIROPRACTIC TO THEIR PATIENTS.

The overriding objective of these principles is for the doctor of chiropractic to render the greatest possible service and care to mankind.

Principle 1A.

Availability and Accessibility

The doctor of chiropractic should make himself/herself available, but more importantly, be accessible to patients in need of his/her professional services. The doctor of chiropractic shall, to the best of his/her ability and immediate circumstantial limitations, render all possible assistance to any patient(s) in emergency health care situations. Except in emergency situations, a doctor of chiropractic has the right to accept or reject a particular patient.

Principle 1B.

Confidentiality

The doctor of chiropractic is obliged to keep the trust and confidence of the patient and the patient's family. The following rules should be adhered to:

1. The doctor of chiropractic shall not discuss patient information with one patient about another patient.
2. The doctor of chiropractic shall not discuss any patient information with relatives or friends of the patient without the consent of the patient, preferably in writing.
3. The doctor of chiropractic shall not discuss any patient information with visitors to the office or hospital.
4. Patient information should not, under any circumstances, be discussed with the news media without written patient consent.
5. The doctor of chiropractic shall not discuss patient information with other employees, except in conference and/or consultation. Discussion about patients should be avoided in patient areas. A patient's privacy should be respected at all times. When consulting another doctor of chiropractic health care provider, it should be done privately and out of the range of the patient's hearing.
6. The doctor of chiropractic shall not discuss patient information with his/her own relatives or friends.
7. The doctor of chiropractic shall not discuss any patient information over the telephone with anyone without the patient's consent, preferably in writing.

Medical/Health Records

The Joint Commission on Accreditation of Hospitals (JCAH) stipulates the following minimum standards in assessing hospital accreditation compliance with medical record taking and confidentiality of the information contained therein. The ICA endorses the JCAH standards in principle:

Medical records are confidential, secured, current, authenticated, legible, and complete.

The medical record is the property of the hospital or clinic and is maintained for the benefit of the patient, the medical staff, and the hospital.

The hospital or clinic is responsible for safeguarding both the records and its informational content against loss, defacement, tampering, and from use by unauthorized individuals.

Written consent of the patient or his legally qualified representative is required for the release of medical information to persons not otherwise authorized to receive the information.

Where certain portions of the medical record are so confidential that extraordinary means are necessary to preserve their privacy such as in the care of some psychiatric disorders, these portions may be stored separately, provided that the complete record is readily available when required for current medical care or follow-up, review functions, or use in quality assurance activities.

Principle 1C.

Release of Confidential Patient Records

The doctor of chiropractic shall comply with a patient's written authorization to provide records or copies of records to individuals the patient designates to inspect or receive all or part of said records. Further, doctors of chiropractic shall abide by the general standards for patient records confidentiality and release promulgated by the American Medical Records Association (AMRA). The AMRA standards, listed below, are endorsed by the International Chiropractors Association and henceforth are an integral part of the ICA Code of Professional Ethics.

All requests for health records or health information shall be referred to the health records department of a hospital or clinic.

Release of health information to the patient shall be carried out in accordance with all applicable legal requirements and written institutional policy. A properly completed and signed authorization is required.

Subject only to specific contraindications described below, and to any legal constraints such as those governing minors and those adjudicated as incomplete, a patient or his representative may have access to his own health record for review, upon written request with reasonable notice. A patient may have access to records of his/her care during or after discharge from care. A copy of the requested health information will be provided after completion and upon written request by the patient and payment of a reasonable fee.

The health care provider is not required to permit the patient access to his/her health record if the provider reasonably concludes that:

> *Knowledge of the health care information would be injurious to the health of the patient, or*
>
> *Knowledge of the health care information could reasonably be expected to cause danger to the life or safety of any person.*

If the health care provider denies a patient's request to see or copy, in whole or in part, his health record based on the above grounds, the provider must either:

> *Provide a summary of the health record, according to the requirements of this section. If the health care provider chooses to prepare such a summary of the record rather than allow access to the entire record, he or she shall make such a summary of the records, available to the patient within ten (10) working days from the date of the patient's request. However if more time is needed because the record is extraordinary in length or because the patient was discharged from a licensed health facility within the last ten (10) days, the health care provider shall notify the patient of this fact and the date that the summary will be completed, but in no case shall more than thirty days (30) elapse between the request by the patient and the delivery of the summary. In preparing the summary of the record, the health care provider shall not be obligated to include information which is not contained in the original record; or*
>
> *The provider must permit inspection by, or provide copies of, the health record to another health care practitioner who is licensed to care for the same condition as the health care provider and who has*

been so designated, in writing, by the patient. The health care provider shall inform the patient of the provider's refusal to permit him/her to inspect or obtain copies of the requested records, and inform the patient of the right to require the provider to permit inspection by, or provide copies to another health care practitioner who is licensed to care for the same condition as the health care provider and who has been so designated, in writing, by the patient.

In either event, the health care provider shall make a written record, to be included with the health records requested, noting the date of the request and explaining the health care provider's reason for refusing to permit inspection or provide copies thereof, including a description of the specific adverse or detrimental consequences to the patient which the provider anticipates would occur if inspection or copying were permitted.

In the event that the patient wishes to correct data, it shall be done as an amendment, without change to the original entry, and shall be clearly identified as an additional document appended to the original health record at the direction of the patient.

This document shall then be regarded as an integral part of the health record. Upon request of the patient, the provider will furnish copies of the amendment to any person to whom the disputed information has been properly released. Whenever health information is requested subsequent to the amendment, the copy sent shall include the amendment.

The provider will make these policies known to patients upon request.

Following authorized release of patient information, the signed authorization will be retained in the health record with notation of the specific information released, the date of release and the signature of the individual who released the information.

Release of Primary Records

All requests for health records or health information, including requests for information on patients currently under care, shall be directed to the health record department.

Release of information from the health record shall be carried out in accordance with all applicable legal, accrediting, and regulatory agency requirements, and in accordance with written institutional policy.

All information contained in the health record is confidential and the release of information will be closely

controlled. A properly completed and signed authorization is required for release of all health information except:

As required by law.
For release to another health care provider currently involved in the care of the patient.
For medical care evaluation, or
For research and education in accordance with conditions specified below.

In keeping with the tenet of informed consent, a properly completed and signed authorization to release patient information shall include at least the following data:

Name of institution that is to release the information
Name of the individual or institution that is to receive information
Patient's full name, address and date of birth
Purpose or need for information
Extent or nature of information to be released, with inclusive dates of care

(Note: An authorization specifying "any and all information…" shall not be honored).

Specific date, event or condition upon which authorization will expire unless revoked earlier

Statement that authorization can be revoked but not retroactive to the release of information made in good faith.

Date that consent is signed (Note: Date of signature must be later than the date of information to be released.), and

Signature of patient or legal representative (Note: In the case of care given to a minor without parental knowledge, the institution shall refrain from releasing the portion of the record relevant to this episode of care when responding to a request for information for which the signed authorization is that of the parent or guardian. An authorization by the minor shall be required in this instance.)

Information released to authorized individuals or agencies shall be strictly limited to that information required to fulfill the purpose stated on the authorization. Authorizations specifying "any and all information…" or other such broadly inclusive statements shall not be honored. Release of information that is not essential to the stated purpose of the request is specifically prohibited.

Following authorized release of patient information, the signed authorization will be retained in the health record with notation of the specific information released, the date of release and the signature of the individual who released the information.

Health records shall be available for use within the facility for direct patient care by all authorized personnel as specified by the chief executive officer and documented in a policy manual.

Direct access to health records for routine administrative functions, including billing, shall not be permitted, except where the employees are instructed in policies on confidentiality to penalties arising from violation.

Health records shall be available to authorized students enrolled in educational programs affiliated with the institution. Students must present proper identification and written permission of the instructor with their request. Data compiled in educational studies may not include patient identity or other information which could identify the patient.

Health records shall be made available for research to individuals who have obtained approval for their research projects from an institutional review board or appropriate chiropractic staff committee, administrator or other designated authority. Research projects which involve use of health records shall be conducted in accordance with institutional policies on the use of health records for research. Any research project which involves contact of the patient by the researcher must have written permission of the patient's attending doctor and/or by the chief executive officer of the facility or his/her designee, prior to contact. An institutional policy on use of medical records in research should guide these activities.

If facsimiles of health records are provided to authorized internal users, the same controls will be applied for return of these facsimiles as for return of the original health record. Wherever possible, internal users will be encouraged to use the original health record rather than to obtain a facsimile.

The names, addresses, dates of admission or discharge of patients shall not be released to the news media or commercial organization without the express written consent of the patient or his authorized agent.

Requests for health information received via telephone will require proper identification and verification to assure that the requesting party is entitled to receive such information. A record of the request and information released will be kept.

Principle 1D.

Limits of Chiropractic Care

The doctor of chiropractic shall attend to his/her patient as often as necessary according to his/her professional judgment to ensure the well-being of the patient and continued progress. However, a doctor of chiropractic shall scrupulously avoid unnecessary care.

The doctor of chiropractic shall neither exaggerate nor minimize the gravity of a patient's condition, nor offer any false hope or prognosis. It is also the doctor of chiropractic's duty to acquaint a close friend or relative of a patient who is incapable of caring for himself/herself with the patient's condition, the care being provided and the particular care needed by the patient.

Once committed to serving a patient, a doctor of chiropractic should not terminate his/her professional services without notice, allowing the patient reasonable time to obtain alternative professional services and giving the discharged patient all papers and documents as required by the Professional Code of Ethics.

Principle 1E.

Patient's Bill of Rights Within the Health Care Setting

A patient should expect and receive from doctors of chiropractic entrusted with the responsibility of delivering chiropractic care consideration of their basic rights as human beings to independence of expression, decisions and actions; and concerns and respect for their personal dignity at all times.

The following patient's rights are an integral part of the ICA Code of Professional Ethics and the patient should be advised of these rights by his/her doctor of chiropractic.

1. The patient has the right to impartial access to chiropractic care without regard to race; sex; cultural, national, or ethnic origins; economic, educational, religious, or political affiliation; and without having to disclose the source of payments for his/her care.

2. The patient has the right to be interviewed and examined in surroundings that permit reasonable visual and auditory privacy. Individuals not directly involved in his/her care will not be present without the patient's permission. The patient has the right to be advised of the presence of any individual during consultation and/or care and the reason of their presence.

3. The patient has the right to have a person of his/her sex present during certain physical examinations by a doctor of chiropractic of the opposite sex and the right not to remain disrobed any longer than is required for accomplishing the examination for which the patient was asked to disrobe.

4. The patient should know the identity and professional status of individual(s) providing service to him/her and to know who has the primary responsibility for coordinating his/her care. This includes the right to know the professional relationships among individuals who are caring for him/her as well as the relationship to any other health care or educational institution involved in his/her care.

5. The patient has the right to expect information from the doctor of chiropractic coordinating

his/her care concerning the diagnosis/analysis, prognosis and the planned course of care in terms that the patient is able to understand. When it is not clinically advisable to give such information to the patient, the information should be made available to a legally authorized representative of the patient.

6. The patient has the right to actively participate in any and all decisions regarding his/her care. To the extent permissible by applicable law, this will include the right to refuse care even after being informed of possible adverse consequences of his/her decision. When a patient or his/her legally authorized representative refuses procedures which prevent the doctor of chiropractic from providing care in accordance with professional standards, the relationship with the patient may be terminated upon reasonable notice.

7. The patient has the right not to be subjected to any procedure(s) without voluntary consent of the consent of his/her legally authorized representative. When alternatives to chiropractic care exist, the patient can be expected to be informed of these alternatives.

8. The patient has the right to expect confidential care of all communications and records pertaining to his/her care. The patient also has the right to have his/her health care record read only by individuals directly involved in his/her care or in monitoring of its quality and by other individuals only on the patient's written authorization or that of his/her legally authorized representative. Written permission shall be obtained before health care records are made available to anyone not directly concerned with the patient's care.

9. The patient has the right to leave or voluntarily be discharged from chiropractic care even against the best advice of the attending doctor of chiropractic.

10. A patient can expect reasonable continuity of care. He/she shall be informed in advance of the time(s) and location(s) of appointments as well as the name and capacity of the doctor of chiropractic/health practitioner who will be providing care.

11. A patient has the right to be advised if the doctor of chiropractic and/or other attending physicians or other concomitant health care personnel propose to engage in or otherwise perform human experimentation affecting his/her care. The patient has the privilege and right of refusing to participate in any research project. Participation by patient in clinical training programs or in the gathering of data for research purposes should always and everywhere be voluntary.

12. The patient has the right to be informed of continuing health care requirements following discharge from care in the out-patient or in-patient setting.

13. The patient has the right upon request to receive an itemized, detailed and thorough explanation of total charges billed for services rendered, regardless of the source of payment. The patient has the right to timely notice prior to termination of his/her eligibility for reimbursement by any third-party payor for the cost of his/her care.

14. The patient shall be advised of his/her rights and shall be instructed as to the rules and policies which apply to his/her conduct as a patient in the out-patient and/or in-patient setting.

15. The patient shall have all his/her rights also applied to the person or persons who may assume the legal responsibility to make decisions on the patient's behalf regarding the

care of the patient should the patient be a legal minor or otherwise incapacitated.

16. The patient has the right to expect reasonable safety insofar as the health care environment is concerned.

17. The patient at his/her own request and expense, has the right to consult with another health care practitioner.

Patient's Responsibilities

1. Provision of Information

A patient has the responsibility to provide, to the best of his/her ability and knowledge, accurate and complete information about present complaints, past illnesses, accidents, hospitalizations, medications, and other matters relating to his/her health. It is the patient's responsibility to report any new episode of trauma or any unexpected changes in his/her health condition to the practitioner. The patient is responsible for letting the doctor of chiropractic know if he/she does not fully comprehend the practitioner's contemplated course of care.

2. Compliance with Instructions

A patient is responsible for following the care plan recommended by the practitioner primarily responsible for his/her care. The patient is responsible for keeping appointments and, when unable to do so, for notifying the practitioner or his/her office.

3. Refusal of Care

The patient is responsible for the consequences if he/she refuses care or does not follow the practitioner's instructions.

4. Charges

The patient is responsible for assuring that the financial obligations of his/her health care are fulfilled as promptly as possible.

5. Office/Hospital Rules and Regulations

The patient is responsible for following office/hospital rules and regulations affecting patient care and conduct.

6. Respect and Consideration

The patient is responsible for being considerate of the rights of other patients. He/she is also responsible for being respectful of the property of other persons and of the offices and environment in which care is rendered.

Principle 1F.

Freedom of Choice

The doctor of chiropractic shall recognize the right of the patient to select his/her own method of health care. The doctor of chiropractic shall also respect the patient's right to change his/her choice of providers at will. This may be separate, concomitant or complementary to chiropractic care where cooperation with another provider may be required and concurrent procedures do not conflict.

The doctor of chiropractic should ensure that patients possess enough information to enable the patient to make an informed intelligent decision with regard to any proposed chiropractic care.

Principle 1G.

Consultation and Referral

In difficult or protracted cases, consultation(s) with other health care providers are recommended and advisable. Having requested the opinion, the doctor of chiropractic shall make available any relevant information and indicate clearly whether he/she wishes the colleague to continue care of the patient.

The doctor of chiropractic shall be ready to act upon a patient's expressed desire for a consultation with another doctor of chiropractic or provider even though he/she may not feel the need for consultation.

The doctor of chiropractic shall, when his/her opinion has been requested by a colleague, report in detail his/her findings and recommendations to the colleague and may outline his/her opinion to the patient. He/she will continue with the care of the patient only at the specific request of the attending doctor of chiropractic or health care provider, and with the consent of the patient.

The doctor of chiropractic shall make available at a patient's request a report of his/her findings and a description of his/her care of the patient.

Principle 1H.

Remuneration

The health and welfare of the patient should always be paramount and expectation of remuneration or lack thereof shall not in any way affect the quality of service rendered to the patient.

The doctor of chiropractic is entitled to receive proper and reasonable compensation for his/her professional services commensurate with the value of the services rendered compared to the fees commonly assessed in the community by other members of the profession based on usual and customary practices, experience, time, reputation, the nature of the patient's condition and the patient's ability to pay. The doctor of chiropractic should be prepared to discuss his/her fees with individual patients and should initiate discussion when fees are expected to exceed usual and customary charges.

The doctor of chiropractic should support proper activities designed to enable access to necessary chiropractic care on behalf of individuals who are unable to pay reasonable chiropractic fees or who are otherwise legally destitute.

Principle 1I.
Termination of Patients

Since patients have the right to dismiss providers at will for reasons satisfactory to themselves, likewise, a doctor of chiropractic may decline to attend to a patient if professional ethics and personal self-respect and dignity are compromised. The doctor of chiropractic is encouraged to terminate a doctor-patient relationship when it becomes reasonably clear that the patient is not benefiting from chiropractic care.

Having accepted a patient, a doctor of chiropractic shall give the patient the best chiropractic care possible within the confines of his or her expertise.

If a doctor of chiropractic decides to withdraw from a particular case, the patient or the patient's legal representative shall be given sufficient notice to enable him/her to obtain another health care provider.

Principle 1J.

Guarantees

The doctor of chiropractic shall not offer or guarantee a cure to any patient either verbally or in writing.

The doctor of chiropractic may give a patient a reasonable estimate regarding the length of time/number of visits that may be required to favorably address a particular condition, but he/she should scrupulously avoid protracted or unnecessary care without some favorable remission of the patient's complaint(s).

Principle 1K.

Practices or Questionable Propriety

The doctor of chiropractic shall avoid participating or assisting in all practices of questionable propriety either with his/her patients, colleagues, family or other business associates.

The doctor of chiropractic shall conduct his/her practice in surroundings which will not compromise the quality of patient care.

The doctor of chiropractic shall not initiate or otherwise knowingly participate in any illegal or fraudulent action. He/she should maintain the highest standards of professional conduct so the practice is above reproach.

The doctor of chiropractic shall not take physical, emotional, or financial advantage of the public or any patient he/she serves.

Principle 1L.
Diagnostic Procedures

The doctor of chiropractic shall recommend and use only those diagnostic and analytical procedures, laboratory and imaging techniques allowable by applicable state and/or provincial law that are in the best interests of the patient, will assist in the patient's diagnosis/analysis and care, and are necessary for the well-being of the patient. Furthermore, a doctor of chiropractic shall recognize his/her responsibility in advising patients of diagnostic/analytic findings and any attendant recommendations therefrom.

The doctor of chiropractic shall ensure that a patient is adequately prepared for examination and care and it suitably attired for such purposes.

Principle 1M.
Patient Benefits

The doctor of chiropractic shall be required to assist patients in securing any benefits due the patient by supplying the information required, if possible, in response to a patient's request for assistance.

When acting at the request of a third or other party, the doctor of chiropractic will ensure that the patient understands the doctor of chiropractic's legal responsibility before conducting any examination and/or care procedures.

Principle 1N.
Equality

The doctor of chiropractic shall render responsible chiropractic care to any and all individuals regardless of race; sex; cultural, national or ethnic origins; religion; political persuasions or ability to recompense.

Principle 1O.
Practice Aims

The doctor of chiropractic shall conduct his/her practice with courtesy, honesty, and a high-degree of professional competence in the proper care of the patients with due regard and respect for the patient's unequivocal rights and personal dignity.

The ultimate end is the greatest good of the patient.

2. DUTIES, OBLIGATIONS AND RESPONSIBILITIES OF THE DOCTOR OF CHIROPRACTIC TO THE PUBLIC

Principle 2A.
Demands Upon the Profession

The doctor of chiropractic shall recognize that, with respect to licensed professionals dedicated to the promotion of health, prevention of illness and alleviation of suffering, the public demands the highest standard of integrity and dedication from the practitioner and that the practitioner should act accordingly.

The doctor of chiropractic shall recognize that the practice of chiropractic shall recognize that the practice of chiropractic is a privilege and that he/she must merit and retain the respect of the public for this privilege.

The doctor of chiropractic who is also a public official, either elected or appointed, full or part-time, should not engage in activities which are, or may be perceived to be, in conflict with their professional duties.

Principle 2B.
Observance of Law and Codes

The doctor of chiropractic shall observe the appropriate laws, decisions and regulations of federal, state and local governmental agencies and cooperate with the pertinent activities and policies of associations legally authorized to regulate or assist in the regulation of the chiropractic profession. The doctor of chiropractic should be actively concerned with improvements in licensing procedures consistent with the development of the profession and of relevant advances in science.

The International Chiropractors Association holds that the best interest of both the public and the chiropractic profession are served by maintaining chiropractic as a separate and distinct, drugless, non-surgical alternative form of health care. To this end, it is the doctor of chiropractic's duty to provide chiropractic care. It is the responsibility of any licensed health care practitioner not to practice within the field of any other licensed health practitioner unless properly qualified by education, degree and licensing by proper respective authorities.

Principle 2C.
Participation in Community Affairs

The doctor of chiropractic shall be a responsible citizen and participate in the public affairs of his/her state and/or local community in order to improve law, administrative procedures and public policies that pertain to chiropractic and the health care delivery system.

The doctor of chiropractic shall be ready to take the initiative in the proposal and development of measures to benefit the general public health and well-being and should cooperate in the administration and enforcement of such measures and programs to the extent consistent with the law and with chiropractic principles.

Principle 2D.

Advertising

The doctor of chiropractic may advertise, but advertising should be accurate, truthful, and in good taste. Advertisements should not be misleading or deceptive and should accurately represent the doctor of chiropractic's professional status and area of special competence.

Advertising should not appeal primarily to an individual's anxiety or create unjustified expectations or claim cures or absolute results.

The doctor of chiropractic should conform to all applicable state laws, regulations and judicial decisions in connection with personal advertising.

The doctor of chiropractic should avoid advocacy of any product if he/she is identified as a member of the chiropractic profession, except in certain situations where advocacy of the product will reflect on chiropractic's health care specialty and is in the best interest of the consumers' health. Under no circumstances should advocacy of a product be undertaken to promote the doctor of chiropractic's personal practice.

Principle 2E.

Depositions

The doctor of chiropractic may testify either as an expert or when his/her patients are involved in legal proceedings, workers' compensation cases, or in other similar administrative proceedings in personal injury or related cases.

2. DUTIES, OBLIGATIONS AND RESPONSIBILITIES OF THE DOCTOR OF CHIROPRACTIC TO THE PROFESSION

The doctor of chiropractic shall maintain the integrity, competency and high standards of the chiropractic profession by continuously striving to improve his/her skills and competency by keeping abreast of current developments contained in chiropractic, health and scientific literature, and by participating in continuing chiropractic educational programs.

The doctor of chiropractic should, at all times, avoid the appearance of professional impropriety and should recognize that his/her behavior may have an impact on the profession's ability to serve the public. He/she should endeavor to promote the public's confidence in the chiropractic profession.

The doctor of chiropractic shall avoid impugning the reputation of his/her colleagues.

The doctor of chiropractic shall promote and maintain cordial relationships with other members of his/her profession and other professions for the exchange of information advantageous to the public's health and well-being.

Principle 3A.

Contractual Agreements

The doctor of chiropractic shall, when aligning himself/herself in practice with other doctors of chiropractic, insist that they maintain the standards enunciated in this Code of Professional Ethics and the provisions of their respective Chiropractic Act.

The doctor of chiropractic shall enter into a contract with an organization only if it will allow him/her to maintain his/her professional integrity.

Principle 3B.

Research and Study

The doctor of chiropractic shall recognize that he/she has a responsibility to the profession and the public when interpreting scientific knowledge for the public. He/she should do so objectively and not be guided by personal philosophy or personal aggrandizement.

VI. Statements of Official ICA Policy

Over the many decades of the existence of the International Chiropractors Association, the organization's Board of Directors has felt it necessary to present statements of official policy on issues of concern to the science, practice and administration of chiropractic. The following position statements represent the official consensus of ICA's Board of Directors and present the organization's official public position on a wide variety of issues.

ICA POLICY STATEMENT ON
Professional Impairment Through Substance Abuse

The impairment of a doctor of chiropractic through chemical dependence (drug or alcohol) represents a potentially serious threat to the delivery of quality care and to public confidence in the chiropractic profession at large. ICA holds that it is the responsibility of doctors of chiropractic suffering from such conditions to seek appropriate professional help for reasons of personal health and professional reliability. Furthermore, the ICA holds that ethical professional peers should make every effort to assist doctors of chiropractic who are known to them to be impaired through chemical dependency to obtain appropriate professional help in confidence and with dignity.

ICA POLICY STATEMENT ON
Spinal Adjustment and Spinal Manipulation

The ICA holds that the chiropractic spinal adjustment is unique and singular to the chiropractic profession. The chiropractic adjustment shall be defined as a specific directional thrust that sets a vertebra into motion with the intent to improve or correct vertebral malposition or to improve its juxtaposition segmentally in relationship to its articular mates thus reducing or correcting the neuroforaminal/neural canal encroachment factors inherent in the chiropractic vertebral subluxation complex.

The adjustment is characterized by a specific thrust applied to the vertebra utilizing parts of the vertebra and contiguous structures as levers to directionally correct articular malposition. Adjustment shall be differentiated from spinal manipulation in that the adjustment can only be applied to a vertebral malposition with the express intent to improve or correct the subluxation, whereas any joint, subluxated or not, may be manipulated to mobilize the joint or to put the joint through its range of motion.

Chiropractic is a specialized field in the healing arts, and by prior rights, the spinal adjustment is distinct and singular to the chiropractic profession.

ICA POLICY STATEMENT ON *Animal Adjusting*

Animal adjusting can, in many situations, be an effective and humane service. Many doctors of chiropractic, through their own experiences, testify as to the beneficial results of adjustments and as D.D. Palmer stated, chiropractic care applies to “all vertebra”. The chiropractic adjustment of subluxations in animals applies to their ills in the same nature as humans. Recognizing the above considerations, the ICA recommends that such services should be provided by chiropractors in accordance with existing regulations.

ICA POLICY STATEMENT ON *Child Care*

The International Chiropractic Association recognizes that infants suffer many birth traumas including traction, rotation and lateral flexion of the head relative to the thorax. With the use of forceps, such forces can be extreme (Towbin, 1969, Developmental Child Neurology). Forces of traction, rotation and lateral flexion, etc. sustained by the cervical spine when the skull is used as a lever during delivery, have been shown to subluxate the atlanto-occipital and atlanto-axial joints (Gutmann, G., 1987, *Manuelle Medizin*).

It is also recognized that day-in, day-out trauma is a continual part of childhood life which can create spinal misalignment and aberrant motor function.

Asymmetrical development is extremely rare in fetuses (Farfan, 1973), but is actually a developmental process of growth due to asymmetrical stresses on growing tissues. Abnormal posture and spinal misalignment cause abnormal stresses, strains, compression, tension, etc., on vertebral structures, para-spinal tissues, the pelvis and lower extremities during development which may lead to permanent structural change and spinal malformation, e.g., scoliosis. The ICA recommends the earliest possible evaluation, detection and correction of chiropractic lesions (subluxation) in children, especially infants, to maximize the potential for normal growth and development.

ICA POLICY STATEMENT ON *Political Organization Membership and Post Graduate Credentialing*

The International Chiropractors Association holds that is inappropriate to require initial membership, and/or continued membership in a political organization to receive, hold, or maintain a postgraduate specialty certification or diplomate in chiropractic.

It is not in the best interest of the D.C., the profession as a whole, nor the public we serve to hold forth the necessity of such political affiliation.

ICA POLICY STATEMENT ON
Surface Electrode Paraspinal Electromyography (EMG)

The ICA acknowledges that analysis of the vertebral subluxation and its effects on the human body is paramount to chiropractic practice. The ICA acknowledges that surface EMG studies are a part of the practice of chiropractic when used to evaluate the muscular changes associated with the vertebral subluxation complex. Surface electrode paraspinal electromyography (EMG) is a non-invasive diagnostic technique used to measure the electrical activity in the muscles surrounding the spine. Such information may be presented as numerical values, or used to create an image.

Protocols and normative data for paraspinal EMG scanning in chiropractic practice have been published in refereed, peer-reviewed journals. Furthermore, courses in the use of paraspinal EMG scanning have been offered and are being offered under the aegis of CCE accredited chiropractic colleges.

ICA POLICY STATEMENT ON
Fluoridation

The countries of the world are facing an increasingly complex and serious problem with respect to the delivery of pure drinking water to their citizens. The addition of any medication or substance to public drinking water constitutes a form of mass medication.

The proponents of artificial water fluoridation have not proven it to be safe and/or without possible cause of future bodily harm.

The International Chiropractors Association considers public water fluoridation to be possibly harmful and a deprivation of the rights of citizens to be free from unwelcome mass medication. The ICA is opposed to the addition of fluoride in any of its forms of drinking water supplies of our nation’s cities and municipalities.

ICA POLICY STATEMENT ON
Open Access to Chiropractic Licensure

The International Chiropractors Association supports the principle of free and open licensure for qualified candidates in all states and jurisdictions. Furthermore, the ICA holds that any licensing authority which restricts access to licensure for qualified graduates for political reasons or restricts competition in a state or jurisdictions is in violation of the public trust and is engaging in grossly unfair behavior at the expense of the consumer and the chiropractic profession.

ICA POLICY STATEMENT ON
Low-Force Adjustive Techniques

The International Chiropractors Association recognizes chiropractic techniques that utilize low-force adjustments and soft tissue contacts to achieve correction of the varied components of the subluxation complex. Such techniques, when utilized in attempts to reduce and stabilize biomechanical lesions through alteration of the biodynamics of the musculoskeletal system, are recognized as part of chiropractic practice.

ICA POLICY STATEMENT ON
"Manipulation" Under Anesthesia

The International Chiropractors Association holds that within the armamentarium of chiropractic techniques efficient methods exist that address the pain profiles of even the most sensitive patient.

Furthermore, the chiropractic adjustment relies on the body's own inherent constructive survival mechanisms to innately accomplish adjustic correction.

In light of the above considerations, the International Chiropractors Association holds that anesthesia is inappropriate and unnecessary to the deliverance of a chiropractic adjustment.

ICA POLICY STATEMENT ON
The Multi-Disciplinary Practice

The International Chiropractors Association recognizes that doctors of chiropractic may employ or be employed by other licensed professionals, but that the establishment of such relationships solely for the purpose of insurance or other payment raises serious ethical questions.

ICA POLICY STATEMENT ON
Pre-Chiropractic College Undergraduate Degree Requirements

The International Chiropractors Association strongly opposes state regulations, statutes or criteria for licensure that impose a bachelor's degree requirement prior to entry into a chiropractic professional program. ICA views the establishment of such a requirement as unnecessary, inconsistent with the requirements for licensure in other professions and discriminatory. Such pre-matriculation degree requirements create a class of citizens that will permanently be barred from licensure. ICA also views such artificial and arbitrary barriers to licensure as raising serious legal issues, and to be contrary to both the public's and the chiropractic profession's best interest.

ICA POLICY STATEMENT ON
Questionable Qualifier Terms

While encouraging chiropractic postgraduate education and chiropractic diplomate programs, the International Chiropractors Association holds that Diplomate Programs are not chiropractic specialties and qualifier terms used in conjunction with the title Chiropractor or the term Chiropractic that imply specialization or skill in another health care field is inappropriate. Such usage serves to confuse the public's perception of chiropractic and is not in the public's and the profession's best interest.

ICA POLICY STATEMENT ON
Unethical Patient Recruitment

The International Chiropractors Association recognizes that in the highly competitive modern health economy, the Doctor of Chiropractic often must engage in public education, various methods of practice promotion and, perhaps, advertising to establish and maintain a viable practice. The ICA further recognizes that this process is a difficult and challenging one. The difficulty of the marketing task, however, does not absolve the Doctor of Chiropractic from maintaining the highest ethical and professional standards in the marketing process.

The International Chiropractors Association holds that the enticement of potential patients into any chiropractic clinic or office on the basis of the assertion or representation to the potential patient that research will or is being conducted, at no charge to that subject patient, is inherently suspect. The ICA further holds that attempts to convert such “research subjects” into paying patients, either via self-payment or through third-party payers, represents unethical behavior contrary to the interests of the consumer, the chiropractic profession and the insurance system.

The ICA recognizes the danger such schemes hold for the chiropractic profession at large and the damage these unethical and repugnant activities can and will do to public perception of the integrity and reliability of the chiropractic profession as a whole.

The ICA encourages appropriate authorities to carefully examine patient recruitment schemes that contain the elements of deception and misrepresentation embodies in such research-practice promotion schemes, and take such action as is appropriate to protect the public.

ICA POLICY STATEMENT ON
Referral

The unique, non-duplicative role of the Doctor of Chiropractic as a primary health care provider is a product of the system of chiropractic education and the licensing and regulatory authority of the states. The primary obligation of Doctors of Chiropractic is to provide the highest quality of care to each patient within the confines of their education and their legal authority. It is the position of the International Chiropractors Association that this primary obligation includes recognizing when the limits of skill and authority are reached. At that point, it is the ICA’s position that doctors in all fields of practice are ethically and morally bound to make patient referrals to practitioners in other fields of healing when such referrals are necessary to provide the highest quality of patient care. This interchange of professional referrals includes, but should not be limited to, doctors of medicine, osteopathy and chiropractic.

Doctors of Chiropractic are also obligated to receive referrals from other health care providers, applying to those patients the same considerations for quality and appropriateness of care as with any other patient. It is the position of the ICA that the professional obligation to the patient includes honest, full and straightforward communication with the referring provider on the issue of optimal patient care.

ICA POLICY STATEMENT ON
The Right to Practice Chiropractic

The International Chiropractors Association has been alerted to attempts within healing arts institutions to train health care providers other than chiropractors to deliver chiropractic vertebral adjustments. Such efforts jeopardize the boundaries between the healing arts professions. Competent expertise cannot be gained through such “short” courses and they pose a danger to the health care consumer. The International Chiropractors Association holds that the only person legally allowed to provide chiropractic care should be one who has graduated with a Doctor of Chiropractic degree granted by a Council on Chiropractic Education accredited chiropractic institution or equivalent and who has passed the Boards required for licensure in the jurisdiction in which he/she practices. The International Chiropractors Association holds that no institution or entity should purport to prepare a practitioner to deliver the chiropractic adjustment without filling the above-stated requirement.

ICA POLICY STATEMENT ON
ICA Position on “Specialties”

The International Chiropractors Association (ICA) is a professional organization dedicated to advancing the chiropractic profession and representing and promoting the interests of doctors of chiropractic and the patients they serve through advocacy, research and education. ICA's mission is to move the profession forward while preserving chiropractic's unique identity as a separate, distinct and drugless health care profession.

The International Chiropractors Association does not endorse or recognize any post-graduate educational program or certification as a formal specialty as the term applies routinely in other doctoral level health professions. ICA understands that no profession-wide consensus exists regarding postgraduate education and credentials and that no recognized accrediting body presently offers such status. ICA offers through its system of postgraduate councils several educational programs in numerous areas of study. The objective of these programs is to enhance the knowledge and clinical skills of chiropractic practitioners. ICA recognizes that many options exist in postgraduate education and encourages all doctors of chiropractic to participate in substantive programs to maintain familiarity with trends and developments, to maintain professional informational exchanges, and to enhance clinical skills.

The Postgraduate Councils of the International Chiropractors Association meet the constitutional requirements of the ICA to foster the professional and technical development of the doctor of chiropractic and maximize the personal and professional fulfillment of the chiropractor within the traditional principles and values of chiropractic.

Council membership is open to all licensed doctors of chiropractic regardless of their affiliation with ICA. Doctors of chiropractic who are not Council members may also enroll in the diplomate/certification educational programs. However, to obtain diplomate or certification status and to maintain that status, doctors must be members of that Council and fulfill the requirements for continued postgraduate education as set forth in the Council bylaws.

The ICA publishes a *Membership Referral Directory of Councils*. All diplomates listed in this *Directory* have completed the 3-year, 300+ hours of postgraduate classroom instruction through a CCE-accredited institution and passed the Council's Board Examination. Fellows have achieved their status with additional postgraduate teaching and research/publishing requirements as well as other significant voluntary efforts for the chiropractic profession.

The International Chiropractors Association holds that clear and concise communication to the public regarding health care is both vital and critical. Further, the public needs to clearly understand the skills, talents, and competencies each member of the health care community brings to their benefit. Professional titles and identifiers can be confusing to the public. Health care professionals of all kinds must take whatever steps are necessary to accurately identify themselves to the public, avoid misrepresentation and reduce confusion wherever possible. It is in this spirit that the International Chiropractors Association is opposed to the use of terms such as "chiropractic physician" or "chiropractic sports physician" or "chiropractic medicine". The ICA perceives that the public, the chiropractic profession and the medical profession are all well served by the avoidance of the use of such terms.

ICA POLICY STATEMENT ON *Spinal Sprain and Strain Injuries*

Inherent in most spinal sprain and strain injuries, there exists a biomechanical neurological component of articular malposition referred to chiropractically as subluxation. Such subluxation, if not addressed and merely treated with soft tissue therapeutics and/or joint immobilization forms of care may lead to joint fixation and/or instability and loss of motor unity integrity.

It is the opinion of the International Chiropractors Association that in such injuries evidence of the chiropractic vertebral subluxation complex should be analyzed and, if present, be corrected by specific chiropractic articular adjustment before immobilization procedures are applied. Lack of such correction of articular misalignment (subluxation) may result in permanent impairment, for waiting more than an hour, much less days, may lead to joint fixation, motion impairment, neurological insult and/or hypermobility of the intervertebral motor unit. Adjustive reduction of the articular subluxation must be accomplished with due regard to soft tissue injury, attempt to enhance recovery and contribute to the prevention of future joint motion impairment, neurological impairment and deteriorative pathological consequences.

ICA POLICY STATEMENT ON
The Use of Anabolic Steroids

The use of anabolic steroids presents a serious health hazard to athletes of all age groups. The use of such growth and performance drugs is rapidly on the rise in all forms of sports. The easy availability of such drugs from illegal sources is increasing to feed a growing demand.

The International Chiropractors Association recognizes the hazards presented by the illegal distribution and use of anabolic steroids and other related drugs and strongly encourages doctors of chiropractic to incorporate factual information on this problem, as appropriate, in patient and community education programs.

The ICA supports strong legislation to deter the distribution and use of these substances and urges a vigorous program of education be undertaken by public health authorities. The ICA pledges to do all it can as a responsible professional society, to educate the public both to the damages of steroid use and to the benefits of drug-free athletic competition.

ICA POLICY STATEMENT ON
Subluxation as an Acceptable Primary Diagnosis

Subluxation is a responsible and credible diagnosis for the doctor of chiropractic and this condition should be recognized and reimbursed as a primary diagnosis by all third-party payment organizations, both public and private.

The analytical/diagnostic determination of a subluxation indicates the need for chiropractic care.

ICA POLICY STATEMENT ON
Immunization and Vaccination

The International Chiropractors Association recognizes that the use of vaccines is not without risk and questions the wisdom of mass vaccination programs. Chiropractic principles favor the enhancement of natural immunity over artificial immunization.

The ICA supports each individual’s right to select his or her own health care and to be made aware of the possible adverse effects of vaccines upon a human body. In accordance with such principles and based upon the individual’s right to freedom of choice, the ICA is opposed to compulsory programs which infringe upon such rights.

The International Chiropractors Association is supportive of a conscience clause or waiver in compulsory vaccination laws, providing an elective course of action for all regarding immunization, thereby allowing patients freedom of choice in matters affecting their bodies and health.

ICA POLICY STATEMENT ON
Videofluoroscopy

Definition: Videoflouroscopy, Dynamic Spinal Visualization or Cineradiography is the specific, chiropractic, radiographic procedure, study, and interpretation of the dynamics and kinetic properties of the spinal column and its immediate articulations.

The International Chiropractors Association holds that videoflouroscopy, also known as cineradiography or dynamic spinal visualization, is a technology that is especially useful in the observation, determination and classification of kinetic irregularity as seen in the vertebral subluxation complex. A significant body of valid scientific literature has been found to support this conclusion.

The International Chiropractors Association officially recognizes videoflouroscopy to be an acceptable part of chiropractic care for the Doctor of Chiropractic who is trained in this procedure.

VII. REFERENCES

Cherkin DC, Mootz, RD. Chiropractic in The United States; Training, Practice and Research. *AHCPR Publication No. 98-N002*, December 1997

Christensen M, Morgan D (eds). *Job Analysis of Chiropractic: A Project Report, Survey, Analysis and Summary of the Practice of Chiropractic within the United States*. Greeley, CO: National Board of Chiropractic Examiners, 1993.

Council on Chiropractic Education Biennial Report, Feb. 94-Jan 96. Scottsdale, AZ: Council on Chiropractic Education, 1996.

Educational Standards for Chiropractic Colleges. Scottsdale, AZ: Council on Chiropractic Education, 1997.

Hendrickson RM. *The Legal Establishment of Chiropractic*, Arlington, VA: International Chiropractors Association,1992.

International Chiropractors Association Code of Professional Ethics, 4th Edition, l998.

Lamm LC, Wegner E, Collard D. Chiropractic Scope of Practice: What the Law Allows Update 1993. *J Manip Physiol Ther* 1995; 18:16-20.

Williams SE *The Science and Practice of Chiropractic in the United States.* Arlington, VA: International Chiropractors Association, 1991.

NOTE: Each quotation from state law in the body of this chapter is followed by the appropriate source information. Those references are not, therefore, included in this summary.

CHAPTER 2

BASIC ESSENTIAL CARE

Chapter Outline

I. Overview

II. Literature Review

III. List of Subtopics

IV. References

I. OVERVIEW

The doctor of chiropractic is a primary care, direct access, first professional degree level provider who serves as a portal-of-entry into the health care system. ICA understands the term primary care provider to be defined as: Any health care provider capable of providing first level contact and intake into the health delivery system, any health care provider licensed to receive patient contact in the absence of physician referral. All laws and regulations in the United States allow any citizen to seek the services of the doctor of chiropractic without referral from any other provider. Individuals are free to seek basic essential care on the same individual initiative basis that applies to other direct access providers.

Only the doctor of chiropractic is professionally competent to evaluate the chiropractic needs of a patient and to determine the level of service appropriate to meet those needs.

Chiropractic intervention is indicated in all instances where the objective and/or subjective presence of subluxation can be demonstrated and/or in a setting of routine checkups. Patient needs must be individually determined on the basis of recognized procedures, but the issue of clinical necessity of providing adjustive care shall be based on the presence of subluxation, and/or other structural misarticulations, which may or may not have yet manifested subjective symptoms.

The International Chiropractors Association recognizes subluxation as an acceptable primary diagnosis, and includes the following official policy statement in their body of formally adopted position statements:

> *Subluxation is a responsible and credible diagnosis for the doctor of chiropractic and this condition should be recognized and reimbursed as a primary diagnosis by all third-party payment organizations, both public and private.*
>
> *The analytical/diagnostic determination of a subluxation indicates the need for chiropractic care.*

Chiropractic understands that illness, dysfunction (lack of wellness), etc., is the product of the body's inability to maintain itself or to successfully adapt to its environmental circumstances. While recognizing that illness has multiple origins, chiropractic science holds that under normal circumstances, the self-healing powers of the body will be sufficient to deal with illness or dysfunction. The doctor of chiropractic's duty is to assist the body in this process, and to remove as many barriers as possible to self-healing.

Chiropractic perceives the correction of subluxation at the earliest possible moment as the most basic, essential responsibility of the doctor of chiropractic. The adjustment of the subluxation(s) determined to be present is held by the chiropractic profession to be the unique, fundamental intervention chiropractic has to offer.

II LITERATURE REVIEW

From the very beginning, the chiropractic model of health has had as its foundation the maxim that a human being is an ecologically and biologically unified organism. The relationship between a patient's internal and external environment must be understood. A major chiropractic premise is that the inherent recuperative power of the body aids restoration and maintenance of health. These assumptions comprise a wellness paradigm embraced by the great majority of the chiropractic profession.

A. The Objective Determination of Subluxation

The chiropractic literature specifically addresses the means of objectively identifying the presence of vertebral subluxation(s), apart from subjective patient complaints and/or symptoms. Such reproducible, reliable procedures are the cornerstone of chiropractic practice. A detailed review of instrumentation, imaging, and other procedures is presented in later chapters. It is essential to note here and refer the reader to those detailed discussions later in this work; as such objective indicators are the foundation for the clinical merit of basic essential care.

Strong consensus as to acceptable objective procedures has emerged and such procedures have been incorporated into chiropractic education, authorizing legislation and routine chiropractic practice. Kent, Grostic, et al conducted a consensus study employing a variety of sound procedures that identified the following procedures as, "having progressed beyond the experimental stage, and are acceptable procedures for general clinical practice." Those procedures were:

a. Palpation (static and motion).
b. Postural analysis.
c. Orthopedic and neurological examination.
d. X-ray spinography.
e. Video fluoroscopy.
f. Computed tomography.
g. Magnetic resonance imaging.
h. Skin temperature differential analysis, including thermography.
i. Paraspinal EMG scanning.

Of the procedures identified by Kent and Grostic, six represent imaging or instrumentation procedures that are extensively addressed in Chapter 13, Diagnostic Imaging and Chapter 14, Instrumentation. Those chapters should be consulted regarding the contribution those procedures make towards the objective determination of the presence of subluxation.

Of the non-imaging and instrumentation procedures routinely employed by doctors of chiropractic, palpation is perhaps the primary procedure most universally applied. Indeed, Hass and Panzer state: *The hands are the primary tools of the chiropractic and are of utmost importance in identifying subluxation.*

Faye and Wiles define palpation as:

> *...the use of the tactile senses to determine variations in tissue consistence to recognize whether these variations are normal or abnormal. During palpation, the practitioner senses variations in temperature, shape and contour, textures, resistance, and motion. Palpation is usually conducted with a light, medium, or deep touch, using the pads of the fingertips...There are two basic classifications of manual palpation, static and dynamic.*

Palpation provides the doctor of chiropractic with unique information about the state of the patient and the relationship of the various spinal segments in the patient. Bryner and Bruin found that chiropractic colleges responding to their survey utilize palpation in basic diagnostic instruction, with an emphasis by those responding on motion palpation and joint play assessment.

Palpation has been a key element in the chiropractic examination process from its very beginnings. D.D. Palmer and Dr. B.J. Palmer both wrote extensively on palpation and co-developed a variety of techniques, including nerve tracing, static and motion forms of palpation.

An abundance of chiropractic texts exist which provide extensive and detailed procedural guides to palpation. Haldeman, et al, Faye and Schafer, Gillet and Schafer provide extensive discussions of palpation procedures and articles numbering in the hundreds have been published on various aspects of palpation and the subluxation.

Akin to palpation, range of motion studies provide the doctor of chiropractic with important information about the state of a patient from individual testing and observation. Meeker writes, *Assessing the range of limb and trunk motion is still considered to be one of the most objective ways to judge disability of the motor system and is a standard part of the chiropractor's diagnostic procedures.* Blunt, Gatterman and Bereznick offer a highly detailed discussion of mobility in the human spine and attempt to quantify ranges of normal for the various segments of the spine. In their analysis, *the characteristics and analysis of normal dynamic regional and inter-segmental motion are explored to understand a deviance from these patterns that characterizes the abnormal motion of a subluxation complex. A continuum of abnormal motion is described, from hypomobility to hypermobility and instability.* Blunt, et al note that, *...the literature spawns a wide range of techniques used to evaluate and describe ranges of motion.* The utility and validity of all such procedures is related to the degree to which such procedures allow the patient's status to be quantified and measured, and the validity of the scales of normal and abnormal against which an individual patient's findings are compared. There is consensus, however, regarding the importance of range of motion studies in gathering subluxation related information and such procedures continue to commend themselves to chiropractic practice because of the objective nature of findings.

Muscle testing is also routinely employed in chiropractic practice as a basis for gathering objective indications regarding the status of patients. Meeker writes, *Assessment of muscle function for strength and quality of contraction is a standard test of the motor system. Manual muscle testing is popular and, indeed, forms the basis of several techniques used by chiropractors.* In the general healthcare literature (Mayer and Gatchel, 1988) muscle weakness is related to a number of complaints and dysfunctions. In recent years, the development of sophisticated muscle testing equipment, including computerized muscle testing equipment, has changed the status of these procedures somewhat from individual evaluations done by the DC to measures that fall into the category of instrumentation. A fuller discussion of such computerized muscle testing activities is found in Chapter 16.

Subsequent chapters provide detailed discussions of the standard as well as the developmental means of determining the presence of subluxation by objective means. Those chapters should be consulted for detailed information of the various procedures employed. The essential point necessary to the discussion here is that a wide range of accepted, accurate means of determining the presence of subluxation have been developed and that strong consensus exists within the chiropractic profession as to what those means are and how and when they should be applied.

B. The Progressive Nature of Spinal Subluxation

Behavior such as physical and emotional stress, tension, chemical/environmental stressors, repetitive motion, over-extension of spinal tissues and/or characteristics such as posture, weight, or even footwear can establish patterns of progressive subluxation that lead to the degeneration of spinal segments . As well, injury, periods of confined inactivity or immobilization such as a long hospital stay, and congenital structural problems may give rise to subluxation.

There is growing consensus in the chiropractic profession that inter-vertebral subluxation occurs as a result of numerous postural and traumatic insults, initially creating segmental dysfunction with its motion disturbance and inflammatory and ischemic sequelae, and subsequently results in: 1. JOINT INSTABILITY, 2. SPINAL DEGENERATION, and 3. ABNORMAL STABILIZATION, as the final attempt by the body to ameliorate the spinal lesion.

Attempts have been made to quantify the degeneration process and terms such as "phase of subluxation degeneration" have been commonly used to identify the progressive stages of the subluxation lesion, although there is no single, universally agreed upon description of subluxation phases operative in the profession at this time. The terms "subluxation" and "vertebral subluxation complex" are, however, universally employed to describe the subluxation lesion, regardless of stage or point of progression.

A three-phase model of subluxation generation has been developed by numerous sources. Sandoz, Leach and Gibson have extensively developed this approach to classifying the degeneration process. According to this approach, since the vertebral subluxation complex (VSC) is associated with pathophysiological sequelae of the correctable lesion regardless of the phase or stage of degeneration with which it has been associated, the three-phase model will be utilized in these discussions.

Sandoz may have articulated the natural history of the vertebral subluxation complex more thoroughly than any other chiropractic theorist in his paper "The Natural History of a Spinal Degenerative Lesion."

According to the Sandoz Model, Phase 3 is associated with episodic fixations. A vertebral fixation occurs when a vertebra becomes temporarily immobilized in a position that it may occupy during any phase of physiological spinal movement.

The final stage of spinal dysfunction is termed VSC Phase 3: this is phase of stabilization, of fixation to the point of frank immobilization, and the final phase of repair. This phase is characterized by signs of advanced degenerative joint disease such as ossification of the longitudinal ligaments, formation of uncovertebral arthrosis and, in the most advanced cases, vertebral ankylosis.

Since hypermobility is such a central and perhaps more commonly recognized component of spinal dysfunction, a brief review of scientific literature regarding the role of immobilization in promoting spinal dysfunction and degeneration will be helpful to our discussion of the phases of the Vertebral Subluxation Complex.

Muscular atrophy following immobilization has been extensively investigated. In addition to functional, structural and biochemical properties of immobilization, Appell has discussed oxygen supply and use, connective tissue changes and recovery from immobilization. These sorts of studies, including the postmortem examinations of Hadley and others, show that the earliest phase of Vertebral Subluxation Complex (Spinal Dysfunction with its primary characteristic of restricted joint mobility) can create not only the second phase of VSC--the instability often associated with the radiographically demonstrable intervertebral subluxation—but also lead to the stabilizing and immobilizing final phase of VSC--the response referred to as osteo-arthrosis or degenerative joint disease to the point of vertebral ankylosis.

In human research, the role of immobilization in promoting osteoarthritis and impeding healing is well established. Immobilization promotes thickening of the joint capsule and results in increased capsular tension, compression of articular cartilage, subsequent disturbance of chondrocyte metabolism, fibrillation, depletion of glycosaminoglycans and finally, arthritic changes to the joint. Pain can trigger the immobilization and can result from the arthritic changes as well, thus completing a deleterious cycle.

A few examples of acceptable chiropractic diagnoses using the unified model for phases of vertebral subluxation complex follow:

1. VSC PHASE 1 LESION: C2/C3 Spinal Dysfunction with right rotation, restriction, and cervicogenic headache.

2. VSC PHASE 2 LESION: Grade 2 Spondylolisthesis of L5 (Unstable on flexion of the trunk) with mild degenerative joint disease at L5/S1 (explain particulars of degenerative joint disease in a separate radiology report) and sciatic neuritis.

3. VSC PHASE 3 LESION: C5/C6 Spondylosis (explain particulars of degenerative joint disease in a separate radiology report) with right lateral bending restriction and cervicalgia.

A three-phase model for the progression of the vertebral subluxation complex (VSC), based upon a synthesis of the literature, includes: VSC Phase 1, the phase of spinal dysfunction; VSC Phase 2, the phase of instability; and VSC Phase 3, the final phase of abnormal stabilization. Research on immobilization degeneration, in addition to other biomedical research, lends strong support for this model to predict progression of spinal degenerative lesions.

Spinal degeneration and its reversibility has been the subject of considerable scientific debate. O.J. Ressel, based on a comprehensive review of 329 published references and a series of detailed case studies, concluded that chiropractic intervention not only halted spinal osteoarthritis, but also reversed the deterioration process by measurable levels. Conversely, individuals who exercise in a manner that puts the spine through a full range of motion on a periodic basis, develop the supporting muscles of the vertebrae and foster strong circulation, and promote spinal health through such activities.

The incidence of spinal degenerative disease is well established. Tencer, et al, stated that osteoarthritis is detectable in 35 percent of the U.S. population by age 30 and Lawrence stated that ten percent of all individuals in the U.S. between the ages of 14 and 24 had roentgeno-graphically identifiable osteoarthritis. Numerous studies have also indicated that spinal degeneration plagues men and women equally and Anderson, Buerger, et al have indicated that osteoarthritis is not influenced by climatic, geographic or ethnic considerations. Spinal degeneration is demonstrably a near-universal condition.

The erosion of spinal tissues is seen by some as simply a natural and predictable manifestation of the aging process. Indeed, the nearly universal incidence of spinal degeneration is powerful evidence that this is a plausible assertion. The response of spinal tissues to the chiropractic adjustment, as demonstrated by Ressel, indicates that the process of spinal degeneration is not an unstoppable process and that chiropractic adjustments revivify the spinal tissues through the restoration of normal nerve function as well as stimulate biochemical changes that enhance the performance of spinal tissues.

The relationship between neurological deficit-related spinal degeneration and the subluxation represent one of the most exciting research frontiers of human health. Likewise the health implications of the chiropractic adjustment, which works to eliminate such neurological deficits and conditions caused thereby, are already well established, but require massive new research if the precise mechanisms of the healing process are to be fully understood.

Spinal degeneration associated with the subluxation complex has been well documented and much written about. Erhardt demonstrated in great detail the progression of the untreated subluxation via x-ray. Lantz, Harrison, Junghanns, and Eisenstein, likewise have shown the progressive nature of the subluxation. Such evidence indicates the high clinical utility of early chiropractic intervention, regardless of the presence of subjective symptoms.

The degenerative nature of the subluxation has been widely described in terms of phases. Commonly, four phases of subluxation degeneration are recognized and have been widely described in the literature. As well, these four phases correspond to x-ray findings and can be demonstrated clearly via diagnostic imaging.

Four-Phase Definition of Subluxation

While not in conflict in any way with the three-phase model of subluxation, some researchers and practitioners have elected to utilize a four-phase approach to describing the degenerative progression of the subluxation. This model is, however, frequently used in interpreting radiological findings.

In this approach, a “Near Normal” spine is presented as a model or baseline. This concept has been defined as follows:

Near Normal: Prior to the emergence of any phase of subluxation degeneration, a patient who is in a state of basic effective functioning can be characterized as near normal. Such patients present with an absence of significant or outstanding clinical indicators and functions within normal limits.

PHASE I - SUBLUXATION
no radiographic degenerative changes
mild aberrant motion
mild muscle involvement
mild local tissue inflammation
mild biochemical changes/pathology
mild soft tissue degradation
mild neurological involvement

PHASE II - SUBLUXATION
mild to moderate radiographic degenerative changes
mild to moderate aberrant motion
mild to moderate muscle involvement
mild to moderate local tissue inflammation
mild to moderate biochemical changes/pathology
mild to moderate soft tissue degradation
mild to moderate neurological involvement

PHASE III SUBLUXATION
Moderate radiographic degenerative changes
Moderate aberrant motion
Moderate muscle involvement
Moderate local tissue inflammation
Moderate biochemical changes/pathology
Moderate soft tissue degradation
Moderate neurological involvement

PHASE IV - SUBLUXATION
severe radiographic degenerative changes
severe aberrant motion
severe muscle involvement
severe local tissue inflammation
severe biochemical changes/pathology
severe soft tissue degradation
severe neurological involvement

C. Early Detection, Early Intervention and "Wellness"

Enhanced public awareness of environmental, psychosocial, and physiological issues through education and community action has forced early detection/early intervention into the public health agenda as a significant new priority. Smoking cessation, weight control, nutritional considerations, stress reductions, advice about exposure to environmental pollutants and education in respect to the potential dangers of over-the-counter drugs are examples of initiatives affecting the chiropractic patient population worldwide. However, the most important and vital preventive measure which has been severely neglected care the importance of which has been illustrated in this chapter is spinal health education and prevention services, best introduced during routine check ups. These guidelines hopefully will aid in rectifying this situation

Coile offers this historical input: "Thirty years ago, Rene Dubos, a research microbiologist, suggested in *Mirage of Health* that the advancements he and others had made in the development of antibiotics and therapeutics had less to do with the real health of populations than a variety of economic, social, nutritional, and behavioral factors. Five years later, the U.S. Surgeon General's landmark report clearly revealed the links between smoking and diseases such as emphysema, chronic bronchitis, hypertension, and lung cancer.

"A new awareness of the contribution of lifestyle, environment, and genetics infused medicine in the decade following. Sometimes called the 'wellness movement', this new orientation broadened the paradigm of traditional biomedicine. Since Dubos' essay on health, a body of research findings has accumulated that demonstrates the validity of a more comprehensive approach to health, one which recognizes the many antecedents and co-factors in the disease and healing process.

"Although not fully accepted by all physicians, the holistic concept of health is gaining stature. Dozens of studies by employers have begun to quantify the beneficial impact of health promotion programs in terms of reduced health care utilization and lower health care costs."

Long-term care concepts and considerations in chiropractic have been discussed by a number of authors. Jamison offers a comprehensive overview of the current trends in chiropractic, and worksheets for health care assessment. McDowell and Newell describe general health care indicators and instruments. Jamison reviews the improvement of basic health status by alteration of behavior, especially through health education.

Some recent surveys focus upon neuro-musculoskeletal chiropractic practice, but other current literature takes a firm stance on the importance of maintaining a focus on prevention and health promotion, through routine checkups.

A detailed analysis of a database collected during a three-year randomized study of senior citizens over 75 years of age revealed that patients who received chiropractic care reported better overall health, used fewer prescription drugs, and spent fewer days in hospitals and nursing homes than elderly non-chiropractic patients. The chiropractic patients were also more likely to exercise vigorously and more likely to be mobile in the community.

Eighty-seven percent of the chiropractic patients described their health status as good to excellent, compared to only 67 percent of the non-chiropractic patients. Furthermore, the chiropractic patient spent 15 percent less time in nursing homes and 21 percent less time in hospitals than the non-chiropractic patients.

III. LIST OF SUBTOPICS

A. Basic Essential Care
B. Chiropractic Patient Evaluation and Care Pathway
   1. Routine Checkups and Prevention Services (wellness)
   2. Initial Presentation-Is Emergency Care Needed
   3. Initial Presentation-Referral Needs
   4. Determining Appropriate Chiropractic Care
   5. Care Delivery
   6. Re-Evaluation for New Condition or Re-Injury
   7. Progress Evaluation
   8. Duration of Care

C. Referral

A. Basic Essential Care

Subluxation is a progressive condition and it is therefore in the patients essential interest to have subluxation addressed through the chiropractic adjustment at the earliest moment. Delay in receiving chiropractic care can result in increasingly severe subluxation dysfunction and require an extended period of chiropractic procedures to correct, proportionally prolonged according to duration of the period of neglect.

Such early detection and intervention to address emerging subluxation patterns is basic, essential patient care, and is addressed at the routine checkup and prevention visit. When the objective indicators of subluxation show the presence of a defined spinal lesion, the doctor of chiropractic is alerted to the specific anatomical and physiological basis for chiropractic intervention.

Subluxation(s) have been demonstrated to be present in persons of all ages, from the newborn infant to the most senior citizen. Likewise, authorizing laws and regulations empower doctors of chiropractic to care for patients of all ages with no exceptions, and chiropractic education instructs professionals in training in the proper procedures and techniques necessary to address the spinal needs of all patients, including infants and the elderly. The Council on Chiropractic Education (CCE) the agency recognized by the United States Department of Education for the accreditation of chiropractic professional programs recognizes no exceptions or limitations on the appropriateness of chiropractic procedures because of age. The International Chiropractors Association recognizes the utility and appropriateness of chiropractic procedures for all persons regardless of age, and views efforts to restrict the access of any age group to chiropractic services as profoundly discriminatory, contrary to the laws of the several states and unsupported by the scientific literature.

Periodic chiropractic examinations to determine objectively the presence of subluxation(s) are in the patient's interest, and are called routine checkups and prevention visits. This is often referred to as maintenance or wellness care. The frequency of the need for such examinations must be determined on the basis of individual evaluation. Such periodic examinations are a vital component of quality basic health care. In the absence of subjective patient complaints of specific symptoms, the doctor of chiropractic must focus on objective measures and fully educate the patient on the status of their condition, and the measures to be taken to achieve optimal health.

Routine checkups provides both patient and doctor with the opportunity to examine environmental circumstances, behavioral factors and individual patient characteristics that may contribute to spinal problems. In addition to the adjustment of any subluxation(s) demonstrated to be present, if at all, in the course of routine checkups, the doctor of chiropractic may assist patients in altering conditions that might contribute to or set the state for on-going and/or progressively severe subluxation patterns. Such care efforts emphasize patient responsibility and may include exercise programs, weight loss, dietary counseling, life style modifications, education on body postures and mechanics, mental attitude, coordination training, safety habits, ergonomics, spinal hygiene, modification of life stressors, etc.

Health care policy makers, providers and consumers are becoming increasingly aware of the merits of early detection and early intervention in all human health concerns. From tooth decay to cancer, the progressive nature of human deterioration means that in both human and economic terms, early detection and early intervention are highly desirable goals.

B. Chiropractic Patient Evaluation and Care Pathway

This decision tree regarding the pathways and evaluation process for a patient presenting at the chiropractic office is based on the doctor of chiropractic's competence to evaluate the general health status and needs of each patient and determine the appropriateness of chiropractic care and/or the need for referral to other provider(s) for urgent care, additional diagnostic evaluation in the context of another branch of the healing arts, concurrent care, or no care at all, etc. It also recognizes that the majority of patients making the decision to seek the services of any health care professional do so on the basis of some self-perceived symptom, problem or health concern, or at the behest of a patient or guardian. This patient care pathway is graphically presented in Table 1. P. 26(a)

1. Routine Checkup and Prevention/Wellness Care

2. Initial Presentation--Is Emergency Care Needed

Upon presentation of each new patient, the doctor of chiropractic determines whether there is any condition, element or crisis that requires the immediate referral for emergency life-saving care or urgent care.

The attending doctor of chiropractic is competent to determine, on the basis of immediate findings whether the patient is in immediate need of emergency intervention.

3. Initial Presentation--Is the Care of Another Provider Needed

In the course of this evaluation, the attending doctor determines whether there are findings that indicate the need for referral to another provider.

If indications for immediate referral are not present, the patient proceeds along the care pathway to the next level. If such a referral is necessary it does not preclude concurrent chiropractic care.

4. Determining Appropriate Chiropractic Care - Are There Potential Restrictions On Chiropractic Care

The elimination of imperatives to refer having been undertaken, the next step on the chiropractic care pathway centers on the development of an appropriate course of adjustive care, if needed. In that process, the patient's needs and circumstances are evaluated to determine whether there is a need, and if so whether there are any restrictions on the delivery of adjustive care. This evaluation process will direct the attending doctor to employ specific chiropractic techniques that are appropriate to the status of the patient.

5. Care Delivery

Having carefully worked through the evaluation process eliminating potential red flags to standard care and techniques, the doctor of chiropractic next outlines and delivers a program of adjustive care according to the individual needs of the patient, based on the lifestyles and presenting factors, i.e. phase of subluxation.

6. Re-Evaluation for New Condition(s) and/or Re-Injury

On each encounter, the doctor of chiropractic will determine whether new conditions and/or injuries might require alterations in the care plan. If there are no such indications, the program of care previously devised will continue.

7. Progress Evaluation

After a reasonable period of care, each patient's progress will be evaluated to determine the effectiveness of the chosen course of care and to determine whether alterations in that program are indicated, ad determined by the clinician.

9. Duration of Care (see Chapter 11)

C. Referral

Referral is a professional obligation that is present throughout all phases and aspects of the chiropractic practice. The primary obligation of Doctors of Chiropractic is to provide the highest quality of care to each patient within the confines of their education and their legal authority. It is the position of the International Chiropractors Association that this primary obligation includes recognizing when the limits of skill and authority are reached. At that point, it is the ICA's position that doctors in all fields of practice are ethically and morally bound to make patient referrals to practitioners in their own and/or other fields of healing when such referrals are necessary to provide the highest quality of patient care. This interchange of professional referrals includes, but should not be limited to, doctors of chiropractic, doctors of medicine, and osteopathy.

Doctors of Chiropractic are also obligated to receive referrals from other health care providers, applying to those patients the same considerations for quality and appropriateness of care as with any other patients. It is the position of the ICA that the professional obligation to the patient includes honest, full and straightforward communication with the referring provider on the issue of optimal patient care.

IV. REFERENCES

Akeson WH, Woo SL, Taylor TK, Ghosh P, Bushell CR. Biomechanics and biochemistry of the intervertebral discs. Clin Orthop (129): 133-140, 1977.

Balduc H. How chiropractic care can promote wellness. Northwestern College of Chiropractic, Bloomington, MN.

Barnsley: Cervical Flexion-Extension/Whiplash Injuries. In *Spine: State of the Art Reviews* Sept. 1993, p. 339. Hanley & Belfus.

Bedford PD: Degeneration of the spinal cord associated with cervical spondylosis. Lancet 2: 55-59, 1952.

Bick EM: Common degenerative disease of the aging spine. *Geriatrics* 19(l):35-40, 1964.

Bick EM: Vertebral osteophytosis in the aged. *Clin Orthop 26:50-53,* 1963.

Bick EM: Vertebral osteophytosis in the aged. *Clin Orthoped26:50-53,* 1963.

Blanks RH, Schuster TL, Dobson M: A retrospective assessment of network care using a survey of self-rated health, wellness, and quality of life. *Journal of Vertebral Subluxation Research* 1997; 1(4): 15-3 1.

Brinckmann P: Pathology of the vertebral column. *Ergonomics* 28(1):77-80, 1985.

Broberg KB: On the mechanical behavior of intervertebral discs. *Spine* 8(2): 15 1-165, 1983.

Buckwalter JA, et al. Age-related changes in articular cartilage proteoglycans; electron microscopic studies. *Orthop Res* 3(3)15 1- 257.)8.

Buerger AA, et al: Empirical approaches to the validation of spinal manipulation Biomechanical properties of the intervertebral disc (pp. 30-4 1). Pope MH, ed C Thomas Co, Springfield, 1985.

Burkart SL, Beresford WA: The aging intervertebral disc. Phys Ther 59(8):969-974, 1979.

Calliet R: Lumbar discogenic disease: why the elderly are more vulnerable. *Geriatrics* pp. 73-76, 1975.

Caplan RL: Health care reform and chiropractic in the 1990s. *JManip Physiol Ther* 1991; 14(6):341-354.

Coile Jr., Russell CD: *Promoting Health, The New Medicine: Reshaping Medical Practice and Health Care Management,* Rockville, MD: Aspen Publishers, Inc., 1990: 15 1-166.

Collins DH: The pathology of articular and spinal disease. Arnold, Long 1949.

Coulter I, Hurwitz E, Aronow H, Cassata D, Beck J: Chiropractic patients in a comprehensive home-based geriatric assessment, follow-up and health promotion program. *Topics in Clinical Chiropractic* 1996; 3(2): 46-55.

Coulter ID, Hurwitz EL, Aronow HU, et al: Chiropractic patients in a comprehensive home-based geriatric assessment, follow-up and health promotion program. Topics in *Clinical Chiropractic* 1996; 3(2): 46.

Coulter IID: The patient, the practitioner, and wellness: paradigm lost, paradigm gained. *JManip Physio Ther* 1990; 13(2): 107-111.

Drum DC: Conservative management of lumbar degeneration; part 1. *JCan Chiro Assoc* 14(4): 8-11, 1970.

Drum DC: The posterior gravity line syndrome. *Digest of Chiropractic Economics,* June, 1968.

Drum DC: Disc degeneration; The rationale for a positive therapeutic approach. *JCan Chiro Assoc* 1969; 13(4):18-23.

Drum DC: Conservative management of lumbar degeneration; part 2. *JCan Chiro Assoc 15(1)* 18-21, 1971.

Drum DC: Conservative management of lumbar disc degeneration; part 3. *JCan Chiro Assoc* 15 (2):12-15, 1971.

Emori: Whiplash in Low Speed Vehicle Collisons. *SAE* Feb. 1990, p. 108.

Fallon J: The role of the chiropractic adjustment in the care and treatment of 332 children with otitis media. *Journal of Clinical Chiropractic Pediatrics* 1997; 2(2): 167-184.

Flesia JM : Vertebral subluxation degeneration complex, a review of therapeutic necessity for FSC well patient care, in: Seminar Notes (The New Renaissance, "Global Chiropractic.. .one patient at a time"), 7-3 6. Including the 496 various papers referenced therein.

Friedenberg et al: Degenerative disc disease of the cervical spine. *JBone Joint Surg* 45A(6): 1171-1178, 1963.

Fullenlover TM, Williams AJ: Comparative roentgenographic findings in symptomatic and asymptomatic backs. *Radiol* 68:572, 1957.

Gibson, Hugo V., DC, FICA, “Chiropractic Clinical Applications”, unpublished paper, ICA, 2000.

Gordon CV, et al: Autopsy study correlating degree of osteoarthritis, synovitis and evidence of articular calcification. *JRheumatol* 1 1(5): 681-686, 1984.

Green WT, Akeson WH, Mankin JIH et al: Can cartilage heal? *Contemp Orthop* 3:157- 177, 1981.

Grieve GE: Lumbar instability Physiotherapy 68(1):2-9, 1982.

Guifli C, Zongmin L, Zhenzhong You, Jiaghua W: Lateral rotatory manipulative maneuver in the treatment of subluxation and synovial entrapment of lumbar facet joints. The Trad Chin Med 1984; 4:211-12.

Hadley LA: Intervertebral joint subluxation, bony impingement and foramen encroachment with nerve root change. *Am JRoent &Rad Ther* 65:377-402, 1951.

Havsy: Whiplash Injuries of the Cervical Spine and Their Clinical Sequelae. *Am J. of Pain Mang,* Jan. 1994.

Havsy: Whiplash Injuries of the Cervical Spine and Their Clinical Sequelae. *Am J. of Pain Mang,* Jan. 1994, p. 30.

Health Care Financing Administration, Office of the Actuary. Expenditures and percent of gross national product for national health expenditures, by private and public funds, hospital care, and physician services; calendar years 1960-87. *Health Care Financing Review* 10:2, Winter 1988.

A Healthy People 2000,@ National Health Promotion and Disease Prevention Objectives Conference Edition: Summary U.S. Department of Health and Human Services. Public Health Service.

Hildebrandt R: Chiropractic physicians as members of the health care delivery system: The case for increased utilization. *J Manipulative Physiol Ther* 1980; 3(1):23-32.

Hjertquist SO, Lemperg R: Microscopical and microchemical studies of osteochondral articular defects. Comparison of spontaneous healing and transplantation of autologous costal cartilage. *Calaf Tissue Res* Suppl: 107C 109, 1970.

Jamison J: Preventive chiropractic and the chiropractic management of visceral conditions: Is the cost to chiropractic acceptance justified by the benefits to health care? *J Aust Chiro Assoc* 1991; 9(3):95- 101.

Jamison J: Chiropractic as conventional health care. *J Aust Chiro Assoc* 1989; 15(2):55-59.

Jamison J: Preventive chiropractic and the chiropractic management of visceral conditions: Is the cost to chiropractic acceptance justified by the benefits to health care? *Chiropr J Austr* 1991, 9(3):95-101.

Jamison JR: *The Chiropractor as Health Information Resource, Health Promotion for Chiropractic Practice,* Gaithersburg, MD: Aspect Publishers, Inc. 1991, pp. 3 5-36.

Jayson MI:. Compression stresses in the posterior elements and pathologic consequences. Spine 8(3):338C339, 1983.

Jirout J: The rotational component in the dynamics of the C2-3 spinal segment. *Neuroradiology* 17:177-181, 1979.

Kaplan RM: Behavior as the central outcome in health care. *American Psychologist* 1990, 45:1211-1220.

Karl SV: The Detection and Modification of Psychosocial and Behavioral Risk Factors. Applications of Social Science to Clinical Medicine and Health Policy, Chapter 17. Rutgers University Press, New Brunswick, NJ, 1986.

Kellegren JH, Lawrence JS: Osteoarthritis and disc degeneration in an urban population. *Ann Rheum Dis* 17:338-397, 1958.

Kirkaldy-Willis WH, et al: Pathology and pathogenesis of lumbar spondylosis and stenosis (pp 169-180). San Francisco: Radiology Research and Education Foundation, 1983.

Kirkaldy-Willis WH, Wedge JH, Yong-Hing K, Reilly J: Pathology and pathogenesis of lumbar spondylosis and stenosis. *Spine* 3(4):3 19-328, 1978.

Kraemar J: Dynamic characteristics of the vertebral column, effects of prolonged loading *Ergonomics* 28(l):95-97, 1985.

Kulak RF, Schultz AD, Belytschko T, Galante J: Biomechanical characteristics of vertebral motion segments and intervertebral discs. *Orthop Clin North Am* 6(1): 12 1-133, 1975.

Lawrence JS, Bremmer JIM, Bier F: Osteoarthritis; prevalence in the population and relationships between symptoms and x-ray changes. Ann Rheum Dis 25:1-24, 1966.

Leach, R.A., DC, The Chiropractic Theories: Principles and Clinical Applications, Third Edition, Williams & Wilkins, l996.

Lipson SJ, Muir H: Vertebral osteophyte formation in experimental disc degeneration. *Arthritis Rheum* 23(3):319C324, 1980.

Lord: Cervical Flexion-Extension/Whiplash Injuries. in *Spine: State of the Art Reviews,* Sept. 1993, p. 360. Hanley & Belfiis.

Mankin JH: The reaction of articular cartilage to injury and osteoarthritis. Part I. *N Engl Jmed* 291:1285-1292, 1974.

Mankin JH: The reaction of articular cartilage to injury and osteoarthritis. Part II. *N Engl Jmed* 291:335- 1340, 1974.

McDowell I, Newell C: *Measuring Health: A Guide to Rating Scales and Questionnaires,* New York: Oxford University Press, 1987.

McKenzie: The Dynamic Behavior of the head and Cervical Spine During >Whiplash. *Journal of Biomechanics,* Vol. 4, 1971: p. 477.

Pellils C, et al: Cervical spondylosis: incidence and implications. *Brain* 77:274-289, 1954.

Phillips RB, Butler R: Survey of chiropractic in Dade County, Florida. *J Manip Physiol Ther* 1982, 5(2):83-89.

Posner I, White AA, Edwards WT, Hayes WC: A biomechanical analysis of the clinical stability of the lumbar and lumbosacral spine. *Spine* 7(4):374-389, 1982.

Prasad GC, Udupa KN, Rajan KT: Effect of insulin on the regeneration of cartilage cells. *Calcif Tissue Res* Suppl:48, 1968.

Pyerson J: Inflammation in osteoarthritis. Review of its role in clinical picture, disease progress, subsets and pathophysiology. Semin Arthritis Rheum XI (Suppl 1): 115-116, 1981.

Quinnell RC, et al: Observations of pressures within normal discs in the lumbar spine. *Spine* 8(2):166-169, 1983.

Ressel OJ: Chiropractic and children; a rationale for care. *Int Rev Chiro* 1986 42(3):44-50.

Rice DP, MacKenzie EJ, Jones AS, Kaufman SR, deLissovoy GV, Max W, McLoughlin E, Miller TR, Robertson LS, Salkever DS, Smith GS: Cost of Injury in the United States: A Report to Congress, 1989. San Francisco, CA: Institute for Health and Aging, University of California and Injury Prevention Center, The Johns Hopkins University, 1989.

Ryu J, et al: Biochemical and metabolic abnormalities in normal and osteoarthritic human articular cartilage. Arthritis Rheum 27(1): 49-57, 1984.

Schmorll C, Junghans H: The human spine in health and disease. New York: Crone and Stratton, 1971.

Scott D, Bird H, Wright V: Joint laxity leading to osteoarthritis. Rheumatol Rehabil 18:167-169, 1979.

Shekelle PG. Brook RH: A community-based study of the use of chiropractic services. *Am J Pub Health* 1991, 81(4):439-442.

Sokoloff L: The biology of degenerative joint disease. Chicago: University of Chicago Press. 1969.

Sportelli L (Commentary): The future of health and health care: Contradictions and dilemmas. *J Manip Physiol Ther* 1985, 8(4):271-182.

Spurling RC: Lesions of the cervical intervertebral disc. Thomas, Springfield 1956.

Stacey TA: Osteoporosis: exercise therapy, pre- and post-diagnosis. *J Manip Physiol Ther* 1989, 12(3):21 1-219.

Suh CU: The clinical significance of research into spinal mechanics. *J Can Chiro Assoc* 20(3): 21-35, 1976.

Teasell, McCain: Cervical Flexion-Extension/Whiplash Injuries. in *Spine: State of the Art Reviews* Sept. 1993, p. 374. Hanley & Belfus.

Teasell, McCain: in *Painful Cervical Trauma.* Baltimore, MD: Williams and Wilkins, 1992, p. 293.

Vear H: The role of chiropractic in preventive health care. *J Can Chiro Assoc* 1974; 18(4): 10-3.

Vernon H: Static and dynamic roentgenography in the diagnosis of degenerative disc disease: a review and comparative assessment. *J Manipulative Physiol Ther* 5(4): 163-169, 1982.

Vernon-Roberts B: Degenerative changes in the vertebral discs of the lumbar spine and their sequelae. *Rheumatol Rehabil* 16:13-21, 1977.

Wardwell WI: The Connecticut survey of public attitudes toward chiropractic. *J Manip Physiol Ther* 1989, 12(3):167-173.

Webb: Whiplash: Mechanisms and Patterns of Tissue Injury. *Journal of the Australian Chiropractors' Association,* June 1985.

White AA, Rinjabi MM: Clinical biomechanics of the spine. JIB Lappincou. Philadelphia, 1978.

Roberts J, Burch TA: Osteoarthritis prevalence in adults by age, sex, race, and geographic area.

Washington, DC. US Public Health Service, Publication 1,000, Series 11, No. 15.

Windsor H. Sympathetic segmental disturbances. The evidence of the association in dissected cadavers of visceral disease with vertebral deformities of the same sympathetic segments. *Med Times* 49:1-7 1921.

Yates RG, Lamping DL, Abram NL, Wright C: Effects of chiropractic treatment on blood pressure and anxiety: A randomized, controlled trial. J Manip Physiol Ther 1988, 1 1(6):484-488.

CHAPTER 3

THE VERTEBRAL SUBLUXATION IN CHIROPRACTIC PRACTICE

Chapter Outline

I. Overview

This component of the International Chiropractors Association protocols and guidelines represents the incorporation of a fully compatible clinical practice document developed by a parallel guidelines committee. The focus of this section is on the subluxation, the core of chiropractic clinical responsibility. In many respects, this chapter is a summary document that addresses in an efficient and concentrated format the essentials of subluxation detection and care.

This section is the intellectual product of an independent panel of chiropractic researchers, educators and practitioners, the Council on Chiropractic Practice (CCP), consisting of William Ralph Boone, Ph.D., DC, Terry A. Rondberg, DC, Harold G. McCoy, DC, Emmanuel T. Akporiaye, Ph.D., Robert Blanks, Ph.D., Patrick Gentempo, DC, John J. Gerhardt, M.D., Veronica Gutierrez, DC, Jonathan Hatch, Esq., Jay Holder, DC, Carol James (consumer representative), Matthew McCoy, DC, Stephen F. Renner, DC and Steven Shochat, DC. This panel was chaired by Christopher Kent, DC, who also served as a member of the ICA Guidelines Committee. The CCP effort came to fruition in 1998, and this text has been incorporated into the ICA protocols and guidelines with the permission of the CCP and upon vote of the ICA Board of Directors.

These guidelines were specifically compiled according to strict evidenced-based guidelines development procedures. Evidence-based clinical practice is defined as "The conscientious, explicit and judicious use of the current evidence in making decisions about the care of individual patients…(it) is not restricted to randomized trials and meta-analysis. It involves tracking down the best external evidence with which to answer our clinical questions." (Sackett, DL. Editorial: Evidence Based Medicine, Spine, 1998; 23(10):1085.

RATINGS AND CATEGORIES OF EVIDENCE

RATINGS

Established: Accepted as appropriate for use in chiropractic practice for the indications and applications stated.

Investigational: Further study is warranted. Evidence is equivocal, or insufficient to justify a rating of "established".

Inappropriate: Insufficient favorable evidence exists to support the use of this procedure in chiropractic practice.

CATEGORIES OF EVIDENCE

E. Expert opinion based on clinical experience, basic scientific rationale, and/or individual case studies. Where appropriate, this category includes legal opinion.

L. Literature support in the form of reliability and validity studies, observational studies, "pre-post" studies, and/or multiple case studies. Where appropriate, this category includes case law.

C. Controlled studies, including randomized and non-randomized clinical trials of acceptable quality.

The entire following text represents the unaltered work of the CCP panel. The International Chiropractors Association wishes to express sincere appreciation for the efforts of those who participated in this important endeavor. ICA wishes to highlight the full compatibility of the findings of this group with those of the ICA Guidelines Committee. That these parallel yet independent efforts developed such highly consistent findings is an indication of the fundamental validity of the respective conclusions and practice recommendations.

History and Chiropractic Examination

II CASE HISTORY

RECOMMENDATION

A thorough case history should precede the initiation of chiropractic care. The elements of this history should include general information, reason for seeking chiropractic care, onset and duration of any symptomatic problem, family history, past health history, occupational history, and social history.

Rating: Established
Evidence: E, L

Commentary

The purpose of the case history is to elicit information which might reveal salient points concerning the patient's spinal and general health that lead the chiropractor to elect appropriate examination procedures. The case history may provide information which will assist the chiropractor in determining the safety and appropriateness of chiropractic care as well as the nature of additional analytical procedures to be performed. History taking is considered a key element of quality patient care necessary for effective doctor-patient communication and improved patient health outcomes.(1-4) Verbal, nonverbal and cognitive assessment are also included in the patient history. The chiropractic case history should emphasize eliciting information relevant to the etiology and clinical manifestations of vertebral subluxation.

CHIROPRACTIC EXAMINATION

RECOMMENDATION

The initial chiropractic examination shall include a case history and an assessment for the presence of vertebral subluxation, which, if present, is to be noted with regard to location and character. A review of systems may be conducted at the discretion of the practitioner, consistent with individual training and applicable state laws.

Reassessments may be conducted periodically throughout a course of chiropractic care to assess patient progress. Such reassessments typically emphasize re-examination of findings which were positive on the previous examination, although need not be limited to same. Reassessment is also indicated in the case of trauma or change in the clinical status of a patient.

Rating: Established
Evidence: E, L

Commentary

The term subluxation has a long history in the healing arts literature. It may be used differently outside of the chiropractic profession. The earliest non-chiropractic English definition is attributed to Randall Holme in 1668. Holme defined subluxation as "a dislocation or putting out of joynt"(5) In medical literature, subluxation often refers to an osseous disrelationship which is less than a dislocation.(6) However, B.J. Palmer, the developer of chiropractic, hypothesized that the "vertebral subluxation" was unique from the medical use of the term "subluxation" in that it also interfered with the transmission of neurological information independent of what has come to be recognized as the action potential. Since this component has yet to be identified in a quantitative sense, practitioners currently assess the presence and correction of vertebral subluxation through parameters which measure its other components.(7) These may include some type of vertebral biomechanical abnormality,(8-14) soft tissue insult of the spinal cord and/or associated structures(15-49) and some form of neurological dysfunction involving the synapse separate from the transmission of neurological information referred to by Palmer.(50-57)

As noted, chiropractic definitions of subluxation include a neurological component. In this regard, Lantz (58) stated "common to all concepts of subluxation are some form of kinesiologic[al...sic] dysfunction and some form of neurologic[al...sic] involvement." In a recently adopted position paper, The Association of Chiropractic Colleges accepted a definition of subluxation as follows: "A subluxation is a complex of functional and/or structural and/or pathological articular changes that compromise neural integrity and may influence organ system function and general health."(59) The case history and examination are means of acquiring information pertinent to the location and analysis of subluxation. This information is primarily used to characterize subluxation regarding its presence, location, duration, and type. Additionally, the information gained through analysis guides the practitioner to ascertain which chiropractic techniques best suit the patient to effect correction of the condition.

Data collected during the patient's initial consultation and examination, pertaining to the health history and presenting concerns, thus supports the decision-making process of the practitioner. This information, relayed by the practitioner to the patient, further serves to incorporate the patient into the decision-making process regarding chiropractic care.

Elements of the Examination

History

Important elements of the case history include previous and present social and occupational events revealed by the patient; unusual sensations, moods or actions relative to the patient, with dates of occurrence and duration; previous chiropractic and non-chiropractic intervention; and other factors. The case history usually includes the following:

1. Patient clinical profile.

    A. Age.
    B. Gender.
    C. Occupation.
    D. Other information germane to the presenting complaint, if any.

2. Primary reasons for seeking chiropractic care.

    A. Primary reason.
    B. Secondary reason.
    C. Other factors contributing to the primary and secondary reasons.

3. Chief complaint, if one exists. This may include onset and duration of symptoms as well as their subjective and objective characteristics, and location, as well as aggravating or relieving factors.

    A Trauma, by etiology, when possible.
    B. Chief complaint.
    C. Characteristics of chief complaint.
    D. Intensity/frequency/location, radiation/onset/duration.
    E. Aggravating/arresting factors.
    F. Previous interventions (including chiropractic care), treatments, medications, surgery.
    G. Quality of pain, if present.
    H. Sleeping position and sleep patterns.

4. Family history.
   A. Associated health problems of relatives.
   B. Cause of parents' or siblings' death and age of death.

5. Past health history.
   A. Overall health status.
   B. Previous illnesses.
   C. Surgery.
   D. Previous injury or trauma.
   E. Medication and reactions.
   F. Allergies.
   G. Pregnancies and outcomes.
   H. Substance abuse and outcomes.

6. Social and occupational history.
   A. Level of education.
   B. Job description.
   C. Work schedule.
   D. Recreational activities.
   E. Lifestyle (hobbies, level of exercise, drug use, nature of diet).
   F. Psychosocial and mental health.

Chiropractic Analysis

Complementing the case history is the necessity of conducting a thorough chiropractic analysis. This involves procedures which indicate the presence, location, and character of vertebral subluxation. Inherent in this process is the noting of unusual findings, both related and unrelated to vertebral subluxation. This information is useful in determining the safety and appropriateness of chiropractic care.

The analysis is based partly upon the recognition that vertebral subluxation may be asymptomatic, yet still exert various physiological effects. Thus, by assimilating information relative to certain body systems, the presence of vertebral subluxation may be inferred. Examination protocols have been developed by field practitioners and researchers. Many of these protocols have been deemed acceptable by the various chiropractic educational institutions. This acceptance is expressed either through adding the protocols to the curriculum, or awarding continuing education credit to post-graduate seminars instructing these protocols, thus judging them to be sufficient in safety, efficacy, and validity to be included in clinical practice.

Manual palpation is a basic element of the chiropractic examination. This aspect of analysis includes palpation of the bony elements of the spine and includes assessment of the motion of the spine as a whole as well as the individual vertebral motion segments. Palpation of the numerous muscles which attach to and control the stability, posture, and motion of the spine is included. Static vertebral position is analyzed for abnormality. The chiropractor is additionally interested in locating areas of abnormal segmental motion to identify hypermobile segments and segments with decreased joint play (hypomobility). Palpation may also include evaluation of soft tissue compliance, tenderness, and asymmetric or hypertonic muscle contraction. The presence of vertebral subluxation may bring with it varying degrees of attendant edema, capsulitis, muscle splinting, and tenderness to digital palpation. There may be tenderness of the spinous processes upon percussion of these structures when vertebral subluxation is present.

Neurological components of the subluxation, postural distortions and other factors may bring deep and superficial myospasm to muscles of the spine, pelvis and extremities. Palpation may reveal myofascial trigger points which are associated with the articular dysfunctions accompanying vertebral subluxations. Muscular involvement may manifest as "taut and tender" fibers.

Visual inspection of the spine and paraspinal region may reveal areas of hypo- or hyperemia associated with vertebral subluxation. Observation of patient posture is an important element of chiropractic analysis.(60-62) Posture has far-reaching effects on physiology, biomechanics, psychology, and esthetics.(63) Proper body alignment relates to functional efficiency while poor structural alignment limits function. Changes in posture are considered in some chiropractic approaches as a measure of outcome.(64-69) Plain film radiographs, as well as other forms of imaging may provide information concerning the integrity of osseous and soft tissues as well as juxtapositional relationships. Other assessments such as leg length analysis,(70-94) palpatory and strength challenges(95-130) are also employed to assess states of muscular responses to neurological facilitation. Spinal distortions and resultant neurological interference may create postural or neurological reflex syndromes which result in a functional change in apparent leg length. This information is also combined with skin temperature assessments(131-138) and/or electromyography(139-167, 175-180) as well as technique-specific examination procedures to evaluate the integrity of the nervous system.(181-182) Although clinical tradition supports the use of orthopedic and neurological tests in chiropractic practice, research to support the applicability of many of these tests to the assessment of vertebral subluxation is lacking or negative.(168-174). Orthopedic and neurological tests are indicated only when relevant to the assessment of vertebral subluxation, or when determining the safety and appropriateness of chiropractic care.

It is recognized that research will continue to evolve the most efficacious applications of assessment techniques described in this document. However, the literature is sufficiently supportive of their usefulness in regard to the chiropractic examination to warrant inclusion as components of the present recommendation.

The chiropractic examination may include, but not be limited to:

1. Clinical examination procedures.
    - A. Palpation (static osseous and muscular, motion).
    - B. Range of motion.

C. Postural examination.
D. Muscle strength testing.
E. Orthopedic/neurological tests.
F. Mental status examination procedures.
G. Quality of life assessment instruments.
H. Substance abuse and outcomes.

2. Imaging and instrumentation
A. Plain film radiography.
B. Videofluoroscopy.
C. Computerized tomography.
D. Magnetic resonance imaging.
E. Range of motion.
F. Thermography.
G. Temperature reading instruments.
H. Electromyography.
I. Pressure algometry.
J. Nerve/function tests.
K. Electroencephalography.

3. Review of systems.
A. Musculoskeletal.
B. Cardiovascular and respiratory.
C. Gastrointestinal.
D. Genitourinary.
E. Nervous system.
F. Eye, ear, nose and throat.
G. Endocrine.

Clinical Impression

An appropriate interpretation of case history and examination findings is essential in determining the appropriate application of chiropractic care within the overall needs of the patient. The clinical impression derived from patient information acquired through the examination process is ultimately translated into a plan of corrective care, including those elements which are contraindicated. The clinical impression serves to focus the practitioner on the patient's immediate and long-term needs. It is through this process that a clear picture is created regarding the patient's status relative to chiropractic care.

Initial Consultation

The initial consultation serves the purpose of determining how chiropractic care can benefit the patient. It is during this interchange that the practitioner presents and discusses examination findings with the patient. Additionally, during the initial consultation, the practitioner should take the opportunity to present his/her practice objectives and terms of acceptance. The terms of acceptance provides the patient with information regarding the objectives, responsibilities and limitations of the care to be provided by the practitioner. This reciprocal acknowledgment allows both practitioner and patient to proceed into the plan of care with well-defined expectations.

While not limited to the following, it is suggested that the initial consultation include the following parameters:

1. Description of chiropractic: Chiropractic is a primary contact health care profession receiving patients without necessity of referral from other health care providers. Traditionally, chiropractic focuses on the anatomy of the spine and its immediate articulations, the existence and nature of vertebral subluxation, and a scope of practice which encompasses the correction of vertebral subluxation, as well as educating and advising patients concerning this condition, and its impact on general health.

2. Professional responsibility: To assess the propriety of applying methods of analysis and vertebral subluxation correction to patients; to recognize and deal appropriately with emergency situations; and to report to the patient any nonchiropractic findings discovered during the course of the examination, making referral to other health professionals for care or for evaluation of conditions outside the scope of chiropractic practice. Such referral does not obviate the responsibility of the chiropractor for providing appropriate chiropractic care.

3. Practice objective: The professional practice objective of the chiropractor is to correct or stabilize the vertebral subluxation in a safe and effective manner. The correction of vertebral subluxation is not considered a specific cure or treatment for any specific medical disease or symptom. Rather, it is applicable to any patient exhibiting vertebral subluxation, regardless of the presence or absence of symptoms and diseases.

References

1. Bates B. A guide to physical examination. Lippincott, Philadelphia, PA. 1982.

2. Saad M. Medical history taking records and forms control. J Can Chiro Assoc 1988.

3. Strachan G. Chiropractic physician records: essential for defense and new ractice areas. DC Tracts 1990; 2(6)315-321.

4. Vernon H. Clinical Note: S.O.R.E. A record keeping system for chiropractic reatment visits. J Can Chiro Assoc 1990:34(2)93.

5. Holme R. Academy of Armory. Menston, England: Published by the Author in 1688. Reprinted by the Scholar Press, Ltd., 1972.

6. Stedman TL. Stedman's Medical Dictionary (26th Ed.). Baltimore, Williams & Wilkins, 1995.

7. Palmer BJ. The subluxation specific - the adjustment specific. Davenport: The Palmer School of Chiropractic, 1934 (1986 printing):15.

8. Ito J, Tadano S, Neda K. A biomechanical definition of spinal segmental instability taking personal and disc level differences into account. Spine 1993; 18(15): 2295-2304.

9. Kawchuk G, Herzog W. Biomechanical characterization (Fingerprinting) of five novel methods of cervical spine manipulation. J Manipulative Physiol Ther 1993; 16(9): 573-577.

10. Kondracki M, Weston J, Breen K. A comparison between the 3-space isotrak and digital videofluoroscopy in the assessment of lumbar flexion. Proc of the Int'l Conf on Spinal Manip 1994; 95.

11. Mawhiney R. Clinical Report: reduction of minor lumbar scoliosis in a 57-year-old female. J Chiro Research 1989; 2:48-51.

12. Mawhiney R. Vertebral median line angle and vertebral/pelvic measurements versus Cobb's angle in chiropractic evaluation of scoliosis. Chiropractic: J Chiro Research and Clinical Investigation. 1991; 7(1):10-15.

13. Zengel F, Davis B. Biomechanical analysis by chiropractic radiography: Part II. Effects of x-ray projectional distortion on apparent vertebral rotation. J Manipulative Physiol Ther 1988; 11(5): 380-389.

14. Zengel F, Davis B. Biomechanical analysis by chiropractic radiography: Part I A simple method for determining x-ray projectional distortion. J Manipulative Physiol Ther 1988; 11(4): 273-280.

15. Antos J, Robinson K, Keating J, et al. Interrater reliability of fluoroscopic detection of fixation in the mid-cervical spine. Chiropractic Technique 1990; 2(2): 53-55.

16. Brand N, Gizoni C. MoirŽ contourography and infrared thermography: changes resulting from chiropractic adjustments. J Manipulative Physiol Ther 1982; 5:113-116.

17. Brightbill T, Pile N, Eichelberger R, et al. Normal magnetic resonance imaging and abnormal discography in lumbar disc disruption. Spine 1994; 19(9):1075-1077.

18. Brodeur R, Hansmeier D. Variability of intervertebral angle calculations for lateral cervical videofluoroscopic examinations. Proc of the Int'l Conf on Spinal Manip 1993; 37.

19. Byrd R, Kahler J, Leaman S, et al. Reliability of magnetic resonance imaging for morphometry of the intervertebral foramen. Proc of the Int'l Conf on Spinal Manip 1990; 79-82.

20. Cantu J, Cramer G, Dorsett R, et al. Magnetic resonance imaging of the cervical intervertebral foramina: comparison of two techniques. Proc of the Int'l Conf on Spinal Manip 1994; 101-103.

21. Cramer G, Cantu J, Greenstein J, et al. The accuracy of magnetic resonance imaging in determining the vertical dimensions of the cervical intervertebral foramina. Proc of the Int'l Conf on Spinal Manip 1993; 38-40.

22. Cramer G, Howe J, Glenn W, et al. Comparison of computed tomography to magnetic resonance imaging in evaluation of the intervertebral foramen. The National College of Chiropractic, Lombard, IL, Los Angeles College of Chiropractic Whittier, CA, Private Practice of Medical Radiology, Carson, CA, Computer programmer, Los Angeles, CA.

23. Cramer G., Howe J, Glenn W, et al. Lumbar intervertebral foramen dimensions from thirty-seven human subjects as determined by magnetic resonance imaging. Proc of the Int'l Conf on Spinal Manip 1992; 3-5.

24. Daruwalla J, Balasubramaniam P. MoirŽ topography in scoliosisÑits accuracy in detecting the site and size of the curve. J Bone Joint Surg 1985; 67:211-213.

25. Bennett SF, Hayde TN. Cervical spondylolisthesis: a case report. ACA J Chiro. 1991; 2:69-71.

26. Denton T, Randall F, Deinlein D. The use of instant moirŽ photographs to reduce exposure from scoliosis radiographs. Spine 1992; 17(5):509-512.

27. EilBert L, Spector B. The moirŽ contourographic analysis controversy: A question of validity in present-day clinical practice. J Manipulative Physiol Ther 1979; 2:85.

28. Eldevik O, Dugstad G, Orrison W, et al. The effect of clinical bias on the interpretation of myelography and spinal computed tomography. Radiology 1982; 145:85-89.

29. Gertzbein S, Holtby R, Tile M, et al. Determination of a locus of instantaneous centers of rotation of the lumbar disc by moirŽ fringes. A new technique. Spine 1984; 9:409-413.

30. Gertzbein S, Seligman J, Holtby R, et al. Centrode patterns and segmental instability in degenerative disc disease. Spine 1985; 10(3):257-261.

31. Ho E, Upadhyay S, Chan F, et al. New methods of measuring vertebral rotation from computed tomographic scans. An intraobserver and interobserver study on girls with scoliosis. Spine 1993; 18(9):1173-1177.

32. Laulund T, Sojbjerg J, Horlyck E. MoirŽ topography in school screening for structural scoliosis. ACTA Orthop Scand 1982; 53:765-768.

33. Leung, S. The value of cineradiographic motion studies in the diagnosis dysfunctions of the cervical spine. Bull Eur Chiro Union 1977; 25(2):28-43.

34. Montgomery F, Persson U, Benoni G, et al. Screening for scoliosis. A cost-effectiveness analysis. Spine 1990; 15(2):67-70.

35. Pope M, Wilder D, Stokes I, et al. Biomechanical testing as an aid to decision making in low back pain patients. Spine 1979; 4(2):135-140.

36. Reinke T, Jahn W. Spinal diagnostic imaging: computerized axial tomography vs. magnetic resonance imaging. Am J Chiro Med 1988; 1(14):181-184.

37. Ruggerone M, Austin J. MoirŽ topography in scoliosis: correlations with vertebral lateral curvature as determined by radiography. Phys Ther 1986; 66(7):1072-1077.

38. Sahlstrand, T. The clinical value of moirŽ topography in the management of scoliosis. Spine 1986; 11:409-417.

39. Spector B, Eilbert L, Finando S, et al. Video integrated measurement system. J Manipulative Physiol Ther 1982; 5(2): 55-61.

40. Spector B, Eilbert L, Fukuda F, et al. Development and application of spect-eil indices for quantitative analysis in moirŽ contourography. J Manipulative Physiol Ther 1979; 2(1):16-25

41. Spector B, Finando S, Fukuda F, et al. An intergrated video biofeedback/moirŽ system for diagnosis and treatment: A preliminary report. J Manipulative Physiol Ther 1980; 3(4):220-224.

42. Spector B, Fukuda F, Krammer L, Thorschmidt E. A preliminary integrated video biofeedback/moirŽ system. Am Chiro 1981; 14, 19.

43. Stokes I, Moreland M. Concordance of back surface asymmetry and spine shape in idiopathic scoliosis. Spine 1989; 14(1):73-78.

44. Tibbles A, Belanger M, Grinder L, et al. MoirŽ topography in scoliosis screening: A study of the precision of the method. Proc of the Int'l Conf on Spinal Manip 1991; 43-44.

45. Turner-Smith A, Harris J, Houghton G, Jefferson R. A method for analysis of back shape in scoliosis. J Biomech 1988; 21:497-509.

46. Van Wijk, M. MoirŽ contourograph: An accuracy analysis. J Biomech 1980; 13:605-613.

47. Wallace H, Wagon R, Pierce W. Inter-examiner reliability using videofluoroscope to measure cervical spine kinematics: A sagittal plane lateral view). Proc of the Int'l Conf on Spinal Manip 1992; 7-8.

48. Willner, S. A comparative study of the efficiency of different types of school screening for scoliosis. ACTA Orthop Scand 1982; 53:769-774.

49. Willner, S. Prevalence study of trunk asymmetries structural scoliosis in 10-year-old school children. Spine 1984; 9:644-647.

50. Bamford C, Graeme K. Percutaneous S1 root somatosensory evoked potential. Electromyogr Clin Neurophysiol 1995; 35:181-186.

51. Chistyakov A, Soustiel J, Hafner H, et al. Motor and somatosensory conduction in cervical myelopathy and radiculopathy. Spine 1995; 20(19):2135-3140.

52. Collins K, Pfleger B. The neurophysiological evaluation of the subluxation complex: documenting the neurological component with somatosensory evoked potentials. CRJ 1994; 3(1): 40-48.

53. Glick, D. Characterization of neurological insult in the low back utilizing somatosensory evoked potential studies. Proc of the Int'l Conf on Spinal Manip 1994; 17.

54. Kai Y, Owen J, Allen B, et al. Relationship between evoked potentials and clinical status in spinal cord ischemia. Spine 1994; 19(10):1162-1168.

55. Leppanen R, Maguire J, Wallace S, et al. Intraoperative lower extremity reflex muscle activity as an adjunct to conventional somatosensory-evoked potentials and descending neurogenic monitoring in idiopathic. Spine 1995; 20(17):1872-1877.

56. Swenson, R. Dermatomal somatosensory evoked potentials: A review of the literature. Journal of the Neuromusculoskeletal System 1994; 2(2):45-51.

57. Zhu Y, Hsieh C, Haldeman S, et al. Paraspinal muscle somatosensory evoked potentials in low back pain patients with muscle spasm: A quantitative study of the effect of spinal manipulation. Proc of the Int'l Conf on Spinal Manip 1994; 16.

58. Lantz CA. The vertebral subluxation concept. In: Gatterman MI, ed. Foundation of Chiropractic Subluxation. St. Louis, MO: Mosby, 1995.

59. Association of Chiropractic Colleges (ACC) Position on Chiropractic; Position paper #1; July 1996; (http://Lifenet.life.edu/other/acc.htm1)

60. Adams A, Lopez D, Wild S, et al. Intra- and inter-examiner reliability of plumb line posture analysis measurements using a three dimensional electrogoniometer. Res For 1988; 4(3):60-72.

61. Ebrall, P. An estimation of the clinical error for the metrecom computer-assisted goniometer. Chiropractic Technique 1993; 5(1):1-4.

62. McGregor M, Mior S. Anatomical and functional perspectives of the cervical spine: Part 1: the normal cervical spine. JCCA 1989; 33(3):123-9.

63. Gill-Body K, Krebs D. Usefulness of biomechanical measurement approaches in rehabilitation. Topics in Geriatric Rehabilitation 1994; 10(2):82-96.

64. Leach RA. The chiropractic theories. A symposia of chiropractic research. Baltimore: Williams & Wilkins, 1986; 35-46.

65. Decosta, A. The correction of lumbosacral and sacroiliac disrelationships. Digest Chiro Econ 1983; 26(3):14-19, 140-143.

66. Keating, J. Technique system application: The Gonstead approach. J Chiro Tech 1991; 3(3): 135-136.

67. Lopes M, Plaugher G, Ray S. Closed reduction of lumbar retrolisthesis: A report of two cases. Proc of the Int'l Conf on Spinal Manip (Wash D.C.) 1991; 110-114.

68. Maltezopoulos V, Armitage N. A comparison of four chiropractic systems in the diagnosis of sacroiliac malfunction. Euro J Chiro 1984; 32(1):4-42..

69. Nansel D, Cremata E, Carlson J, et al. Effect of unilateral spinal adjustments on goniometrically-assessed cervical lateral-flexion end-range asymmetries in otherwise asymptomatic subjects. J Manipulative Physiol Ther 1989; 12(6):419-427.

70. Beattie P, Isaacson K, Riddle D, et al. Validity of derived measurements of leg-length differences obtained by use of a tape measure. Phys Ther 1990; 70(3):150-157.

71. Bowman C, Gribble R. The value of the forward flexion test and three tests of leg length changes in the clinical assessment of movement of the sacroiliac joint. Journal of Orthopaedic Medicine 1995; 17(2):66-67.

72. Burke M, Rhudy T. Inter-examiner reliability of functional leg-length assessment. Am J Chiro Med 1990; 3(2):63-66.

73. Giles LGF, Taylor JR. Low-back pain associated with leg length inequality. Spine 1981; 6:510-521.

74. Deboer K, Harmon R, Savoie S, et al. Inter- and intra-examiner reliability of leg length differential measurement: A preliminary study. J Manipulative Physiol Ther 1983; 9(2):61-66.

75. Dewitt J, Osterbauer P, Stelmach G, et al. Optoelectric measurement of leg length changes during isolation tests. Transactions of the Consortium for Chiropractic Research 1993; 8:156-157.

76. Dewitt J, Osterbauer P, Stelmach G. Optoelectric measurement of changes in leg length inequality resulting from isolation tests. J Manipulative Physiol Ther 1994; 17(8):530-538.

77. Falltrick D, Pierson S. Precise measurement of functional leg length inequality and changes due to cervical spine rotation in pain-free students. J Manipulative Physiol Ther 1989; 12(5):364-368.

78. Frogley, H. The value and validity of the leg check as used in the chiropractic profession. Dig Chiro Econ 1987; 29(5):24-25.

79. Fuhr A, Osterbauer P. A preliminary look at inter-examiner reliability of prone leg lengths. Proc of the Int'l Conf on Spinal Manip 1989; 213-218.

80. Fuhr A, Osterbauer P. Interexaminer reliability of relative leg-length evaluations in the prone, extended position. Chiro Tech 1989; 1(1):13-18.

81. Haas M, Peterson D, Panzer D, et al. Reactivity of leg alignment to articular pressure testing: Evaluation of a diagnostic test using a randomized crossover clinical trial approach. J Manipulative Physiol Ther 1993; 16(4):220-227.

82. Haas M, Peterson D, Rothman E, et al. Responsiveness of leg alignment changes associated with articular pressure testing to spinal manipulation: The

use of a randomized clinical trial design to evaluate. J Manipulative Physiol Ther 1993; 16(5):306-311.

83. Haas M, Peterson D, Solomon S, et al. Reactivity of leg length to articular pressure testing: A randomized cross-over clinical trial. Proc of the Int'l Conf on Spinal Manip 1992; 121-122.

84. Haas M. Inter- and intra-examiner reliability of leg-length differential measurement: A preliminary study. J Manipulative Physiol Ther 1988; 11(1):50-51.

85. Lawrence D. Chiropractic concepts of the short leg: A critical review. J Manipulative Physiol Ther 1985; 8(3):157-161.

86. Mannello D. Leg length inequality: A literature review. Transactions of the Consortium for Chiropractic Research 1992; 7:67-92.

87. Montgomery D, Egan I, Pollard H. Palpable unilateral sacral prominence as a clinical sign of lower limb anisomelia: A pilot study. J Manipulative Physiol Ther 1995; 18(6):353-356.

88. Mootz R, Hansen D, Adams A. The value of leg length inequality and specific contact short lever adjusting in chiropractic practice: Results of a consensus process by chiropractic expert panels. Chiro Tech 1993; 5(1):26-31.

89. Rhodes D, Mansfield E, Bishop P, et al. Comparison of leg length inequality methods as estimators of the femur head height difference on standing x-ray. J Manipulative Physiol Ther 1995; 18(7):448-452.

90. Rhodes D, Mansfield E, Bishop P. The validity of the prone leg check as an estimate of standing leg length inequality measured by x-ray. J Manipulative Physiol Ther 1995; 18(6):343-346.

91. Rock B. Short legÑA review and survey. J Aust Chiro Assoc 1988; 18(3):91-96.

92 Shambaugh P, Sclafani L, Fanselow D. Reliability of the Derifield-Thompson test for leg length inequality, and use of the test to demonstrate cervical adjusting efficacy. J Manipulative Physiol Ther 1988; 11(5):396-399.

93. Troyanovich, S. Letters to the editor: optoelectric measurement of changes of leg length inequality resulting from isolation tests. J Manipulative Physiol Ther 1995; 18(5):322.

94. Venn E, Wakefield K, Thompson P. A comparative study of leg length checks. Eur J Chiro 1983; 31(2):68-80.

95. Bendtsen L, Jensen R. Pressure-controlled palpation: A new technique which increases the reliability of manual palpation. CEPHDF 1995; 15:205-210.

96. Bergstrom E, Courtis G. An inter- intra-examiner reliability study of motion palpation of the lumbar spine in lateral flexion in the seated position. Eur J Chiro 1986; 34(3):121-141.

97. Boline P, Keating J, Brist J, et al. Interexaminer reliability of palpatory evaluations of the lumbar spine. Am J Chiro Med 1988; 1(1):5-11.

98. Breen A. The reliability of palpation and other diagnostic methods. J Manipulative Physiol Ther 1992; 15(1):54-56.

99. Byfield D, Mathiasen J, Sangren C. Intra- and inter-examiner reliability of static palpation of specific landmarks in the lumbar spine and pelvis using an invisible skin marking pen. Proc of the World Chiro Congress 1991.

100. Byfield D. Intra- and inter-examiner reliability of body landmark identification in the lumbar spine. Eur J Chiro 1992; 72:13-17.

101. Byfield D. Preliminary studies with a mechanical model for the evaluation of spinal motion palpation in the lumbar spine. Proc of the Int'l Conf on Spinal Manip 1990; 215-218.

102. Carmichael J. Inter- and intra-examiner reliability of palpation for sacroiliac joint dysfunction. J Manipulative Physiol Ther 1987; 10(4):164-171.

103. Cassidy J. Sacroiliac motion palpation. JCCA 1980; 24(4):143.

104. Cooperstein R, Gardner R, Nansel D. Concordance of two methods of motion palpation with goniometrically-assessed cervical lateral flexion asymmetry. Proc of the Int'l Conf on Spinal Manip 1991; 235-259.

105. Cooperstein R, Gardner R, Nansel D. Concordance of two methods of motion palpation with goniometrically-assessed cervical lateral flexion asymmetry. Palmer College of Chiropractic West, Sunnyvale, CA.

106. Gonnella C, Paris S, Kutner M. Reliability in evaluating passive intervertebral motion. Phys Ther 1982; 62(4):436-444.

107. Haas M, Nyiendo J. Interexaminer concordance in detecting joint-playv asymmetries in the cervical spines of otherwise asymptomatic subjects. J Manipulative Physiol Ther 1990; 13(6):346-348.

108. Harvey D, Byfield D. Preliminary studies with a mechanical model for the evaluation of spinal motion palpation. Clinical Biomechanics 1991; 6(2):79-82.

109. Herzog W, Read L, Conway P, et al. Reliability of motion palpation procedures to detect sacroiliac joint fixations. J Manipulative Physiol Ther 1989; 12(2):86-92.

110. Jensen KJ, Gemmell H, Thiel H. Motion palpation accuracy using a mechanical spinal model. Eur J Chiro 1993; 41:67-73.

111. Johnston W, Allan B, Hendra J, et al. Interexaminer study of palpation in detecting location of spinal segmental dysfunction. J Am Osteopath Assoc 1983; 82(11):839-845.

112. Johnston W, Beal M, Blum G. Passive gross motion testing: Part 3. examiner agreement on selected subjects. J Am Osteopath Assoc 1982; 82(5):309-313.

113. Johnston W. The role of static and motion palpation in structural diagnosis. J Am Osteopath Assoc 1975; 75:421-424.

114. Keating J. Inter-examiner reliability of motion palpation of the lumbar spine: A review of quantitative literature. Am J Chiro Med 1989; 2(3):107-110.

115. Keating J. Interexaminer reliability of motion palpation of the lumbar spine: A review of the quantitative literature. J Manipulative Physiol Ther 1990; 13(1):55.

116. Kilgore W. Interexaminer reliability of palpatory evaluation of the lumbar spine. Am J Chiro Med 1988; 1(3):142.

117. King R, Warner A, Lapierre P. Student interexaminer reliability in localization of hypomobile joints of the spine utilizing motion palpation techniques. International Review of Chiropractic (ICA Review) 1981; 35(2):39-40.

118. Lewitt K, Liebenson C. Palpation problems and implications. J Manipulative Physiol Ther 1993; 16(9):586-590.

119. Love R. Inter- and intra-examiner reliability of motion palpation for the thoracolumbar spine. J Manipulative Physiol Ther 1987; 10:1-4.

120. Mior S, King R, McGregor M, et al. Intra and interexaminer reliability of motion palpation in the cervical spine. JCCA 1985; 29:195-199.

121. Mootz R, Keating J, Kontz H, et al. Intra- and interobserver reliability of passive motion palpation of the lumbar spine. J Manipulative Physiol Ther 1989; 12(6):440-445.

122. Nansel D, Peneff A, Jansen R, et al. Inter-examiner concordance in detecting joint-play asymmetries in the cervical spines of otherwise asymptomatic subjects. J Manipulative Physiol Ther 1989; 12(6):428-433.

123. Panzer D. Lumbar motion palpation: A literature review. Transactions of the Consortium for Chiropractic Research 1991; 171-186.

124. Panzer D. The reliability of lumbar motion palpation. J Manipulative Physiol Ther 1992; 15(8):518-524.

125. Paydar D, Thiel H, Gemmell H. Intra- and interexaminer reliability of certain pelvic palpatory procedures and the sitting flexion test for sacroiliac joint mobility and dysfunction. Journal of the Neuromusculoskeletal System 1994; 2(2):65-69.

126. Ray S. The Gonstead system of lumbar motion palpation. Transactions of the Consortium for Chiropractic Research 1991; 162-163.

127. Russell R. Diagnostic palpation of the spine: A review of procedures and assessment of their reliability. J Manipulative Physiol Ther 1983; 6(4):181-183.

128. Vernon H, Aker P, Menko M, et al. Evaluation of neck muscle strength with a modified sphygmomanometer dynanometer: reliability and validity. J Manipulative Physiol Ther. 1992, 15(6):343-9.

129. Hyytiainen K, Salminen J, Suvitie T, et al. Reproducibility of nine tests to measure spinal mobility and trunk muscle strength. Scand J Rehabil Med. 1991; 23:3-10.

130. Wiles M. Reproducibility and interexaminer correlation of motion palpation findings of the sacroiliac joints. JCCA 1980; 24(2):56-69.

131. Uematsu S, Haberman J, Pochaczevsky R, et al. Thermography as a diagnostic aid in sciatica: a commentary on experimental methods, data interpretation and conclusions. Thermology. 1985; 1(1):43-50.

132. Brand N, Gizoni C. MoirŽ contourography and infrared thermography: changes resulting from chiropractic adjustments. J Manipulative Physiol Ther 1982; 5:113-6

133. Diakow P. The status of thermography as a diagnostic tool. J Manipulative Physiol Ther 1990; 13(2):121.

134. Ebrall P, Iggo A, Hobson P, et al. Preliminary report: the thermal characteristics of spinal levels identified as having different temperature by contact thermocouple measurement (nervo scope). Chiropr J Aust 1994; 24:139-146.

135. Hart J. Skin temperature patterns of the posterior neck used in chiropractic analysis- A Case Study. Chiropractic 1991; 7(2):46-8

136. Kobrossi T. L5 and S1 nerve fiber irritation demonstrated by liquid crystal thermography-a case report. JCCA 1985; 29:199-202.

137. Schram S, Hosek R, Owens E. Computerized paraspinal skin surface temperature scanninng: a technical report. J Manipulative Physiol Ther 1982; 5(3)117-21.

138. Wallace H, Wallace J, Resh R. Advances in paraspinal thermographic analysis. Chiropractic Research Journal. 1993; 2(3):39-55.

139. Ahern D, Follick M, Council J, et al. Reliability of lumbar paravertebral EMG assessment in chronic low back pain. Arch Phys Med Rehab 1986; 67:762.

140. Brown WF. The physiology and technical basis of electromyography. Butterworth Publishers, Stoneham, MA,1984.

141. Calancie B, Madsen P, Lebwohl N. Stimulus-evoked EMG monitoring during transpedicular lumbosacral spine instrumentation. Spine 1994; 19(24):2780-2786.

142. Cobb C, DeVries H, Urban R, et al. Electrical activity in muscle pain. Am J Phys Med 1975; 54(2):80.

143. Andreassi JL. Psycho physiology: human behavior and physiological response. New York. Oxford University Press 1980:149-172.

144 Gentempo P, Kent C. Establishing medical necessity for paraspinal EMG scanning. Chiropractic: (J Chiro Research and Clinical Investigation) 1990; 3(1):22.

145. Kent C, Gentempo P. Static and dynamic paraspinal surface EMG: an outcome assessment for subluxation-based chiropractic care. International Review of Chiropractic. 1995; 29-35, 37.

146. Hoyt W, Hunt Jr. H, De Pauw M, et al. Electromyographic assessment of chronic low-back pain syndrome. J Am Osteopath Assoc 1981; 80(11):728-730.

147. Kent C, Fitzsimons W. Admissibility of electromyographic findings in personal injury cases. Digest Chiro Econ 1988; 30(5):43-46.

148. Kent C, Gentempo P. Medical evidence of soft tissue injury: legal aspects of paraspinal EMG findings. Am Chiro 1990; 12(12):10-15.

149. Kent C, Gentempo P. Protocol and normative data for paraspinal EMG scanning in chiropractic practice. J Chiro Research and Clinical Investigation 1990; 6(3):64-67.

150. Kent C, Hyde R. Potential applications for electromyography in chiropractic practice. Digest Chiro Econ 1987; 30(2):20-25.

151. Kent C. Surface electrode EMG/lumbar spine. Transactions of the Consortium for Chiropractic Research 1993; 8:48.

152. Komi P, Buskirk E. Reproducibility of electromyographic measurements with inserted wire electrodes and surface electrodes. Electromyography 1970; 10:357.

153. Kondo M, Matsuda H, Kureya S, et al. Electrophysiological studies of intermittent claudication in lumbar stenosis. Spine 1989; 14:862-866.

154. Konrad P, Owen J, Bridwell K. Magnetic stimulation of the spine to produce lower extremity EMG responses: significance of coil position and the presence of bone. Spine 1994; 19(24): 2812-2818.

155. Marcarian D. Factors influencing the SEMG's potential for continued future use. Transactions of the Consortium for Chiropractic Research 1993; 8:51-52.

156. Meeker W, Matheson D, Milus T, et al. Lack of correlation between scanning EMG asymmetries and history and presence of low back pain: analysis of pilot data. Proc of the Int'l Conf on Spinal Manip 1990; 230-235.

157. Meeker W, Matheson D, Wong A, et al. Lack of evidence for a relationship between low back pain and asymmetrical muscle activity using scanning electromyography. Proc of the World Chiro Congress 1991.

158. Meyer J. The current status on validity of thoracolumbar paraspinal scanning EMG as a diagnostic test: a literature review. Transactions of the Consortium for Chiropractic Research 1993; 8:21-47.

159. Meyer J. The validity of thoracolumbar paraspinal scanning EMG as a diagnostic test: an examination of the current literature. J Manipulative Physiol Ther 1994; 17(8):539-551.

160. Myerowitz M. Scanning paraspinal surface EMG: a method for corroborating post-treatment spinal and related neuromusculoskeletal symptom improvement. Journal of Occupational Rehabilitation 1994; 4(3):171-179.

161. Papakyriakou M, Triano J. Effects of filtering on the evaluation of surface EMG signals. Proc of the Int'l Conf on Spinal Manip 1993; 84.

162. Sandrini G, Antonaci F, Pucci E, et al. Comparative study with EMG, pressure alogmetry and manual palpation in tension-type headache and migraine. Cephalalgia (CEPHDF) 1994; 14:451-457.

163. Shinomiya K, Komori H, Matsuoka T, et al. Neuroradiologic and electrophysiologic assessment of cervical spondylotic amyotrophy. Spine 1994; 19(1):21-25.

164. Spector B, Eilbert L, Finando S, Fukuda F. Video integrated measurement system. J Manipulative Physiol Ther 1982; 5(2):55-61.

165. Thompson D, Biederman H. Electromyographic power spectrum analysis of the paraspinal muscles. Spine 1993; 18(15):2310-2313.

166. Triano J. Surface electrode EMG/lumbar spine: static paraspinal EMG scanning-clinical utility and validity issues. Transactions of the Consortium for Chiropractic Research 1993; 8:53-58.

167. Triano J. The validity of thoracolumbar paraspinal scanning EMG as a diagnostic test: examination of the current literature. J Manipulative Physiol Ther 1995; 18(7):482-483.

168. Strender LE, Sjoblom A, Sundell K, Ludwig R, Taube A. Interexaminer reliability in physical examination of patients with low back pain. Spine. 1997; 22(7):814-20.

169. Leamon TB. Research to reality: a critical review of the validity of various criteria for the prevention of occupationally induced low back pain disability. Ergonomics. 1994; 37(12):1959-74 0014-0139.

170. Breen A. The reliability of palpation and other diagnostic methods. J Manipulative Physiol Ther. 1992; 15(1):54-6 0161-4754.

171. Porter RW, Trailescu IF. Diurnal changes in straight leg raising. Spine. 1990; 15(2):103-6 0362-2436.

172. Nelson MA, Allen P, Clamp SE, de Dombal FT. Reliability and reproducibility of clinical findings in low-back pain. Spine. 1979; 4(2):97-101 0362-2436.

173. Potter NA, Rothstein JM. Intertester reliability for selected clinical tests of the sacroiliac joint. Phys Ther. 1985; 65(11):1671-5 0031-9023.

174. Matsumoto M, Fujimura Y, Toyama Y. Usefulness and reliability of neurological signs for level diagnosis in cervical myelopathy caused by soft disc herniation. J Spinal Disord. 1996; 9(4):317-21.

175. Kent C, Gentempo P. Static and dynamic paraspinal surface EMG: an outcome assessment for subluxation-based chiropractic care. International Review of Chiropractic. 1995; 29-35, 37.

176. Kent C, Gentempo P. Dynamic paraspinal surface EMG: a chiropractic protocol. Chiropractic Research Journal. 1993; 2(4):40-6.

177. Kent C, Gentempo P. Paraspinal EMG potentials in pediatric patients: preliminary observations. Chiropractic Research Journal. 1992; 2(2):48-52.

178. Kent C, Gentempo P. Paraspinal EMG scanning in chiropractic practice: a review. Chiropractic Research Journal. 1991; 2(1):41-9.

179. Gentempo P, Kent C, Hightower B, Minicozzi SJ. Normative data for paraspinal surface electromyographic scanning using a 25-500 Hz bandpass. Journal of Vertebral Subluxation Research. 1996; 1(1):43-46.

180. Kent C. Surface electromyography in the assessment of changes in paraspinal muscle activity associated with vertebral subluxation: a review. Journal of Vertebral Subluxation Research. 1997; 1(3):15-22.

181. Collins K, Pfleger B. The neurophysiological evaluation of subluxation complex: documenting the neurological component with somatosensory evoked potentials. Chiropractic Research Journal. 1994; 3)1):40-8.

182. Capria M. Somatosensory neurological evaluation of chiropractic manipulation. Chiropractic: J Chiro Research and Clinical Investigation 1990; 6(3):56-58.

III Instrumentation

RECOMMENDATION

Instrumentation is indicated for the qualitative and/or quantitative assessment of the biomechanical and physiological components of vertebral subluxation. When using instrumentation, baseline values should be determined prior to the initiation of care.

Rating: Established
Evidence: E, L

Commentary

The chiropractor uses a variety of procedures to assess the vertebral subluxation. These methods may include history taking, physical examination, imaging procedures and instrumentation. Through information gained from research and personal experience, the chiropractor generally assigns a personal value to each procedure in a particular clinical circumstance. The intent of this chapter is to describe clinical applications for the various instruments that may be used by chiropractors in examining their patients for evidence of vertebral subluxation.

Definition of instrumentation: The use of any tool or device used to obtain objective data, which can be recorded in a reproducible manner, about the condition of the patient relative to vertebral subluxation. Such instrumentation as that described below may provide information concerning the biomechanical and/or neurological aspects of vertebral subluxation.

POSTURAL ANALYSIS

Sub-Recommendation

Postural analysis using plumb line devices, computerized and non-computerized instruments may be used to evaluate changes in posture associated with vertebral subluxation.

Rating: Established
Evidence: E, L

Posture analysis is recommended for determining postural aberrations associated with vertebral subluxation. The findings of such examinations should be recorded in the patient record. In order to encourage standardization of reporting, it is suggested that findings be recorded in a form consistent with manufacturers' recommendations.

Posture analysis may include the use of such devices as the plumb line, scoliometer and posturometer.(1-8) Posture is often analyzed by x-ray methods(9-13) simply by visualizing the patient and making determinations based on that visualization. The procedure is often enhanced by a plumb line and other vertical and horizontal lines.

BILATERAL AND FOUR-QUADRANT WEIGHT SCALES

Sub-Recommendation

Bilateral and four-quadrant weight scales may be used to determine the weight distribution asymmetries indicative of spinal abnormalities.

Rating: Established
Evidence: E, L

Unequal weight distribution has been shown to be indicative of spinal abnormalities.(14-18) Weight scales are a simple and effective means to determine weight distribution asymmetries.

MOIRÉ CONTOUROGRAPHY

Sub-Recommendation

Moiré contourography may be used to provide a photographic record of changes in body contour associated with vertebral subluxation.

Rating: Established
Evidence: E, L

Moiré contourography is a photographic technique which yields information regarding body contours and their variations for the purpose of evaluating structural abnormality. It is useful to the chiropractor because body surface asymmetries may be indicative of the presence of vertebral subluxation.(19-33)

INCLINOMETRY

Inclinometry may be used as a means of measuring motion against a constant vertical component of gravity as a reference. Changes in ranges of spinal motion may be associated with vertebral subluxation.

Rating: Established
Evidence: E, L

Mechanical, electronic and fluid-filled inclinometers are available.(34-38) Inclinometer measurements have been thoroughly studied regarding their ability to measure complex motions of the spine.(39-49) Inclinometers are considered superior to goniometers for assessing spinal motion.(50) Inclinometers have been shown to be accurate within 10% of those obtained by radiographic evaluation.(51) Achieving acceptable reliability is dependent upon use of standardized procedures.

GONIOMETRY

Sub-Recommendation

Goniometry, computer associated or not, may be used to measure joint motion. Inclinometry is superior to goniometry when standardized procedures are employed.

Rating: Established
Evidence: E, L

A goniometer is a protractor that may be held in the proximity of the area being measured to provide a means by which to determine degrees of motion.(35) Although goniometry is common, a wide range of variance has been reported, (56-59) expressing up to 10°-15° error.(60, 61)

ALGOMETRY

Sub-Recommendation

Algometry may be used to measure pressure-pain threshold. Changes in sensory function associated with vertebral subluxation may produce changes in pressure-pain thresholds.

Rating: Established
Evidence: E, L

A pressure-pain threshold meter yields a measurement of when a patient feels a change from pressure to tenderness as the device produces mechanical irritation of deep somatic structures. Pressure-pain-threshold measurements produce acceptable levels of reliability.(62-66, 142-145) Algometry has been shown to be very useful in measuring changes in paraspinal tissue tenderness as the thresholds are symmetrical.(145) This renders the procedure applicable to chiropractic analysis.

CURRENT PERCEPTION THRESHOLD (CPT) TESTING

Sub-Recommendation

Current perception threshold devices may be used for the quantitative assessment of sensory nerve function. Alterations in sensory nerve function may be associated with vertebral subluxation.

Rating: Established
Evidence: E, L

The current perception threshold device is a variable voltage constant current sine wave stimulator proposed as a simple noninvasive and quantitative measure of peripheral nerve function.(67-71, 137-141) One type of current perception threshold instrument, the neurometer, has been shown to be appropriate for rapid screening for neural dysfunction.(69)

ELECTROENCEPHALOGRAPHY (EEG)

Sub-Recommendation

Electroencephalographic techniques including brain mapping and spectral analysis, may be used to assess the effects of vertebral subluxation and chiropractic adjustment associated with brain function.

Rating: Established
Evidence: E, L

Standard EEG and computerized EEG techniques, including spectral analysis and brain mapping, have been shown to change following chiropractic adjustments or manipulation.(72, 161, 204) Such procedures may be useful in evaluating possible effects of chiropractic care on brain function.

SOMATOSENSORY EVOKED POTENTIALS (SSEP)

Sub-Recommendation

Somatosensory evoked potentials may be used for localizing neurological dysfunction associated with vertebral subluxations.

Rating: Established
Evidence: E, L

Somatosensory and dermatomal evoked potentials are used for localizing neurological abnormalities in the peripheral and central conducting pathways. These findings are useful as objective indicators of the level or levels of involvement.(73-86, 154) One study reported that improved nerve root function was observed in subjects who received a high-velocity chiropractic thrust; similar changes were not observed in controls.(73)

SKIN TEMPERATURE INSTRUMENTATION

Sub-Recommendation

Temperature reading devices employing thermocouples, infrared thermometry, or thermography (liquid crystal, telethermography, multiple IR detector, etc.) may be used to detect temperature changes in spinal and paraspinal tissues related to vertebral subluxation.

Rating: Established
Evidence: E, L

The measurement of paraspinal cutaneous thermal asymmetries and other measurements of anomalies have been shown to be a mode of sympathetic nervous system assessment, (88, 90, 91, 93-95, 97-103, 160) which may be used as one indicator of vertebral subluxation. Demonstrable changes in thermal patterns have been observed following chiropractic adjustment.(19, 92) Thermocouple instruments have been shown to demonstrate an acceptable level of reliability and clinical utility applicable to the assessment of vertebral subluxation related temperature changes.(87, 89, 96, 104) Normative data have been collected concerning the degree of thermal asymmetry in the human body in healthy subjects.(105) These values may serve as one standard in the assessment of sympathetic nerve function and the degree of asymmetry as a quantifiable indicator of possible dysfunction.(106)

SURFACE ELECTROMYOGRAPHY

Sub-Recommendation

Surface electrode electromyography, using hand-held electrodes, or affixed electrodes, may be used for recording changes in the electrical activity of muscles associated with vertebral subluxations.

Rating: Established
Evidence: E, L, C

Surface electromyographic techniques using both hand-held electrodes and affixed electrodes have demonstrated an acceptable level of reliability for general clinical usage.(107-112, 114-121, 129-136, 159) Other studies have demonstrated that significant changes in muscle electrical activity occur following adjustment or spinal manipulation.(111, 113, 126, 136) Protocols and normative data for paraspinal EMG scanning in chiropractic practice have been published.(122-125, 127-128) Surface EMG techniques may be used to assess changes in paraspinal muscle activity associated with vertebral subluxation and chiropractic adjustment.

MUSCLE STRENGTH TESTING

Sub-Recommendation

Muscle strength testing may be used to determine bilateral differences or other differences in patient resistance. These differences may be characterized by the experienced examiner based on various technologies. Manual, mechanized and computerized muscle testing may be used to determine changes in the strength and other characteristics of muscles. These changes may be a result of alterations of function at various levels of the neuromuscular system and/or any other system related to the patient. Such changes may be associated with vertebral subluxation.

Rating: Established
Evidence: E, L

Muscle testing as a means of evaluation and diagnosis of patients within chiropractic as well as other disciplines, is well documented.(146-153, 155-158, 163-177) Muscle testing techniques may be used to assess the effect of vertebral subluxation on various aspects of muscle strength. Research has shown manual muscle testing to be sufficiently reliable for clinical practice. (148, 149, 153, 156, 169, 170, 171, 175) Studies concerning manual muscle testing have also demonstrated electromyographic differences associated with various muscle weaknesses, and differences in somatosensory evoked potentials associated with weak versus strong muscles.(146,

147) Other studies have demonstrated the clinical utility and reliability of hand-held muscle strength testing devices.(151, 152, 157, 172)

QUESTIONNAIRES

Sub-Recommendation

Questionnaires may be used in the assessment of the performance of activities of daily living, pain perception, patient satisfaction, general health outcomes, patient perception outcomes, mental health outcomes, and overall quality of life, throughout a course of chiropractic care. Questionnaires provide important information, but should not be used as a substitute for physical indicators of the presence and character of vertebral subluxations.

Rating: Established
Evidence: E, L

There are a variety of questionnaires of demonstrated reliability and validity which may be used to document outcomes,(178-203) including pain and symptoms, although these are not necessary correlates of vertebral subluxation. However, correction of vertebral subluxation and reduction of the abnormal spinal and general functions associated with it may be accompanied by reduction or elimination of pain and symptoms. It must be emphasized that the clinical objective of chiropractic care is the correction of vertebral subluxations. No questionnaires exist which assess the presence or correction of vertebral subluxation. Therefore, it is inappropriate to employ questionnaires to determine the need for chiropractic care, but questionnaires are appropriate as one aspect of monitoring patient progress and the effectiveness of subluxation-based care.

References

1. Vernon H. An assessment of the intra- and inter-reliability of the posturometer. J Manipulative Physiol Ther 1983; 6(2):57-60.

2. Pearsall DJ, Reid JG, Hedden, DM. Comparison of three noninvasive methods for measuring scoliosis. Phys Ther 1992; 72(9):648-57.

3. Adams A, Loper D, Willd S, et al. Intra- and inter-examiner reliability of plumb line posture analysis measurements using a 3-dimensional electrogoniometer. Res For 1988; 4(3):60-72.

4 Amendt LE, Ause-Ellias KL, Eybers JL, Wadsworth CT, Nielsen DH, Weinstein SL. Validity and reliability testing of the scoliometer. Phys Ther 1990; 70(2):108-17.

5. Johnson GM: The correlation between surface measurement of head and neck posture and the anatomic position of the upper cervical vertebrae. Spine 1998; 23(8):921.

6. Korovessis PG, Stamatakis MV. Prediction of scoliotic Cobb angle with the use of the scoliometer. Spine 1996; 21(14):1661-6.

7. Grossman TV, Mazur JM, Cummings RJ. An evaluation of the Admas forward bend test and the scoliometer in a scoliosis school screening setting. J Pediatr Orthop 1995; 15(4):535-8.

8 Murrell GA, Coonrad RW, Moorman CT, 3d, Fitch RD. An assessment of the reliability of the scoliometer. Spine 1993; 18(6):709-12.

9. Thomas E, Silman AJ, Papageorgiou AC, et al. Association between measures of spinal inability and low back pain: An analysis of new attenders in primary care. Spine 1998; 23(3):343-347.

10. Chernuckha KU, Daffner RH, Reigel DH. Lumbar lordosis measurement. A new method versus Cobb technique. Spine 1998; 23(1):74-78.

11. Haas M, Nyiendo J, Peterson C, et al. Interrater reliability of roentgenological evaluation of the lumbar spine in lateral bending. J Manipulative Physiol Ther 1990; 13(4):179-183.

12. Owens E, Leach R. Changes in cervical curvature determined radiographically following chiropractic adjustment. Proceedings of the 1991 International Conference on Spinal Manipulation. April 12, 1991, Arlington, VA. Foundation for Chiropractic Education and Research.

13. Plaugher G, Cremata E, Phillips R. A retrospective consecutive case analysis of pretreatment and comparative static radiological parameters following chiropractic adjustments. J Manipulative Physiol Ther, 1990; 13(9):498-503.

14. Seemann DC. Bilateral weight differential and functional short leg: An analysis of pre and post data after reduction of an atlas subluxation. Chiropractic Research Journal 1993; 2(3):33-38.

15. Lawrence D. Lateralization of weight in the presence of structural short leg: A preliminary report. J Manipulative Physiol Ther 1984; 7(2):105-108.

16. Seeman D. A comparison of weight differential between a group that had a history of spinal problems or had been under care and a group that had neither a history of spinal problems or had been under care and a group that had neither a history of spinal problems nor been under care. Upper Cervical Monograph 1991; 5(2):17-19.

17. Herzog W, Nigg BM, Read LJ, Olsson E. Asymmetries in ground reaction force patterns in normal human gait. Med Sci Sports Exerc 21(1):110, 1989.

18. Vernon H, Grice A. The four-quadrant weight scale: A technical and procedural review. J Manipulative Physiol Ther 3:165, 1984.

19. Brand N, Gizoni C. MoirŽ contourography and infrared thermography: Changes resulting from chiropractic adjustments. J Manipulative Physiol Ther 1982; 5:113-116.

20. Laulund T, Sojbjerg J, Horlyck E. MoirŽ topography in school screening for structural scoliosis. ACTA Orthop Scand 1982; 53:765-768.

21. Ruggerone M, Austin J. MoirŽ topography in scoliosis: correlations with vertebral lateral curvature as determined by radiography. Phys Ther 1986; 66(7):1072-1077.

22. Spector B, Finando S, Fukuda F, Wilson S. An integrated video biofeedback/MoirŽ system for diagnosis and treatment: A preliminary report. J Manipulative Physiol Ther 3(4):220, 1980.

23. Spector B, Eilbert L, Fukuda F, Nystrom K. Development and application of spec-eil indices for quantitative analysis in moirŽ contourography. J Manipulative Physiol Ther 2(1): 16, 1979.

24. Van Wijk, M. MoirŽ ContourgraphÑAn accuracy analysis. Am Chiro 1981; 64-69.

25. Daruwalla J, Balasubramaniam P. MoirŽ topography in scoliosisÑits accuracy in detecting the site and size of the curve. J Bone Joint Surg 1985; 67:211-213

26. Denton T, Randall F, Deinlein D. The use of instant moirŽ photographs to reduce exposure from scoliosis radiographs. Spine 1992; 17(5):509-512.

27. East A, Kwan W. The application and validity of moirŽ topography in the screening of scoliosis. Eur J Chiro 1985; 33(2):108-130.

28. Eilbert L, Spector B. The moirŽ contourographic analysis controversy: a question of validity in present-day clinical practice. J Manipulative Physiol Ther 1979; 2:85.

29. El-Sayyad M. Comparison of roentgenography and moirŽ topography for quantifying spinal curvature. Phys Ther 1986; 66(7):1078-1082.

30. Sahlstrand T. The clinical value of moirŽ topography in the management of scoliosis. Spine 1986; 11:409-417.

31. Spector B, Finando S, Fukuda F, et al. An integrated video biofeedback/moirŽ system for diagnosis and treatment: a preliminary report. J Manipulative Physiol Ther 1980; 3(4):220-224.

32. Spector B, Fukuda F, Krammer L, et al. A preliminary integrated video biofeedback/moirŽ system. Am Chiro 1981; 14, 19.

33. Tibbles A, Belanger M, Grinder L, et al. MoirŽ topography in scoliosis screening: a study of the precision of the method. Proc of the Int'l Conf on Spinal Manip 1991; 43-44.

34. Stude D, Goertz C, Gallinger M. Inter- and intra-examiner reliability of a single, digital inclinometric range of motion measurement technique in the assessment of lumbar range of motion. J Manipulative Physiol Ther 1994; 17(2):83-87.

35. Lea, RD, Gerhardt JJ. Current Concepts Review: Range-of-Motion Measurements. J Bone Joint Surg, Vol 77-A(5):784-798, 1995.

36. Gerhardt, JJ, Rippstein JR: Measuring and Recording of Joint Motion. Instrumentation and Techniques. Toronto, Hogrefe and Huber, 1990.

37. Gerhardt, JJ. Documentation of Joint Motion. Revised ed. 4. Portland, Oregon, Isomed, 1994.

38. Petherick M, Rheault W, Kimble S, Lechner C, Senear V. Concurrent validity and intertester reliability of universal and fluid-based goniometers for active elbow range of motion. Phys Ther 58:996-969, 1988.

39. Asmussen E, Heeboll-Nielsen K. Posture, mobility and strength of the back in boys, 7 to 16 years old. Acta Orthop Scand, 28: 174-189, 1959.

40. Keeley J, Mayer TG, Cox R, Gatchel RJ, Smith J, Mooney V. Quantification of lumbar function. Part 5: Reliability of range-of-motion measures in the sagittal plane and an in vivo torso rotation measurement technique. Spine, 11:31-35, 1986.

41. Loebl WY. Measurement of spinal posture and range of spinal movement. Ann Phys Med, 9:103-110, 1967.

42. Mayer TG. Rehabilitation of the patient with spinal pain. Orthop. Clin. North America, 14:623-637, 1983.

43. Mayer TG, Tencer AE, Kristoferson S, Mooney V. Use of noninvasive techniques for quantification of spinal range-of-motion in normal subjects and chronic low-back dysfunction patients. Spine, 9:588-595, 1984.

44. Portek L, Pearcy MJ, Reader GP, Mowat AG. Correlation between radiographic and clinical measurement of lumbar spine movement. British J Rheumatol., 22:197-205, 1983.

45. Reynolds PM. Measurement of spinal mobility: a comparison of three methods. Rheumat. and Rehab., 14:180-185, 1975.

46. Schober, VP. Lendenwirbelsaule und Kreuzschmerzen. Munchener med. Wochenschr., 84:336-338, 1937.

47. Tichauer, ER, Miller M, Nathan IM. Lordosimetry: a new technique for the measurement of postural response to materials handling. Am Indust Hyg Assn J, 34:1-12, 1973.

48. Troup JD, Hood CA, Chapman AE. Measurements of the sagittal mobility of the lumbar spine and hips. Ann Phys Med, 9:308-321, 1968.

49. Twomey LT, Taylor JR. Sagittal movements of the human lumbar vertebral column: a quantitative study of the role of the posterior vertebral elements. Arch Phys Med and Rehab, 64:322-325, 1983.

50. Kao MJ, Liao WS, Chen CY, Lai CL, Lien IN. Validity and reliability of measurement in the range of neck motion. Read at the Fifth General Assembly of the Asian Confederation for Physical Therapy, Taipei, Taiwan, Sept. 22, 1993.

51. Mayer TG, Tencer AF, Kristoferson S, Mooney V. Use of noninvasive techniques for quantification of spinal range-of-motion in normal subjects and chronic low-back dysfunction patients. Spine, 9:588-595, 1984.

52. Ebrall P. An estimation of the clinical error for the Metrecom computer-assisted goniometer. Chiropractic Technique 5 (1):1, 1993.

53. Ebrall P, Alevaki H, Cust S, Roberts N. An estimation of the measurement error of the Metrecom for computation of sagittal spinal angles. Chiropractic Technique 5 (3):104, 1993.

54. Chiarello C, Savidge R. Interrator reliability of the Cybex EDI-320 and fluid goniometer in normals and patients with low back pain. Archives of Physical Medicine and Rehabilitation 74: 32, 1993.

55. Dotson, LR, Luithens CA. A Comparison Between a Standard Manual Goniometer and the Metrecom Skeletal Analysis System. Presented at the South Florida Physical Therapy Association Meeting, North Miami Beach, FL, 1988.

56. Mior S, Clements D. A Comparison of X-Ray and Electrogoniometric Derived Cobb Angles: A Feasibility Study. Proc of the Int'l Conf on Spinal Manip 1992; 115.

57. Gill K, Krag MH, Johnson GB, Haugh LD, Pope MH. Repeatability of four clinical methods for assessment of lumbar spinal motion. Spine, 13:50-53, 1988.

58. American Medical Association: Guides to the Evaluation of Permanent Impairment. Ed. 4. Chicago, American Medical Association, 1993.

59. Ebrall P. An estimation of the clinical error for the Metrecom computer-assisted goniometer. Chiropractic Technique 1993; 5(1):1-4.

60. Waddell G, Somerville D, Henderson I, Newton M. Objective clinical evaluation of physical impairment in chronic low back pain. Spine, 17:617-628, 1992.

61. Gerhardt JJ. Measurements of ranges of motion and strength in evaluation of impairment. J Disabil 3:121-141, 1993.

62. Wallace H, Jahner S, Buckle K, Desai N. Correlation of the algometer neck disability index visual analog scale and the cervical spine curve in neck pain patients. J Manipulative Physiol Ther 17(4):292, 1994.

63. Fischer A. Application of pressure algometry in manual medicine. Manual Medicine 5 (4):145, 1990.

64. Reeves J, Jaeger B, Graff-Radford S. Reliability of the pressure algometer as a measure of myofascial trigger point sensitivity. Pain 24:313, 1986.

65. Fisher, AA. Pressure Algometry Over Normal Muscles: Standard Values, Validity and Reproducibility of Pressure Threshold. Pain 1989; 1:115-126.

66. Vernon H, Gitelman R. Pressure Algometry and Tissue Compliance Measures in the Treatment of Chronic Headache by Spinal Manipulation: A Single Case/Single Treatment Report. J Can Chiro Assoc 1990; 34(3):141-144.

67. Hill RS, Lawrence A. Current perception threshold and evaluating foot pain. Two case presentations. J Am Podiatr Med Assoc 81 (3):150, 1991.

68. Katims JJ, Rouvelas P, Sadler BT, Weseley SA. Current perception threshold. Reproducibility and comparison with nerve conduction in evaluation of carpal tunnel syndrome. ASAIO Trans 35(3):280, 1989.

69. Pitei DL, Watkins PJ, Stevens MJ, Edmonds ME. The value of the neurometer in assessing diabetic neuropathy by measurement of the current perception threshold. Diabet Med 11(9):872, 1994.

70. Katims JJ, Patil AS, Rendell M, et al. Current perception threshold screening for carpal tunnel syndrome. Archives of Environmental Health 46(4):207, 1991.

71. Vernon H, Aker P, Buns S, et al. Pressure pain threshold evaluation of the effect of a spinal manipulation in the treatment of chronic neck pain. J Manipulative Physiol Ther 13(1):13, 1990.

72. Hospers L. EEG and CEEG studies before and after upper cervical or SOT category II adjustment in children after head trauma in epilepsy and in hyperactivity. Proceedings of the National Conference on Chiropractic and Pediatrics. November of 1992, 84-139.

73. Capria MP. Somatosensory neurological evaluation of chiropractic manipulation. Chiropractic: J Chiro Research and Clinical Investigation 6(3):56, 1990.

74. Collins K, Pfleger B. The neurophysiological evaluation of the subluxation complex: Documenting the neurological component with somatosensory evoked potentials. Chiropractic Research Journal 3(1):40, 1994.

75. Glick D, Lee F, Grostic J. Documenting the efficacy of chiropractic care utilizing somatosensory evoked potential testing. Proc of the Int'l Conf on Spinal Manip 1993, 82.

76. Grostic JD, Glick DM, Burke E, Sheres B. Chiropractic adjustment reversal of neurological insult: A Preliminary Report. Proc of the Int'l Conf on Spinal Manip 1992.

77. Collins KF, Pfleger B. The neurophysiological evaluation of the subluxation complex: Documenting the neurological component with somatosensory evoked potentials. Chiropractic Research Journal, 1994; 3(1):40-48.

78. Collins KF, Pfleger B. Significance of functional leg length inequality upon somatosensory evoked potential findings. Eleventh Annual Upper Cervical Spine Conference, Life College, 1994.

79. Grostic JD. Somatosensory evoked potentials in chiropractic research. Today's Chiropr, 56-58, 90.

80. Bamford C, Graeme K. Percutaneous S1 root somatosensory evoked potential. Electromyogr Clin Neurophysiol 1995; 35:181-186.

81. Chistyakov A, Soustiel J, Hafner H, et al. Motor and somatosensory conduction in cervical myelopathy and radiculopathy. Spine 1995; 20(19):2135-3140.

82. Glick D. Characterization of neurological insult in the low back utilizing somatosensory evoked potential studies. Proc of the Int'l Conf on Spinal Manip 1994; 17.

83. Kai Y, Owen J, Allen B, et al. Relationship between evoked potentials and clinical status in spinal cord ischemia. Spine 1994; 19(10):1162-1168.

84. Leppanen R, Maguire J, Wallace S, et al. Intraoperative lower extremity reflex muscle activity as an adjunct to conventional somatosensory-evoked potentials and descending neurogenic monitoring in idiopathic scoliosis. Spine 1995; 20(17):1872-1877.

85. Swenson R. Dermatomal somatosensory evoked potentials: A review of the literature. Journal of the Neuromusculoskeletal System 1994; 2(2):45-51.

86. Zhu Y, Hsieh C, Haldeman S, et al. Paraspinal muscle somatosensory evoked potentials in low back pain patients with muscle spasm: A quantitative study of the effect of spinal manipulation. Proc of the Int'l Conf on Spinal Manip 1994; 16.

87. Wallace H, Wallace J, Resh R. Advances in paraspinal thermographic analysis. Chiropractic Research Journal 2(3):39, 1993.

88. Abernathy M, Uematsu S. Medical Thermology. American Academy of Thermology, Georgetown University Medical Center, Washington, D.C.

89. Diakow, PRP. The status of thermography as a diagnostic tool. J Manipulative Physiol Ther 1990; 13(2):121.

90. Stewart MS, Riffle DW, Boone WR. Computer-aided pattern analysis of temperature differential. J Manipulative Physiol Ther. 1989; 12(5):345.352.

91. Hart J. Skin temperature patterns of the posterior neck used in chiropractic analysis- a case study. Chiropractic 1991; 7(2):46-48.

92. Hilliard K. Thermographic assessment of a toggle recoil adjusting treatment program. Proc of the Int'l Conf on Spinal Manip 1992; 117-118.

93. Erball P, Iggo A, Hobson P, et al. Preliminary report: The thermal characteristics of spinal levels identified as having different temperature by contact thermocouple measurement (Nervo Scope). Chiro J Aust 1994;24(4):139.

94. Kobrossi T. L5 and S1 nerve fiber irritation demonstrated by liquid crystal thermography-a case report. JCCA 1985; 29:199-202.

95. Schram S, Hosek R, Owens E. Computerized paraspinal skin surface temperature scanning: A technical report. J Manipulative Physiol Ther 1982; 5(3):117-121.

96. Pierce W, Stillwagon G. Charting and interpreting skin temperature differential patterns. Digest of Chiro Econ 1970; 12(5):37-9.

97. Fitzgerald P. Skin temperature patterns of the posterior neck used in chiropractic analysis. Chiropractic 1992; 8(1):1.

98. Hart J. Skin temperature patterns of the posterior neck used in chiropractic analysis. Chiropractic 1991; 7(2):46-48.

99. BenEliyahu DJ. Thermographic imaging of pathoneurophysiology due to cervical disc herniation. J Manipulative Physiol Ther 1989; 12:482-490.

100. Meeker W, Gahlinger P. Neuromuscular thermography: A valuable diagnostic tool? J Manipulative Physiol Ther 1986; 9:257-266.

101. Plaugher G. Skin temperature assessment for neuromuscular abnormalities of the spinal column: A review. Proc 6th Annual Conf on Research and Education, 1991.

102. Stillwagon G, Dalesio D. Chiropractic thermography. ICA Intl Rev Chiro 8-17, 1992.

103. Chafetz N, Wexler CE, Kaiser JA. Neuromuscular thermography of the lumbar spine with CT correlation. Spine 1988; 13:922-925.

104. Plaugher G, Lopes M, Melch P, et al. The inter- and intraexaminer reliability of a paraspinal skin temperature differential instrument. J Manipulative Physiol Ther 1991; 14(6):361-367.

105. Uematsu S. Symmetry of skin temperature comparing one side of the body to the other. Department of Neurosurgery, Johns Hopkins University School of Medicine, Baltimore, MD.

106. Uematsu S. Thermographic imaging of cutaneous sensory segment in patients with peripheral nerve injury. J Neurosurg 1985; 62:716-720.

107. Komi P, Buskirk E. Reproducibility of electromyographic measurements with inserted wire electrodes and surface electrodes. Electromyography 1970; 10:357.

108. Marcarian D. Factors influencing the SEMG's potential for continued future use. Transactions of the Consortium for Chiropractic Research 1993; 8:51-52.

109. Meyer J. The current status on validity of thoracolumbar paraspinal scanning EMG as a diagnostic test: A literature review. Transactions of the Consortium for Chiropractic Research 1993; 8:21-47.

110. Meyer J. The validity of thoracolumbar paraspinal scanning EMG as a diagnostic test: An examination of the current literature. J Manipulative Physiol Ther 1994; 17(8):539-551.

111. Myerowitz M. Scanning paraspinal Surface EMG: A method for corroborating post-treatment spinal and related neuromusculoskeletal symptom improvement. Journal of Occupational Rehabilitation 1994; 4(3):171-179.

112. Papakyriakou M, Triano J. Effects of filtering on the evaluation of surface EMG signals. Proc of the Int'l Conf on Spinal Manip 1993; 84.

113. Shambaugh P. Changes in electrical activity in muscles resulting from chiropractic adjustment: A Pilot Study. J Manipulative Physiol Ther 1987; 10(6):300-304.

114. Spector B. Surface electromyography as a model for the development of standardized procedures and reliability testing. J Manipulative Physiol Ther 1979; 2:214-222.

115. Triano J. Surface electrode EMG/lumbar spine: static paraspinal EMG scanning-clinical utility and validity issues. Transactions of the Consortium for Chiropractic Research 1993; 8:53-58.

116. Triano J. The validity of thoracolumbar paraspinal scanning EMG as a diagnostic test: examination of the current literature. J Manipulative Physiol Ther 1995; 18(7):482-483.

117. Ahern D, Follick M, Council J, et al. Reliability of lumbar paravertebral EMG assessment in chronic low back pain. Arch Phys Med Rehab 1986; 67:762.

118. Gentempo P, Kent C. Establishing medical necessity for paraspinal EMG scanning. Chiropractic: J Chiro Research and Clinical Investigation 1990; 3(1):22.

119. Gentempo P. Evaluating soft tissue injuries with electromyography-case studies. Today's Chiro 1988; 83.

120. Kent C, Fitzsimons W. Admissibility of electromyographic findings in personal injury cases, Digest Chiro Econ 1988; 30(5):43-46.

121. Kent C, Gentempo P. Medical evidence of soft tissue injury: legal aspects of paraspinal EMG findings. Am Chiro 1990; 12(12):10-15.

122. Kent C, Gentempo P. Protocol and normative data for paraspinal EMG scanning in chiropractic practice. Chiropractic: J Chiro Research and Clinical Investigation 1990; 6(3):64.

123. Kent C, Hyde R. Potential applications for electromyography in chiropractic practice. Digest Chiro Econ 1987; 30(2):20-25.

124. Kent C. Surface electrode EMG/lumbar spine. Transactions of the Consortium for Chiropractic Research 1993; 8:48.

125. Thompson D, Biederman H. Electromyographic power spectrum analysis of the paraspinal muscles. Spine 1993; 18(15):2310-2313.

126. Kent C. Surface electromyography in the assessment of changes in paraspinal muscle activity associated with vertebral subluxation: A review. Journal of Vertebral Subluxation Research. 1997; 1(3):15-22.

127. Miller EB, Redmond PD. Changes in digital skin temperature, surface electromyography, and electrodermal activity in subjects receiving network spinal analysis care. Journal of Vertebral Subluxation Research. 1998; 2(2):14-21.

128. Kent C, Gentempo P. Normative data for paraspinal surface electromyographic scanning using a 25-500 Hz band pass. Journal of Vertebral Subluxation Research, 1996; 1(1):43.

129. Giroux B, Lamontagne M. Comparisons between surface electrodes and intramuscular wire electrodes in isometric and dynamic conditions. Electromyogr Clin Neurophysiol 1990; 30:397.

130. Andersson G, Johnson B, Ortengren R. Myoelectric activity in individual lumbar erector spinal muscles in sitting. A study with surface and wire electrodes. Sc and J Rehab Med 1974; Suppl; 3:91.

131. Thompson J, Erikson R, Offord K. EMG muscle scanning: stability of hand-held electrodes. Biofeedback Self Requl 1989; 14(1):55.

132. Cram JR, Lloyd J, Cahn TS. The reliability of EMG muscle scanning. Int J Psychosomatics 1994; 41:41.

133. Boline P, Haas M, Meyer J, et al. Interexaminer reliability of eight evaluative dimensions of lumbar segmental abnormality: Part II. J Manipulative Physiol Ther 1993; 16(6):363-374.

134. Cram JR. Letter to the editor regarding interexaminer reliability of eight evaluative dimensions of lumbar segmental abnormality: Part II J Manipulative Physiol Ther 1994; 17(4):263.

135. Kent C, Gentempo P. Letter to the editor regarding Interexaminer reliability of eight evaluative dimensions of lumbar segmental abnormality: Part II J Manipulative Physiol Ther 1994; 17(7):495.

136. Ellestad S, Nagel R, Boesler D, et al. Electromyographic and skin resistance responses to osteopathic manipulative treatment for low-back pain. JAOA 1988; 88(8):991.

137. Katims JJ, Naviasky EH, Rendell MS, Ng LK, Bleecker ML. Constant current sine wave transcutaneous nerve stimulation for the evaluation of peripheral neuropathy. Arch Phys Med Rehabil. 1987; 68(4):210-3.

138. Evans ER, Rendell MS, Bartek JP, Bamisedun O, Connor S, Giitter M. Current perception thresholds in ageing. Age Ageing. 1992; 21(4):273-9.

139. Weseley SA, Sadler B, Katims JJ. Current perception: preferred test for evaluation of peripheral nerve integrity. ASAIO Trans. 1988; 34(3):188-93.

140. Katims JJ, Naviasky EH, Ng LK, Rendell M, Bleecker ML. New screening device for assessment of peripheral neuropathy. J Occup Med. 1986; 28(12):1219-21.

141. Masson EA, Beves A, Fernando D, et al. Current perception threshold: A new quick and reproducible method for the assessment of peripheral neuropathy in diabetes mellitus. Diabetologia 1989; 32:724-728.

142. Vatine JJ, Shapira SC, Magora F, Adler D, Magora A. Electronic pressure algometry of deep pain in healthy volunteers. Arch Phys Med Rehabil. 1993; 74(5):526-30.

143. Sandrini G, Antonaci F, Pucci E, Bono G, Nappi G. Comparative study with EMG, pressure algometry and manual palpation in tension-type headache and migraine. Cephalalgia. 1994; 14(6):451-7; discusson 394-5.

144. Kosek E, Ekholm J, Nordemar R. A comparison of pressure pain thresholds in different tissues and body regions. Long-term reliability of pressure algometry in healthy volunteers. Scand J Rehabil Med. 1993; 25(3):117-24.

145. Hogeweg JA, Langereis MJ, Bernards AT, Faber JA, Helders PJ. Algometry. Measuring pain threshold, method and characteristics in healthy subjects. Scand J Rehabil Med. 1992; 24(2):99-103.

146. Teisman G, Ferentz A, Zenhausern R, Tefera T, Zemoov A. Electromyographic effects of fatigue and task repetition on the validity of strong and weak muscle estimates in applied kinesiology muscle testing procedures: Perceptual and Motor Skills. 1995; 80:963-977.

147. Teisman G, Schambaugh P, Ferentz A. Somatosensory evoked potential changes during muscle testing. Intern J Neuroscience. 1989; 45:143-151.

148. Perot G, Meldener R, Goubol F. Objective measurement of proprioceptive technique consequences on muscular maximal voluntary contraction during manual muscle testing. Agressologic (French). 1991; 32(10):471-474.

149. Lawson A, Calderon I. Interexaminer reliability of applied kinesiology manual muscle testing. Perceptual and Motor Skills. 1997; 84:539-546.

150. Bender WL, Kaplan CM. The effectiveness of isometric testing as diagnostic aid: A hospital study. Journal of the Association for Physical and Mental Rehabilitation. 1962; 16:137-139.

151. Bohannan RW. Hand-held dynamometry: stability of music strength over multiple measurements. Clin Biomech 1986; 2:74.

152. Byl NN, Richards S, Asturias J. Intrarater and interrater reliability of strength measurements of the biceps and deltoid using a hand held dynamometer. J Orthop Sports Phys Ther 1988; 9:399.

153. Frese E, Brown M, Norton B. Clinical reliability of manual muscle testing. Middle trapezius and gluteus medius muscles. Phys Ther 1987; 67(7):1072-1076.

154. Glick DM, Lee F. Differential diagnostic somatosensory evoked potentials. Chiropractic Research Journal 1991; 2(2):38.

155. Hsieh J, Gilbertson K. Reliability of mean power frequency and median power frequency in bilateral upper trapezius isometric work. Proc of the Int'l Conf on Spinal Manip 1993; 21.

156. Saraniti AJ, Gleim GW, Melvin M, et al. The relationship between subjective and objective measurements of strength. J Orthop Sports Phys Ther 1980; 2:15.

157. Silverman JL, Rodriquez AA, Agre JC. Reliability of hand-held dynanometer in neck strength testing. Arch Phys Med Rehab 1989; 70(Suppl):94.

158. Hseih J, Phillips R. Reliability of manual muscle testing with a computerized dynamometer. J Manipulative Physiol Ther 1990; 13(2):72.

159. Thabe J. Electromyography as a tool to document diagnostic findings and therapeutic results associated with somatic dysfunction in the upper cervical spinal joints and sacro-iliac joints. Manual Med 1986; 2:53-58.

160. Wexler C, Small R. Thermographic demonstration of a sensory nerve deficit: A case report. Journal of Neurological and Orthopaedic Surgery 1981; 3(1).

161. Dretakis E, Paraskevaidis C, Zarkadoulas V, Christodoulou N. Electroencephalographic study of schoolchildren with adolescent idiopathic scoliosis. Spine. 1988; 13:143-5.

162. Carrick FR. Changes in brain function after manipulation of the cervical spine. J Manipulative Physiol Ther, 1997; 8:529-545.

163. Bonci A, Ratliff C. Strength modulation of the biceps brachii muscles immediately following a single manipulation of the C4/5 intervertebral motor unit in healthy subjects: preliminary report. Am J Chiro Med 1990; 3(1):14-18.

164. Brodie D, Callaghan M, Green A. Ergotest 2000 - a new device for muscle testing and rehabilitation Physiotherapy 1990; 76(7):412-415.

165. Bussieres A, Mior S, Frazer M, et al. Cervical motion and muscle strength measurements: A comparative study of symptom free and neck pain subjects. Proc of the Int'l Conf on Spinal Manip 1994; 110-111.

166. Chapman, S. Isokinetics: muscle testing, interpretation and clinical applications. J Manipulative Physiol Ther 1995; 18(6):424-425.

167. Finucane S, Walker M, Rothstein J, et al. Reliability of isometric muscle testing of knee flexor and extensor muscles in patients with connective tissue disease. Phys Ther 1988; 68(3):338-343.

168. Grossi J. Effects of an applied kinesiology technique on quadriceps femoris muscle isometric strength. Phys Ther 1981; 61:1011-1016.

169. Haas M, Peterson D, Hoyer D, et al. Muscle testing response to provocative vertebral challenge and spinal manipulation: A randomized controlled trial of construct validity. J Manipulative Physiol Ther 1994; 17(3):141-148.

170. Hsieh C, Phillips R. Reliability of manual muscle testing with a computerized dynamometer. J Manipulative Physiol Ther 1990; 13(2):72-82.

171. Hyytiainen K, Salminen J, Suvitie T, et al. Reproducibility of nine tests to measure spinal mobility and trunk muscle strength. Scand J Rehabil Med 1991; 23:3-10.

172. Mannello D, Sanders G, Kavalin J. The ability of the Dynatron 2000 to detect effort level. J Manipulative Physiol Ther 1991; 13(2):122.

173. Newton M, Waddell G. Trunk strength testing with iso-machines: Part 1: Review of a decade of scientific evidence. Spine 1993; 18(7):801-811.

174. Vernon H, Aker P, Aramenko M, et al. The use of a modified sphygmomanometer dynamometer in isometric strength tests in the neck: Reliability and normative data. Proc of the Int'l Conf on Spinal Manip 1990; 170-173.

175. Vernon H, Aker P, Menko M, et al. Evaluation of neck muscle strength with a modified sphygmomanometer dynamometer: Reliability and Validity. J Manipulative Physiol Ther 1992; 15(6):343-349.

176. Vernon H. Sincerity of effort in neck muscle strength testing - An analogue study. Proc of the Int'l Conf on Spinal Manip 1992; 82-83.

177. Westers B. Factors influencing strength testing and exercise prescription. Physiotherapy 1982; 68(2):42-44.

178. McDowell J, Newell C. Measuring health: A guide to rating scales and questionnaires. 1st ed. New York: Oxford University Press, 1996.

179. Tennant A, Badley E. A confidence interval approach to investigating non-response bias and monitoring response to postal questionnaires. Journal of Epidemiology and Community Health 1991; 45:81-85.

180. Tennant A, Badley E. Investigating non-response bias in a survey of disablement in the community: implications for survey methodology. Journal of Epidemiology and Community Health 1991; 45:247-250.

181. Diener E, Suh E, Smith H, et al. National differences in reported subjective well-being: Why do they occur? Social Indicators Research 1995; 34:7-32.

182. Torrance G. Utility approach to measuring health-related quality of life. J Chron Dis 1987; 40(6):593-600.

183. Grant M, Ferrell B, Schmidt GM, et al. Measurement of quality of life in bone marrow transplantation survivors. Quality of Life Research 1992; 1:375-384.

184. Wilson I, Cleary P. Linking clinical variables with health-related quality of life. A conceptual model of patient outcome. JAMA1995; 273(1):59-65.

185. Kenney J. The consumer's views of health. Journal of Advanced Nursing 1992; 17(7):829-834.

186. Commentary. Choosing measures of health status for individuals in general populations. AJPH 1981; 71:620-625.

187. Kirshner B, Guyatt Gordon. A methodological framework for assessing health indices. J Chron Dis 1985; 38(1)27-36.

188. Pavot W, Diener E. The affective and cognitive context of self-reported measures of subjective well-being. Social Indicators Research 1993; 28:1-20.

189. Diener E. Assessing subjective well-being: progress and opportunities. Social Indicators Research 1994; 31:103-157.

190. Andersson G, Weinstein J. Introduction: health outcomes related to low back pain. Spine 1994; 19(18S):2026S-7S.

191. Bronfront G. An overview of short multi-dimensional health status outcomes instruments. Northwestern College of Chiropractic.

192. Cherkin DC. Patient satisfaction as an outcome measure. J Chiropracic Tech 1990; 2(3) 138.

193. Haas M, Jacobs G, Raphael R, et al. Responsiveness and applicability of two functional disability questionnaires in the chiropractic teaching clinic setting. Western State College and Cleveland College of Chiropractic.

194. Haas M, Nyiendo J. Diagnostic utility of the McGill Pain Questionnaire and the Oswestry Disability Questionnaire for classification of low back pain syndromes. J Manipulative Physiol Ther 1992; 15(22):90-98.

195. Hagino C, Papernick L. Test-retest reliability of the 'CMCC Low Back Status Questionnaire for Laypersons.' Proc of the Int'l Conf on Spinal Manip A/M 1993; 47.

196. Hains F, Waalen J, Mior S. Psychometric properties of the Neck Disability Index; final results. Proc of the Int'l Conf on Spinal Manip 1994; 8-9.

197. Hawk C, Wallace H, Dusio M. Development of a global well-being scale: A study of reliability, validity and responsiveness. Proc of the Int'l Conf on Spinal Manip 1994; 41-42.

198. Jaeschke R, Singer J, Guyatt G. A comparison of seven-point and visual analog scales: Data from a randomized trial. Controlled Clin Trials 11:43-51, 1990.

199. Lawlis G, Cuencas R, Selby D, et al. The development of the Dallas Pain Questionnaire: An assessment of the impact of spinal pain on behavior. Spine 1989; 14(5)511-516.

200. Love A, Leboeur C, Crisp T. Chiropractic chronic low back pain sufferers and self-report assessment methods. Part I. A reliability study of the visual analogue scale, the pain drawing and the McGill. J Manipulative Physiol Ther 1989; 12(1)21-25.

201. Nylendo J, Haas M, Jones R. Using the SF-36D (General Health Questionnaire) in a pilot study of outcome assessment for low back chiropractic patients. Proc of the Int'l Conf on Spinal Manip FCER, Arlington, VA. 172, 1991.

202. Sawyer, C. Patient satisfaction as a chiropractic research outcome. Proc Int'l Conf on Spinal Manip. FCER, Arlington, VA. 163, 1991.

203. Blanks RHI, Schuster T, Dobson M. A retrospective assessment of Network Care using a survey of self-rated health, wellness and quality of life. Journal of Vertebral Subluxation Research, 1997; 1(4):15-31.

204. Holder JM. New technique introduced. EEG confirms results. ILAC Journal, May 1996: 10.

IV Radiographic and Other Imaging

RECOMMENDATION

Diagnostic imaging procedures may be utilized to characterize the biomechanical manifestations of vertebral subluxation, and to determine the presence of conditions which affect the safety and appropriateness of chiropractic care.

Sub-Recommendation

Plain film radiography is indicated: to provide information concerning the structural integrity of the spine, skull and pelvis; the misalignment component of the vertebral subluxation; the foraminal alteration component of the vertebral subluxation; and the postural status of the spinal column. Imaging procedures, including post-adjustment radiography, should be performed only when clinically necessary. It is common for lines of mensuration to be drawn on radiographs to assess subluxation and alignment. These procedures may be done by hand, or the chiropractor may utilize computerized radiographic digitization procedures.

Rating: Established
Evidence: E, L

Commentary

In considering the use of imaging methods employing ionizing radiation as a component of patient assessment, the clinician should determine if the methods of subluxation correction, patient safety, and management require the use of such procedures. The patient should be asked about any conditions which may contraindicate certain imaging procedures.

Reliability studies of several systems of biomechanical analysis, including radiographic marking systems, have been published. Imaging is a necessary component of a number of different chiropractic analyses. The preponderance of evidence supports the reliability of these procedures when properly performed.(1-8, 12, 15-27, 29-32, 36-39, 42-61, 64-68, 70-79, 153)

Moreover, radiographic imaging has revealed statistically significant changes in the direction of atlas positioning following chiropractic adjustment(s).(14, 28, 33-35, 146-148) The effect of chiropractic care on lateral curvature of the cervical spine has been investigated, with significant changes in the cervical curve noted in patients receiving chiropractic care.(9, 62, 63, 69, 149-152, 156-158)

Sub-Recommendation

Imaging procedures employing ionizing radiation should be performed consistent with the principles of obtaining films of high quality with minimal radiation. This may include the use of gonad shielding, compensating filters, and appropriate film-screen combinations.

Rating: Established
Evidence: E, L

A number of dosimetry studies using supplemental filtration and single-speed screens have revealed that in the case of 14 x 36 inch AP full-spine radiographs, the radiation levels were less than sectional films of like-sized subjects. Shielding of radiosensitive structures may be used when it does not obliterate structures of clinical interest. Such shielding results in a reduction of radiation exposure.(10, 11, 13, 160)

Conclusion

The judicious use of spinographic techniques can be valuable in characterizing aspects of the biomechanical manifestations of vertebral subluxation.(146, 154, 155, 187-193) The use of post-adjustment radiographs may also assist the chiropractor in determining effects of chiropractic adjustments on the spine when other less hazardous examination techniques cannot reveal the desired information.

VIDEOFLUOROSCOPY

Sub-Recommendation

Videofluoroscopy may be employed to provide motion views of the spine when abnormal motion patterns are clinically suspected. Videofluoroscopy may be valuable in detecting and characterizing spinal kinesiopathology associated with vertebral subluxation.

Rating: Established
Evidence: E, L

Commentary

A videofluoroscopic system consists of an x-ray generator capable of operating at low (1/4 to 5) milliamperage settings, an x-ray tube assembly, an image intensifier tube, a television camera, a VCR, and a monitor. The heart of the system is the image intensifier tube. This tube permits imaging at very low radiation levels. It is used instead of intensifying screens and film as a image receptor.

The role of videofluoroscopy in the evaluation of abnormalities of spinal motion has been discussed in textbooks, medical journals, and chiropractic publications.(19, 20, 23, 80-83, 140, 145, 163, 164, 168-170, 172-179, 186, 220) Studies have appeared in the literature comparing the diagnostic yield of fluoroscopic studies versus plain films, as well as reporting abnormalities detected by fluoroscopy which could not be assessed using plain films.(161, 165-167, 171, 180, 183-185)

Reliability has been addressed in a number of studies.(162, 181, 182, 214) Additionally, in a study evaluating the interexaminer reliability of fluoroscopic detection of fixation in the mid-cervical spine, two examiners reviewed 50 videotapes of fluoroscopic examinations of the cervical spine. The examiners achieved 84 percent agreement for the presence of fixation, 96 percent agreement for the absence of fixation, and 93 percent total agreement. The Kappa value was .80 (p .001). The authors concluded, The current data indicate that VF determination of fixation in the cervical spine is a reliable procedure. (181, 214)

Conclusion

Observational and case studies support the use of videofluoroscopy to evaluate vertebral motion when this information cannot be obtained by other means.

Sub-Recommendation

Magnetic Resonance Imaging (MRI)

MR imaging may be employed to assess suspected neoplastic, infectious and degenerative conditions of the spine and related tissues as well as the stages of subluxation degeneration. Its use is generally restricted to instances where the desired information cannot be obtained by less costly procedures.

Rating: Established
Evidence: E, L

Commentary

Magnetic resonance imaging enables clinicians to obtain clear images of the human body without ionizing radiation.

Literature supports the use of MR imaging for the detection and characterization of numerous manifestations associated with subluxation degeneration.(84-107, 141-143, 194-198, 212) These studies cover a spectrum of phenomena, including:

1. Osseous malalignment
2. Intervertebral disc desiccation and degeneration
3. Osteophytosis
4. Corrugation/hypertrophy of the ligamentum flava
5. Spinal canal stenosis
6. Foraminal stenosis
7. Disc herniation and disc bulging
8. Facet asymmetry
9. Facet degeneration
10. Altered cerebrospinal fluid dynamics
11. Cord compression
12. Gliosis and myelomalacia

13. Spinal cord atrophy

Conclusion

MRI may be employed to disclose manifestations of vertebral subluxation when this information cannot be obtained by more cost-effective means. MRI is also appropriate for evaluating patients with clinical evidence of conditions which may affect the safety and appropriateness of chiropractic procedures.

Sub-Recommendation

Computed Tomography (CT)

CT imaging may be employed to assess osseous and soft tissue pathology in the spine and contiguous tissues. Its use is generally restricted to instances where the desired information cannot be obtained by less costly procedures.

Rating: Established
Evidence: E, L

Commentary

Computed tomography (also referred to as CT or CAT scanning) is an imaging technique which produces axial (cross sectional) images of body structures using x-radiation. Computer reconstruction methods may be used to depict other planes.

Manifestations of subluxation degeneration which may be demonstrated by CT scanning include disc lesions, spinal canal stenosis due to infolding of the ligamentum flava, osteophytosis, and bony sclerosis.(108-139, 144, 199-201, 210, 211, 213, 220) In addition, CT may be used to evaluate developmental variance and pathologies which could affect the chiropractic management of a case.

Conclusion

CT may be employed to disclose manifestations of vertebral subluxation when this information cannot be obtained by more cost-effective means. CT is also appropriate for evaluating patients with clinical evidence of conditions which may affect the safety and appropriateness of chiropractic procedures, particularly fractures, degenerative changes, and osseous pathology.

Sub-Recommendation

Spinal Ultrasonography

Spinal ultrasonography may be used to evaluate the size of the spinal canal, and to detect pathology in the soft tissues surrounding the spine. Its applications in the assessment of the facet inflammation and nerve root inflammation remain investigational at this time.

Ratings: Established for determining spinal canal size.
Investigational for facet and nerve root inflammation.
Evidence: E, L

Commentary

Sonographic imaging is a technique which utilizes echoes from ultrasonic waves to produce an image on a cathode ray tube.

Sonographic techniques have been employed to measure the lumbar canal, as well as determining focal stenosis and disc disease.(202-209, 221, 222)

A small study compared sonographic results in patients with back pain previously examined by MRI, x-ray and standard orthopedic examination. The study concluded that the correlation with MRI, x-ray, orthopedic and neurologic examination was approximately 90 percent.(207)

Conclusion

The low cost, availability, ease of application, and noninvasive nature of sonographic imaging make it an attractive addition to the chiropractor's armamentarium. Furthermore, it has the potential to image various components of the vertebral subluxation. However, caution must be exercised in evaluating the claims of promoters of sonographic equipment, particularly those relating to the assessment of nerve root inflammation or facet joint disease. Further research toward the establishment of chiropractic protocols should be undertaken to explore the clinical utility of spinal sonography in chiropractic practice.

Sub-Recommendation

Radioisotope Scanning (Nuclear Medicine Studies)

Radioisotope scans performed by qualified medical personnel may be used by a chiropractor to determine the extent and distribution of pathological processes which may affect the safety and appropriateness of chiropractic care when this information cannot be obtained by less invasive means.

Rating: Established
Evidence: E, L

Commentary

In this procedure, bone-seeking radioisotopes are injected, and an image is produced demonstrating the degree of uptake of the radioisotopes. The examination is sensitive to regional changes in osseous metabolism, but is not specific. Abnormal bone scans may be due to metastasis, infection, fracture, osteoblastic activity or other pathology.(215-219) No studies or case reports were found linking abnormal bone scans with vertebral subluxation. Bone scans may have limited value in determining the safety and appropriateness of chiropractic procedures.

Conclusion

Radioisotope scans have a limited role in chiropractic practice. Bone scans are a sensitive, but nonspecific indicator of abnormal metabolic activity in bone.

References

1. Rochester RP. Inter- and intra-examiner reliability of the upper cervical x-ray marking system: A third and expanded look. Chiropractic Research Journal 1994; 3(1):23-31.

2. Seemann DC. Observer reliability and objectivity using rotatory measurements on x-rays. Upper Cervical Monograph 1986; 4(1):1, 68.

3. Seemann DC. A reliability study using a positive nasium to establish laterality. Upper Cervical Monograph 1994; 5(4):7, 8.

4. Rochester RP, Owens EF. Patient placement error in rotation and its affect on the upper cervical measuring system. Chiropractic Research Journal 1996; 3(2):40-53.

5. Suh CH. The fundamentals of computer aided x-ray analysis of the spine. J Biomechanics 1974; 7:161-169.

6. Suh CH. Minimum error point search for spinal x-ray analysis. Chiropractic Research Journal 1988; 1(1):4-12.

7. Suh CH. Displacement analysis of the spine with use of x-rays. Chiropractic Research Journal 1988; 1(2):5-16.

8. Grostic JD. Some observations on computer-aided x-ray analysis. Internat Rev Chiropr, July-September 1979, pp. 38-41.

9. McAlpine JE. Subluxation induced cervical myelopathy: A pilot study. Chiropractic Research Journal 1991; 2(1):7-22.

10. Dickholtz M. Comments and concerns re x-ray radiation (A guide for upper cervical x-ray). The Upper Cervical Monograph 1989; 4(8):7-9.

11. Eriksen K. Reducing x-ray exposure. The Atlas 1996; 1(2):2, 3.

12. Eriksen K. Comparison between upper cervical x-ray listings and technique analyses utilizing a computerized database. Chiropractic Research Journal 1996; 3(2):13-24.

13. Eriksen K, Owens EF. Upper cervical post x-ray reduction and its relationship to symptomatic improvement and spinal stability. Chiropractic Research Journal 1997; 4(1):10-17.

14. Grostic J. Roentgenographic measurement of atlas laterality and rotation: A retrospective pre- and post-manipulation study. J Manipulative Physiol Ther 1982; 5(2)63.

15. Hadley L. Anatomical and roentgenographic studies of the spine. CC Thomas, IL, 1981.

16. Hass M, Nylendo J. Lumbar motion trends and correlation with low back pain. A roentgenographic evaluation of quantitative segmental motion in lateral bending. Proc 1991 World Chiro Congr Toronto, 1991.

17. Plaugher G, Cremata E, Phillips R. A retrospective consecutive case analysis of pre-treatment and comparative static radiological parameters following chiropractic adjustments. J Manipulative Physiol Ther 1990; 13(1)57.

18. El-Sayyad M. Comparison of roentgenography and moirŽ topography for quantifying spinal curvature. Phys Ther, 1986; 66(7):1078-1082.

19. Armstrong P, Wastic ML. Diagnostic Imaging, 2nd Ed. Blackwell Scientific Publications, Oxford, 1987.

20. Ball and Moore: Essential physics for radiographers, 2nd Ed. Blackwell Scientific Publications, St. Louis, Mo., 1987.

21. Hildebrandt RW. Chiropractic Spinography A manual of technology and interpretation. Hilmark Publication, Des Plains, IL, 1977.

22. Kent C, Gentempo P. The documentary basis for diagnostic imaging procedures in the subluxation-based chiropractic practice. International Chiropractors Association, 1992.

23. Kent, C. Contemporary technologies for imaging the vertebral subluxation complex. ICA Review 1989; 45(4): 45-51.

24. Selman J. The fundamentals of x-ray and radiation physics, 7th Ed. CC Thomas Publ, 1986.

25. X-ray examinations (A guide to good practice). U.S. Dept. of Health, Education, and Welfare. USPHS, 1971.

26. Plaugher G, Hendricks A, Doble R, et al. The reliability of patient positioning for evaluating static radiologic parameters of the human pelvis. J Manipulative Physiol Ther 1993; 16(8):517-522.

27. Taylor, J. Full-spine radiography: A review of the literature. Transactions of the Consortium for Chiropractic Research 1992; 7:190-216.

28. Sherwood K, Brickner D, Jennings D. Postural changes after reduction of the atlantal-axial subluxation. Chiropractic Research Journal 1989; 96-100.

29. Haas M, Nyiendo J, Peterson C, et al. Interrater reliability of roentgenological evaluation of the lumbar spine in lateral bending. J Manipulative Physiol Ther 1990; 13(4)179-189.

30. Hon T, Smith R. Interrater reliability of roentgenological evaluation of the lumbar spine in lateral bending. J Manipulative Physiol Ther 1991; 14(2)158.

31. Lane, M. A radiographic study of the movement of the innominate with respect to the sacrum about the sacroiliac joint. Bull Eur Chiro Union 1976; 24(1)41-47.

32. Lantz, C. Interrater reliability of roentgenological evaluation of the lumbar spine in lateral bending. J Manipulative Physiol Ther 1991; 14(5)329-331.

33. McGregor M, Mior S, Shannon H, et al. The clinical usefulness of flexion-extension radiographs in the cervical spine. Topics in Clinical Chiropractic 1995; 2(3)19-28.

34. Mior S, Clements D. A comparison of x-ray and electrogoniometric derived Cobb angles: A feasibility study. Proc of the Int'l Conf on Spinal Manip 1992; 115.

35. Jirout, J. Roentgen studies of the cervical spine. Radiologic Clinic, Dept of Neuroradiology, Charles Univ Prague, Czechoslovakia. Gustav-Fischer-Verlag, Stuttgart, Germany (translated to English by author).

36. Dailey E, Buehler M. Plain Film Assessment of Spinal Stenosis: Method Comparison with Lumbar CT. J Manipulative Physiol Ther 1989; 12:192-199.

37. Zengel F, Davis B. Biomechanical analysis by chiropractic radiography: Part II. Effects of x-ray projectional distortion on apparent vertebral rotation. J Manipulative Physiol Ther 1988; 11(5): 380-389.

38. Zengel F, Davis B. Biomechanical analysis by chiropractic radiography: Part I. A simple method for determining x-ray projectional distortion. J Manipulative Physiol Ther 1988; 11(4): 273-280.

39. DeVilliers PD, Booysen EL. Fibrous spinal stenosis, a report of 850 myelograms with a water-soluble contrast medium. Clin Orthop 1976; 115:140-144.

40. Larsen JL. The lumbar spinal canal in children: II. The interpedicular distance and its relation to the sagittal diameter and transverse pedicular width. Eur J Radiol 1981; 1:312-321.

41. Eisenstein S. Measurement of the lumbar spinal canal in 2 racial groups. Clin Orthop 1976; 115:42-46.

42. Dailey EJ, Buehler MT. Plain film assessment of spinal stenosis: Method comparison with lumbar CT. J Manipulative Physiol Ther 1989; 3:192-199.

43. Burns S, Mior S, McGregor M, et al. Identifying errors in cervical spinal canal measurements. Proc of the World Chiro Congress, 1991.

44. Deboer K. Inter- and intra-examiner reliability of the upper cervical x-ray marking system. J Manipulative Physiol Ther 1985; 8(4): 285-286.

45. Grostic J, Marshall W. Accuracy of an upper cervical measuring system: A validity study. Proc of the Int'l Conf on Spinal Manip 1992; 146-147.

46. Jackson B, Barker W, Bentz J, et al. Inter- and intra-examiner reliability of the upper cervical x-ray marking system: a second look. J Manipulative Physiol Ther 1987; 10(4):157-163.

47. Jackson B. Reliability of the upper cervical x-ray marking system: A replication study. Chiropractic Research Journal 1998; 1(1):10-13.

48. Keating J. Interexaminer/intertechnique reliability in spinal subluxation assessment: a multifactorial approach. Am J Chiro Med 1989; 2(1):30.

49. Keating J. The precision and reliability of an upper cervical x-ray marking system: lessons from the literature. Chiropractic Research Journal 1988; 4:32-42.

50. Moroney S, Plaugher G, Cremata E, et al. An analysis of the accuracy of a biplanar radiographic algorithm: The simulated motions of a mathematical model and the calculated motions of a calibrated physical model. Proc of the Int'l Conf on Spinal Manip 1990; 99-101.

51. Owens E, Hosek R. Structure location errors in an upper cervical x-rays analysis. Chiropractic Research Journal 1988; 1(1): 13-20.

52. Owens E. Line drawing analyses of static cervical x-ray used in chiropractic. J Manipulative Physiol Ther 1992; 15(7): 442-449.

53. Owens E, Hoirris K. Cervical curvature assessment using digitized radiographic analysis. Chiropractic Research Journal 1990; 1(4):47-62.

54. Palmer J. Inter- and intra-examiner reliability of the upper cervical x-ray marking system. J Manipulative Physiol Ther 1985; 8(4):285.

55. Plaugher G, Hendricks A. The Inter- and intra-examiner reliability of the gonstead pelvic marking system. J Manipulative Physiol Ther 1991; 14(9):503-508.

56. Rochester, R. Inter and intra-examiner reliability of the upper cervical x-ray marking system: A third and expanded look. Chiropractic Research Journal; 3(1):23-31.

57. Sansone M, Wooley J, Grannis G. Inter- and intra-examiner reliability of upper cervical x-ray marking system. J Manipulative Physiol Ther 1986; 9(4):285.

58. Schram S, Hosek R. Error limitations in x-ray kinematics of the spine. J Manipulative Physiol Ther 1982; 5(1): 5-10.

59. Schram, S. Analysis of errors in x-ray measurements of cervical vertebrae. Proc of the Biomechanics Conf on the Spine 1980; 93-111.

60. Sigler D, Howe J. Inter- and intra-examiner reliability of the upper cervical x-ray marking system. J Manipulative Physiol Ther 1985; 8:75-80.

61. Sigler, D. Inter- and intraexaminer reliability of the upper cervical x-ray marking system: A second look. J Manipulative Physiol Ther 1988; 11(3):228-229.

62. Mears, D. Adjustment of subluxations as analyzed on lateral cervical x-rays. Digest Chiro Econ 1972; 14(6):14-15.

63. Mears, D. Analysis and adjustment of the occiput and cervical spine. Digest Chiro Econ 1970; 12(4):52-53.

64. Beekman C. Variability of scoliosis measurement from spinal roentgenograms. Phys Ther 1979; 59: 764-765.

65. Bellamy N, Newhook L, Rooney P. PerceptionÑA problem in the grading of sacro-iliac joint radiographs. Scand J Rheumatol 1984; 13:13-120.

66. Carman D, Browne R, Birch J. Measurement of scoliosis and kyphosis radiographs. J Bone Joint Surg 1990; 72A(3):328-333.

67. Cockshott W, Park W. Observer variation in skeletal radiology. Skeletal Radiol 1983; 10:86-90.

68 Dailey E, Buehler M. Plain film assessment of spinal stenosis: Method comparison with lumbar CT. J Manipulative Physiol Ther 1989; 12(3):92-199.

69. Herring C. Static cervical x-ray analysis as utilized in Herring technique. Transactions of the Consortium for Chiropractic Research 1991; 121-139.

70. Herzog R. Imaging corner: The goal of spinal imaging. Spine 1994; 19(21):2486-2488.

71. Mannello D. Inter-rater agreement of basic technique radiographic analysis. Transactions of the Consortium for Chiropractic Research 1993; 8:158-159.

72. Mick, T. The use of functional radiographs in diagnosis: A literature review. Transactions of the Consortium for Chiropractic Research 1992; 7:108-167.

73. Morrissy R, Goldsmith G, Hall E. Measurement of the Cobb angle on radiographs of patients who have scoliosis. J Bone Joint Surg 1990; 72A(3):320-327.

74. Portek I, Pearcy M, Reader G, et al. Correlation between radiographic and clinical measurement of lumbar spine movement. BR J Rheumatol 1983; 22:197-205.

75. Rupert, R. Anatomical measures of standard chiropractic skeletal references (a preliminary report). Proc of the Biomechanics Conf on the Spine 1980; 11:83-92.

76. Taylor J, Clopton P, Bosch E, et al. Interpretation of abnormal lumbosacral spine radiographs: A test comparing students, clinicians, radiology residents, and radiologists in medicine and chiropractic. Spine 1995; 20(10):1147-1154.

77. Taylor J. Full-spine radiography: A review of the literature. Transactions of the Consortium for Chiropractic Research 1992; 7:190-216.

78. Thorkeldsen A, Breen A. Gray scale range and the marking of vertebral coordinates on digitized radiographic images. J Chiro 1994; 17(6):359-363.

79. Yamagata M, Inoue S, Moriya H, et al. Three-dimensional measurement of the scoliotic spine using biplanar radiographic method. J West Pac Orthop Assoc 1990; 27:95-100.

80. Wallace H, Pierce W, Wagon R. Cervical flexion and extension analysis using digitized videofluoroscopy. Chiropractic: J Chiro Research and Clinical Investigation 1992; 7(4)94-97.

81. Bushong SC. Radiologic science for technologists, 4th Ed. The C.V. Mosby Company, St. Louis, Mo. 1988; 1-621.

82. Kent C. The role of videofluoroscopy in chiropractic practice. ICA Review 1990; 46(1):41-45.

83. Mauer E. Biological effects of x-ray exposure. Am J Chiro Med 1988; 1(3):115-118.

84. Kent C, Holt F, Gentempo P. Subluxation Degeneration in the Lumbar Spine: Plain Film and MR Imaging Considerations. ICA Review 1991; 47(1):55-59.

85. Kent C, Gentempo P. Subluxation degeneration in the cervical spine: Plain film and MRI findings. ICA Review 1991; 47(4):47.

86. Kent C, Gentempo P. MR imaging of subluxation degeneration. Chiropractic Research Journal 1990; 1(4):39.

87. Bishop PB. Intervertebral disc magnetic resonance image: Correlation with gross morphology and biochemical composition. J Can Chiro Assoc 1993; 37:77-84.

88. Abdelwahab IF, Kenan S, Hermann G, Klein MJ, Lewis MJ, Lewis MM. Periosteal ganglia: CT amd MR imaging features. Radiology 1993; 188:245-248.

89. Parkkola R, Rytokoski U, Kormano M. Magnetic resonance imaging of the discs and trunk muscles in patients with chronic low back pain and healthy control subjects. Spine 1993; 18:830-836.

90. Buirski G, Silberstein M. The symptomatic lumbar disc in patients with low-back pain: Magnetic resonance imaging appearances in both a symptomatic and control population. Spine 1993; 18:1808-1811.

91. Major NM, Helms CA, Genant HK. Calcification demonstrated as high signal intensity on T1-weighted MR images of the disks of the lumbar spine. Radiology 1993; 189:494-496.

92. Ross JS, Ruggieri P, Tkach J, Obuchowski N, Dillinger J, Masaryk TJ, Modic MT. Lumbar degenerative disk disease: Prospective comparison of conventional T2-weighted spin-echo imaging and T2-weighted rapid acquisition relaxation-enhanced imaging. AJNR 1993; 14:1215-1223.

93. Ciricillo SF, Weinstein PR. Lumbar spine stenosis. West J Med 1993; 158:171-177.

94. Schnebel B, Kingston S, Watkins R, et al. Comparison of MRI to CT in the diagnosis of spinal stenosis. Spine 1989; 14:332-337.

95. Gaskill M, Lukin R, Wiot G. Lumbar disc disease and stenosis. Radiol Clin North Am 1991; 29:753-764.

96. Modic MT, Masaryk TJ, Mulopulos GP, et al. Cervical radiculopathy: Prospective evaluation with surface coil MR imaging, CT with metrizamide, and metrizamide myelography. Radiology 1986; 161:753-759.

97. Modic MT, Masaryk TJ, Ross JS, et al. Cervical radiculopathy: value of oblique MR imaging. Radiology 1987; 163:227-331.

98. Hedberg MC, Drayer BP, Flom RA, et al. Gradient echo (GRASS) MR imaging in cervical radiculopathy. AJR 1988; 150:663-689.

99. Van Dyke C, Ors JS, Tkach J, et al. Gradient-echo MR imaging of the cervical spine: Evaluation of extradural disease. Am J Neuroadiol 1989; 10:627-632.

100. Kent DL, Haynor DR, Larson EB, et al. Diagnosis of lumbar spinal stenosis in adults: A metaanalysis of the accuracy of CT, MR, and myelography. Am J Radiol 1992; 158:1135-1144.

101. Rydevik B. Spinal stenosis Ñ conclusions. Acta Orthop Scand 1993; 64:81-82.

102. Deyo RA. Magnetic resonance imaging of the lumbar spine. [editorial]. N Engl J Med 1994; 331:115-116.

103. Bowen V, Shannon R, Kirkaldy-Willis WH. Lumbar spinal stenosis: A review article. Childs Brain 1978; 4:257-277.

104. Frymoyer JW. Backpain and sciatica. N Engl J Med 1988; 318:291-300.

105. Wiltse LL, Kirkaldy-Willis WH, McIvor GWD. The treatment of spinal stenosis. Clin Orthop 1976; 115:83-91.

106. Kirkaldy-Willis WH, Paine KW, Cauchoix J, et al. Lumbar spinal stenosis. Clin Orthop 1974; 99:30-50.

107. Spengler DM. Degenerative stenosis of the lumbar spine. J Bone Joint Surg (Am) 1987; 69A:305-308.

108. Lee CK, Hansen HT, Weiss AB. Developmental lumbar spinal stenosis: Pathology and surgical treatment. Spine 1978; 3:246-255.

109. Epstein JA, Epstein BJ, Lavine L. Nerve root compression associated with narrowing of the lumbar spinal canal. J Neurol Neurosurg Psychiatry 1962; 25:165-176.

110. Schonstrom NS, Bolender NF, Spengler DM. The pathomorphology of spinal stenosis as seen on CT scans of the lumbar spine. Spine 1985; 10:806-811.

111. Weinstein PR. Diagnosis and management of lumbar spinal stenosis. Clin Neurosurg 1983; 30:677-697.

112. Herkowitz HN, Garlin SR, Bell GR, et al. The use of computerized tomography in evaluating non-visualized vertebral levels caudad to a complete block on a lumbar myelogram, a review of thirty-two cases. J Bone Joint Surg (Am) 1987; 69A:218-224.

113. Quencer RM, Murtagh FR, Post JD, et al. Postoperative bony stenosis of the lumbar spinal canal: Evaluation of 164 symptomatic patients with axial radiography. Am J Roentgenol 1978; 131:1059-1064.

114. Gonzalez EG, Hajdu M, Bruno R, et al. Lumbar spinal stenosis: Analysis of pre- and postoperative somatosensory evoked potentials. Arch Phys Med Rehabil 1985; 66:11-15.

115. McAfee PC, Ullrich CG, Yuan HA, et al. Computed tomography in degenerative spinal stenosis. Acta Orthop Scand 1981; 52:427-433.

116. Dublin AB, McGahan JP, Reid MH. The value of computed tomographic metrizamide myelography in the neuroradiological evaluation of the spine. Radiology 1983; 146:79-86.

117. Williams DM, Gabrielson TO, Latack JT, et al. Ossification in the cephalic attachment of the ligamentum flavum: An anatomical and CT study. Radiology 1984; 150:423-426.

118. Arroyo IL, Barron KS, Brewer EJ. Spinal cord compression by epidural lipomatosis in juvenile rheumatoid arthritis. Arthritis Rheum 1988; 31:447-451.

119. Urso S, Postacchini F. The value of transverse axial tomography in the diagnosis of lumbar stenosis. Ital J Orthop Traumatol 1978; 4:213-221.

120. Simeone FA, Rothman RH. Clinical usefulness of CT scanning in the diagnosis and treatment of lumbar spine disease. Radiol Clin North Am 1983; 21:197-200.

121. Postacchini F, Petteri G. CT scanning versus myelography in the diagnosis of lumbar stenosis, a preliminary report. Int Orthop 1981; 5:209-215.

122. Lee BCP, Kazam E, Neuman AD. Computed tomography of the spine and spinal cord. Radiology 1978; 128-95Ð102.

123. Hammerschlag SB, Wolpert SM, Carter BL. Computed tomography of the spinal canal. Radiology 1976; 121:361-367.

124. Burton CV, Kenneth BH, Kirkaldy-Willis W, et al. Computed tomographic scanning and the lumbar spine: II. Clinical considerations. Spine 1978; 4:356-368.

125. Lancourt JE, Glenn WV, Wiltse LL. Multiplanar computerized tomography in the normal spine and in the diagnosis of spinal stenosis. A gross anatomic-computerized tomographic correlation. Spine 1979; 4:379-390.

126. Jacobson RE, Gargano RP, Rosomoff HL. Transverse axial tomography of the spine: 2. The stenotic spinal canal. J Neurosurg 1975; 42:412-419.

127. Keim HA. Diagnostic problems in the lumbar spine. Clin Neurosurg 1979; 25:184-192.

128. Pleatment CW, Lukin RR. Lumbar spinal stenosis. Semin Roentgenol 1988; 23:106-110.

129. Kaiser MC, Capesius P, Roilgen A, et al. Epidural venous stasis in spinal stenosisÑCT appearance. Neuroradiology 1985; 26:435-438.

130. Helms CA. CT of the lumbar spineÑstenosis and arthrosis. Comput Radiol 1982; 6:359-369.

131. Gaskill MF, Lukin R, Wiot JG. Lumbar disc disease and stenosis. Radiol Clin North Am 1001; 29:753-764.

132. Hyman RA, Merten CW, Liebeskind AL, et al. Computed tomography in ossification of the posterior longitudinal ligament. Neuroradiology 1977; 13:227-228.

133. Crawshaw C, Kean DM, Mulholland RC, et al. The use of nuclear magnetic resonance in the diagnosis of lateral canal entrapment. J Bone Joint Surg (AM) 1984; 66:711-715.

134. Modic MT, Massaryk T, Boumphrey M, et al. Lumbar herniated disk disease and canal stenosis: Prospective evaluation by surface coil MR, CT, and myelography. AJR 1991; 147:757-765.

135. Resnick D. Synovial cysts, Imaging techniques in intraspinal diseases. In Haughton V (ed): Bone and joint imaging. WB Saunders, Philadelphia, 1989, p. 146.

136. Phytinen J, Lahde S, Tanska EL, et al. Computed tomography after lumbar myelography in lower back and extremity pain syndrome. Diagn Imaging 1983; 52:19-22.

137. Ho E, Upadhyay S, Chan F, et al. New methods of measuring vertebral rotation from computed tomographic scans. An intraobserver and interobserver study on girls with scoliosis. Spine 1993; 18(9): 1173-1177.

138. Reinke T, Jahn W. Spinal diagnostic imaging: Computerized axial tomography vs. magnetic resonance imaging. Am J Chiro Med 1988; 1(14):181-184.

139. Brightbill T, Pile N, Eichelberger R, et al. Normal magnetic resonance imaging and abnormal discography in lumbar disc disruption. Spine 1994; 19(9):1075-1077.

140. Brodeur R, Hansmeier D. Variability of intervertebral angle calculations for lateral cervical videofluoroscopic examinations. Proc of the Int'l Conf on Spinal Manip 1993; 37.

141. Byrd R, Kahler J, Leaman S, et al. Reliability of magnetic resonance imaging for morphometry of the intervertebral foramen. Proc of the Int'l Conf on Spinal Manip 1990; 79-82.

142. Cantu J, Cramer G, Dorsett R, et al. Magnetic resonance imaging of the cervical intervertebral foramina: Comparison of two techniques. Proc of the Int'l Conf on Spinal Manip 1994; 101-103.

143. Cramer G, Cantu J, Greenstein J, et al. The accuracy of magnetic resonance imaging in determining the vertical dimensions of the cervical intervertebral foramina. Proc of the Int'l Conf on Spinal Manip 1993; 38-40.

144. Eldevik O, Dugstad G, Orrison W, et al. The effect of clinical bias on the interpretation of myelography and spinal computed tomography. Radiology 1982; 145:85-89.

145. Wallace H, Wagon R, Pierce W. Inter-examiner reliability using videofluoroscope to measure cervical spine kinematics: A sagittal plane (lateral view). Proc of the Int'l Conf on Spinal Manip 1992; 7-8.

146. Jackson BL, Bunker WF, Bentz J, Gamble AG. Inter and intra examiner reliability of upper cervical x-ray marking system: a second look. J Manipulative Physiol Ther, 1987 10:157-63.

147. Seemann DC. A reliability study using positive nasium to establish laterality. The Upper Cervical Monograph, 5(4):7-8.

148. Sigler DC, Howe JW. Inter- and intra examiner reliability of the upper cervical x-ray marking system. J Manipulative Physiol Ther 1985;8:75-80.

149. Grostic JD, DeVoer KP. Roentgenographic measurement of atlas laterality and rotation: a retrospective pre- and post manipulation study. J Manipulative Physiol Ther 1982;5:63-71.

150. Gay RE. The curve of the cervical spine: Variations and significance. J Manipulative Physiol Ther, 199316(9):591-594.

151. Owens EF. Line drawings analyses of static cervical x-ray used in chiropractic. J Manipulative Physiol Ther, 1992; 15:442-449.

152. Rochester RP. Inter and intra-examiner reliability of the upper cervical x-ray marking system: A third and expanded look. Chiropractic Research Journal 1994; 3(1).

153. Plaugher G, Hendricks AH. The interexaminer reliability of the Gonstead pelvic marking system. Proc of the Int'l Conf on Spinal Manip. Arlington, VA, 1990. p. 93-8.

154. Zengel F, Davis BP. Biomechanical analysis by chiropractic radiography: Part II. Effects of x-ray projectional distortion on apparent vertebral rotation. J Manipulative Physiol Ther 1988; 11(5):380-9.

155. Zengel F, Davis BP. Biomechanical analysis by chiropractic radiography: Part III. Lack of effect of projectional distortion on Gonstead vertebral endplate lines. J Manipulative Physiol Ther 1988; 11(6):469-73.

156. Leach RA. An evaluation of the effect of chiropractic manipulative therapy on hypolordosis of the cervical spine. J Manipulative Physiol Ther 1983; 6(1):17-23.

157. Troyanovich S, Robertson G, Harrison D, Holland B. Intra- and interexaminer reliability of the Chiropractic Biophysics lateral lumbar radiographic mensuration procedure. J Manipulative Physiol Ther 1995; 18(8):519-524.

158. Jackson B, Harrison D, Robertson G, Barker W. Chiropractic biophysics lateral cervical film analysis reliability. J Manipulative Physiol Ther 1993; 16(6):384-391.

159. Phillips RV. The use of x-rays in spinal manipulative therapy. In Halderman S (ed) Modern Developments in the Principles and Practice of Chiropractic. Norwalk, CT. Appleton-Century-Crofts, 1980.

160. Buehler MT, Hrejsa AF. Application of lead-acrylic compensating filters in chiropractic full spine radiography: a technical report. J Manipulative Physiol Ther 1985; 8(3):175-80.

161. Shaff AM. Video fluoroscopy as a method of detecting occipitoatlantal instability in Down's syndrome for Special Olympics. Chiropractic Sports Medicine 1994; 8(4):144.

162. Wallace H, Wagnon R, Pierce W. Inter-examiner reliability using videofluoroscope to measure cervical spine kinematics: a sagittal plane (lateral view). Proc of the Int'l Conf on Spinal Manip May 1992:7-8.

163. Van Mameren H, Sanches H, Beursgens J, Drukker J. Cervical spine motion in the sagittal plane II. Spine 1992; 17(5):467.

164. Ochs CW. Radiographic examination of the cervical spine in motion. US Navy Med 1974; 64:21.

165. Buonocard E, Hartman JT, Nelson CL. Cineradiograms of cervical spine in diagnosis of soft-tissue injuries. JAMA 1981(1):143, 1966.

166. Jones MD. Cineradiographic studies of abnormalities of high cervical spine. AMA Arch Surg 1967; 94:206.

167. Tasharski CC. Dynamic atlanto-axial aberration: a case study and cinefluorographic approach to diagnosis. J Manipulative Physiol Ther 1981; 4(2):75.

168. Woesner ME, Mitts MG. The evaluation of cervical spine motion below C-2: a comparison of cineroentgenographic methods. Am J Roent Rad Ther & Nuc Med 1972; 115(1):148.

169. Bard G, Jones MD. Cineradiographic recording of traction of the cervical spine. Arch Phys Med 1964; 45:403.

170. Bard G, Jones MD. Cineradiographic analysis of laminectomy in cervical spine. AMA Arch Surg 1968; 97;672.

171. Brunton FJ, Wilkerson JA, Wise KS, Simonis RB. Cineradiography in cervical spondylosis as a means of determining the level for anterior fusion. J Bone Joint Surg 1982; 64-B(4):399.

172. Jones MD. Cineradiographic studies of collar immobilized cervical spine. J Neurosurg 1960; 17;633.

173. Jones MD. Cineradiographic studies of various joint diseases in the cervical spine. Arthritis & Rheumatism 1961; 4:422.

174. Jones MD. Cineradiographic studies of degenerative disease of the cervical spine. J Canad Assoc Radiol 1961; 12:52.

175. Jones MD, Stone BS, Bard G. Occipitalization of atlas with hypoplastic odontoid process, a cineroentgenographic study. Calif Med 1966; 104:309.

176. Gillet H. A cineradiographic study of the kinetic relationship between the cervical vertebrae. Bull Eur Chiro Union 1980; 28(3):44.

177. Henderson DJ. Kinetic roentgenographic analysis of the cervical spine in the saggital plane: a preliminary study. Int Review of Chiro 1981; 35:2.

178. Howe JW. Observations from cineroentgenological studies of the spinal column. ACA J of Chiro 1970; 7(10: 75.

179. Leung ST. The value of cineradiographic motion studies in diagnosis of dysfunctions of the cervical spine. Bull Eur Chiro Union 1977; 25(2):28.

180. Shippel AH, Robinson GK. Radiological and magnetic resonance imaging of the cervical spine instability: A case report. J Manipulative Physiol Ther 1987; 10(6):316.

181. Antos J. Robinson GK, Keating JC, Jacobs GE. Interexaminer reliability of cinefluoroscopic detection of fixation in the mid-cervical spine. Proceedings of the Scientific Symposium on Spinal Biomechanics, International Chiropractors Association, 1989, p. 41.

182. Taylor M, Skippings R. Paradoxical motion of atlas in flexion: a fluoroscopic study of chiropractic patients. Euro J Chiro 1987; 35:116.

183. Betge G. The value of cineradiographic motion studies in the diagnosis of dysfunction of the cervical spine. J Clin Chiro 1979; 2(6):40.

184. Masters B. A cineradiographic study of the kinetic relationship between the cervical vertebrae. Bull Eur Chiro Union 1980; 28(1):11.

185. Mertz JA. Videofluoroscopy of the cervical and lumbar spine. ACA J Chiro 1981; 18(8):74.

186. Robinson GK. Interpretation of videofluoroscopic joint motion studies in the cervical spine C-2 to C-7. The Verdict, February 1988.

187. Akeson WH, Woo SL, Taylor TK, Ghosh P, Bushell GR. Biomechanics and biochemistry of the intervertebral discs. Clin Orthop 1977; (122):133.

188. White AA, Johnson RM, Panjabi MM, Southwick WO. Biomechanical analysis of clinical stability in the cervical spine. Clin Orthop 1975; (109):85.

189. Vernon H. Static and dynamic roentgenography in the diagnosis of degenerative disc disease: a review and comparative assessment. J Manipulative Physiol Ther 1982; 5(4):163.

190. Ressel OJ. Disc regeneration: reversibility is possible in spinal osteoarthritis. ICA Review 1989; 45(2):39.

191. Posner I, White AA, Edwards WT, Hayes WC. A biomechanical analysis of the clinical stability of the lumbar and lumbosacral spine. Spine 1982; 7:374.

192. Nachemson A. Towards a better understanding of low back pain; a review of the mechanics of the lumbar disc. Rheumatol Rehabil 1975; 14(3):129.

193. Huelke DF, Nusholtz GS. Cervical spine biomechanics: a review of the literature. J Orthop Res 1986; 4(2):232.

194. Karnaze MG, Gado MH, Sartos KJ, Hodges FJ 3d. Comparison of MR and CT myelography in imaging the cervical and thoracic spine. AJR 1988; 150(2):397.

195. Kulkarni MV, Narayana PA, McArdle CB, Yeakley JW, et al. Cervical spine MR imaging using multislice gradient echo imaging: comparison with cardiac gated spin echo. Magn Reson Imaging 1988; 6(5):517.

196. Takahashi M, Sakamoto Y, Miyawaki M, Bussaka H. Increased MR signal intensity secondary to chronic cervical cord compression. Neuroradiology 1987; 29(6):550.

197. Grenier N, Kressel HY, Scheibler ML, Grossman RI, Dalinka M. Normal and degenerative posterior spinal structures: MR Imaging. Radiology 1987; 165(2):517.

198. Richards G, Thompson J, Osterbauer T, Fuhr A. Use of pre- and post-CT scans and clinical findings to monitor low force chiropractic care of patients with sciatic neuropathy and lumbar disc herniation: A review. J Manipulative Physiol Ther 1990, 13:58.

199. Walker B. The use of computer-assisted tomography of the lumbar spine in a chiropractic practice. Journal of the Australian Chiropractic Association 1985; 15:86.

200. Koentges A. Computerized axial tomography of the spine in the differential diagnosis of vertebral subluxations. Annals of the Swiss Chiropractors' Association 1985; 8:25.

201. Kent C. Contemporary technologies for imaging the vertebral subluxation complex. ICA Review 1989; 45(4):45.

202. Aldrete JA. Diagnostic ultrasound in pain management: an overview. Am J Pain Management 1994; 4(4):160.

203. Anderson DJ, Adcock DF, Chovil AC, Farrell JJ. Ultrasound lumbar canal measurement in hospital employees with back pain. Br J Ind Med 1988; 45(8):552.

204. Chovil AC, Anderson DJ, Adcock DF. Ultrasonic measurement of lumbar canal diameter: a screening tool for low back disorders? South Med J 1989; 82(8):977.

205. Engel JM, Engel GM, Gunn DR. Ultrasound of the spine in focal stenosis and disc disease. Spine 1985; 10(10):928.

206. Suzuki S, Yamamuro T, Shikata J, Shimizu K, Iida H. Ultrasound measurement of vertebral rotation in idiopathic scoliosis. J Bone Joint Surg 1989; 72-B(2):252.

207. Moore RE. Blind study: comparison of sonographic results in patients with back pain previously diagnosed by MRI, x-ray and standard orthopedic exam. American Journal of Clinical Chiropractic May 1995; 5(2):34.

208. Mandell G. Radionuclide imaging. In: Kricun ME. Imaging modalities in spinal disorders. W.B. Saunders Company, Philadelphia, PA. 1988.

209. Bates D, Ruggieri P. Imaging modalities for evaluation of the spine. Radiologic Clinics of North America 1991;29(4):675-690.

210. Carmichael, J. Clinical case reports in the use of computed tomography for the quantification of leg length inequality. The CT Scanogram. Proc of the Int'l Conf on Spinal Manip. FCER, Arlington, VA. 191, April 1991.

211. Cramer G, Howe J, Glenn W, et al. Comparison of computed tomography to magnetic resonance imaging in evaluation of the intervertebral foramen. Proc of the Int'l Conf on Spinal Manip. FCER, Arlington, VA. 186, 1991.

212. Dreyer P, Lantz CA. Chiropractic management of herniated disc restoration of disc protrusion and management of disc integrity as substantiated by MRI. Proc of the Int'l Conf on Spinal Manip. FCER, Arlington VA. 57, 1991.

213. Richards G, Thompson J, Osterbauer P, et al. Use of pre-and post CT scans and clinical findings to monitor low force chiropractic care of patients with sciatic neuropathy and lumbar disc herniation: A Review. J Manipulative Physiol Ther 1990; 13(1):58.

214. Antos J, Robinson K, Keating J, et al. Interrater reliability of fluoroscopic detection of fixation in the mid-cervical spine. Chiropractic Technique 1990; 2(2):53-55.

215. Krishnamurthy GT, Blahd WH. Technetium-99m polyphosphate bone image for early detection of skeletal metastasis. Correlation with other diagnostic parameters. Nucl Med (Stuttg) 1975; 13(4):330-40.

216. Wetzel LH, Engelbrecht DE, Baxter KG, et al. Comparison of MR imaging and bone scintigraphy for detection and evaluation of osseous spinal metastases. Nineteenth Annual Meeting of the American Roentgen Ray Society. May 13-18, 1990, Washington, DC.

V Clinical Impression and Assessment

RECOMMENDATION

Practitioners should develop a method of patient assessment which includes a sufficient diversity of findings to support the clinical impression as related to vertebral subluxation.(1-24) In this regard, it is considered inappropriate to render an opinion regarding the appropriateness of chiropractic care without a chiropractic assessment, including a physical examination of the patient by a licensed chiropractor. When management of patient care is carried out in the collaborative setting, the chiropractor, as a primary contact health care provider, is the only professional qualified to determine the appropriateness of chiropractic care. The unique role of the chiropractor is separate from other health disciplines,(25-35) and should be clarified for both the patient and other practitioners. The patient assessment, specific to the technique practiced by the chiropractor, should minimally include a biomechanical and neurophysiological component. It is inappropriate to make a retrospective determination of the clinical need for care rendered prior to the assessment.

Rating: Established
Evidence: E, L

Commentary

The procedures employed in the chiropractic assessment may include some or all of, but
are not limited to the following:

Physical examination:

- Palpation (static osseous, static muscle, motion).
- Range of motion.
- Postural examination
- Comparative leg length (static, flexed, cervical syndrome).
- Manual muscle tests.
- Nerve function tests.
- Mental status examination and psychosocial assessment.

Instrumentation examination:

- Range of motion.
- Thermography.
- Temperature reading instruments.
- Muscle testing.
- Electromyography.
- Pressure algometry.
- Nerve-function tests.
- Electroencephalography and brain mapping.
- Bilateral and four quadrant weight scales.

Imaging examination:

Spinography.
Videofluoroscopy.
Computerized tomography.
Magnetic resonance imaging.

Following the determination of a clinical impression, the patient should be made aware of the findings and consent to the proposed plan of care. Literature support for the use of these technologies may be found in the chapters on chiropractic examination, instrumentation and diagnostic imaging (Chapters 1, 2, 3).

References

1. Leboeuf C, Gardner V, Carter A, et al. Chiropractic examination procedures: A reliability and consistency study. J Aust Chiro Assoc 1989; 19(3):101-104.

2. Mior S, McGregor M, Schut B. The role of experience in clinical accuracy. J Manipulative Physiol Ther 1990; 13(2):68-71.

3. Rhudy T, Sandefur M, Burk J. Interexaminer/intertechnique reliability in spinal subluxation assessment: A multifactorial approach. Am J Chiro Med 1988; 1(3):111-114.

4. Sandefur, R. Interexaminer/intertechnique reliability in spinal subluxation assessment: A multifactorial approach. Am J Chiro Med 1989; 2(3):131.

5. Upledger, J. The reproducibility of craniosacral examination findings: A statistical analysis. J Am Osteopath Assoc 1977; 76(12):889-890.

6. Damron, D. A retrospective consecutive case analysis of pretreatment and comparative static radiological parameters following chiropractic adjustments. J Manipulative Physiol Ther 1991; 14(5): 334-335.

7. Plaugher G, Cremata E, Phillips R. A retrospective consecutive case analysis of pretreatment and comparative static radiological parameters following chiropractic adjustments. J Manipulative Physiol Ther 1990; 13(9): 498-506.

8. Terrett A. It is more important to know when not to adjust. Chiro Tech 1990; 2(1): 1-9.

9. Adair I, Vanwijk M, Armstrong G. MoirŽ topography in scoliosis screening. Clin Orthop 1977; (129): 165-171.

10. Ardran G, Dickson R, Dixon-Brown B, et al. Assessment of scoliosis in children: low dose radiographic technique. BR J Radiol 1980; 53:146-147.

11. Osterbauer P, Fuhr A, Hildebrandt R. Mechanical force, manually assisted short lever chiropractic adjustment. J Manipulative Physiol Ther 1992; 15:309-317.

12. Rosen, M. Short lever specific contact procedures. Transactions of the Consortium for Chiropractic Research 1991; 261-264.

13. Burke EJ, Glick D, Grostic J, et al. Validity of selected measures of the DDSSEP protocol: A factor analytic approach. J Manipulative Physiol Ther 1994; 17(4):273.

14. Fisher, AA. Pressure threshold meter: Its use for quantification of tender spots. Arch Phys Med Rehab 1986; 67(11):836-838.

15. Fisher, AA. Tissue compliance meter for objective documentation of soft tissue consistency and pathology. Arch Phys Med Rehab 1987; 68:122-125.

16. Hospers LA, Sweat RW, Hus L, et al. Response of a three year old epileptic child to upper cervical adjustment. Today's Chiro 1987; 15(16):69-76.

17. Jansen R, Nansel D, Slosberg M. Normal paraspinal tissue compliance: The reliability of a new clinical and experimental instrument. J Manipulative Physiol Ther 1990; 13(5):243-246.

18. Wagnon, R. Finally, an objective instrument for assessing the effects of chiropractic intervention. Am Chiro 1991; 13(2):20-22.

19. La Francis, M. A chiropractic perspective of atlantoaxial instability in Down's syndrome. J Manipulative Physiol Ther 1990; 13(3):157-160.

20. Whittingham W, Ellis W, Molyneux T. The effects of manipulation (toggle recoil technique) for headaches with upper cervical joint dysfunction: A pilot study. J Chiro 1994; 17(6):369-375.

21. Hsieh C, Pringle R. Range of motion of the lumbar spine required for four activities of daily living. J Manipulative Physiol Ther 1994; 17(6):353-358.

22. Lea R, Gerhardt J. Range-of-motion measurements. J Bone Joint Surgery 1995; 77A(5):784-798.

23. Nilsson N. Measuring passive cervical motion: A study of reliability. J Manipulative Physiol Ther 1995; 18(5):293-297.

24. Williamson S. Effect of unilateral spinal adjustments on goniometrically-assessed cervical lateral-flexion end-range asymmetries in otherwise asymptomatic subjects. J Manipulative Physiol Ther 1990; 13(7):418.

25. Leach RA. The chiropractic theories: A synopsis of chiropractic research, 2nd ed. Williams & Wilkins, Baltimore, MD, 1986.

26. Palmer DD. The science, art and philosophy of chiropractic. Published by the author, Portland, OR, 1910.

27. Palmer BJ. The science of chiropractic. Palmer School of Chiropractic, Davenport, IA, 1920.

28. Jamison J. Chiropractic as conventional health care. J Aust Chiro Assoc 1989; 15(2):55-59.

29. Janse J. Chiropractic and children. J Can Chiro Assoc 1979; 23(3).

30. Ressel OJ. Chiropractic and children: A rationale for care. Intl Rev Chiro 1986; 42:44-50.

31. Schneier M, Burns R. Atlanto-occipital hypermobility in sudden infant death syndrome. Chiropractic (J Chiro Res Clin Inves) 1991; 7(2):33-38.

32. Vear H. The role of chiropractic in preventive health care. J Can Chiro Assoc 1974; 18(4):10-3.

33. Webster LL. Subluxation at birth and early childhood. Int'l Chiro Pediatric Assoc, Stone Mountain, GA, 1989.

34. Sawyer C, Bergmann T, Good D. Attitudes and habits of chiropractors concerning referral to other health care providers. J Manipulative Physiol Ther 1988; 11:480-483.

35. Seventh Report to the President & Congress on the Status of Health Personnel. U.S. Dept. of Health and Human Services, 1990.

VI. Reassessment and Outcomes Assessment

RECOMMENDATION

Determination of the patient's progress must be made on a per-visit and periodic basis. This process provides quantitative and qualitative information regarding the patient's progress which is utilized to determine the frequency and duration of chiropractic care. Per-visit reassessment should include at least one analytical procedure previously used. This chosen testing procedure should be performed each time the patient receives chiropractic care.

Concomitant with this process, the effectiveness of patient care may also be monitored through the development of an outcomes assessment plan. Such a plan may utilize data from the patient examination, assessment and reassessment procedures. Patient-reported quality of life instruments, mental health surveys, and general health surveys are encouraged as part of the outcomes assessment plan. The analysis of data from these sources may be used to change or support continuation of a particular regimen of patient care and/or change or continue the operational procedures of the practice.

Rating: Established
Evidence: E, L

Commentary

The reassessment provides information to determine the necessity of an adjustment on a per-visit basis. Partial reassessment involves duplication of two or more preceding positive analytical procedures. Full reassessment involves duplication of three or more preceding positive analytical procedures. Any additional or complementary analytical procedures should be performed as indicated by the patient's clinical status. The frequency of partial and full reassessments should be at the discretion of the practitioner, consistent with the objectives of the plan of care.

A substantial body of literature attests to the methods and significance of measuring outcomes.(1-100) For the practicing chiropractor the implication is that regular evaluations of practice and procedures provides a form of quality control. Outcomes assessments can alert the practitioner to problems with, as well as reinforce, aspects of practice which might otherwise be overlooked. In addition, on-going evaluation provides information about the clinical value of care to both patients and third-party providers. It is important to point out that there is no one "ideal" way to assess outcomes. While the responsibility to conduct this type of assessment rests with the chiropractor, so does the choice of how it is to be implemented.

References

1. Mrozek J, Wiles M. A reliability assessment of four-quadrant weight-scale measurements. J Can Chiro Assoc 1982; 26(3):97-100.

2. Deboer K, Harmon R, Savole S, Tuttle C. Inter- and intra-examiner reliability of leg-length differential measurement: A preliminary study. J Manip Physiol Ther 1983; 6(2):61-66.

3. Sandoz R. The choice of appropriate clinical criteria for assessing the progress of a chiropractic case. Annals Swiss Chiro Assoc 1985; 8:53-73.

4. Homewood A. A posturometer survey. J Can Chiro Assoc 1964; 9(1):9-10.

5. Beech R. The fundamentals of the short-leg syndrome. Annals Swiss Chiro Assoc 1965; 3:7-36.

6. Mears D. Spinal analysis. Digest Chiro Econ 1973; 16(3):80-81.

7. Mears D. Analysis of lateral cervical x-ray. Digest Chiro Econ 1972; 14(4):36-37.

8. Pierce W, Stillwagon G. Charting and interpreting skin temperature differential patterns. Digest Chiro Econ 1970; 12(5):37-39.

9. Gillet H. A cineradiographic study of the kinematic relationship between the cervical vertebrae. Bull Euro Chiro Union 1980; 28(3):44-46.

10. Johnston L. Three dimensional spinal analysis: The key to statistical research and public service. Digest Chiro Econ 1967; 10(2):18-19.

11. Brunarski D. Chiropractic biomechanical evaluations: Validity in myofascial low back pain. J Manipulative Physiol Ther 1982; 5(4):155-160.

12. Dailey E, Buehler M. Plain film assessment of spinal stenosis: method comparison with lumbar CT. J Manipulative Physiol Ther 1989; 12:192-199.

13. Kobrossi T, Schut B. The use of the objective structured clinic examination (OSCE) at the Canadian Memorial Chiropractic College Outpatient Clinic. J Can Chiro Assoc 1987; 31:21-25.

14. Richards D, Thompson J, Osterbauer P, Fuhr A. Use of pre- and post-CT scans and clinical findings to monitor low force chiropractic care of patients with sciatic neuropathy and lumbar disc herniations: A review. J Manipulative Physiol Ther 1990; 13(1):58.

15. Hsieh C, Phillips R. Reliability of manual muscle testing, with a computerized dynamometer. J Manipulative Physiol Ther 1990; 13(2):72-82.

16. McGregor M, Minor S. Anatomical and functional perspectives of the cervical spine: Part I: The "normal" cervical spine. J Can Chiro Assoc 1989; 33:123-129.

17. Jansen R, Nansel D, Slosberg M. Normal paraspinal tissue compliance: the reliability of a new clinical and experimental instrument. J Manipulative Physiol Ther 1990; 13(5):243-246.

18. Herbert S. Computer graphics research in chiropractic comes of age. ICA Rev Chiro 1985; 25-27.

19. Hildebrandt R. Chiropractic spinography and postural roentgenology Ñ Part I: History of development. J Manipulative Physiol Ther 1980; 3(2):87-92.

20. Christensen K. Medical vs. chiropractic x-ray interpretation. Am Chiro 1982; 20-23.

21. Kent C, Gentempo P, Grostic J, Grassam I, Gregg R, Hofmann J. A consensus approach to subluxation-based chiropractic: Phase I questionnaire results.

22. Kent C, Gentempo P. The documentary basis for diagnostic imaging procedures in the subluxation-based chiropractic practice. ICA, Arlington, VA, 1992.

23. Wallace H, Pierce WV, Wagnon R. Cervical flexion and extension analysis using digitized videofluoroscopy. Chiropractic: J Chiro Research and Clinical Investigation 1992; 7(4):94-97.

24. Adams A, Loper D, Willd S, Lawless P, Loueks J. Intra- and interexaminer reliability of plumb line posture analysis measurements using a 3-dimensional electrogoniometer. Res For 1988; 4(3):60-72.

25. Boline PD, Keating JC, Brist J, Denver G. Interexaminer reliability of palpatory evaluations of the lumbar spine. Am J Chiro Med 1988; 1(1):5-11.

26. Beal M, Vorro J, Johnson W. Chronic cervical dysfunction: correlation of myoelectric findings with clinical progress. J Am Osteopath Assoc 1989; 89:391-900.

27. Becker R. The body electric: electromagnetism and the foundation of life. Quill, NY, 1985.

28. BenEliyahu DJ. Thermographic imaging of pathoneurophysiology due to cervical disc herniation. J Manipulative Physiol Ther 1989; 12:482-490.

29. Brieg A, Turnbull I, Hassler C. Effect of mechanical stresses on the spinal cord in cervical spondylosis. J Neurosurg 1966; 25:45-56.

30. Brighton P, Graham R, Bird H. Hypermobility of the joints. Springer-Verlag, NY, 1983.

31. Carmichael J. Clinical case reports in the use of computed tomography for the quantification of leg length inequality: The CT scanogram. Proc of the Int'l Conf on Spinal Manip. FCER, Arlington, VA 1991; 191.

32. Chang-Yu J, Hsieh DC, Phillips EB, Adams A, Pope MH. Functional outcomes of low back pain: comparison of four treatment groups in a randomized controlled trial. J Manipulative Physiol Ther 1992; 15(1):4-10.

33. Cherkin DC. Patient satisfaction as an outcome measure. J Chiropractic Tech 1990; 2(3):138.

34. Cooperstein R, Gardner R, Hansel D. Concordance of two methods of motion palpation with goniometrically-assessed cervical lateral flexion asymmetry. Proc of the Int'l Conf on Spinal Manip. FCER, Arlington, VA 1991; 186.

35. Cram J. Clinical EMG: muscle scanning for surface recordings. Biofeedback Inst of Seattle, Seattle, WA, 1986.

36. Cramer G, Howe J, Glenn W, Greenstein J, Marx P, Johnson S, Huntoon R, Cantu J, Emde J, Aoys M. Comparison of computed tomography to magnetic resonance imaging in evaluation of the intervertebral foramen. Proc of the Int'l Conf on Spinal Manip. FCER, Arlington, VA 1991; 186.

37. Deyo RA. Measuring the functional status of patients with low back pain. J Chiropractic Tech 1990; 2(3):127.

38. Diakow P. Thermographic assessment of sacroiliac syndrome: report of a case. J Can Chiro Assoc 1990; 34(3):131.

39. Dreyer P, Lantz CA. Chiropractic management of herniated disc. Restoration of disc protrusion and management of disc integrity as substantiated by MRI. Proc of the Int'l Conf on Spinal Manip. FCER, Arlington, VA 1991; 57.

40. Eddy J. Designing a practice policy: standards, guidelines, options and clinical decision making. JAMA 1990; 263(2):3077.

41. Ellwood P. Outcomes management: a technology of patient experience. N Engl J Med 1988; 318:23.

42. Flesia J. The vertebral subluxation complex: an integrative perspective. ICA Intl Rev Chiro 1992; 25.

43. Granger M, McDowell S. An investigation of the effect of chiropractic treatment upon the mobility of the spine. Eur J Chiro 1985; 33(3):143-164.

44. Grostic J. Roentgenographic measurement of Atlas laterality and rotation: a retrospective pre- and post-manipulation study. J Manipulative Physiol Ther 1982; 5(2):63.

45. Haas M, Nylendo J. Lumbar motion trends and correlation with low back pain. A roentgenographic evaluation and quantitative segmental motion in lateral bending. Proc 1991 World Chiro Congr Toronto, 1991.

46. Haas M, Nylendo J. Diagnostic utility of the McGill questionnaire and the Oswestry Disability questionnaire for classification of low back pain syndrome. J Manipulative Physiol Ther 1992; 15(22):90-98.

47. Haldeman S. Spinal manipulation therapy in the management of low back pain. HE Finnegan (ed), Lippincott, Toronto, 1973.

48. Hansen D. Development and use of clinical algorithms in chiropractic. J Manip Physiol Ther 1991; 14(8):478-482.

49. Gerzog W, Conway P, Willcox B. Effects of different treatment modalities on gait symmetry and clinical measures for sacroiliac joint patients. J Manipulative Physiol Ther 1991; 14(2):104-109.

50. Homewood AE. The neurodynamics of the vertebral subluxation complex, 3rd ed. Valkyrie Press, St. Petersburg, FL, 1977.

51. Hsieh J, Phillips R. Reliability of manual muscle testing with a computerized dynamometer. J Manipulative Physiol Ther 1990; 13(2):72.

52. Hsieh CY. Instrumentation of reported low back pain clinical trials. Proc 1989 Intl Conf on Spinal Manip 2-14, 1989.

53. Jaeschke R, Singer J, Guyatt G. A comparison of seven-point and visual analog scales: data from a randomized trial. Controlled Clin Trials 1990; 11:43-51.

54. Jansen R, Nansel D, Slosbert M. Normal paraspinal compliance. The reliability of a new clinical experimental instrument. J Manipulative Physiol Ther 1990; 13(5):243.

55. Jirout J. Studies of the dynamics of the spine. Acta Rad 1956; 4655-60.

56. Jose W. Outcome measures for chiropractic health care, Part I: introduction to outcomes assessment and general health assessment instruments. Spinal Manip 1991; 7(22):1-5.

57. Kapandji IA. The physiology of joints, Vol III. LH Honore (trans). Churchill Livingstone, New York, NY, 1974.

58. Keating JC. Rationalism and empiricism vs. the philosophy of science in chiropractic. Chiro Hist 1990; 10(2):23.

59. Kent C, Gentempo P. The documentary basis for diagnostic imaging procedures in the subluxation-based chiropractic practice. ICA 1992.

60. Kirkaldy-Willis W, Yong-Hong K, Reilly J. Pathology and pathogenesis of lumbar spondylosis and stenosis. Spine 1978; 3(4):319.

61. Koss I. The spinal cord as organizer of disease, Process I. J Am Osteo Assoc 1976; 76(1):34-35.

62. Korr I. The peripheral nervous system, II. J Am Osteo Assoc 1979; 79(2):82-90.

63. Lawlis G, Cuencas R, Selby D, McCoy C. The development of the Dallas Pain questionnaire: an assessment of the impact of spinal pain on behavior. Spine 1989; 14(5):511-516.

64. Lovell F, Rothstein J, Personius W. Reliability of clinical measurements of lumbar lordosis taken with a flexible rule. Phys Ther 1989; 69(2):96-105.

65. Manello D. Leg length inequality: a review. Proc Sixth Annual Conf on Research and Education. Consortium for Chiro Res, 1990.

66. McLachlan C. Enhanced patient decision-making: a role for outcomes management systems. Proc Intl Conf on Spinal Manip. FCER, Arlington, VA 1991; 3.

67. Meade TW, Dyer S, Browne W, Townsend J, Frank AO. Low back pain of mechanical origin: randomized comparison of chiropractic and hospital outpatient treatment. Brit Med J 1990; 300(6737):1437.

68. Meeker W, Gahlinger P. Neuromuscular thermography: a valuable diagnostic tool? J Manipulative Physiol Ther 1986; 9:257-266.

69. Miol S, Grockman J, Fournier G, Vernon H. A comparison of two objective measures in assessing cervical range of motion. Proc of the Int'l Conf on Spinal Manip. FCER, Arlington, VA 1991; 79-81.

70. Nansel DD, Peneff A, Quitoriano J. Effectiveness of upper vs. lower cervical adjustments with respect to the amelioration of passive rotational vs. lateral-flexion end-range asymmetries in otherwise asymptomatic subjects. J Manipulative Physiol Ther 1992; 15(2):99-105.

71. Nylendo J, Haas M, Jones R. Using the SF-36D (General Health Questionnaire) in a pilot study of outcome assessment for low back chiropractic patients. Proc of the Int'l Conf on Spinal Manip. FCER, Arlington, VA 1991; 172.

72. Panjabi MM, White A, Brand R. A note on defining body part configurations. J Biomech 1974; 7:385.

73. Plaugher G. Skin temperature assessment for neuromuscular abnormalities of the spinal column: a review. Proc 6th Annual Conf on Research and Education, June 21-23, 1991.

74. Robinson R, Herzog W, Nigg B. Use of force platform variables to quantify the effects of chiropractic manipulation on gait symmetry. J Manipulative Physiol Ther 1987; 19(4):172-176.

75. Russell G, Raso V, Hill D, McIvor J. A comparison of four computerized methods for measuring vertebral rotation. Spine 1990; 15(1):24-27.

76. Sandoz R. Some physical mechanisms and effects of spinal adjustments . Ann Swiss Chiro Assoc 1976; 6(2):91-142.

77. Sawyer C. Patient satisfaction as a chiropractic research outcome. Proc of the Int'l Conf on Spinal Manip. FCER, Arlington, VA 1991;163, Apr,.

78. Schafer R, Faye L. Motion palpation and chiropractic technique. Principles of dynamic chiropractic. Motion Palp Instrument, Huntington Beach, CA, 1981.

79. Sharpless SK. Susceptibility of spinal roots to compression block. Res Status of Spinal Manip Ther. Washington, NIH Workshop, NINCDS Monograph 1975; 15:155-161.

80. Suh CH. Researching the fundamentals of chiropractic. J Bio Conf Spine. U of Colo. 1974; 5:1-52.

81. Thabe J. Electromyography as tool to document diagnostic findings and therapeutic results associated with somatic dysfunction in the upper cervical spinal joints and sacro-iliac joints. Manual Med 1986; 2:53-58.

82. Wallace H, Clapper J., Wood J, Wagnon R. A method for measuring changes in cervical flexion and extension using videofluoroscopy. Proc of the Int'l Conf on Spinal Manip. FCER, Arlington, VA 1991; 175-182.

83. Vernon H. Applying research based assessments of pain and loss of function to the issue of developing standards of care in chiropractic. J Chiropractic Tech 1990; 2(3):121.

84. Diener E, Suh E, Smith H, et al. National differences in reported subjective well-being: why do they occur? Social Indicators Research 1995; 34:7-32.

85. Grant M, Ferrell B, Schmidt GM, et al. Measurement of quality of life in bone marrow transplantation survivors. Quality of Life Research 1992; 1:375-384.

86. Barrett S. Complementary self-care strategies for healthy aging. Generations 1993; 17(3)49.

87. Clouser KD, Hufford D. Nonorthodox healing systems and their knowledge claims. The Journal of Medicine and Philosophy 1993; 18(2)101-106.

88. Wilson I, Cleary P. Linking clinical variables with health-related quality of life. A conceptual model of patient outcome. JAMA 1995; 273(1)59-65.

89. Kenney J. The consumer's views of health. Journal of Advanced Nursing 1992; 17(7)829-834.

90. Pavot W, Diener E. The affective and cognitive context of self-reported measures of subjective well-being. Social Indicators Research 1993; 28:1-20.

91. Diener E. Assessing subjective well-being: progress and opportunities. Social Indicators Research 1994; 31:103-157.

92. Boone WR, Dobson GJ. A proposed vertebral subluxation model reflecting traditional concepts and recent advances in health and science: Part III. Journal Vertebral Subluxation Research 1997; 1(3):25-33.

93. Franklin G, Haug J, Heyer N. Outcome of lumbar fusion in Washington State Worker's Compensation. Spine 1994; 19(17)1897-1904.

94. Glick D, Lee F, Grostic J. Documenting the efficacy of chiropractic care utilizing somatosensory evoked potential (SEP) testing: Post spinal adjustment changes in SEPs. Proc of the Int'l Conf on Spinal Manip A/M 1993; 82.

95. Hagino C, Papernick L. Test-retest reliability of the ÔCMCC low back status questionnaire for laypersons'. Proc of the Intl Conf on Spinal Manip A/M 1993; 47.

96. Hains F, Waalen J, Mior S. Psychometric properties of the Neck Disability Index; final results. Proc of the Int'l Conf on Spinal Manip 1994; 8-9.

97. Hawk C, Wallace H, Dusio M. Development of a global well-being scale: A study of reliability, validity and responsiveness. Proc of the Int'l Conf on Spinal Manip 1994; 41-42.

98. Liang M, Andersson G, Bombardier C, et al. Strategies for outcome research in spinal disorders. Spine 1994; 19(18S)2037S-2040S.

99. Whitton M. Outcomes assessment: its relationship to chiropractic and managed health care. J Chiro 1994; 31(7)37-40.

100. Stano M. A comparison of health care costs for chiropractic and medical patients. J Manipulative Physiol Ther 1993. 16:291-299.

VII Modes of Adjustive Care

RECOMMENDATION

Adjusting procedures should be selected which are determined by the practitioner to be safe and effective for the individual patient. No mode of care should be used which has been demonstrated by critical scientific study and field experience to be unsafe or ineffective in the correction of vertebral subluxation.

Rating: Established
Evidence: E, L

Commentary

This chapter is concerned with the modes of adjustive care (techniques) associated with the correction of vertebral subluxation. The literature reveals many articles on adjusting modes. These articles include technique descriptions, various applications of techniques, and reliability studies usually assessing inter- and intra-examiner reliability. A number of review articles provide discussion of the modes of care. Available research data has been complemented with professional opinion, derived from two separate forums of chiropractic experts' The International Straight Chiropractic Consensus Conference, Chandler, Arizona (1992) and the Council on Chiropractic Practice Symposium on Chiropractic Techniques, Phoenix, Arizona, (1996), both of which served to validate procedures by common knowledge and usage.

The intent of this chapter is not to include nor exclude any particular technique, but rather to provide a guideline, drawing upon the commonality of various techniques, which contributes to the chiropractic objective of correcting vertebral subluxation. Any technique which does not espouse the correction of subluxation would be considered outside the scope of the Guidelines.

A list of descriptive terms and definitions related to chiropractic adjustive care as commonly practiced follows:

Adjustment: The correction of a vertebral subluxation.

Adjustic Thrust: The specific application of force to facilitate the correction of vertebral subluxation.

Adjusting Instruments: Fixed or hand-held mechanical instruments used to deliver a specific, controlled thrust to correct a vertebral subluxation.

Amplitude: Magnitude; greatness of size or depth.

Blocking Technique: The use of mechanical leverage, achieved through positioning of the spine or related structures, to facilitate the correction of vertebral subluxation.

Cleavage: The movement of one vertebra between two other vertebrae.

Concussion: An adjustic thrust produced by arrested momentum. Momentum is the result of weight (mass) in motion and also of speed. An adjustic concussion depends more on speed than mass.

High Velocity Thrust with Recoil: A controlled thrust delivered such that the time of impact with the vertebra coincides with the chiropractor's contact recoil, thus setting the vertebra in a specific directional motion.

Impulse: A sudden force directionally applied to correct a malpositioned joint.

Low Velocity Thrust with Recoil: A controlled thrust administered at low speed with a sudden pull-off by the practitioner, setting the segment in motion.

Low Velocity Thrust without Recoil: A controlled thrust administered at low speed coupled with a sustained contact on the segment adjusted.

Low Velocity Vectored Force without Recoil: A short or long duration (usually ranging from 1 to 20 seconds) contact with the segment being adjusted, with or without a graduation of force.

Manually Assisted Mechanical Thrust: A manually delivered specific thrust enhanced by a moving mechanism built into the adjusting table.

Manipulation: The taking of a joint past its passive range of motion into the paraphysiological space but not past the anatomic limit, accompanied by articular cavitation (Kirkaldy-Willis). It is not synonymous with chiropractic adjustment, which is applied to correct vertebral subluxation.

Multiple Impulse: Impulses delivered in rapid succession.

Recoil: The bouncing or springing back of an object when it strikes another object.

Tone: The normal degree of nerve tension.

Thrust: The act of putting a bony segment in motion using a directional force.

Toggle: A mechanical principle wherein two levers are hinged at an elbow giving mechanical advantage. Combinations of toggles may be used to multiply or strengthen mechanical advantage.

Toggle Recoil with Torque: A method of using the toggle with rotation twist) as the toggle straightens, causing the adjusting contact to travel in a spiral path.

Torque: A rotational or twisting vector applied when adjusting certain vertebral subluxations.

Velocity: The speed with which a thrust is delivered.

Conclusion

Considerable evidence substantiates the adjustment being administered for the purpose of correction of vertebral subluxation.(1-11) Studies regarding the different modes(4, 12-86) compare low force methods to those employing a high velocity thrust without recoil, and low velocity vectored force without recoil, high velocity thrust with recoil, low velocity thrust with and without recoil, manually and mechanically assisted thrusts, blocking techniques, and sustained force. These studies are often presented in the context of effects on various physical and physiological parameters.

Although providing useful information, the majority of these studies are limited by uncontrolled variables and lack of statistical power. They do, however, demonstrate that the application of various modes of adjustive care is accompanied by measurable changes in physical and physiological phenomena. The importance of this information, in terms of its linkage to processes used by the body in the correction of subluxation, will be assessed through continued research.

These guidelines consider(86) the modes of adjustive care in common usage, which adhere to one or more of the descriptive terms presented in this chapter, as appropriate for correction of subluxation. However, studies regarding their theoretical basis and efficacy are often conducted by advocates of (those practicing or instructing) the respective techniques. While the information attained in the numerous investigations is not in question, since many of the studies have not passed the scrutiny of peer and editorial review, it is suggested that the advocates of particular modes of adjustive care encourage research by chiropractic colleges, independent universities and other facilities to extend the level of credibility already achieved.

Continuing research and reliability studies are necessary to better understand and refine the underlying mechanisms of action common to the various modes of adjustive care. In addition, it is suggested that more observational and patient self-reporting studies be conducted which deal with quality of life assessments and overall "wellness," to demonstrate the pattern of health benefits which heretofore have been the purview of the patient and the practitioner. A conference sponsored by U.S. Department of Health and Human Services, Public Health Service Agency for Health Care Policy and Research, proposed many different approaches for studying the effects of treatments for which there is no direct evidence of health outcomes.(87)

The CCP recognizes that many subluxation-based chiropractors do not adhere, in totality, to the current hypothetical model thus far described. These practitioners consider two additional components. One is interference with the transmission of nonsynaptic neurological information which is homologous to the Palmer concept of mental impulse. The other limits the misalignment component of the subluxation to the vertebrae and their immediate articulations. While these practitioners may adhere to some concepts of other subluxation models, their practice objectives are based on correction of the vertebral subluxation as proposed by Palmer, which has recently been elaborated by Boone and Dobson.(88-90)

References

1. Fracenboud R. A survey of anterior thoracic adjustments. J Chiro Research 1988; 1:89-92.

2. Gitelman R. A chiropractic approach to biomechanical disorders of the lumbar spine and pelvis. Book Excerpt 1979; 297-330.

3. Jessen A. The sacroiliac subluxation. ACA J Chiro 1973; 7(9):865-872.

4. Kale M. How the toggle is used in adjusting. Today's Chiro 1989; 18(4):54-58.

5. Keating J. Technique system application: The Gonstead approach. J Chiropractic Tech 1991; 3(3):135-136.

6. Malik D, Slack J, Wald L, Brooks S. Effectiveness of chiropractic adjustment and physical therapy to treat spinal subluxation. PC Northern J Clin Chiro 1985; 3(2):25-29.

7. McDowall D. The subluxation specific, the adjustment: An early theory of muscle imbalance. ACA J Chiro 1983; 13(1):27-29.

8. Mears D. Adjustment of subluxation as analyzed on lateral cervical x-rays. Digest Chiro Econ 1972; 14(6)14-15.

9. Mears D. Analysis and adjustment of the occiput and cervical spine. Digest Chiro Econ 1970; 12(4):52-53.

10. Nansel D, Cremata E, Carlson J, Szlazak M. Effect of unilateral spinal adjustments on goniometrically-assessed cervical lateral-flexion end-range asymmetrics in otherwise asymptomatic subjects. J Manipulative Physiol Ther 1989; 12(6):419-427.

11. Sandoz R. Some critical reflections on subluxations and adjustments. Ann Swiss Chiro Assoc 1989; 3:7-29.

12. Bryner P. Technique system application: The Gonstead approach. J Chiro Tech 1991; 3(3):134.

13. Decosta A. The correction of lumbosacral and sacroiliac disrelationships. Digest Chiro Econ 1983; 26(3):14-19, 140-143.

14. Fuhr A, Smith D. Accuracy of piezoelectric accelerometers measuring displacement of a spinal adjusting instrument. J Manip Physiol Ther 1986; 9(1):15-21.

15. Gemmell H, Jacobson B, Heng B. Effectiveness of Toftness sacral apex adjustment in correcting fixation of the sacroiliac joint: Preliminary report. Am J Chiro Med 1990; 3(1):5-8.

16. Gregory R. A kinesiological basis for the C1 adjustment (part 2). Digest Chiro Econ 1983; 25(5):41-44.

17. Gregory R. A kinesiological basis for the C1 adjustment (part 1). Digest Chiro Econ 1983; 25(4):22-27.

18. Richards G, Thompson J, Osterbauer P, Fuhr A. Use of pre- and post-CT scans and clinical findings to monitor low force chiropractic care of patients with sciatic neuropathy and lumbar disc herniation: A review. J Manipulative Physiol Ther 1990; 13(1):58.

19. Terrett A, Webb M. Vertebrobasilar accidents (VA) following cervical spine adjustment manipulation. J Aust Chiro Assoc 1982; 12(50):24-27.

20. Ungerank R. Implementing the U.S.L.F. technique. Today's Chiro 1989; 18(4):50-52.

21. Hospers, L. EEG and CEEG studies before and after upper cervical or SOT category II adjustment in children after head trauma, in epilepsy and in "hyperactivity." Proc of the Int'l Conf on Spinal Manip 1992; 84-139.

22. Insignia, F. A comparative study of activator methods and sacro-occipital technique in low back pain: Short term effects on biomechanical measures. Proc of the Int'l Conf on Spinal Manip 1991; 87-89.

23. Maltezopoulos V, Armitage N. A comparison of four chiropractic systems in the diagnosis of sacroiliac malfunction. Eur J Chiro 1984; 32(1):4-42.

24. Unger, J. Precision block placement indicator. Am Chiro 1991; 13(3):8-11.

25. Unger, J. Short lever manual force mechanically-assisted procedures in sacro occipital technique (SOT). Transactions of the Consortium for Chiropractic Research 1991; 305-309.

26. Plaugher G, Cremata E, Phillips R. A retrospective consecutive case analysis of pretreatment and comparative static radiological parameters following chiropractic adjustments. J Manipulative Physiol Ther 1990; 13(9):498-506.

27. Whittingham W, Ellis W, Molyneux T. The effects of manipulation (toggle recoil technique) for headaches with upper cervical joint dysfunction: A pilot study. J Chiro 1994; 17(6):369-375.

28. Hospers LA, Sweat RW, Hus L, et al. Response of a three year old epileptic child to upper cervical adjustment. Today's Chiro 1987; 15(16):69-76.

29. Hospers LA, Zozula L, Sweat M. Life upper cervical adjustment in a hyperactive teenager. Today's Chiro 1987; 16(16):73-76.

30. Bednar, D. Anterior spinal adjustment in inversion traction and effects on the spine. Am Chiro 1991; 13(3):21-24.

31. Haas, M. The physics of spinal manipulation. Part IV. A theoretical consideration of the physician impact force and energy requirements needed to produce synovial joint cavitation. J Manipulative Physiol Ther 1990; 13(7):378-383.

32. Hessell B, Herzog W, McEwen M, et al. Experimental measurement of the force exerted during spinal manipulation using the Thompson technique. J Manipulative Physiol Ther 1990; 13(8):448-453.

33. Kawchuk G, Herzog W. Biomechanical characterization (fingerprinting) of five novel methods of cervical spine manipulation. J Manipulative Physiol Ther 1993; 16(9):573-577.

34. Osterbauer P, Fuhr A, Hildebrandt R. Mechanical force, manually assisted short lever chiropractic adjustment. J Manipulative Physiol Ther 1992; 15:309-317.

35. Rosen, M. Short lever specific contact procedures. Transactions of the Consortium for Chiropractic Research 1991; 261-264.

36. Gal J, Herzog W, Kawchuk G, et al. Relative movements of vertebral bodies that accompany cracking sounds (cavitation) during manipulative thrusts to unembalmed post-rigor human cadavers. Proc of the Int'l Conf on Spinal Manip 1994; 55.

37. Good, C. An analysis of diversified (lege artis) type adjustments based upon the assisted-resisted model of intervertebral motion unit prestress. Chiro Tech 1992; 4(4):117-123.

38. Greenman P. Principles of manipulation of the cervical spine. J Manual Medicine 1991; 6(3):106-113.

39. Smith D, Fuhr A, Davis B. Skin accelerometer displacement and relative bone movement of adjacent vertebrae in response to chiropractic percussion thrusts. J Manipulative Physiol Ther 1989; 12(1):26-37.

40. Triano J. Modeling of thoracic manipulation: A case study of applied biomechanics. Proc of the Int'l Conf on Spinal Manip 1989; 70-74.

41. Cooperstein R. Thompson technique. Chiropractic Technique 1995; 7(2):60-63.

42. Fracenbound R. A survey of anterior thoracic adjustments. J Chiro Res 1988; 1:89-92.

43. Gemmell H, Jacobson B, Heng B. Effectiveness of Toftness sacral apex adjustment in correcting fixation of the sacroiliac joint: Preliminary Report. Am J Chiro Med 1990; 3(1):5-8.

44. Goodheart G. The cervical challenge. Digest Chiro Econ 1972; 15(2):36-39.

45. Malik D, Slack J, Wald L, et al. Effectiveness of chiropractic adjustment and physical therapy to treat spinal subluxation. PC Northern J Clin Chiro 1985; 3(2):25-29.

46. Mears D. Analysis and adjustment of the occiput and cervical spine. Digest Chiro Econ 1970; 12(4):52-53.

47. Moses D. 1991 year-end compendium. Studies on Logan Basic Piriformis Contact. ACA J Chiro 1991; 28(12):35-37.

48. Nansel D, Cremata E, Carlson J, et al. Effect of unilateral spinal adjustments on goniometrically-assessed cervical lateral-flexion end-range asymmetries in otherwise asymptomatic subjects. J Manipulative Physiol Ther 1989; 12(6):419-427.

49. Richards G, Thompson J, Osterbauer P, et al. Use of pre-and post CT scans and clinical findings to monitor low force chiropractic care of patients with sciatic neuropathy and lumbar disc herniation: A review. J Manipulative Physiol Ther 1990; 13(1):58.

50. Sandoz R. Some critical reflections on subluxations and adjustments. Ann Swiss Chiro Assoc 1989; 3:7-29.

51. Stonebrink R. Thoraco-costal adjustments and related supine techniques. ACA J Chiro 1977; 12(5):855-861.

52. Terrett A, Webb M. Vertebrobasilar accidents (VA) following cervical spine adjustment manipulation. J Aust Chiro Assoc 1982; 12(50):24-27.

53. Boesler D, Warner M, Alpers A, Finnerty EP, Kilmore MA. Efficacy of high-velocity low-amplitude manipulative technique in subjects with low-back pain during menstrual cramping. J Am Osteopath Assoc 1993; 93:203-214.

54. Cassidy JD, Thiel HW, Kirkaldy-Willis WH. Side posture manipulation for lumbar intervertebral disk herniation. J Manipulative Physiol Ther 1993; 16:96-103.

55. Epstein D. Network spinal analysis: A system of health care delivery within the subluxation-based chiropractic model. Journal of Vertebral Subluxation Research, 1996; 1(1):3.

56. Cox JM. Managing low back pain cases with distraction adjustment procedures. Today's Chiro 1993; 22:48-54.

57. Turchin C. Light force techniques for children: An introduction to gentle adjusting techniques for the lower extremity. ICA Review 1993; 49:21-27.

58. Bergmann TF. Various forms of chiropractic technique. Chiropractic Technique 1993; 5:53-55.

59. Bergmann TF. Short lever, specific contact articular chiropractic technique. J Manipulative Physiol Ther 1992; 15:591-595.

60. Triano JJ. Studies on the biomechanical effect of a spinal adjustment. J Manipulative Physiol Ther 1992; 15:71-75.

61. Bergmann TB, Peterson DH, Lawrence DJ. Chiropractic Technique. New York, Churchill Livingstone 1993; 127-128.

62. Cremata EE, Plaugher G, Cox WA. Technique system application: The Gonstead approach. Chiropractic Technique 1991; 3:19-25.

63. Good C. An analysis of diversified (lege artis) type adjustments upon the assisted-resisted model of intervertebral motion unit prestress. Chiropractic Technique 1992; 4:117-123.

64. Evans DP, Burke MS, Lloyd KN, et al. Lumbar spinal manipulation on trial: 1. Clinical assessment. Rheum Rehabil 1978; 17:46-53.

65. Tran TA, Kirby JD. The effectiveness of upper cervical adjustment upon the normal physiology of the heart. ACA J Chiro 1977; XIS:58-62.

66. Briggs L, Boone WR. Effects of a chiropractic adjustment on changes in pupillary diameter: A model for evaluating somatovisceral response. J Manipulative Physiol Ther 1988; 11:181-189.

67. Palmer DD. The chiropractor's adjuster, the science, art and philosophy of chiropractic. Portland, Ore. Portland Printing House, 1910.

68. VanRumpt R. Directional non-force technique notes. Beverly Hills, Calif, Directional Non-Force Technique, 1987.

69. Osterbauer PJ, Fuhr AW. The current status of activator methods chiropractic technique, theory, and training. Chiropractic Technique 1990; 2:168.

70. Bartol KM. A model for the categorization of chiropractic treatment procedures. Chiropractic Technique 1991; 3:78.

71. Kaminski M, Boal R, Gillette RG, et al. A model for the evaluation of chiropractic methods. J Manipulative Physiol Ther 1987; 10:61.

72. Kaminski M. Evaluation of chiropractic methods. Chiropractic Technique 1990; 2:3.

73. Osterbauer PJ, Fuhr AW, Hildebrandt RW. Mechanical force manually adjusted short lever chiropractic adjustment. J Manipulative Physiol Ther 1992; 15:309-317.

74. Smith DB, Fuhr AW, Davis BP. Skin accelerometer displacement and relative bone movement of adjacent vertebrae in response to chiropractic percussion thrusts. J Manipulative Physiol Ther 1989; 12:26-37.

75. Triano JJ. The biomechanics of the chiropractic adjustment. J Manipulative Physiol Ther 1992; 15:71-75.

76. Van Rumpt R. Directional non-force technique notes. In Directional Non-Force Technique. Beverly Hills, Calif, 1987.

77. Thompson C. Technique Reference Manual. Thompson Educational Workshops. Ill, SM & Williams Manufacturing, 1987.

78. Nansel DD, Waldorf The, Cooperstein R. Effect of cervical spinal adjustments on lumbar paraspinal muscle tone: Evidence for facilitation of intersegmental tonic neck reflexes. J Manipulative Physiol Ther 1993; 16:91-95.

79. Hessel BW, Herzog W, Conway PIW, et al. Experimental measurement of the force exerted during spinal manipulation using the Thompson technique. J. Manipulative Physiol Ther 1990; 13:448-453.

80. Herzog W. Biomechanical studies of spinal manipulative therapy. J Can Chiro Assoc 1991; 35:156-164.

81. Kawchuk GN, Herzog W, Hasleer EM. Forces generated during spinal manipulative therapy of the cervical spine. J Manipulative Physiol Ther 1992; 15:275-278.

82. Gal JM, Herzog W, Kawchuk G, et al. Movements of vertebrae during PA adjustment to unembalmed cadavers. Proceedings of the 1993 International Conference on Spinal Manipulation, Montreal, Foundation of Chiropractic Education and Research, 1993; 15.

83. Herzog W, Gal J, Conway P, et al. Vertebral movement during spinal manipulative therapy. Proceedings of the 1993 International Conference on Spinal Manipulation, Montreal, Foundation of Chiropractic Education and Research, 1993; 14.

84. Lee M, Svensson NL. Effect of loading frequency response of the spine to lumbar posteroanterior forces. J Manipulative Physiol Ther 1993; 16:439-446.

85. Wood J, Adams AA, Hansmeter D. Force and time characteristics of Pierce technique cervical adjustments. Chiropractic: J Chiro Research and Clinical Investigation 1994; 9:39-44.

86. Bergmann TF. Chiropractic technique: An overview. Advances in Chiropractic 1995; 2:429-431.

87. Methodology Perspectives. Clinical Practice Guideline Development. US Department of Health and Human Services, Public Health Service, Agency for Health Care Policy and Research, 1994; 5-12.

88. Boone WR, Dobson GJ. A proposed vertebral subluxation model reflecting traditional concepts and recent advances in health and science. Journal of Vertebral Subluxation Research 1996; 1(1) 19-30.

89. Boone WR, Dobson GJ. A proposed vertebral subluxation model reflecting traditional concepts and recent advances in health and science: Part II. Journal of Vertebral Subluxation Research 1996; 1(2):23-30.

90. Boone WR, Dobson GJ. A proposed vertebral subluxation model reflecting traditional concepts and recent advances in health and science: Part III. Journal of Vertebral Subluxation Research 1997; 1(3)25-33.

VIII Duration of Care for Correction of Vertebral Subluxation

RECOMMENDATION

Since the duration of care for correction of vertebral subluxation is patient specific, frequency of visits should be based upon the reduction and eventual resolution of indicators of vertebral subluxation. Since neither the scientific nor clinical literature provides any compelling evidence that substantiates or correlates any specific time period for the correction of vertebral subluxation, this recommendation has several components which are expressed as follows:

a) Based on the variety of assessments utilized in the chiropractic profession, the quantity of indicators may vary, thus affecting the periodicity of their appearance and disappearance, which is tantamount to correction of vertebral subluxation.

b) Vertebral subluxation, not being a singular episodic event such as a strain or sprain, may be corrected but reappear, which necessitates careful monitoring and results in a wide variation in the number of adjustments required to affect a longer-term correction.

c) Based on the integrity of the spine in terms of degree and extent of degeneration, the frequency of assessments, and the necessity for corrective adjustments, may vary considerably.

d) Because the duration of care is being considered relative to the correction of vertebral subluxation, it is independent of clinical manifestations of specific dysfunctions, diseases, or syndromes. Treatment protocols and duration of care for these conditions are addressed in other guidelines, which may be appropriate for any practitioner whose clinical interests include alleviation of such conditions.

Rating: Established
Evidence: E, L

Commentary

Attempts have been made to identify an appropriate number and frequency of chiropractic visits based on type of condition and degree of severity.(1-24) Unfortunately, these recommendations are based merely on consensus, and research to support these recommendations is lacking. Moreover, little to no delineation has been made in the duration of care literature base between care for specific symptomatic profiles such as low-back pain, and long-term subluxation-specific care.

Two studies were found which addressed quality of life issues in patients under chiropractic care. One large, well-designed retrospective study assessing patient reported quality of life found no clinical end point where improvement reached a plateau.(25) A second study involved a detailed examination of a database collected during a randomized clinical trial testing the effectiveness of a comprehensive geriatric assessment program. It was reported that compared to non-chiropractic patients, chiropractic patients in this population were less likely to have been hospitalized, less likely to have used a nursing home, more likely to report a better health status, more likely to exercise vigorously, and more likely to be mobile in the community. Furthermore, they were less likely to use prescription drugs.(26)

It is the position of the Guideline Panel that individual differences in each patient and the unique circumstances of each clinical encounter preclude the formulation of "cookbook" recommendations for frequency and duration of care.

The appropriateness of chiropractic care should be determined by objective indicators of vertebral subluxation.

References

1. Balduc H. How chiropractic care can promote wellness. Northwestern College of Chiropractic, Bloomington, MN.

2. Coile J, Russel C. "Promoting health," the new medicine: reshaping medical practice and health care management. Aspen Publ, Inc, Rockville, MD 1990; 151-166.

3. Coulter ID. The patient, the practitioner, and wellness: Paradigm lost, paradigm gained. J Manipulative Physiol Ther 1990; 13(2):107-111.

4. Flesia JM (President, Renaissance International and President, Chiropractic Basic Science Research Foundation). Vertebral subluxation degeneration complex, a review of therapeutic necessity for FSC well patient care, in: Seminar Notes (The New Renaissance, "Global Chiropractic ... one patient at a time"), 7-36, including the 496 various papers, referenced therein.

5. Hildebrandt R. Chiropractic physicians as members of the health careb delivery system: The case for increased utilization. J Manipulative PhysiolbTher 1980; 3(1):23-32.

6. Jamison J. Chiropractic as conventional health care. J Aust Chiro Assoc 1989; 15(2):55-59.

7. Jamison J. Preventive chiropractic and the chiropractic management of visceral conditions: Is the cost to chiropractic acceptance justified by the benefits to health care? J Aust Chiro Asso 1991; 9(3):95-101.

8. Vear H. The role of chiropractic in preventive health care. J Can Chiro Assoc 1974; 18(4):10-3.

9. Olson RE. Chiropractic/physical therapy treatment standards: a reference guide. Data Management Ventures, Inc. Atlanta, GA, 1987.

10. Lang MG (chm) et al. Oregon chiropractic practices and utilization guidelines for neuromusculoskeletal conditions. Oregon Chiropractic Practice and Utilization Guidelines Committee.

11. Minnesota Chiropractic Association. Standards of practice. Roseville, MN, 1991.

12. Ohio State Chiropractic Association. The chiropractic manual for insurance personnel. Columbus, Ohio, 1988-1990.

13. Hansen DT (ed). Chiropractic standards and utilization guidelines in the care and treatment of injured workers. Chiropractic Advisory Committee, Department of Labor and Industries, State of Washington, 1988.

14. Leblanc F (ed). Scientific approach to the assessment and management of activity-related spinal disorders. Spine 1987; 12:16-21.

15. Haldeman S. Presidential address, North American Spine Society: Failure of the pathology model to predict back pain. Spine 1990; 15:718-24.

16. Frymoyer J. Back pain and sciatica. N Engl J Med 1988; 318:291-300.

17. Mayer T, Gatchel R. Functional restoration for spinal disorders: A sports medicine approach. Philadelphia, Lea & Febiger, 1988.

18. Bronfort G. Chiropractic treatment of low-back pain: a prospective survey. J Manipulative Physiol Ther 1986; 9:99-133.

19. Phillips RB, Butler R. Survey of chiropractic in Dade County, Florida. J Manipulative Physiol Ther 1982; 5:83-9.

20. Phillips R. A survey of Utah chiropractic patients. ACA J Chiro 1981; 18:113-28.

21. Guifu C, Zongmin L, Zhenzhong You, Jiaghua W. Lateral rotatory manipulative maneuver in the treatment of subluxation and synovial entrapment of lumbar facet joints. The Trad Chin Med 1984; 4:211-12.

22. Jarvis KB, Phillips RB, Morris EK. Cost per case comparison of back injury claims of chiropractic versus medical management for conditions with identical diagnostic codes. J Occup Med 1991; 33:847-52.

23, Sullivan MD, Turner JA, Romano J. Chronic pain in primary care identification and management of psychosocial factors. J Fam Pract 1991; 32:193-199.

24. Waddell G, Main CJ, Morris EW, DiPaola M, Gray L. Chronic low back pain, psychologic distress and illness behavior. Spine 1984; 9:209-13.

25. Blanks RH, Schuster TL, Dobson M. A retrospective assessment of network care using a survey of self-rated health, wellness, and quality of life. Journal of Vertebral Subluxation Research 1997; 1(4):15-31.

26. Coulter I, Hurwitz E, Aronow H, Cassata D, Beck J. Chiropractic patients in a comprehensive home-based geriatric assessment, follow-up and health promotion program. Topics in Clinical Chiropractic 1996; 3(2):46-55.

IX Chiropractic Care of Children

RECOMMENDATION

Since vertebral subluxation may affect individuals at any age, chiropractic care may be indicated at any time after birth. As with any age group, however, care must be taken to select adjustment methods most appropriate to the patient's stage of development and overall spinal integrity. Parental education by the subluxation-centered chiropractor concerning the importance of evaluating children for the presence of vertebral subluxation is encouraged.

Rating: Established
Evidence: E, L

Commentary

Schneier and Burns(1) published the results of a blinded study describing the relationship of atlanto-occipital hypermobility to sudden infant death syndrome (SIDS). These authors described the phenomenon of atlas inversion where the posterior arch of C-1 enters the foramen magnum. They further stated, Relative measurements suggested that a correlation existed between instability in the atlanto-occipital articulation and sudden infant death syndrome. Instability is a manifestation of vertebral subluxation.

These findings corroborate those of Gilles, Bina and Sotrel in their paper, Infantile atlanto-occipital instability.(2) These investigators studied 17 infant cadavers. Eleven were SIDS cases and six were non-SIDS cases. Ten of the 17 cases demonstrated atlas inversion, and all ten cases were in the SIDS group. These authors also suggested that atlanto-occipital instability may be a factor in other conditions. They stated, At this early stage in the development of our notions about the potential contribution of atlanto-occipital instability to deaths in infants, it is very difficult to assess the role of this proposed mechanism in the death of an infant with a conventional disease. Thus, one might anticipate that the controls will be contaminated by children who had a conventional disease, but whose death was, in fact, caused by this mechanism.

Towbin(3) addressed the clinical significance of spinal cord and brain stem injury at birth, noting that such damage is often latent and undiagnosed. According to Towbin, Death of the fetus may occur during delivery or, with respiratory function depressed, a short period after birth. Infants who survive the initial effects may be left with severe nervous system defects. In some, the neurologic sequellae are attributable directly to the primary lesion in the cord or brain stem; in others, secondary cerebral damage results, a consequence of the imposed period of hypoxia at birth. Chesire(4) described three cases of traumatic myelopathy in children without demonstrable vertebral trauma. In this paper, the classical mechanism of trauma is said to be hyperextension of the cervical spine in a difficult breech delivery. Although tetraplegia may result, the x-rays are described as usually normal. Complicated deliveries represent a higher risk to the child of suffering spinal cord damage during the birth process. High cervical spinal cord injury in neonates is a specific complication of forceps rotation. The vacuum extractor exerts considerable traction force. Fetal skull fracture can result, and its true incidence may be higher than expected, considering that few neonates with normal neurologic behavior undergo skull x-ray.(5-7) Byers(8) published an excellent review paper addressing spinal cord damage during the birth process. Traction and rotational stresses applied to the spinal axis were listed as causes of spinal cord injury during birth.

The vagus nerve is involved in mechanisms associated with control of tidal volume, breathing rate, and respiratory reflexes. Sachis et al.(9) performed histological examinations of the vagus nerve in infants who died of SIDS and those who died of other conditions. Significant differences were noted between the two groups. Several hypotheses were proposed by authors to explain the data, including damage to the vagus nerve resulting in delayed development.

Gutman(10) described how relational disturbance between occiput and atlas can lead to blocked atlantal nerve syndrome in children and adults. The author listed a variety of conditions which appear clinically related to this syndrome. Although SIDS was not discussed as an entity, the author stated that a brain stem component is a part of this syndrome. It was concluded that for those affected, manual treatment by a qualified practitioner is appropriate.

In her paper Physical stresses of childhood that could lead to need for chiropractic care, presented at the first National Conference on Chiropractic and Pediatrics, McMullen(11) stated, Any condition that arises to change the normal birth process frequently results in subluxation at the level of greatest stress. Severe subluxation resulting in nerve damage may be clinically obvious at birth (e.g., Bells, Erbs and Klumpkes palsies), however, more frequently the trauma remains subclinical with symptoms arising at a later time. These symptoms include, but are not limited to, irritability, colic, failure-to-thrive syndromes, and those syndromes associated with lowered immune responses. These subluxations should be analyzed and corrected as soon as possible after birth to prevent these associated conditions.

Bonci and Wynne(12) and Stiga(13) published papers discussing the relationship between chiropractic theory and SIDS etiology. Banks et al.(14) stated Functional disturbances in the brainstem and cervical spinal cord areas related to the neurophysiology of respiration may contribute the clinical factors associated with sudden infant death syndrome...Any process, whether genetic, biochemical, biomechanical or traumatic, that alters normal development of the respiratory control centers related to spinal constriction and compression following birth trauma may be contributory to sudden infant death syndrome.

Other traumatic events of childhood may produce vertebral subluxations. Orenstein et al.(15) did a retrospective chart review involving 73 children who presented at a children's hospital with cervical spine injuries. Sixty-seven percent of these injuries were traffic related resulting from motor-vehicle crashes. The injured children were passengers in an automobile, pedestrians, or bicyclists. The mean age of the patients surveyed was 8.6 years, with bimodal peaks at 2 to 4 and 12 to 15 years. The authors noted that younger children sustained more severe injuries than older children. Distraction and subluxation injuries were the most common injuries in children aged 8 years and younger. Fractures were more common in older children.

Glass et al.(16) evaluated 35 children with lumbar spine injuries following blunt trauma. Thirty-one of these children were injured in motor-vehicle crashes. Abnormalities noted on plain radiographs and CT scans included subluxation, distraction, and fracture alone or in combination. The authors stated, Children involved in motor-vehicle crashes are at a high risk for lumbar spine injuries Lumbar spine radiographs are necessary in all cases with suspected lumbar spine injury This paper underscores the need to evaluate the entire spine in cases of motor-vehicle accidents, not just the cervical region. It may be cited when claims for lumbar radiographs are questioned in cases of children involved in car accidents.

Rachesky et al.(17) reported that on the cervical spine radiographs of children under 18 they examined, vehicular accidents accounted for 36% of radiographic abnormalities. It was further stated that clinical assessment of a complaint of neck pain or involvement in a vehicular accident with head trauma would have identified all cases of cervical spine injury.

Other authors have described aspects of cervical spine injuries in children involved in motor-vehicle accidents. Hill et al.(18) noted that 31% of the pediatric neck injuries reviewed were the result of motor-vehicle accidents. In younger children (under 8 years of age) subluxation was seen more frequently than fracture. Agran(19) stated that non-crash vehicular events may cause injuries to children. Non-crash events discussed in this paper included sudden stops, swerves, turns, and movement of unrestrained children in the vehicle.

Roberts et al.(20) described a case where a child involved in a motor-vehicle accident sustained a whiplash injury resulting in immediate neck and back pain. Neurobehavioral abnormalities increased in the two-year period following the accident. Four years after the accident, symptoms persisted. Position emission tomography (PET scan) demonstrated evidence of brain dysfunction.

The clinical manifestations of pediatric cervical spine injury may be diverse. Biedermann(21) stated that a wide range of pediatric symptomatology may result from suboccipital strain. The disorders reported include fever of unknown origin, loss of appetite, sleeping disorders, asymmetric motor patterns, and alterations of posture. Maigne(22) stated that trauma to the cervical spine and head can cause such problems as headaches, vestibular troubles, auditory problems and psychic disturbances. Gutmann(23) discussed the diverse array of signs and symptoms which can occur as a result of biomechanical dysfunction in the cervical spine. Others have also reported various pathoneurophysiological changes in children,(24-31) as well as reduction of pathology following chiropractic care.(29,31-41,44) In the chiropractic literature, Clow(42) published a paper addressing pediatric cervical acceleration/deceleration injuries.

Two peer reviewed journals, Chiropractic Pediatrics and the Journal of Clinical Chiropractic Pediatrics are being published to disseminate critically reviewed papers in this field. Additionally, courses in pediatrics are offered at the professional and postgraduate levels at accredited chiropractic colleges and by the International Chiropractic Pediatric Association.

The pediatric case history and physical examination necessarily differ in content and scope from those of adult patients. Even taking into consideration the difference between the two populations, however, a recent quasi meta-analysis reveals an extremely low risk for chiropractic pediatric patients receiving adjustments.(43)

References

1. Schneier M, Burns RE: Atlanto-occipital hypermobility in sudden infant death syndrome. Chiropractic: J Chiro Research and Clinical Investigation 1991; 7(2):33.

2. Gilles FH, Bina M, Sotrel A. Infantile atlanto-occipital instability. Am J Dis Child 1979; 133:30.

3. Towbin A. Latent spinal cord and brain stem injury in newborn infants. Develop Med Child Neurol 1969; 11:54.

4. Chesire DJE. The paediatric syndrome of traumatic myelopathy without demonstrable vertebral injury. Paraplegia 1977-78; 15:74.

5. Menticoglou SM, Peerlman M, Manning FA. High cervical spinal cord injury in neonates delivered with forceps; report of 15 cases. Obstet Gynecol 1995; 86(4 Pt 1):589-94.

6. Hickey K, McKenna P. Skull fracture caused by vacuum extraction. Obstet Gynecol 1996; 88(4 Pt. 2):671.

7. Ross MG. Skull fracture caused by vacuum extraction. Obstet Gynecol 1997; 89(2):319.

8. Byers RK. Spinal-cord injuries during birth. Develop Med Child Neurol 1975 17(1):103.

9. Sachis PN, Armstrong DL, Becker LE, Bryan AC. The vagus nerve and sudden infant death syndrome: a morphometric study. J Pediatrics 1981 98(2):278.

10. Gutman G. Blocked atlantal nerve syndrome in infants and small children. Originally published in Manuelle Medizin, Springer-Verlag, 1987. English translation published in International Review of Chiropractic 1990 46(4):37.

11. McMullen M. Physical stresses of childhood that could lead to need for chiropractic care. Proceedings of the National Conference on Chiropractic and Pediatrics. Arlington, VA: International Chiropractors Association, 1991.

12. Bonci A, Wynne C. The interface between sudden infant death syndrome and chiropractic. Journal of Chiropractic Research 1989; 5(3):78.

13. Stiga J: Sudden infant death syndrome. American Chiropractor 1983:28.

14. Banks B, Beck R, Columbus M, et al. Sudden infant death syndrome: a literature review with chiropractic implications. J Manipulative Physiol Ther 1987; 10(5):246.

15. Orenstein JB, Klein BL, Gotschall CS, et al. Age and outcome in pediatric cervical spine injury: 11-year experience. Pediatr Emerg Care 1994; 10(3):132.

16. Glass RB, Sivit CJ, Sturm PF, et aI, Lumbar spine injury in a pediatric population: difficulties with computed tomographic diagnosis. J Trauma 1994; 37(5):815.

17. Racheskey I, Boyce WT, Duncan B, et al. Clinical prediction of cervical spine injuries in children. Radiographic abnormalities. Am J Dis Child 1987; 141(2):199.

18. Hill SA, Miller CA, Kosnik EJ, Hunt WE. Pediatric neck injuries. A clinical study. J Neurosurg 1984; 60(4):700.

19. Agran PF. Motor vehicle occupant injuries in noncrash events. Pediatrics 1981; 67(6):838.

20. Roberts MA, Manshadi FF, Bushnell DL, Hines ME. Neurobehavioral dysfunction following mild traumatic brain injury in childhood: a case report with positive findings on positron emission tomography (PET). Brain Inj 1995; 9(5):427.

21. Biedermann H. Kinematic imbalances due to suboccipital strain in newborns. Manual Medicine 1992; 6:151.

22. Maigne R. Orthopedic medicine, a new approach to vertebral manipulations. Charles C. Thomas, 1972.

23. Gutmann G. Blocked atlantal nerve syndrome in infants and small children. ICA Review 1990; 46(4):37.

24. Abroms IF, Bresnan MJ, Zuckerman JE, Fischer EG, Strand R. Cervical cord injuries secondary to hyperextension of the head in breech presentations. Obstet Gynecol 1973; 41(3):369-378.

25. Glasauer FE, Cares HL. Biomechanical features of traumatic paraplegia in infancy. J of Trauma 1973; 3(2):166-170.

26. Okumura H, Homma TT. Juvenile compression myelopathy in the cervical spine. Spine 1994; 19(1):72-76.

27. Lanska MJ, Roessmann R, Wiznitzer M. Magnetic resonance imaging in cervical cord birth injury. Pediatrics 1990; 85(5):760-764.

28. Ono K, et al. Atlantoaxial rotatory fixation: radiographic study of its mechanism. Spine 1985; 10(7):602-608.

29. Harris SL, Wood KW. Resolution of infantile Erbs palsy utilizing chiropractic treatment. J Manipulative Physiol Ther 1993; 16(6):415-418.

30. BenEliyahu DJ. The detection and management of pediatric whiplash injuries. Proceedings of the National Conference on Chiropractic & Pediatrics October 1993; Palm Springs, ICA publisher, 53-57.

31. Araghi H. Post-traumatic evaluation and treatment of the pediatric patient with head injury: a case report. Proceedings of the National Conference of Chiropractic & Pediatrics. November 1992; ICA publisher. Colorado Springs 1-8.

32. Peet P. Child with chronic illness: respiratory infections, ADHD, and fatigue. Response to chiropractic care. Chiropractic Pediatrics 1997; 3(1):12.

33. Reed WR, et al. Chiropractic management of primary nocturnal enuretic children. In: Proceedings of the 3rd National Conference of Chiropractic and Pediatrics. Arlington, VA: ICA publisher 1993:64-82.

34. Hudgkins DJ, et al. Evaluation and chiropractic treatment of the pediatric patient with nocturnal enuresis: a case report. In: Proceedings of thyromegaly 4th National Conference on Chiropractic and Pediatrics. Arlington, VA. ICA publisher 1994:80-84.

35. Bachman T, Lantz CA. Management of pediatric asthma and enuresis with probable traumatic etiology. In: Proceedings of the 1st National Conference on Chiropractic and Pediatrics, Arlington, VA: ICA publisher 1991:14-22.

36. Nilsson N, Christiansen B. Prognostic factors in bronchial asthma in chiropractic practice. J Aust Chiro Assoc 1988; 18(3):85-87.

37. Vernon LF, Vernon G. A scientific hypothesis for the efficacy of chiropractic manipulation in the pediatric asthmatic patient. Chiropractic Pediatrics 1995; 1(4):7-8.

38. Langley C. Epileptic seizures, nocturnal enuresis, ADD. Chiropractic Pediatrics 1994; 1(1):21-22.

39. Klougart N, et al. Infantile colic treated by chiropractors: a prospective study of 316 cases. J Manip Physiol Ther 1989; 12(4):281-288.

40. Nilsson N. Infant colic and chiropractic. Eur J Chir 1985; 33(4):264-265.

41. Graham RL, Pistolese RA. An impairment rating analysis of asthmatic children under chiropractic care. Journal of Vertebral Subluxation Research 1997; 1(4):41-48.

42. Clow BJE: Pediatric cervical acceleration/deceleration injuries. Journal of Clinical Chiropractic Pediatrics 1996; 1(1):36.

43. Pistolese RA. Risk assessment of neurological and/or vertebrobasilar complications in the pediatric chiropractic patient. Journal of Vertebral Subluxation Research 1998; 2(2):In press.

44. Blum K, Holder JM. Attention deficit disorders (ADD). Biogenic aspects. Chiropractic Pediatrics 1994; 1(2):21-23.

X Patient Safety

RECOMMENDATION

Patient safety encompasses the entire spectrum of care offered by the chiropractor. Consequently, it is important to define at the onset, the nature of the practice as well as the limits of care to be offered. Minimally this should include a Terms of Acceptance document between the practitioner and the patient. Additionally, all aspects of clinical practice should be carefully chosen to offer the patient the greatest advantage with the minimum of risk.

Rating: Established
Evidence: E, L

Commentary

Patient safety is assured by more than the practitioner's causing no harm. Since every consumer of health care is ultimately responsible for his/her own health choices, patient safety is also a matter of the availability of accurate and adequate information with which the patient must make these choices. The patient's expectations should be consistent with the provider's goals. If the patient perceives those goals as anything different, proper and safe choices cannot be assured. Thus, it is important to recognize that chiropractic is a limited, primary profession which contributes to health by addressing the safe detection, location, and correction or stabilization of vertebral subluxation(s). It is important that the chiropractor take the steps necessary to foster proper patient perception and expectation of the practitioner's professional goals and responsibilities. It is within this context that patient safety is addressed in this chapter.

A Terms of Acceptance is the recorded written informed consent agreement between a chiropractor and the patient. This document provides the patient with disclosure of the responsibilities of the chiropractor and limits of chiropractic, and the reasonable benefit to be expected. This enables the patient to make an informed choice either to engage the services of the chiropractor, aware of the intended purpose of the care involved, or not to engage those services if the proposed goals are not acceptable or not desired. This embodies the responsibility of assuring patient safety by not providing false or misleading promises, claims or pretenses to the patient.(1-7)

Professional Referral: Professional referral requires authority and competence to acquire accurate information concerning matters within the scope and practice of the professional to whom a referral is made. There are two types of professional referrals made by chiropractors:

(A) Intraprofessional referral: Chiropractors, by virtue of their professional objective, education, and experience, have authority and competence to make direct referrals within the scope and practice of chiropractic. Such a referral may be made when the attending chiropractor is not able to address the specific chiropractic needs of a particular patient. Under these circumstances, the chiropractor may refer the patient directly to or consult with another chiropractor better suited by skill, experience or training to address the patient's chiropractic needs.

(B) Interprofessional referral: In the course of patient assessment and the delivery of chiropractic care, a practitioner may encounter findings which are outside his/her professional and/or legal scope, responsibility, or authority to address. The chiropractor has a responsibility to report such findings to the patient, and record their existence. Additionally, the patient should be advised that it is outside the responsibility and scope of chiropractic to offer advice, assessment or significance, diagnosis, prognosis, or treatment for said findings and that, if the patient chooses, he/she may consult with another provider, while continuing to have his/her chiropractic needs addressed.

Rare case reports of adverse events following spinal manipulation exist in the literature. However, scientific evidence of a causal relationship between such adverse events and the manipulation is lacking. Furthermore, spinal adjustment and spinal manipulation are not synonymous terms.

In the case of strokes purportedly associated with manipulation, the panel noted significant shortcomings in the literature. A summary of the relevant literature follows:

*Lee(8) attempted to obtain an estimate of how often practicing neurologists in California encountered unexpected strokes, myelopathies, or radiculopathies following chiropractic manipulation. Neurologists were asked the number of patients evaluated over the preceding two years who suffered a neurological complication within 24 hours of receiving chiropractic manipulation. Fifty-five strokes were reported. The author stated, Patients, physicians, and chiropractors should be aware of the risk of neurologic complications associated with chiropractic manipulation. No support was offered to substantiate the premise that a causal relationship existed between the stroke and the event(s) of the preceding 24 hours.

*In a letter to the editor of the Journal of Manipulative and Physiological Therapeutics, Myler(9) wrote, I was curious how the risk of fatal stroke after cervical manipulation, placed at 0.00025%(10) compared with the risk of (fatal) stroke in the general population of the United States. According to data obtained from the National Center for Health Statistics, the mortality rate from stroke in the general population was calculated to be 0.00057%. If these data are correct, the risk of a fatal stroke following cervical manipulation is less than half the risk of fatal stroke in the general population.

*Jaskoviak(11) reported that not a single case of vertebral artery stroke occurred in approximately five million cervical manipulations at the National College of Chiropractic Clinic from 1965 to 1980.

*Osteopathic authors Vick, et al.(12) reported that from 1923 to 1993, there were only 185 reports of injury associated with several million treatments.

*Pistolese(13) has constructed a risk assessment for pediatric chiropractic patients. His findings covering approximately the last 30 years indicate a risk of a neurological and/or vertebrobasilar accident during a chiropractic visit about one in every 250,000,000 visits.

*An article in the Back Letter(14) noted that In scientific terms, all these figures are rough guesses at best... There is currently no accurate data on the total number of cervical manipulations performed every year or the total number of complications. Both figures would be necessary to arrive at an accurate estimate. In addition, none of the studies in the medical literature adequately control for other risk factors and co-morbidities.

*Leboeuf-Yde et al.(15) suggested that there may be an over-reporting of spinal manipulative therapy related injuries. The authors reported cases involving two fatal strokes, a heart attack, a bleeding basilar aneurysm, paresis of an arm and a leg, and cauda equina syndrome which occurred in individuals who were considering chiropractic care, yet because of chance, did not receive it. Had these events been temporally related to a chiropractic office visit, they may have been inappropriately attributed to chiropractic care.

*In many cases of strokes attributed to chiropractic care, the operator was not a chiropractor at all. Terrett(16) observed that manipulations administered by Kung Fu practitioner, GPs, osteopaths, physiotherapists, a wife, a blind masseur, and an Indian barber were incorrectly attributed to chiropractors. As Terrett wrote, The words chiropractic and chiropractor have been incorrectly used in numerous publications dealing with SMT injury by medical authors, respected medical journals and medical organizations. In many cases, this is not accidental; the authors had access to original reports that identified the practitioner involved as a non-chiropractor. The true incidence of such reporting cannot be determined. Such reporting adversely affects the reader's opinion of chiropractic and chiropractors.

*Another error made in these reports was failure to differentiate cervical manipulation from specific chiropractic adjustment. Klougart et al.(17) published risk estimates which revealed differences which were dependent upon the type of technique used by the chiropractor.

The panel found no competent evidence that specific chiropractic adjustments cause strokes. Although vertebrobasilar screening procedures are taught in chiropractic colleges, no reliable screening tests were identified which enable a chiropractor to identify patients who are at risk for stroke.

After examining twelve patients with dizziness reproduced by extension rotation and twenty healthy controls with Doppler ultrasound of the vertebral arteries, Cote, et al.(18) concluded, We were unable to demonstrate that the extension-rotation test is a valid clinical screening procedure to detect decreased blood flow in the vertebral artery. The value of this test for screening patients at risk of stroke after cervical manipulation is questionable. Terrett(19) noted, There is no evidence which suggests that positive tests have any correlation to future VBS (vertebrobasilar stroke) and SMT (spinal manipulative therapy). Despite this lack of evidence, some have suggested that failure to employ such tests could place a chiropractor in a less defensible position should litigation ensue following a CVA.(20)

References

1. Bolton SP. Informed consent revisited. J Aust Chiro Assoc 1990; 20(4):134-138.

2. Cary P. Informed consent - the new reality. J Can Chiro Assoc 1988; 32(2):91-94.

3. Gill KM. Efforts to prevent malpractice suits. Princeton Insurance Company, Princeton, NJ, May 4, 1989.

4. Gotlib A. The nature of the informed consent doctrine and the chiropractor. J Can Chiro Assoc 1984; 28(2):272-274.

5. Hug PR. General considerations of consent. J Chiro 1985; 22(12):52-53.

6. Jackson R, Schafer R. Basic chiropractic paraprofessional manual, Chapter XII. ACA, Des Moines, 1A. XII:3-4, 1978.

7. White B. Ethical issues surrounding informed consent. Part II. Components of a morally valid consent and conditions that impair its validity. Urol Nurs 1989; 9(4):4-9.

8. Lee K. Neurologic complications following chiropractic manipulation: a survey of California neurologists. Neurology 1995; 45:1213.

9. Myler L. Letter to the editor. J Manipulative Physiol Ther 1996;19:357.

10. Dabbs V, Lauretti WJ. A risk assessment of cervical manipulation vs. NSAIDS for the treatment of neck pain. J Manipulative Physiol Ther 1995; 18:530.

11. Jaskoviac P. Complications arising from manipulation of the cervical spine. J Manipulative Physiol Ther 1980; 3:213.

12. Vick D, McKay C, Zengerle C. The safety of manipulative treatment: review of the literature from 1925 to 1993. JAOA 1996; 96:113.

13. Pistolese RA. Risk assessment of neurological and/or vertebrobasilar complications in the pediatric chiropractic patients. Journal of Vertebral Subluxation Research 1998; 2(2): In Press.

14. What about the serious complications of cervical manipulation? The Back Letter 1996; 11:115.

15. Leboeuf-Yde C, Rasmussen LR, Klougart N. The risk of over-reporting spinal manipulative therapy-induced injuries; a description of some cases that failed to burden the statistics. J Manipulative Physiol Ther 1996; 19:536.

16. Terrett AGJ. Misuse of the literature by medical authors in discussing spinal manipulative therapy injury. J Manipulative Physiol Ther 1995; 18:203.

17. Klougart N, Leboeuf-Yde C, Rasmussen LR. Safety in chiropractic practice, Part I; The occurrence of cerebrovascular accidents after manipulation to the neck in Denmark from 1978-1988. J Manipulative Physiol Ther 1996; 19:371.

18. Cote P, Kreitz B, Cassidy J, Thiel H. The validity of the extension-rotation test as a clinical screening procedure before neck manipulation: a secondary analysis. J Manipulative Physiol Ther 1996; 19:159.

19. Terrett AGJ. Vertebrobasilar stroke following manipulation. NCMIC, Des Moines, 1996, page 32.

20. Ferezy JS. The Chiropractic Neurological examination. Aspen Publishers. Gaithersburg, MD 1992.

XI Professional Development

RECOMMENDATION

Continuing professional development, as in all responsible health professions, is a necessary component of maintaining a high standard for both the practitioner and the profession. Continuing development should be directed to areas germane to each individual practice, including but not limited to: credentialing, continuing education programs, participation in professional organizations, ethics forums, and legal issues.

Rating: Established
Evidence: E, L

Commentary

Continuing professional development is currently widely mandated by most licensing jurisdictions, or encouraged through most professional organizations. Perhaps the most compelling reason for advocating this type of on-going education is to afford practitioners the opportunity to keep abreast of current issues, techniques, and methods which serve to enhance patient care. The fact that most programs are conducted by individuals skilled in the topics presented, also provides a high ratio of quality information delivered in a relatively short period. Thus, professional development serves not only the practitioner, but ultimately benefits the patient through enhanced practice skills acquired in different areas by the chiropractor.(1-14)

In addition to formal postgraduate education courses, other opportunities for professional development may include:

- Reading scholarly journals
- Attending scientific symposia
- Participation in research
- Publication of clinical and scientific papers
- Audio and videocassette courses
- Teleclasses
- Distance education programs

References

1. Hildebrandt RW. Chiropractic continuing education: A critical review. Am J Chiro Med 1989; 2(3):89-92.

2. Rayles MD. Professional ethics. Wadsworth Publishing Co., Belmont, CA 1981; 75.

3. Houle CO. Continuing learning in the professions. Jossey-Bass Publishers, San Francisco 1980; 76-123.

4. Official Directory Federation of Chiropractic Licensing Boards. Greeley, CO, 1993.

5. Council on Chiropractic Education. Standards for chiropractic institutions. West Des Moines, IA 1990; Council on Chiropractic Education.

6. Davis I. Ethics: an analysis and a theory. J Chiro 1990; 27(4):20-23.

7. Federation of Chiropractic Licensing Boards. Official Directory of the Federation of Chiropractic Licensing Boards. Kremmling, CO, Federation of Chiropractic Licensing Boards, 1989. Annual.

8. Haldeman S, ed. Modern developments in the principles and practice of chiropractic: based on a conference sponsored by the International Chiropractors Association, Anaheim, CA, February 1979. New York, Appleton-Century-Crofts 1980; 390 pp.

9. Haldeman S. Philosophy and the future of chiropractic. J Chiro 1990; 27(7):23-28.

10. Kelner M, Hall O, Coulter I. Chiropractors: do they help? A study of their education and practice. Toronto, Fitzhenry & Whiteside 1980; 303 pp.

11. Lawrence DJ. Research and responsibility. J Manipulative Physiol Ther 1984; 7(3):179-181.

12. Mauer EL. Selected ethics and protocols in chiropractic. Gaithersburg, MD, Aspen Publishers 1991; 273 pp.

13. Rosenthal SF. A sociology of chiropractic. Lewiston, NY, Edwin Mellen Press, 1986. 15 pp.

14. Vear HJ, ed. Chiropractic standards of practice and quality of care. Gaithersburg, MD, Aspen Publishers, Incorrectly. 1991; 303 pp.

Chapter 4

Chiropractic Child Care

Chapter Outline

I. Overview

II. List of Subtopics

III. Recommendations

IV. Comments

V. References

OVERVIEW

This section of the ICA protocols and guidelines was compiled by a special committee of the International Chiropractors Association's Council on Chiropractic Pediatrics. This committee consisted of a corp of specially trained and skilled individuals, all of whom have earned diplomate status through years of postgraduate study in chiropractic child care through the ICA Council.

The following protocols and guidelines are a reflection of the growing consensus within the chiropractic profession on the general parameters of chiropractic science and practice as it pertains to the care of the pediatric population. Pediatrics being defined as the time from conception through adolescence. These guidelines are also offered to the profession and the public in the context of the recent Statement on the Chiropractic Paradigm referenced earlier in the general text of the ICA protocols. The Council on Chiropractic Pediatrics of the International Chiropractors Association has developed this component of the general protocols and guidelines to provide the chiropractic practitioner with specific advice and support in addressing the needs of a very special segment of the chiropractic patient population, children.

All laws governing the authority and responsibilities of doctors of chiropractic provide for full access to and responsibility for the care of children, as they do for patients of all ages. While recognizing that differences in approach and manner may be necessary in addressing the needs of various age groups, the ICA understands that the basic principles of chiropractic apply to patients of all ages and that chiropractic intervention through the adjustment of the spine to restore normal nerve function is an appropriate, responsible and highly effective means of clinical care for even the smallest of children, when clinically indicated by objective findings and other standard chiropractic clinical procedures.

A growing body of clinical research, comprised of case studies, trials, observations, outcome assessments, etc. coupled with existing insurance underwriting experience has demonstrated that regardless of methodology, chiropractic has been demonstrated to be safe and effective for children.

As has been previously noted, to obtain a license to practice chiropractic in any of the 50 states requires the degree of doctor of chiropractic from an accredited chiropractic educational institution recognized by the US Department of Education. This education consists of four or more years of full-time, in-residence study is required in human anatomy, physiology, biomechanics, chiropractic diagnosis/analysis, adjective techniques, public health issues and chiropractic philosophy. Chiropractic Education fully encompasses the field of pediatrics.

Chiropractic students are thoroughly trained in the appropriate use of currently accepted diagnostic technology including imaging procedures such as x-ray, thermography, video-fluoroscopy, magnetic resonance imaging and other investigative technologies and procedures as it pertains to use with children. The capacity to evaluate the health care needs of the pediatric patient, including appropriate referrals to other health professionals when necessary, is an important objective of chiropractic education.

The status of the doctor of chiropractic, as established by statute, training and experience, includes the ability and authority to evaluate the general health status of an individual for certification purposes, in the context of a required physical for school, employment, sports and, as federally authorized, approval to operate heavy transportation machinery. The U.S. Department of Transportation authorizes DC's to perform physical examinations for long-distance truck drivers, etc.

Such physicals are a routine part of chiropractic practice. The clinical competence to perform such evaluations and through standard health status measures such as blood pressure, heart rate, etc., make a statement about the general health of an individual does not necessarily include an obligation or authority to develop a full-body medical diagnosis or to perform procedures outside the recognized scope of chiropractic. In the presence of abnormal findings in the course of routine physical examinations for specific purposes, such as those cited above, the DC follows the standard chiropractic care pathways (including referral) as are clinically indicated on an individual basis.

Doctors of chiropractic are also obligated to perform certain public health functions that are common to all primary contact, doctor level health care professionals. Many state laws obligate the doctor of chiropractic to report child abuse, spouse abuse, certain communicable diseases and other findings to public health authorities. Likewise, the doctor of chiropractic may have responsibilities under state laws and regulations to take action in the presence of substance abuse.

State laws have established chiropractic as a separate and distinct professional endeavor and detail the parameters of chiropractic practice. No state of the United States has limited in any fashion, either expressly or by implication, the practice of chiropractic to exclude any age group.

The doctor of chiropractic is a primary care provider, who serves as a portal-of-entry into the health care system. The ICA Council on Chiropractic Pediatrics recognizes that the term primary care provider to be defined as: Any health care provider capable of providing first level contact and intake into the health delivery system, and any health care provider licensed to receive patient contact in the absence of physician referral. All laws and regulations in the United States allow any citizen to seek the services of the doctor of chiropractic without referral from any other provider. The Council further recognizes that the doctor of chiropractic is also a primary care provider for the care of the pediatric patient. Only the doctor of chiropractic is professionally competent to evaluate the chiropractic needs of the pediatric patient and to determine the level of service appropriate to meet those needs.

Chiropractic intervention is indicated in all instances where the objective and/or subjective presence of subluxation can be demonstrated. Patient needs must be individually determined on the basis of recognized procedures, but the issue of clinical necessity of providing adjustive care shall be based on the presence of the vertebral subluxation complex, regardless of the presence of subjective symptom otology.

The International Chiropractors Association's Council on Chiropractic Pediatric recognizes the vertebral subluxation complex as an acceptable primary diagnosis for the pediatric patient.

Pediatric Patient Evaluation and Care Pathway in Chiropractic Practice

The evaluation process for a pediatric patient is based on the doctor of chiropractic's physical examination , health history and assessment of the immediate needs of the patient. Additional information might also be obtained from the parents or other individuals in immediate contact with a child patient, especially in circumstances where a pediatric patient is unable to communicate the details of their complaint or situation. The appropriateness of chiropractic care and/or the need for referral to other provider(s) for urgent care, or for additional diagnostic evaluation is initially determined. In the absence of the necessity for immediate referral the doctor of chiropractic can determine the appropriateness of the following:

1) Chiropractic care

2) Chiropractic care and further non-urgent diagnostic evaluation

3) Chiropractic care and further non-urgent diagnostic evaluation in the context of another branch of the healing arts

4) Chiropractic care and concurrent care

5) Referral to other providers (such as special educators, and social service providers)

Referral is a professional obligation that is present throughout all phases and aspects of the chiropractic practice. The primary obligation of Doctors of Chiropractic is to provide the highest quality of care to each patient within the confines of their education and their legal authority. It is the position of the International Chiropractors Association's Council on Chiropractic Pediatrics that this primary obligation includes recognizing when the limits of skill and authority are reached. . This interchange of professional referrals should include, all professionals who work with children, including but not limited to pediatricians, secondary medical professionals such as gastroenterologists, hematologists, and oprthopedists, osteopathic doctors, speech therapists, occupational therapists, physical therapists, special educators,

Doctors of Chiropractic are also obligated to accept referrals from other professionals, applying to those patients the same considerations for quality and appropriateness of care as with any other patients.

VERTEBRAL SUBLUXATION COMPLEX AND THE CHILD

A. Definition of Subluxation

The subluxation complex includes any alteration of the biomechanical and physiological dynamics of contiguous spinal structures which can cause neuronal disturbances, complication of functional and/or structural and/or pathological articular changes that compromise neural l integrity and may influence organ system function and general health. Subluxation is evaluated and managed through the application of chiropractic procedures based on the best empirical evidence and clinical experience.

The VSC is postulated to be comprised of the following components:

1) Kinesiopathology - alteration in biomechanics

2) Myopathology- alteration in muscle form or function

3) Histopathology- alterations in cellular form or function

4) Neuropathophsyiology - alternation in nerve form or function

5) Pathophysiology- alteration in organ system function, and loss of cellular homeostasis

The chiropractic literature specifically addresses the means of objectively identifying the presence of vertebral subluxation(s), apart from subjective patient complaints and/or symptoms. Such reproducible, reliable procedures are the cornerstone of chiropractic practice. A detailed review of instrumentation, imaging, and other procedures is presented in later chapters.

Objective procedures have emerged and such procedures have been incorporated into chiropractic education, authorizing legislation and routine chiropractic practice. Those procedures are:

a. Palpation (static and motion).
b. Postural analysis.
c. Orthopedic and neurological examination.
d. X-ray spinography.
e. Video fluoroscopy.
f. Computed tomography.
g. Magnetic resonance imaging.
h. Skin temperature differential analysis, including thermography.
i. Paraspinal EMG scanning.

B. Possible Causes of Subluxation

The causative factors of subluxation in the pediatric population are numerous and varied. Their occurrence may begin in utero. Chiropractic science has always held that physical, chemical and emotional trauma exists at the root of the subluxation. With the growing body of information in the fields of psychoneuroimmunology, molecular genetics, and environmental toxicology, the tenets of chiropractic continue to be validated. The following have been proposed to be contributing factors in the formation of the vertebral subluxation complex:

1) In utero constraint
2) Birth malposition
3) Birth malpresentation
4) Birth complications
5) Pre-natal complications
6) Congenital malformations
7) Neonatal injury
8) Developmental delay
9) Routine falls
10) Accidents

11) Sports injury
12) Emotional stress
13) Toxic exposure
14) Repetitive motion

C. The Progressive Nature of Spinal Subluxation

Behavior such as physical and emotional stress, tension, chemical/environmental stressors, repetitive motion activity patterns, over-extension of spinal tissues and/or characteristics such as posture, weight, or even footwear can establish patterns of progressive subluxation that lead to the degeneration of spinal segments. Spinal degeneration and its reversibility has been the subject of considerable scientific study. O.J. Ressell, based on a comprehensive review of 329 published references and a series of detailed case studies concluded that chiropractic intervention not only halted spinal osteoarthritis, but also reversed the deterioration process by measurable levels.

Phase I and Phase II subluxations as outlined elsewhere in these guidelines are the more commonly encountered types in the pediatric population. Based on lack of time and chronicity, in incidences of Phase III and Phase IV subluxation is rarely seen in the pediatric population.

D. Early Detection, Early Intervention and "Wellness"

Enhanced public awareness of environmental, psychosocial, and physiological issues through education and community action has forced early detection/early intervention into the public health agenda as a significant new priority. Many states already have early intervention programs for the pediatric population, as well as federally mandated insurance coverage for all children. A vital measure in early intervention programs which has been neglected is the inclusion of conservative chiropractic spinal health care and education. Most effectively introduced at birth all children should be monitored for the presence of subluxation.

In the child with developmental delay who are often enrolled in state early intervention programs it is imperative that the child have routine chiropractic evaluations in addition to the multidisciplinary care that early intervention provides.

Subluxation(s) have been demonstrated to be present in persons of all ages, from the newborn infant to the most senior citizens. Likewise, authorizing laws and regulations empower doctors of chiropractic to care for patients of all ages with no exceptions, and chiropractic education instructs professionals in training in the proper procedures and techniques necessary to address the spinal needs of all patients, including infants and the elderly. The Council on Chiropractic Education (CCE) the agency recognized by the United States Department of Education for the accreditation of chiropractic professional programs recognizes no exceptions or limitations on the appropriateness of chiropractic procedures because of age. The International Chiropractors Association recognizes the utility and appropriateness of chiropractic procedures for all persons regardless of age, and views efforts to restrict the access of any age group to chiropractic services as profoundly discriminatory, contrary to the laws of the several states and unsupported by the scientific literature.

CHECK-UPS, EXAMINATIONS, & WELLNESS

The practice of chiropractic includes chiropractic examination and analysis to provide for prevention, acute chiropractic intervention, chronic case management, and long-term care plans. This section focuses on wellness and preventive care (designed to reduce the future incidence of illness or impairment) and health promotion (based upon optimal function).

Some confusion arises from the use of various terms to describe such care-including supportive care, maintenance care and preventive care. In this section, it is called Check-ups Prevention and Wellness care.

Long-term ongoing health management has been a significant component of the chiropractic model of health care. Surrounding this is a wellness paradigm that recognizes related influences on health, emphasizes drugless, non-surgical management, and takes a positive dynamic view of health. In addition to periodic routine checkups, the model looks to the whole individual and requires active patient participation.

Prevention efforts emphasize patient responsibility and may include exercise programs, weight loss, dietary counseling, life style modifications, education on body postures and mechanics, mental attitude, coordination training, safety habits, ergonomics, spinal hygiene, modification of life stressors, etc.

Routine check-ups provide an ongoing basis for such patient education efforts as well as early detection of subluxation. These routine check-ups form the basis for wellness care for children. As states elsewhere in these pages, the progressive nature of the subluxation, and the ubiquitous nature by which it can be present in the child, necessitates, that chiropractic care become a routine part of all care for children. Children who not have routine chiropractic check-ups, may be at risk of developing progressive spinal degeneration as a result of trauma, and other degenerative causes.

Emerging evidence from both the molecular genetics field as well as from clinical studies such as the recent one done on colic, give credence to the evidentiary presence of illness or dis-ease as a result of the presence of subluxation.

It is the position of the Council on Pediatrics that all children regardless of age, be checked on a routine basis for subluxations.

This type of health care management program, which combines health promotion, routine checkups prevention services, and patient participation, is gaining much more widespread understanding and acceptance in today's more health conscious society.

In recent years, cost containment of health care has become a regional and national priority. It is certainly a concern of responsible health care providers and consumers, as well as health care insurers.

A major chiropractic premise is that the inherent recuperative power of the body aids restoration and maintenance of health. These assumptions comprise a wellness paradigm embraced by the great majority of the chiropractic profession. The vertebral subluxation, along with other factors such as poor nutrition, trauma, heredity, congenital weaknesses, fatigue, mental and environmental stressors and sedentary lifestyles, are viewed as lowering resistance and creating physical disharmony. The chiropractic model requires active patient participation. In the case of the child, this participation is required both of the child and the parent or guardian.

It is Recommended with respect to the care of children that:

I Doctors of chiropractic provide a unique body services. They do not duplicate the services of other health care providers.

Recommendation:

1. Doctors of chiropractic may restrict themselves to procedures necessary for the detection, analysis, control, reduction and correction of vertebral subluxations so as to non-duplicate services available from other health care providers.

2. Wherever possible, a doctor of chiropractic should avoid duplication of services by using the results of tests which may have already been performed by other providers.

It is self evident that unreasonable and unnecessary analytical procedures drive up health care costs. Therefore, the doctor of chiropractic should utilize the optimal number and types of analytical procedures, specific to the individual patient, necessary to obtain the pertinent data for the detection, analysis, control, reduction and correction of vertebral subluxations.

II. The Doctor refrain from over-utilization of chiropractic services.

Recommendation:

1. Reassessments should be performed to adequately assess frequency of visits therefore providing the highest quality care in the most cost effective manner.

III Patient Education

Once educated about the benefits of chiropractic care, the patient should assume the role of becoming responsible for his/her own health as it relates to chiropractic care. A patient / parent that understands the benefits of chiropractic care will utilize these services as a preventative type measure, thus assisting in the cost containment of the overall health care system.

Recommendation:

The doctor of chiropractic should assume the responsibility of educating the patient as to the benefits of vertebral subluxation correction and prevention and how it relates to their overall health and the health of everyone in the community.

IV Patient Responsibility

In the interest of reducing health care costs, the doctors of chiropractic should always try to instill in the patient the following concepts of patient responsibility:

1. The patient should assume responsibility for their own health and that of their family where applicable and take appropriate care of them.

2. Compliance with the chiropractors recommendations, leading to reduction of visit frequency as soon as possible.

3. The more responsible each patient is for their own fees the less burden they will be on the nation's health system.

4. The patient, as well as the chiropractor, should accept the responsibility to avoid over utilization.

V. Routine Check-ups/Prevention Services

1. Disclosure:

   Routine check-ups and prevention services are an integral part of the patients overall health care. It is necessary for the practitioner to clearly understand the type and nature of this care they are being given and to give proper patient disclosure by the D.C.

2. Use of Chiropractic Adjustments

   The clinical experience of the profession developed over a period of more than 100 years suggests that the use of chiropractic adjustments in a regimen of routine check-ups/prevention services has merit.

3. Health Screening

   The importance of health preventive strategies is widely recognized. These services may have value in identifying early or potential manifestations of a health problem.

4. Health Promotion:

   Preventive orientation to health through health promotion is well established. Health promotion provides the opportunity for chiropractic practitioners to promote health through assessment, education, and counseling on topics such as nutrition, exercise, stress reduction, life style patterns, mental attitude, spinal hygiene, weight reduction, smoking cessation, and ergonomics, among others.

5. Wellness Care:

Chiropractic is the largest, most established and widely licensed of the wellness oriented health professions. Wellness and the conscientious management of lifestyle strategies have gained popularity and acceptance. Chiropractic practitioners may choose to expand their practices to include those services that may influence a person's attainment of optimum performance and behavior, and in so doing, improve health status. This kind of care is performance specific (i.e., quality of life) rather than condition (e.g., symptom) specific and is not intended to duplicate or invade the realms of other health care disciplines.

COLLABORATIVE CARE

All patients of all health care providers have the right to expect health care services at the highest level of quality. The preservation of patient trust and confidence depends on this. When the needs of the patient demand the inclusion of other providers or institutions in the program of care, extra caution and extra effort are required to ensure that no gaps in service or conflicts will be allowed to jeopardize the quality of care. The chiropractic practitioner should be aware of programs of cooperation and/or collaboration, which can assist the patient.

Relationships between health care professionals can only become more complex, and possibly more contentious as we presently enter an era of great change and instability in health care. Concepts such as "managed care," "preferred provider" and "gatekeeper physician" are becoming the new currency of health care policy. As efforts to control health care costs center more and more on the managed care theory of cost and utilization containment, a credible protocol for interaction becomes an urgent necessity.

To ensure that all requirements for patient care can truly be addressed, this new model must consider cooperative relationships in all settings, including institutional settings such as the hospital, nursing home, and hospice, and among all health care professionals. The model to be devised must be comprehensive, clear to all parties involved, and flexible and dynamic enough to adapt to the daily realities of practice.

The special needs of children demand that in all situations, the chiropractic profession take steps to ensure that relationships with other providers are governed by the needs of the patient. Likewise, doctors of chiropractic must carefully safeguard the rights of chiropractic patients and ensure that other providers are conscious of the need to conduct patient care in a totally objective and professional manner. When professions interact in the delivery of health care services, economic and social factors as well as professional territorialism should never be allowed to override the fundamental obligation to the patient. There is no place for such distractions in the delivery of quality health care.

II. LIST OF SUBTOPICS

Reasonable Patient Expectations in the Cooperative and Collaborative Care Setting

A. The Patient and the Primary Care Provider
B. Freedom of Choice and Informed Consent

C. Professional Knowledge and Understanding
D. Referrals
E. Exchange of Information and Records between Providers
F. Professional Interaction in the Hospital or Other Institutional Setting.
G. Economic Considerations

Collaboration can be defined as the reciprocal inter-professional interaction of two or more health care providers. Collaborative care involves this interaction in the management of the patient's current health status. Collaborative care, therefore, includes care in a private practitioner's office, where interaction exists on a daily basis between the practitioner and his/her assistants, as well as care within a complex institutional setting such as a medical specialty ward in a hospital and care within a managed care setting. Various specialty fields exist within chiropractic and are available as a resource.

Hospitals and other institutional inpatient settings represent to some degree a new frontier for chiropractic. Chiropractic has an enormous impact to make in this context. As well, hospitals are of great social, political and economic importance in North America. It is here that the largest publicly supported concentration of leading-edge diagnostic equipment is to be found. Hospitals are also the scene of the vast majority of clinical information gathering and research.

Collaborative care is neither new nor unique to this generation of providers, though cooperative relationships between the medical and chiropractic professions have been less frequent in the past. The federal court judgment in 1987 in Wilk et al. vs. AMA et al., which effectively eliminated formal barriers previously established to the collaboration of the chiropractic and medical professions, has been a key factor in increasing cooperation. However, as greater emphasis is now being placed on the concept of nominating one primary care doctor as a "gatekeeper" whose function is to ensure appropriate care yet contain specialist and other costs, new effort is required to understand the appropriate role of different health disciplines. This is a difficult task for a number of reasons.

Firstly, from an organizational viewpoint, much of modern medicine is based on a "problem-oriented model" rather than one based either on the management of chronic illness or disease prevention. The problem-oriented model is less conducive to an interdisciplinary team approach than a "goal-oriented model" where the patient's achievement of highest possible level of health is the goal of all concerned.

When incorporating chiropractic care into patient care guidelines, it is always understood that the role of the doctor of chiropractic is separate from other health disciplines and should be presented as such. Whatever the unique needs of the individual patient, the objective of chiropractic remains the same. The correction of vertebral subluxations is the goal of chiropractic regardless of whether any other disease or condition is presented.

As the doctor of chiropractic participates more and more in other patient care settings, the importance of keeping the body free from subluxation is paramount to promoting a return to the patient's full health potential. Through greater understanding of the chiropractic objective by both the patient and collaborating professional, the pursuit of cooperation and quality patient care can be enhanced.

Clarity of roles is vital. This clarity is dependent to some extent on the probability of a successful care outcome and to some extent upon the provider chosen. This should be understood when clinical policies and guidelines are made on decision-making in patient management. Dixon has noted that while policies can be helpful in simplifying complex clinical dilemmas, they have at times been adopted without evidence of benefit and that research studies using appropriate clinical methodology should be encouraged in order to prevent useless or even dangerous algorithms of care.

The development of wise patient care guidelines, incorporating the many approaches available in health care today, should provide for the most effective balance of resources for the patient's needs. Determining the role of each profession in the various algorithms for patient management should reflect the varying and unique needs of each individual patient. Developing such algorithms, which are currently not in place nationwide, may reasonably be expected to have a significant impact on health outcomes in general, as well as on the difficult inter-professional issue of cost-containment. To that end, for example, Wenneberg has stated that patients' understanding of their care options is anticipated to be a major contributing factor in their care selection. He noted that health care allocation by patient preference is likely to be cost-effective because patients prefer and select less invasive, less expensive treatments. It is in the best interest, therefore, of all concerned that the health care system have all its professional resources, and ready information on them, available to all patients.

Initially, as the chiropractic profession explores the arena of collaborative care more fully, documents generated by practitioners engaging in this work and setting out inter-professional referral protocols can serve as guidelines. As part of the health care system at large, however, the chiropractic profession must now begin to focus more of its resources in researching and developing clinical standards relevant to collaborative care. As noted earlier, such efforts are needed to meet the many and varied needs of all patients.

CONSULTATION, HISTORY & EXAMINATION

I. OVERVIEW

The chiropractic case history and pediatric examination are concerned with the accumulation of information pertinent to the overall health status of the child. The history and examination of the child is unique and age specific, and needs to be employed when a child presents for chiropractic care. The following is a comprehensive set of history questions, which can to be applied in an age, appropriate manner, according to the specific needs and condition of the patient, as determined by the judgement of the attending doctor.

II. HISTORY

CHIEF COMPLAINT/ Reason for Seeking Chiropractic Care

PRESENT ILLNESS/PROBLEM (if any)

Onset
Progress

Duration
Quality
Severity
Exacerbation/ Remission
Frequency
Radiation
Treatment
Location

PAST HISTORY

Birth History

Prenatal Care
Prenatal Complications
Length of Labor
Vaginal / C-section
Forceps
Anesthesia
Quality of labor
Presentation
Length/ weight
Birth Complications
Apgar Score

Feeding History
Breast/Bottle
Types of Formula
Solid foods
Food allergies

FAMILY HISTORY

Health status of parents
Health status of siblings
Health status of grandparents
History of congenital problems
History of genetic problems
History of infertility
History of mental or other problems
History of illness within the family/i.e. diabetes

MILESTONES

Age child sat up
Age child rolled over
Age Child crawled
Age child crept
Age child walked
Age child took first steps

Age child began to babble
Age child put two words together
Is the child toilet trained?

VACCINATION HISTORY

Has the child been vaccinated? Fully/ Partial
If child has had vaccination which ones and when
Did the child have any reaction adverse or otherwise?

ILLNESS HISTORY

Has he child been ill since birth?
If the child has been ill, with what and what treatment did the child receive?
Frequency and duration of illness
History of broken bones
History of hospitalization

PRIOR CARE

What type of care ha the child received and for what?
Medical/osteopathic/chiropractic/dental
Other

SOCIAL HISTORY

Dos the child interact with adults
Does the child interact with peers?
Does the child have any attention problems?
Does the child appear to play with toys?

REVIEW OF SYSTEMS

General Appearance
Nourishment, height, weight, growth, etc.
Skin
general appearance, color, swelling dryness, rashes, etc.
Head/ Neck
swelling, headaches, pain, dizziness, vertigo, lymph node
Ears
pain, swelling, pinna, infection, discharge, ringing etc.
Nose

nosebleeds, discharge, difficulty smelling, etc.

Throat

tonsil swelling, teeth, gums, bleeding, soreness, tongue, etc.

Respiratory

difficult breathing, cough, sputum, bronchitis, history of asthma, etc.

Cardiovascular

Heart murmur, heart defect, palpitations, great vessel defects, chest pain, etc.

Gastrointestinal

bleeding, upset, abdominal pain, nausea, vomiting, diarrhea, constipation, belching, food intolerance, etc.

Genito-urinary

bladder infections, kidney infections, difficulty urinating, bed wetting,onset of menses, difficulty with menses, onset of puberty, testicular pain, vaginal discharge, vaginal pain, undescended testicles

Musculoskeletal

pain in spine/ joints, difficulty walking/ crawling, muscle pain sports injuries, stiffness,congenital abnormalities

Neurological

Seizures, numbness, tingling, loss of feeling/sensation, loss of balance, lack of speech, loss of eye contact, delayed development,

Psychiatric/ Social

anxiety, difficulty with peers, depression, mood swings, attention difficulty, nervousness, antisocial behavior

Endocrine/Hematological

Sweating, dryness of skin, moth, anemia, excessive hunger, bruising, bleeding, thirst, diabetes

III EXAMINATION

GENERAL APPEARANCE

Does the child appear well nourished?
Does the child appear over or underweight?
Does the child appear to be happy and interactive?
Does the child appear to act age appropriate?

SKIN

Lesions, cafe-au-lait spots, mila, rashes,hemangiomas, dermatitis, urticaria, tinea, pityriasis rocacea etc.

HEAD / NECK

bumps, lymph node swelling, hair discoloration, hair loss, rashes, head tilt
Thyroid, sutures, cranium

EYES

bilateral tracking of objects, focusing, strabysmus,visual acuity, lateral planes of gaze eye deviations, conjunctiva, sclera, colorblindness, eyelids

EARS

otoscopic examination, pinna size, shape, form, rinne, tine, periauricular examination

NOSE

foreign bodies, discharge, nasal mucosa,form, displacement

MOUTH/THROAT

Tonsils, tongue, swellings, lymph node swelling, salivary glands, discoloration, plaques, pharynx, sores

LUNGS

Inspection, auscultation, palpation, percusssion,lymph node swellings, excursion

HEART

Inspection, auscultation, murmurs, palpation, percussion

ABDOMEN

Inspection, bowel sounds/ auscultation, percussion, palpation, light/deep,
organ palpation, swelling, organ enlargement, lymph swelling, rebound tenderness

NERVOUS SYSTEM

Infantile Automatisms

- Rooting
- Sucking
- Babinski
- Fencer/ tonic neck
- Reverse fencer
- Stepping
- Gallant
- Perez
- Startle/Moro
- Grasp
- Blink

Cranial Nerves

I	Olfactory
II	Optic
III	Oculomotor
IV	Trochlear
V	Trigeminal
VI	Abducens
VII	Facial
VIII	Vestibulochochlear
IX	Glossophyngeal
X	Vagus
XI	Accessory

XII Hypoglossal

Reflexes

Jaw
Brachioradialis
Biceps
Triceps
Patella
cremasteric
Abdominal
Achilles
Chaddock
babinski

Dermatomes

Vibratory sense

Pain/ temperature

Toes walking/ heel walking/ heel to toe walking

Muscle testing

MUSCULOSKELETAL

Postural Observation
Gait Observation
Range of Motion
Cervical
Thoracic
Lumbar
Extremities
Inspection/ palpation of muscles
scoliosis screening
Leg length deficiency
body symmetry
Handedness

SPINE/CRANIUM

Inspection/ Observation
Gait Observation
Postural Examination
Static palpation
Motion Palpation
Spinal Muscle Imbalance
Para spinal edema/lymph node selling
Leg length

Body symmetry: guteal , scapular, iliac crest
cranial sutures/ cranial torque/ head tilt
Instrumentation
Muscle testing

Many of these examination parameters are utilized based on an age specific and presentation specific basis.

Specific literature on the appropriate history and examination techniques for the chiropractic practitioner can be found in numerous texts. The reader is directed to those texts listed in the bibliography for detailed description of such techniques. The intent of this chapter is not to serve as a teaching tool. Rather, the purpose is to assist in establishing guidelines related to acceptable history techniques to be used by the practitioner.

The history-taking procedure has been considered the most clinically sophisticated and complex task used by health care providers. Its purpose is to provide the clinician with one or more diagnostic impressions. These are then confirmed or altered following the judicious selection of additional tests -- and it can be noted in the literature that this process does indeed occur. Much of the information that will lead a clinician to a management plan then is gained very early in the doctor patient/parent interaction.

The history and physical examination of the child is extremely important. Firstly, it requires the participation of the parent/guardian/care-giver as well as that of the child. In the very young child the information obtained in the history is solely dependent upon the parent/ guardian/ care-giver. In addition it is important to note that the parent who is not the primary caregiver may not be the best source of information with respect to the history. It is therefore incumbent upon the doctor of chiropractic to encourage all who care for the very young child to participate in the history taking process. With respect to the older child, the child's own participation in the history process is invaluable and should encouraged.

When a long term or chronic problem is at issue, it is important to gather additional information after obtaining the proper consent forms, from the child's other health-care providers as well as teachers, coaches, and others.

MODES OF CARE

This section provides a generic topical summary of typical chiropractic procedures in current use for the pediatric population. Most chiropractic named technique procedures consists of a combination of various analytic and treatment components. Clinical practice and scientific investigation are ongoing processes and it is understood that this document is a dynamic entity that will require modifications as new knowledge becomes available.

A. Use of ineffective or unsafe mode of care

Due to the developing nature of the pediatric spine and nervous system, some modes of care need to be modified. The nature of the pediatric spine is cartilaginous with active growth plates.

The normal ranges of motion of the pediatric spine exceed those of the adult. Any adjustment performed which velocity, thrust, extension, lateral flexion, rotation, extension, flexion, axial distraction and traction require modification for the pediatric patient. Any lack of specificity in adjusting the pediatric spine is contraindicated.

B. Chiropractic adjustment modes

1. High velocity thrusts with high force
   CONTRAINDICATED

2. High velocity thrusts with recoil
   INDICATED WITH MODIFICATION TO ROM AND THRUST

3. Low velocity thrusts without recoil
   INDICATED WITH MODIFICATION TO ROM AND THRUST

4. Low velocity thrusts with recoil
   INDICATED WITH MODIFICATION TO ROM AND THRUST

5. Sustained force
   INDICATED WITH MODIFICATION TO FORCE

6. Blocking techniques
   INDICATED WITH MODIFICATION TO EQUIPMENT

7. Manually assisted mechanical thrusts
   INDICATED WITH MODIFICATION TO THRUST

8. Mechanically assisted manual thrust
   INDICATED WITH MODIFICATION TO THRUST

9. Low velocity controlled vectored force
   INDICATED WITH MODIFICATION

10. Cranial/Sacral Adjusting
    INDICATED WITH MODIFICATION

11. Myofascial / Soft Tissue
    INDICATED WITH MODIFICATION

12. Extremity Adjusting
    INDICATED WITH MODIFICATION

C. Non-manual Procedures

1. Exercise and Rehabilitation

INDICATED WITH MODIFICATION

2. Education Procedures
   INDICATED

3. Electrical Modalities
   AGE SPECIFIC INDICATION

4. Thermal Modalities
   AGE SPECIFIC INDICATION

5. Ultraviolet
   NOT INDICATED

6. Ultrasound and Phonophoresis
   AGE SPECIFIC INDICATION

7. Bracing /Supports / Orthotics
   AGE SPECIFIC INDICATION

8. Traction
   AGE SPECIFIC INDICATION

9. Nutritional Advice
   INDICATED

10. Lifestyle Recommendation
    INDICATED

11. Wellness Care/Prevention - Health Promotion/Spinal Hygiene
    INDICATED

FREQUENCY & DURATION OF CARE

Specific parameters of care appropriate for each individual pediatric case areimpossible to define. Each case must be evaluated with complicating factors, concomitant conditions and all other extenuating circumstances taken into consideration in order to assure the patient maximum benefit through chiropractic care.

Pediatric patients progress at a different rate from adults therefore it is important that adult guidelines not be overlaid on the pediatric patient. Since the nature of pediatric care is somewhat different again, individualization is paramount. In addition, the subjective and objective findings associated with chiropractic care of the pediatric patient is significantly different than that of the adult population.

Principles of Case Management

The primary missions of health care delivery are to provide sufficient care to restore health, maintain it, and prevent the occurrence or recurrence of injury and illness. The practical boundaries on what will constitute necessary and sufficient care are situational. However, guidelines framing expectations of care outcome can be drawn from the literature and adapted by practical experience on a case-by-case basis.

Chiropractic shows the unique ability to determine sub-clinical spinal disorders such as any of the components of the vertebral subluxation complex, known to precede symptoms/end stage conditions eliminating the need for the most part of crisis intervention. A key principle is that chronicity should be prevented wherever possible. Patients who are at risk for becoming chronic show characteristic patterns involving their illness and life situations.

III. RECOMMENDATIONS

The frequency with which a particular patient needs to see their chiropractor is based on the subjective findings, if applicable and the objective clinical findings and the opinion of the doctor. There is no set template on the number of visits needed to obtain maximum chiropractic improvement for the population as a whole. Each patient who presents at the chiropractic clinic is unique and different and must be treated as such.

Some of the factors which need to be taken into consideration is the age of the patient, type of work or daily activities, trauma or aggravation, stability and function ability of supporting structures (muscles and ligaments) the structural integrity of the spine and its articulations (degeneration, demineralization, biomechanical loss or failure). These and other factors are the considerations which go into making a plan of care/number of visits for each patient.

After a patient starts an initial program of care they will be re-examined/re-assessed at proper intervals. This is done to determine the patient's response to care and if the frequency can be reduced or needs to be increased and/ or if a referral is necessary. The re-exam/re-assessment may be performed several times during the course of care until the patient reaches maximum chiropractic improvement (MCI). Maximum improvement varies with each patient and will depend on those factors noted above. Once a patient reaches MCI they are released from care and recommended to a PRN basis or other type program which they and their chiropractor agree upon.

The following shall serve as a guideline. It is important to note that with proper documentation additional care or alteration of care schedule may be warranted for the categories of conditions and levels of care listed herein.

Additional Definitions

Phase I, II, III, IV: These phases refer to the radiographic presentation of the (subluxation) degeneration which occurs in the spine. (Hadley MD).

Acute: New condition, not exceeding 12 months duration

Chronic: Old condition, duration of longer than 12 months

Trauma: Onset due to accidental/intentional injury.

Non-trauma: Symptoms which arise insidiously.

Clinical: That condition which has overt signs and symptoms.

Subclinical: A condition the signs of which require investigation and in which overt symptoms have yet to occur, and would go unnoticed with progressive degeneration until it becomes clinical.

The nature of chiropractic care for the pediatric patient is unique. While one child may seek chiropractic care for the subluxation patterns that occur as part of the birth process, another may seek chiropractic care as a result of a genetic disorder which has causes subluxation as a significant chronic component. The nature of the care therefore, with respect to the duration is significantly different.

Subluxation as we have seen earlier in these guidelines can result from a myriad of stresses on the pediatric spine. The child who presents without symptomatology may still present with spinal subluxations. Frequently in the pediatric population, due to the nature of the growing spinal structures, and the lack of a maturity of the neurological system, the presence of subluxation is without pain or symptomatology. In the presence of symptomatology, it is likely that the level of subluxation is greater, and may require a longer duration of care, with a greater frequency.

In addition the chronic nature of a pediatric condition, such as cerebral palsy may require life-long chiropractic care to minimize subluxation and to maintain optimum functioning in the child and subsequently in the adult.

Accidents are the lading cause of pediatric morbidity. Trauma therefore needs to be addressed frequently in the pediatric population, and the subluxation patterns and changes caused thereby. Birth trauma, generalized falls and developmental patterns, may present another level of subluxation in the child. Automobile accidents, and the flexion-extension injuries caused by these accidents can have a significant impact on the developing spine of the child, and therefore the subluxations caused by these automobile accidents need to be addressed by chiropractic care. The following are some of the categories of possible subluxation causes in the child:

ACUTE- trauma, accidents, falls, birth trauma, toxic exposure

NORMAL DEVELOPMENT- achievement of normal milestones such as sitting up crawling, walking etc.

ABNORMAL DEVELOPMENT- those caused by the presence of congenital/ genetic considerations such as portcullis, cerebral palsy, muscular dystrophy, and autism, ADD/ADHD

PATHOLOGY- those caused by the presence of pathology such as fracture, disease etc.

While these categories are not all inclusive, they should serve as a guideline. There can be considerable overlap between the categories in a child and there can also be the presence of only one category.

The question of supportive care for the child is often presented. The following can serve as a guideline for supportive chiropractic care for children:

The necessity of long term palliative care or supportive care should accomplish one or more of the following goal in order to be considered necessary and appropriate:

1. Care of an exacerbation to return the patient to pre-exacerbation status.
2. Improvement or maintenance of activities of daily living.
3. Improvement or maintenance of work status.
4. Increase of functional strength.
5. Increase stamina, endurance and activity tolerance.
6. Increase functional range of motion.
7. Improve mental attitude.
8. Decrease need for, or amount of, medication.
9. Prevention of surgical intervention when appropriate.
10. To attain optimal expression of life.

V. COMMENTS

In the course of the management of a chiropractic case the objective indicators of vertebral subluxation(s) and other dysfunctional articulations and structures demonstrated during Level I (see glossary for definition of levels of care) care may decrease. As the patient's clinical indicators are minimized and spinal function improves and stabilizes, the frequency of care is reduced and the patient is advanced to Level II care. Some of the variables considered during the evaluation of the patient's status include, but are not limited to age, occupation/lifestyle, past metabolic history, past history of injuries/fractures/surgeries, genetic predisposition, amorphic spinal structure, cortical and medullary bone irregularities, bone density irregularities, articular irregularities, joint irregularities, chronic adaptive postural and structural changes, chronicity, the number of spinal subluxations present, patient tolerance to active care, and the degree of patient cooperation.

When a patient has demonstrated sufficient reduction of clinical indicators of vertebral subluxation and other dysfunctional articulations and structures, they should be advanced from Level II care. The chiropractor should then recommend Level III care.

At some point during a patient's care, the practitioner may note that those clinical indications of vertebral subluxation and other dysfunctional articulations and structures (including, but not limited to those found by motion and static palpation, instrumentation, radiography, etc.) are becoming either more or less noticeable. In order to ascertain the optimal elapsed time period between chiropractic office visits, the practitioner would then begin the process of decreasing or increasing visit frequency. Should the indicators for the presence of a vertebral subluxation and other dysfunctional articulations and structures are imperceptible or absent, in the clinical opinion of the practitioner, office visit frequency would be decreased. At some point in this process, however, the indicators for the presence of a vertebral subluxation and other dysfunctional articulations and structures may again be manifested, necessitating a chiropractic adjustment and a reassessment of visit frequency.

The concerns of the public regarding health care have shifted to an active responsibility for their physical well being. Patients who understand the major objective of chiropractic knowingly choose this approach to help them maximize their health potential. Scientific evidence identifies components of the vertebral subluxation and other dysfunctional articulations and structures and may reveal physiologic changes that occur after the correction of the vertebral subluxation and other dysfunctional articulations and structures. Moreover, it is observed clinically that dramatic changes may occur after the correction of a vertebral subluxation and other dysfunctional articulations and structures. Most chiropractors have observed changes after spinal adjustments that affect major body systems and the patient's complex metabolic system. The clinical explanation for these changes is associated with improved natural functions. When interference to the nervous system is reduced, the body's capacity to heal and thrive is rekindled. Vertebral subluxations and other dysfunctional articulations and structures may occur during the birth process, therefore, it is imperative that chiropractic care should begin as soon as possible. Chiropractic care should continue, in accordance with the patient's needs and the chiropractor's clinical opinion, for the life of the patient.

CONTRAINDICATION & COMPLICATIONS

While chiropractic procedures have consistently been demonstrated to be comparatively safe, special caution is warranted with certain conditions. Prevention of complications from chiropractic care is facilitated when good professional judgment is exercised and quality care is provided. Elements common to all primary care practitioners include sufficient history taking and record keeping, thorough examination, timely re-evaluation procedures throughout the course of case management, good communication with the patient and appropriate response in the event that an unexpected incident does occur. If a significant adverse result from a procedure is apparent, it is of critical importance that the intervention or procedure associated with the onset of the complication not be repeated.

The evidence shows that the low incidence of injury or complications from adjustments is promoted by quality care which follows professional judgment consistent with the objectives of chiropractic care. Chiropractic professional judgment includes, without limitation, appropriate response to unexpected findings and reevaluation of the suitability of a particular technique or procedure associated with the discovery of a complication. The doctor of chiropractic should be alert to the possibility of encountering unusual findings in any phase of care.

Patient safety can be further enhanced by the chiropractic profession's commitment to quality assurance.

When assessing the safety and efficacy of chiropractic care, two factors should always be considered: the type of technique being utilized and the integrity of the area of the spinal column/or articulation being addressed. These two factors assist in evaluating any risk that may be associated with the application of chiropractic care.

The primary focus of the chiropractic management of complications is the recognition of unusual findings that may require modification of the plan of care when the unusual finding is observed..

It is important to note that the literature clearly illustrates that most serious adverse effects with spinal manual procedures, or spinal manipulative therapy as it is described in medical literature (in reference to procedures applied by professions other that the chiropractic profession), have not been the result of procedures performed by doctors of chiropractic. It is important, therefore, that throughout all the professions a standard minimum training greater than or equal to that of a DC in adjustive/manual procedures be required prior to performance of SMT.

REFERENCES

A Healthy People 2000, National Health Promotion and Disease Prevention Objectives Conference Edition: Summary U.S. Department of Health and Human Services. Public Health Service.

Hildebrandt R. Chiropractic physicians as members of the health care delivery system: The case for increased utilization. *J Manipulative Physiol Ther* 1980; 3(1):23-32.

Emori. Whiplash in Low Speed Vehicle Collisions. *SAE* Feb. 1990, p. 108.

Fallon J. The role of the chiropractic adjustment in the care and treatment of 332 children with otitis media. *J of Clin Chiropractic Pediatrics* 1997; 2(2): 167-184.

Jamison J. Preventive chiropractic and the chiropractic management of visceral conditions: Is the cost to chiropractic acceptance justified by the benefits to health care? *Chiro J Australia* 1991, 9(3):95-101.

Jamison JR. The Chiropractor as Health Information Resource, Health Promotion for Chiropractic Practice, Gaithersburg, MD: Aspen Publishers, Inc. 1991, pp. 3 5-36.

Vear H. The role of chiropractic in preventive health care. *J Can Chiro Assoc* 1974; 18(4): 10-3.

Ressel OJ. Chiropractic and children; a rationale for care. *Int Rev Chiro* 1986; 42(3):44-50.

Balduc H. How chiropractic care can promote wellness. Northwestern College of Chiropractic, Bloomington, MN.

Barnsley. Cervical Flexion-Extension/Whiplash Injuries. in *Spine: State of the Art Reviews* Sept. 1993, p. 339. Hanley & Belfus.

Coulter ID: The patient, the practitioner, and wellness: paradigm lost, paradigm gained. *J Manip Physio Ther* 1990; 13(2):107-111.

Coulter ID, Hurwitz EL, Aronow HU, et al. Chiropractic patients in a comprehensive home-based geriatric assessment, follow-up and health promotion program. *Topics in Clin Chiropractic* 1996; 3(2):46.

International Chiropractors' Association Policy Handbook and Code of Ethics, Arlington, Virginia, 1999.

Krantz KC. Chiropractic and Hospital Privileges Protocol, Arlington, VA: International Chiropractors' Association, 1987.

Dishman R. Static and dynamic components of the chiropractic subluxation complex: A literature review. *J Manipulative Physio Thera*, April 1988, Vol. 11 #2A.

Palmer BJ. The Subluxation Specific - The Adjustment Specific, Palmer School of Chiropractic, 1934.

Palmer BJ. Chiropractic Clinical Controlled Research, Palmer School of Chiropractic, 1951.

Palmer BJ. Palmer Technique of Chiropractic, Palmer School of Chiropractic, 1920.

Hyman CA. Chiropractic adjustments and infantile colic: a case study. In *Proceedings of the 4th National Conference on Chiropractic and Pediatrics*. International Chiropractors Association. Arlington, VA. 1994.

Anderson-Peacock E: Chiropractic care of children with headaches: five case reports. *J Clin Chiropractic Pediatrics* 1996; 1(1):18.

Anrig-Howe C: Scientific ramifications for providing pre-natal and neonatal chiropractic care. *Chiropractic Pediatrics* 1994; 1(2):7.

Kent C: Models of vertebral subluxation: a review. *J Vertebral Subluxation Research* 1996; 1(1):11.

Anrig C: Development and mechanisms of injury to the pediatric spine. *A.R.C.S. Symposium* April, 1992.

Kirk CR, Lawrence DJ, Volvo NL. States Manual of Spinal, Pelvic, and Extravertebral Technique, 2nd ed., Lombard, IL; Lombard National College of Chiropractic, 1985.

Barge FH. Idiopathic Scoliosis: Identifiable Causes Detection and Correction, Baldwin Brothers Inc., 2nd ed. 1986.

Evans D, Bethem D. Cervical spine injuries in children. *J Pediatr Orthop* 1989; 9:563.

Webster LL: Subluxation at birth and early childhood. International Chiropractic Pediatric Association March 1989 Stone Mountain, Georgia.

Lovell W, Winter R. *Pediatric Orthopedics*, Philadelphia; J.B. Lippencott, 1978.

Makley J, Carter J. Eosinophilic granuloma of bone. *Clin Orthop* 1986, 204:37.

Mann D. Spine fractures in children and adolescents. *Spine: State of the Art Reviews* 1990, 4(1):25.

Martell W, Molt J, Cassidy J: Roentgenologic manifestations of juvenile rheumatoid arthritis. *AJR* 1962, 88:400.

Sandoz R. The choice of appropriate clinical criteria for assessing the progress of a chiropractic case. *Annals of the Swiss Chiropractic Association* 1985; 8:53-73.

Sawyer CE, Bergman TF, Good DW. Attitudes and habits of chiropractors concerning referral to other health care providers. *J Manip Physiol Ther* 1988; 11(6):480-483.

Stephens D, Gorman F. The prospective treatment of visual perception deficit by chiropractic spinal manipulation: a report of two cases. *Chiropractic Journal of Australia*, 1996, 26(3):82.

Stiga J. Sudden Infant Death Syndrome. *American Chiropractor* October 1983; 28.

Hill SA, Miller CA, Kosnik EJ, Hunt WE. Pediatric neck injuries. A clinical study. *J Neurosurg* Apr 1994; 60(4):700.

Spigelblatt L, Laineammara G, Pless I, Guyver A. The use of alternative medicine by children. *Pediatrics* 1994; 94:811.

McMullen M: Physical stresses of childhood that could lead to need for chiropractic care. *Proceedings of the National Conference on Chiropractic and Pediatrics.* Arlington, VA: International Chiropractors Association, 1991.

Schneier M, Burns R: Atlanto-occipital hypermobility in sudden infant death syndrome.

J Chiropractic Research and Clinical Investigation 1991; 7(2):33.

Horst PA. The posturegraph: an analytical tool for posture evaluation. *J Clinical Chiropractic Pediatrics* Jan 1996; 1(1):33.

Hyman CA. Chiropractic adjustments and the reduction of petit mal seizures in a five-year-old male: a case study. *J Clinical Chiropractic Pediatric* Jan 1996; 1(1):28.

Froehle R. Ear infection: a retrospective study examining improvement from chiropractic care and anlyzing for influencing factors. *J Manip Physiol Thera* 1996; 19(3):169.

Gutmann, G: Blocked atlantal nerve syndrome in infants and small children (Translation). *Intl Rev of Chiropractic* 1990; 46(4):37.

Gutmann, G. Blocked atlantal nerve syndrome in babies and infants. *Manuelle Medizin* 1987; 25:5-10.

Frymoyer J. Back pain and sciatica. *N Engl J Med* 1988; 318-291-300.

Furberg CD. The impact of clinical trails on clinical practice. *Drug Res* 1989; 39:986-8.

Fysh PN: Chronic recurrent otitis media: case series of five patients with recommendations for case management. *J Clin Chiropractic Pediatrics* 1996; 1(2):66.

Eriksen K. Correction of juvenile idiopathic scoliosis after primary upper cervical chiropractic care: a case report. *Chiropractic Res J* 1996; 3(3):25.

Evans DK. Anterior Cervical Subluxation. *JBJS,* August 1976; Vol 58-B, No. 3, pp. 318-321.

Fallon JM, Fysh PN. Chiropractic care of the newborn with congenital torticollis. *J Clinical Chiropractic Pediatrics* 1997; 2(1):116.

Fallon JM. Developmental-behavioral pediatrics: the chiropractors role. *J Clinical Chiropractic Pediatrics* 1997; 2(11):122.

Byers, RK. Spinal cord injuries during birth. *Develop Med Child Neurol* 1975; 17:103-110.

Byers, RK. Spinal cord injuries during birth. *Develop Med Child Neurol* 1975; 17(1):103.

Caffey J. The whiplash shaken body syndrome. *Pediatrics* 1974; 54:396-403.

Klougart N, Nilsson N, Jacobsen J. Infantile colic treated by chiropractors: a prospective study of 316 cases. *J Manip Physiol Thera* 1989; 12(4):281.

Lantz C. Back to basics. A review of the evolution of chiropractic concepts of subluxation. *Topics in Clinical Chiropractic* June 1995, 2(2):1.

Banks B, Beck R, Columbus M, et al. Sudden infant death syndrome: A literature review with chiropractic implications. *J Manip Physiol Ther* 1987; 10(5):246.

Barge FH. Scoliotic screening: the chiropractic approach. *Chiropractic Pediatrics* 1997; 2(4):4.

Lantz C. The vertebral subluxation complex. *J Manip Physiol Ther* Jan 1990, 13(1):56.

Lantz C. The vertebral subluxation complex part II. *Chiropractic Res J* 1990; 1(4):19.

Lantz C. The vertebral subluxation complex part I. *Chiropractic Res J* 1989; 1(3):23.

Leach RA. The Chiropractic Theories: a Synopsis of Chiropractic Research, 2nd ed., Baltimore, MD; Williams & Wilkins, 1986.

Leach RA. The Chiropractic Theories. Baltimore, MD; Williams and Wilkins,1990.

Leboeuf C. Brown P, Herman A, et. al. Chiropractic care of children with nocturnal enuresis: a prospective outcome study. *J Manip Physiol Ther* 1991; 14(2):110-115.

Chapter 5

Routine Check-Ups, Prevention and Public Health

Chapter Outline

I. Overview

II. List of Subtopics

III. Literature Review

IV. Recommendations

V. Comments

VI. References

I. OVERVIEW

The practice of chiropractic includes chiropractic examination and analysis to provide for prevention, acute chiropractic intervention, chronic case management, and long-term care plans. This chapter focuses on wellness and preventive care (designed to reduce the future incidence of illness or impairment) and health promotion (based upon optimal function).

Some confusion arises from the use of various terms to describe such care-including supportive care, maintenance care and preventive care. In this chapter, it is called "Routine Check-ups/Prevention.

Long-term ongoing health management has been a significant component of the chiropractic model of health care. Surrounding this is a wellness paradigm that recognizes related influences on health, emphasizes drugless, non-surgical management, and takes a positive dynamic view of health. In addition to periodic routine checkups, the model looks to the whole individual and requires active patient participation.

Prevention efforts emphasize patient responsibility and may include exercise programs, weight loss, dietary counseling, life style modifications, education on body postures and mechanics, mental attitude, coordination training, safety habits, ergonomics, spinal hygiene, modification of life stressors, etc.

Routine check-ups provide an ongoing basis for such patient education efforts as well as early detection of subluxation.

This type of management program, which combines health promotion, routine checkups/ prevention services, and patient participation, is gaining much more widespread understanding and acceptance in today's more health conscious society.

In recent years, cost containment of health care has become a regional and national priority. It is certainly a concern of responsible health care providers and consumers, as well as health care insurers.

The spiraling costs are driven up by the unique character of the health care marketplace. It does not respond to the usual supply and demand dynamics. This results in the following anomaly:

1. A purchaser (3rd party payer) that pays for service(s) but does not order or receive them.
2. A consumer that receives the service(s) but does not order or purchase them.
3. A provider that orders service(s) but does not receive or pay for them.

This process potentially negates the visible accountability that normally exists between a patient and a doctor.

"Despite the overall health improvements achieved as a result of preventive interventions, the Nation continues to be burdened by preventable illness, injury, and disability. In 1960 the share of the Gross National Product (GNP) going to medical services was 5 percent. It is estimated to reach nearly 12 percent in 1990. Lost economic productivity attendant to illness and early death compounds the impact of this problem, so that in 1980 the total costs of illness equaled nearly 18 percent of GNP. Injury alone now costs the Nation well over $100 billion annually, cancer over $70 billion, and cardiovascular disease $135 billion.

Sophisticated technology for the diagnosis and care of disease conditions has outstripped society's ability to pay for it."

Annual spending on health care is doubling every five years and could hit $1.4 trillion by 1999, "Which is impossible to tolerate economically," said Dr. George Lundberg, editor of The Journal of the American Medical Association. In spite of the staggering expenditure on the nations health care, the health of the people continues to decline.

In the late 1990s the U.S. Department of Health and Human Services, Public Health Service, published a statement of health policy goals entitled Healthy People 2000. It is the product of a National effort of 22 expert groups, almost 300 national organizations and every state health department. More than 10,000 people were involved in public review and comment pertaining to Healthy People 2000.

Several statements, germane to this chapter, have been extracted from that document.

"The nation has within its power the ability to save many lives lost prematurely and needlessly. Implementation of what is already known about promoting health and preventing disease is the central challenge of Healthy People 2000."

"But Healthy People 2000 also challenges the Nation to move beyond merely saving lives. The health of a people is measured by more than death rates. Good health comes from reducing unnecessary suffering, illness, and disability. It comes as well from an improved quality of life...The purpose of Healthy People 2000 is to commit the Nation to the attainment of three broad goals that will help bring us to our full potential, namely to:

- increase the span of healthy life for Americans
- reduce health disparities among Americans
- achieve access to preventive services for all Americans

The challenge of Healthy People 2000 is to use the combined strength of scientific knowledge, professional skill, individual commitment, community support, and political will to enable people to achieve their potential to live full, active lives. It means preventing premature death and preventing disability, preserving a physical environment that supports human life, cultivating family and community support, enhancing each individual's inherent abilities to respond and to act, and assuring that all Americans achieve and maintain a maximum level of functioning."

The chiropractic community agrees emphatically with these goals. What the chiropractic profession has to contribute is a new dimension to the understanding of what is already known about promoting health. Federal officials have, however, been frank in acknowledging that the goals set in the Healthy People 2000 program have not been realized and many of the objectives outlined in that program have re-surfaced as still-to-be-attained in the newer version of that effort. This focus on health and prevention is, still, a welcome signal that the public health system is recognizing the importance of health and wellness instead of only addressing public resources on illness at the crisis stage. The International Chiropractors Association strongly encourages the extension and expansion of these concepts into all health and health care programs, both public and private, throughout

The chiropractic profession offers the fresh perspective of a vitalistic paradigm, emphasizing the expression of human potential. Furthermore, the chiropractic profession provides the service of detection, control and correction of vertebral subluxations and other malpositioned articulations and structures, thereby enhancing the optimum expression of function and health from within.

The focus of chiropractic is to empower the individual with the understanding that true health comes from within. It is important to preserve the individual's right to make an informed choice about options regarding health care services. As chiropractors we embrace the challenge and welcome the opportunity to participate. Healthy People 2000 was a start, acknowledging the role personal choice plays in health promotion strategies. The chiropractic profession holds that the freedom of choice of each individual in selecting a health care provider is a vital consumer freedom and that such freedoms should be an integral part of all health care programs both public and private.

"Healthy People 2000 used the three approaches; of health promotion, health protection, and preventive services as organizing categories,.....It calls on medical and health professionals to prevent, not just to treat, the diseases and conditions that result in premature death and chronic disability. All are necessary. None is sufficient alone to achieve Healthy People 2000's goals and objectives." The chiropractic profession has a vital role to play in meeting these objectives.

In his letter in the foreward of Healthy People 2000, James O. Mason, M.D., Dr. P.H., Assistant Secretary for Health stated "I commend Healthy People 2000 to you and through you to the American people. This set of objectives for the year 2000 makes an important, compelling point to us and to all health policy makers: we can no longer afford not to invest in prevention. From the perspective of avoiding human suffering as well as saving wasteful costs for treating diseases and injuries that could have been prevented, the 1990's should be the decade of prevention in the United States."

Crisis care has formed the backbone of health care throughout the world. Waiting until a person develops an illness is clearly not cost efficient and is partly responsible for the fact that health care costs have become a worldwide crisis.

It is obvious that a person who is not "sick" and knows how to stay healthy will not increase health care costs and will in fact decrease costs.

The chiropractic profession is acutely aware of this situation and doctors of chiropractic are dedicated to the concept of assisting people to not only avoid crises care but, also to stay healthy by removing barriers which interfere with the body and erode the bodies ability to heal and maintain itself in a state of optimum health.

In the event that a person has experienced a health crisis, chiropractic care is highly cost effective in providing a unique service that will help an individual with his/her present crisis and lead him/her toward a healthier state.

II. LIST OF SUBTOPICS

A. Routine Check-Ups/Prevention Services
   1. Disclosure
   2. Chiropractic adjustments used in routine check-ups prevention regimen
   3. Health Screening
   4. Health Promotion
   5. Wellness Care

B. Public Health Considerations
   1. Community Based Screening
   2. Public Health Education

III. LITERATURE REVIEW

From the very beginning, the chiropractic model of health has had as its foundation the maxim that a human being is an ecologically and biologically unified organism. The relationship between a patient's internal and external environment must be understood. A major chiropractic premise is that the inherent recuperative power of the body aids restoration and maintenance of health. These principles comprise a wellness paradigm embraced by the chiropractic profession. The vertebral subluxation, along with other factors such as poor nutrition, trauma, heredity, congenital weaknesses, fatigue, mental and environmental stressors and sedentary lifestyles, are viewed as lowering resistance and creating physical disharmony. The chiropractic model requires active patient participation.

Patients initially presenting with a neuro-musculoskeletal problem often obtain a swift and favorable result. Then they may look to the practitioner for other health care needs.

Some patients require ongoing long-term care, others choose it. Insurance constraints, however, mandate that the practitioner indicate when maximum corrective benefit has been achieved. The effectiveness of chiropractic preventive/maintenance care has not been subjected to study by randomized trial, a process that presents major methodological and financial challenges, but is supported by evidence from case studies.

Third party payers have typically resisted reimbursements for long-term preventive/ maintenance care. Nonetheless, there is growing consumer demand for this and chiropractic care generally, despite increases in out-of-pocket expenses.

It is helpful to the patient to understand their status to the level of care they are experiencing and when routine checkups/prevention services begins. The unique nature of each case makes it difficult to develop any standard schedule according to which patients should be examined and checked for subluxation indicators. The International Chiropractors Association conducted a detailed survey of 145 members inquiring as to the members' understanding of appropriate intervals for routine check-ups, based on their clinical experience. Responses varied somewhat but interval recommendations clustered between the two-week and three-week intervals as appropriate for chiropractic check-ups.

Extensive lifestyle and personal activity data exists that point to an increasingly sedentary population, increasing employment, social and environmental stress and other factors that are recognized as contributors to subluxation causation. While no definitive consensus exists regarding the optimal routine chiropractic check-up interval is likely to emerge in the immediate future, preliminary indicators show that a period of two to three weeks is reasonable for the patient with no immediate complaint or with no history that would indicate the need to specifically pre-schedule examinations and/or adjustive care.

The chiropractic profession has a specific role in the prevention of complaints of spinal origin, and in the development of strategies to avoid the need for more radical interventions.

Enhanced public awareness of environmental, psycho-social, and physiological issues through education and community action has forced preventive care into the public health agenda as the number one priority. Smoking cessation, weight control, nutritional considerations, stress reductions, advice about exposure to environmental pollutants and education in respect to the potential dangers of over-the-counter drugs are examples of initiatives affecting the chiropractic patient population worldwide.

IV. RECOMMENDATIONS

It is essential for all health professions to have a clearly defined mission statement. The doctor of chiropractic's primary mission is to locate, analyze, control, reduce and correct vertebral subluxations to allow the patient to exhibit his/her optimum healing potential.

1. A doctor of chiropractic should adhere to the paradigm statement on chiropractic as developed by the Association of Chiropractic Colleges and formally adopted by the International Chiropractors Association, America Chiropractic Association, the Foundation for the Advancement of Chiropractic Tenets and Science, and a host of other chiropractic associations and specialty groups.

5.1.1 **Rating**: Strong Positive Recommendation
Evidence: E, L

A Non-Duplication of Services

Doctors of chiropractic provide a unique body services. They do not duplicate the services of other health care providers.

Recommendation:

1. Doctors of chiropractic may restrict themselves to procedures necessary for the detection, analysis, control, reduction and correction of vertebral subluxations so as to non-duplicate services available from other health care providers.

2. Wherever possible, a doctor of chiropractic should avoid duplication of services by using the results of tests which may have already been performed by other providers.

It is self evident that unreasonable and unnecessary analytical procedures drive up health care costs. Therefore, the doctor of chiropractic should utilize the optimal number and types of analytical procedures, specific to the individual patient, necessary to obtain the pertinent data for the detection, analysis, control, reduction and correction of vertebral subluxations.

5.2.1 **Rating:** Strong Positive Recommendation
Evidence: E, L

B. Overutilization

Recommendation: Reassessments should be performed to adequately assess frequency of visits therefore providing the highest quality care in the most cost effective manner.

5.2.2 **Rating**: Strong Positive Recommendation
Evidence: E, L

C. Patient Education

Once educated about the benefits of chiropractic care, the patient should assume the role of becoming responsible for his/her own health as it relates to chiropractic care. A patient that understands the benefits of chiropractic care will utilize these services as a preventative type measure, thus assisting in the cost containment of the overall health care system.

Recommendation: The doctor of chiropractic should assume the responsibility of educating the patient as to the benefits of vertebral subluxation correction and prevention and how it relates to their overall health and the health of everyone in the community.

5.3.1 **Rating**: Strong Positive Recommendation
Evidence: E, L

D. Patient Responsibility

In the interest of reducing health care costs, the doctors of chiropractic should always try to instill in the patient the following concepts of patient responsibility:

1. The patient should assume responsibility for their own health and that of their family where applicable and take appropriate care of themselves.

2. Compliance with the chiropractors recommendations, leading to reduction of visit frequency as soon as possible.

3. The more responsible each patient is for their own fees the less burden they will be on the nation's health system.

4. The patient, as well as the chiropractor, should accept the responsibility to avoid overutilization.

5.4.1 **Rating**: Strong Positive Recommendation
Evidence: E

E. Professional Regulation

Recommendation: All regulations should be developed to insure consumer safety and in light of the cost/benefit ratio when it impacts on consumer cost.

5.5.1 **Rating**: Strong Positive Recommendation
Evidence: E, L

F. Shared Resources

Shared resources may have a cost-effective value as in the following examples:

- Multiple providers sharing/using facilities or equipment.
- Centralized facilities housing cost-intensive equipment in lieu of duplication, e.g., video fluoroscopy, and MRI.
- Shared staff

Recommendation: When practical, multiple providers sharing resources is cost effective.

5.6.1 **Rating**: Discretion**ary**
Evidence: E, L

G. Unlimited Chiropractic Care at a Fixed Fee

Doctors of chiropractic may use a fixed charge for a specified period of time for unlimited services. This is found to be an effective method of reducing costs to the purchaser, through reducing clerical and other overhead costs. Such programs must however be in compliance with applicable state and federal laws and regulations.

5.7.1 **Rating**: Discretionary
Evidence: E

H. Routine Check-ups/Prevention Services

1. Disclosure:

Routine check-ups and prevention services are an integral part of the patient's overall health care. It is necessary for the practitioner to clearly understand the type and nature of this care they are being given and to give proper patient disclosure by the D.C.

5.8.1 **Rating**: Established
Evidence: Class III

2. Use of Chiropractic Adjustments

The clinical experience of the profession developed over a period of more than 100 years suggests that the use of chiropractic adjustments in a regimen of routine check-ups/prevention services has merit.

5.8.2 **Rating**: Established
Evidence: Class II, III

3. Health Screening

The importance of health preventive strategies is widely recognized. These services may have value in identifying early or potential manifestations of a health problem.

5.8.3 **Rating**: Established
Evidence: Class II, III

4. Health Promotion:

Preventive orientation to health through health promotion is well established. Health promotion provides the opportunity for chiropractic practitioners to promote health through assessment, education, and counseling on topics such as nutrition, exercise, stress reduction, life style patterns, mental attitude, spinal hygiene, weight reduction, smoking cessation, and ergonomics, among others.

5.8.4 **Rating**: Established
Evidence: Class I, II, III

5. Wellness Care:

Chiropractic is the largest, most established and widely licensed of the wellness oriented health professions. Wellness and the conscientious management of lifestyle strategies have gained popularity and acceptance. Chiropractic practitioners may choose to expand their practices to include those services that may influence a person's attainment of optimum performance and behavior, and in so doing, improve health status. This kind of care is performance specific (i.e., quality of life) rather than condition (e.g., symptom) specific and is not intended to duplicate or invade the realms of other health care disciplines.

5.8.5 **Rating**: Established
Evidence: Class III

I. Public Health Considerations

6. Community Screening:

Community-based screening programs are commonly used by all disciplines to promote public health. Spinal screening by appropriate disciplines should be encouraged to promote public health.

5.9.1 **Rating**: Established
Evidence: Class II, III

7. Public Health Considerations:

The chiropractic profession has recognized the need to engage in the local, state, national and international agendas of public health. Such programs provide opportunities for education and understanding programs regarding spinal health, nutrition, exercise and life styles, drugs, alcohol, tobacco, and infectious disease, as well as environmental and other social issues.

5.9.2 **Rating**: Established
Evidence: II, III

V. COMMENTS

In this chapter a distinction has been drawn between two kinds of long-term chiropractic care: corrective/supportive care which has immediate clinical necessity; and routine check-ups/prevention services which is elective and focuses upon patient participation and wellness.

The chiropractic profession, which has always had a wellness paradigm and has stood at the forefront of the health promotion and wellness movements, must participate in research and that will better evaluate the basis and implementation of worldwide routine check-ups/prevention services.

VI. REFERENCES

Caplan RL: Health care reform and chiropractic in the 1990s. *J Manip Physiol Ther* 1991; 14(6):341-354.

Coile Jr., Russell CD: *Promoting Health, The New Medicine: Reshaping Medical Practice and Health Care Management*, Rockville, MD: Aspen Publishers, Inc., 1990: 151-166.

Coulter ID: The patient, the practitioner, and wellness: paradigm lost, paradigm gained. *J Manip Physio Ther* 1990; 13(2):107-111.

Coulter ID, Hurwitz EL, Aronow HU, et al: Chiropractic patients in a comprehensive home-based geriatric assessment, follow-up and health promotion program. *Topics in Clinical Chiropractic* 1996; 3(2):46.

Fallon J: The role of the chiropractic adjustment in the care and treatment of 332 children with otitis media. *Journal* *of Clinical Chiropractic Pediatrics* 1997; 2(2):167-184.

Health Care Financing Administration, Office of the Actuary. Expenditures and percent of gross national product for national health expenditures, by private and public funds, hospital care, and physician services; calendar years 1960-87. Health Care Financing Review 10:2, Winter 1988.

"Healthy People 2000," National Health Promotion and Disease Prevention Objectives Conference Edition: Summary U.S. Department of Health and Human Services. Public Health Service.

Hendrickson, R.M., "Routine Chiropractic Check-Up Intervals: A Survey of United States Practitioners", ICA, 1999.

Jamison JR: *The Chiropractor as Health Information Resource, Health Promotion for Chiropractic Practice*, Gaithersburg, MD: Aspect Publishers, Inc. 1991, pp. 35-36.

Jamison J: Preventive chiropractic and the chiropractic management of visceral conditions: Is the cost to chiropractic acceptance justified by the benefits to health care? *Chiropractic J Austr* 1991, 9(3):95-101.

Kaplan RM: Behavior as the central outcome in health care. *American Psychologist* 1990, 45:1211-1220.

Karl SV: The Detection and Modification of Psychosocial and Behavioral Risk Factors. Applications of Social Science to Clinical Medicine and Health Policy, Chapter 17. Rutgers University Press, New Brunswick, NJ, 1986.

McDowell I, Newell C: *Measuring Health: A Guide to Rating Scales and Questionnaires*, New York: Oxford University Press, 1987.

Phillips RB, Butler R: Survey of chiropractic in Dade County, Florida. *J Manip Physiol Ther* 1982, 5(2):83-89.

Rice DP, MacKenzie EJ, Jones AS, Kaufman SR, deLissovoy GV, Max W, McLoughlin E, Miller TR, Robertson LS, Salkever DS, Smith GS: Cost of Injury in the United States: A Report to Congress, 1989. San Francisco, CA: Institute for Health and Aging, University of California and Injury Prevention Center, The Johns Hopkins University, 1989.

Shekelle PG, Brook RH: A community-based study of the use of chiropractic services. *Am J Pub Health* 1991, 81(4):439-442.

Stacey TA: Osteoporosis: exercise therapy, pre- and post-diagnosis. *J Manip Physiol Ther* 1989, 12(3):211-219.

Wardwell WI: The Connecticut survey of public attitudes toward chiropractic. *J Manip Physiol Ther* 1989, 12(3):167-173.

Yates RG, Lamping DL, Abram NL, Wright C: Effects of chiropractic treatment on blood pressure and anxiety: A randomized, controlled trial. *J Manip Physiol Ther* 1988, 11(6):484-488.

CHAPTER 6

Collaborative Care

Chapter Outline

I. OVERVIEW

All patients of all health care providers have the right to expect health care services at the highest level of quality. The preservation of patient trust and confidence depends on this. When the needs of the patient demand the inclusion of other providers or institutions in the program of care, extra caution and extra effort are required to ensure that no gaps in service or conflicts will be allowed to jeopardize the quality of care. The chiropractic practitioner should be aware of programs of cooperation and/or collaboration which can assist the patient.

Relationships between health care professionals can only become more complex, and possibly more contentious as we presently enter an era of great change and instability in health care. Concepts such as "managed care," "preferred provider" and "gatekeeper physician" are becoming the new currency of health care policy. As efforts to control health care costs center more and more on the managed care theory of cost and utilization containment, a credible protocol for interaction becomes an urgent necessity.

To ensure that all requirements for patient care can truly be addressed, this new model must consider cooperative relationships in all settings, including institutional settings such as the hospital, nursing home, and hospice, and among all health care professionals. The model to be devised must be comprehensive, clear to all parties involved, and flexible and dynamic enough to adapt to the daily realities of practice.

In an era in which greater scrutiny is being given to all health care procedures and pathways, it is particularly important that the chiropractic profession take steps to ensure that relationships with other providers are based on the best interests of the patient at all times. Likewise, we must carefully safeguard the rights of chiropractic patients and ensure that other providers are conscious of the need to conduct patient care in a totally objective and professional manner. When professions interact in the delivery of health care services, economic and social factors as well as professional competition or misunderstanding should never be allowed to override the fundamental obligation to the patient. There is no place for such distractions in the delivery of quality health care, nor should the chiropractic profession or the public tolerate prejudice or discrimination in the conduct of health care policy at any level.

II. LIST OF SUBTOPICS

Reasonable Patient Expectations in the Cooperative and Collaborative Care Setting

A. The Patient and the Primary Care Provider
B. Freedom of Choice and Informed Consent
C. Professional Knowledge and Understanding
D. Referrals
E. Exchange of Information and Records between Providers
F. Professional Interaction in the Hospital or Other Institutional Setting.
G. Economic Considerations

III. LITERATURE REVIEW

Collaboration can be defined as the reciprocal inter-professional interaction of two or more health care providers. Collaborative care involves this interaction in the management of the patient's current health status. Collaborative care, therefore, includes care in a private practitioner's office, where interaction exists on a daily basis between the practitioner and his/her assistants, as well as care within a complex institutional setting such as a medical specialty ward in a hospital and care within a managed care setting. Various specialty fields exist within chiropractic and are available as a resource.

Hospitals and other institutional inpatient settings represent to some degree a new frontier for chiropractic. Chiropractic has an enormous impact to make in this context. As well, hospitals are of great social, political and economic importance in North America. It is here that the largest publicly-supported concentration of leading-edge diagnostic equipment is to be found. Hospitals are also the scene of the vast majority of clinical information gathering and research.

Collaborative care is neither new nor unique to this generation of providers, though cooperative relationships between the medical and chiropractic professions have been less frequent in the past. The federal court judgment in 1987 in Wilk et al. vs. AMA et al., which effectively eliminated formal barriers previously established to the collaboration of the chiropractic and medical professions, has been a key factor in increasing cooperation. However, as greater emphasis is now being placed on the concept of nominating one primary care doctor as a "gatekeeper" whose function is to ensure appropriate care yet contain specialist and other costs, new effort is required to understand the appropriate role of different health disciplines. This is a difficult task for a number of reasons.

Firstly, from an organizational viewpoint, much of modern medicine is based on a "problem-oriented model" rather than one based either on the management of chronic illness or disease prevention. The problem-oriented model is less conducive to an interdisciplinary team approach than a "goal-oriented model" where the patient's achievement of highest possible level of health is the goal of all concerned.

When incorporating chiropractic care into patient care guidelines, it is always understood that the role of the doctor of chiropractic is separate from other health disciplines and should be presented as such. Whatever the unique needs of the individual patient, the objective of chiropractic remains the same. The correction of vertebral subluxations is the goal of chiropractic regardless of whether any other disease or condition is presented.

As the doctor of chiropractic participates more and more in other patient care settings, the importance of keeping the body free from subluxation is paramount to promoting a return to the patient's full health potential. Through greater understanding of the chiropractic objective by both the patient and collaborating professional, the pursuit of cooperation and quality patient care can be enhanced.

Clarity of roles is vital. This clarity is dependent to some extent on the probability of a successful care outcome and to some extent upon the provider chosen. This should be understood when clinical policies and guidelines are made on decision-making in patient management. Dixon has noted that while policies can be helpful in simplifying complex clinical dilemmas, they have at times been adopted without evidence of benefit and that research studies using appropriate clinical methodology should be encouraged in order to prevent useless or even dangerous algorithms of care.

The development of wise patient care guidelines, incorporating the many approaches available in health care today, should provide for the most effective balance of resources for the patient's needs. Determining the role of each profession in the various algorithms for patient management should reflect the varying and unique needs of each individual patient. Developing such algorithms, which are currently not in place nationwide, may reasonably be expected to have a significant impact on health outcomes in general, as well as on the difficult inter-professional issue of cost-containment. To that end, for example, Wenneberg has stated that patients' understanding of their care options is anticipated to be a major contributing factor in their care selection. He noted that health care allocation by patient preference is likely to be cost-effective because patients prefer and select less invasive, less expensive treatments. It is in the best interest, therefore, of all concerned that the health care system have all its professional resources, and ready information on them, available to all patients.

Initially, as the chiropractic profession explores the arena of collaborative care more fully, documents generated by practitioners engaging in this work and setting out inter-professional referral protocols can serve as guidelines. As part of the health care system at large, however, the chiropractic profession must now begin to focus more of its resources in researching and developing clinical standards relevant to collaborative care. As noted earlier, such efforts are needed to meet the many and varied needs of all patients.

IV. RECOMMENDATIONS

A. The Patient and the Primary Care Provider

1. Patients are entitled to a clear explanation of why the participation of other health professionals has been determined to be necessary.

6.1.1 **Rating**: Necessary
Evidence: Class II, III

B. Freedom of Choice and Informed Consent

1. All health care professionals should recognize and respect the right of the patient to select his/her own methods of health care and the setting in which that care is delivered, as well as the right of the patient to change providers at will.

6.2.1 **Rating**: Necessary
Evidence: Class III

2. Primary health care providers should supply sufficient information to enable the patient to make an informed decision regarding choices in care and of providers.

6.2.2 **Rating**: Necessary
Evidence: Class III

C. Professional Knowledge and Understanding

1. Chiropractic practitioners should make reasonable effort to be familiar with other health care providers whose care may have implications for the care of their patients, and should strive to communicate such information, as appropriate, to the patient.

6.3.1 **Rating**: Recommended
Evidence: Class III

2. Professional Knowledge and Understanding

Chiropractors shall supply sufficient information to enable the patient make an informed decision regarding their choosing of chiropractic care.

6.3.2 **Rating**: Strong positive recommendation
Evidence: E, L

D. Referrals

1. Primary health care providers should consult or refer if the needs of the patient so indicate.

6.4.1 **Rating**: Necessary
Evidence: Class I, II, III

2. Chiropractic practitioners should accept referrals from other health providers.

6.4.2 **Rating**: Recommended
Evidence: Class III

E. Exchange of Information and Records between Providers

1. Chiropractic practitioners referring a patient to a peer or another professional should take all necessary steps to provide information from the case history and diagnostic findings to the practitioner receiving the referral in an effort to minimize unnecessary testing or repetition of diagnostic procedures.

6.5.1 **Rating**: Recommended
Evidence: Class III

2. Post-referral communication between referring and receiving practitioners should be complete and adequately detailed. Appropriate records of clinical findings or recommendations should be exchanged.

6.5.2 **Rating**: Recommended
Evidence: Class III

3. Questions about care decisions made or recommended by another provider should be addressed directly to that provider in a constructive manner. Relying on the patient to be an effective messenger of critical information is inappropriate.

6.5.3 **Rating**: Recommended
Evidence: Class III

4. Response to requests for records should occur in a timely fashion. Likewise, records requested by the practitioner that are another practitioner's property should be returned in a timely fashion.

6.5.4 **Rating**: Recommended
Evidence: Class III

F. Professional Interaction in the Hospital or Other Institutional Setting

1. In a collaborative or cooperative care setting, every effort should be made to develop and present to the patient a consensus among all participating practitioners on the recommended course of care.

6.6.1 **Rating**: Recommended
Evidence: Class III

2. Practitioners should seek access to other health care facilities and institutions as necessary to meet the needs of their patients. This may include authority to admit or co-admit the patient into the appropriate clinical setting or hospital.

6.6.2 **Rating:** Recommended
Evidence: Class III

3. In the process of concurrent care, each professional party should be aware of the care decisions made by other participants, and fully coordinate activities and information for the patient's benefits.

6.6.3 **Rating**: Recommended
Evidence: Class III

4. The resolution of disputes between members of different professions on the course of care for a given patient should be based on: a) the best professional judgment of the practitioners involved; b) the objective evaluation of appropriate clinical options and intervention alternatives; and c) responsible family involvement where appropriate. Informed consent on the part of the patient continues to be necessary.

6.6.4 **Rating**: Recommended
Evidence: Class III

5. To facilitate patient access to the widest possible range of health care resources and options, practitioners should investigate participation in managed health care organizations (e.g., HMOs, PPOs, etc.). Managed care plans should provide for direct access to chiropractic services.

6.6.5 **Rating**: Recommended
Evidence: Class III

G. Economic Considerations

1. No referral should be sought or made on the basis of economic considerations and no financial relationship should exist between parties in a referral process. No fee, rebate or commission should be paid to any referring provider for the referral.

6.7.1 **Rating:** Recommended
Evidence: Class III

2. Determination of the need and appropriateness of chiropractic procedures constitutes the practice of chiropractic. Such determinations should be based upon a review and records and a physical examination of the patient by a licensed chiropractor. Rendering an opinion concerning the need or appropriateness of such care without an examination of the patient constitutes unprofessional conduct.

6.7.2 **Rating**: Necessary
Evidence: Class III

3. Primary providers should cooperate to secure proper insurance payment for all clinically-indicated health care services.

6.7.3 **Rating**: Recommended
Evidence: Class III

V. COMMENTS

Professional behavior should be governed by the principles of the philosophy, art and science of chiropractic, and a strict set of ethical canons which go beyond the legal obligations of licensure. Ethical requirements are as compelling and imperative to the delivery of quality care as any clinical indications.

Interaction between professions in a hospital or other institutional setting will be governed by the laws and regulations of the jurisdiction within which the facility operates and the rules and bylaws of the hospital or facility. Recognition of the degree to which professional roles are specified by such regulations should eliminate much of the confusion and concern surrounding the participation of chiropractic practitioners in the hospital setting.

In situations where patients need or request diagnostic outpatient services or inpatient care, the practitioner should provide a full and accurate explanation of his/her professional access to such facilities. It is important that degrees of institutional access be understood by all parties in a collaborative care situation. Under no circumstances should any chiropractic practitioner overlook or minimize the need to employ outside services because he/she does not have access, referral or staff privileges at a specific facility. It is incumbent upon the practitioner to find a means to meet patient needs on a timely basis, all such considerations notwithstanding.

VI. REFERENCES

Anderson, R: *Standards for Interprofessional Relations: Chiropractic Standards of Practice and Quality of Care*, Veal, H., Gaithersburg: Aspen, 1991; p. 163-178.

Banks R, Leboeuf C, Webb M: Recently graduated chiropractors in Australia: Part 3. Interprofessional referrals. *J Australian Chiro Assoc* 1988; 18:14-16.

Denton D: Wave of the future: equality and cooperation. *ACA J Chirop* 1988; 25:23-25.

Dixon AS: The Evolution of Clinical Policies. *Medical Care* 1990, 28:201-220.

Eisenberg JM: The Internist as Gatekeeper: Preparing the General Internist for a New Role. *Annals of Internal Medicine*, 1985, 102-537-543.

Harrison JD: *Chiropractic Practice and Ability: A Practical Guide to Successful Risk Management*, Arlington, VA: International Chiropractors' Association, 1990.

International Chiropractors' Association Policy Handbook and Code of Ethics, Arlington, Virginia, ed 2, 1991.

Krantz KC: *Chiropractic and Hospital Privileges Protocol*, Arlington, VA: International Chiropractors' Association, 1987.

Krantz, KC: *Chiropractic Hospital Privileges Protocol*, Arlington, VA: International Chiropractors' Association, 1988.

Krantz KC, Hendrickson RM: *Chiropractic and the HMO-PPO Challenge*, Arlington, VA: International Chiropractors' Association, 1988.

Mold JW, Blake GH, Becker LA: Goal Oriented Medical Care. *Family Medicine* 1991, 23:46-51.

Mootz RD: Interprofessional Referral Protocol.

Richards T: Chiropractic specialists: A referral resource. *ACA J Chirop* 1990, 27-26-29.

Sawyer C, Bergmann, Good, D: Attitudes and habits of chiropractor concerning referral to other health care providers. *J Manip Physiol Ther* 1988, 11:480-483.

Somers AR: And who shall be the gatekeeper? The role of the primary physician in the health care delivery system. *Inquiry* 1983, 20:301-313.

Wennenberg JE: Outcomes Research, Cost-Containment, and the Fear of Health Care Rationing. *New Eng J Med* 1991, 323-1202.

Wilk et al., vs. AMA et al.: US Federal Court for the Northern District of Illinois, Eastern Division, No 76C3777, Judgment dated August 27, 1987.

CHAPTER 7

Consultation, History and Examination

Chapter Outline

I. Overview

II. List of Subtopics

III. Literature Review

IV. Recommendations

V. References

I. OVERVIEW

The primary objective of a chiropractic practice is to detect, analyze, control, reduce and correct a patient's vertebral subluxation(s) and other malpositioned articulations and structures in the safest and most efficient manner possible. The chiropractic profession recognizes patient safety as being paramount.

The purpose of this chapter is to act as a guide to the practitioner of Chiropractic. It is understood that the taking of a case history and the performing of an examination is a component part of the chiropractic practice

The chiropractic case history and examination are concerned with the accumulation of information pertinent to the location and analysis of vertebral subluxation(s) and other malpositioned articulations and structures, in the context of the patient's general health status. Doctors of chiropractic accept the responsibility to recognize and deal with emergencies as defined by the International Red Cross. They also accept the responsibility to inform the patient of any significant clinical findings.

In order for the doctor of chiropractic to initially determine the presence, duration, location and type of subluxations present, and to determine whether the patient is suited for certain types of chiropractic techniques, it is necessary to gather data relative to the patient's health history and stated concerns. This information will also serve as a basis for wellness counseling and lifestyle advice. This data is collected during the patient's initial consultation and examination.

The doctor of chiropractic can begin to interpret the chiropractic needs of the patient following the initial examination and case history which might produce salient points relative to the patient's spinal and general health that may lead the doctor of chiropractic to alter the evaluation of the patient. The doctor's findings during the initial case history and examination will establish an initial course of care which will be recommended to the patient.

The doctor of chiropractic should inform the patient during the consultation as to the objective of chiropractic care and of the doctor's responsibility.

II. LIST OF SUBTOPICS

A. History
   1. General Considerations
   2. Components
   3. Reason for seeking Chiropractic care.
   4. Onset and duration of symptomatic problem, if one exists. This includes determination of the character and location of subjective symptoms (if they exist); and aggravating/relieving factors (only relevant if symptoms exist). In addition, this element includes:

   5. Prior care
      a. Medical
      b. Chiropractic
      c. Self
      d. Other

   6. Family history

7. Past health history
8. Occupational history
9. Social history (smoking, drinking, sports, etc.)

B. Examination Procedures

1. Review of systems
2. Use of analytical procedures
3. Use of physical examination procedures may be used to locate and document vertebral subluxation and other malpositioned articulations and structures
4. Use of laboratory and physical examination procedure to determine altered body functions.
5. Use of physical examination procedures may be used to classify vertebral subluxation and other malpositioned articulations and structures
6. Use of physical examination procedures to locate and classify vertebral subluxation and other malpositioned articulations and structures may reveal contraindications.
7. In presence of head complaints
8. Neck and adjacent structures
9. Thoracic structures and/or chest structures
10. Lower back and adjacent structures
11. Extremity structures
12. Independent chiropractic examinations

III. LITERATURE REVIEW/DOCUMENTATION

History taking and patient examination are based on principles of elucidating information relative to the patient's health status.

Specific literature on the appropriate history and examination techniques for the chiropractic practitioner can be found in numerous texts. The reader is directed to those texts listed in the bibliography for detailed description of such techniques. The intent of this chapter is not to serve as a teaching tool. Rather, the purpose is to assist in establishing guidelines related to acceptable history techniques to be used by the practitioner.

Many journals published for the chiropractic profession, including the *Journal of Manipulative and Physiological Therapeutics, Chiropractic Technique, Chiropractic Research Journal, Journal of Vertebral Subluxation Research* and *Chiropractic Sports Medicine*, provide articles on the appropriateness of various examination procedures, but there is little information in history taking procedures. The articles range from describing the measurement of lumbar range of motion to objectively measuring the strength of the biceps muscle. These articles often reflect only one individual's perspective. These considerations increase our need for objective information gained from well-designed research projects.

The history-taking procedure has been considered the most clinically sophisticated and complex task used by health care providers. Its purpose is to provide the clinician with one or more diagnostic impressions. These are then confirmed or altered following the judicious selection of additional tests -- and it can be noted in the literature that this process does indeed occur. One study determined that a sample group of practitioners determined their first hypothesis regarding the diagnosis of a random sample of patients an average of 28 seconds after hearing the chief complaint.

The correct hypothesis (which was identified in 75% of these cases) was found on average within the first six minutes of a half-hour workup. Much of the information that will lead a clinician to a management plan, then, is gained very early in the doctor/patient interaction.

Sandler also emphasized the importance of the history. He found that the percentage of diagnostic completion was as high as 73% after the history and physical examination alone. He suggested that further tests were often unnecessary and costly. Cutler stated that 70%-90% of diagnoses are derived from the history alone. The art and skill of the doctor in the history taking process includes the ability 1) to obtain an appropriate description of the patient's complaints; 2) to elicit data vital of the case that may not have been volunteered, and 3) to know that the patient does not have clinically relevant factors that are left unmentioned.

These skills can be diminished in a number of ways. Previous experience, while of great value, may result in the clinician prejudging a patient's condition, coming to a conclusion too quickly. This may result in unnecessary testing procedures in order to determine that the hypothesis made during the history is incorrect, or may result in an appropriate confirmatory test not being used and the patient being treated inappropriately. Further the meaning of words used by the patient may not be the same as that of the practitioner. "Night pain," for example, may signify a pain when resting in bed which has high sensitivity (greater than 0.90) for the detection of malignancy; or it might mean that the patient wakes up whenever he/she rolls over and that the movement irritates an inflamed facet. A practitioner's arbitrary use of professional jargon, and the assumption that the patient understands it, can lead to further confusion. All of the above are further complicated when the first language of the clinician is not the same as that of the patient. It is perhaps for these reasons that the accuracy of patient histories has been questioned, and significant variability noted.

Mishler et. al. state that there are three parameters involved in the interview process: attentiveness, facilitation and collaboration. Attentiveness is defined as the degree to which the practitioner takes the patient's concerns seriously. Facilitation is the encouragement given by the clinician to allow patients to tell their own stories in their own words, and collaboration is the degree to which patients are considered partners in the process by which they receive care.

The literature is sorely lacking with respect to controlled randomized clinical trials directed at measuring reliability and validity of specific history taking procedures. A thorough review of practitioner reliability studies performed by Koran did not include any studies relating to history taking. Earlier studies, in which practitioners interviewed different samples of patients drawn from one population, found considerable disagreement in symptom prevalence rates.

While the chiropractor's history taking is broad and general, the examination is quite specific and relates to procedures which give information, either directly or indirectly, relative to the location and classification of vertebral subluxation(s) and other malpositioned articulations and structures.

While vertebral subluxations and other malpositioned articulations and structures may be asymptomatic it is known that they commonly have peripheral physiological effects. Therefore, the examination, although heavily concentrated on the spine may include procedures remote from the spine including ,but not limited to other physical examination procedures, clinical laboratory and imaging procedures.

Palpation is an intrinsic part of chiropractic. Utilization of this procedure should help the examiner to detect abnormalities and therefore develop a more thorough assessment of spinal function. Chiropractic colleges place palpation techniques high on their curricular agendas. Standardized training and protocol for palpation is necessary and should be promoted by the colleges to help improve inter-examiner reliability.

The biological/diagnostic sciences, are aids to the decision-making process. This process, however, must take place within the social context of our society. As a result a social interactive component must be recognized and taken into account in order to make appropriate choices during the physical examination and any additional testing procedures.

There are several examination styles that are currently recognized. Not all of them are practical in a clinical setting. One is the exhaustive approach, with the completion of a comprehensive series of all tests that may significantly contribute to determining the diagnosis. A study by Durbridge, performed in a hospital setting, showed that exhaustive testing produced no improvement in mortality rate, morbidity, duration of monitoring, disability, medical opinions of the patient's progress or length of stay.

Another style, the one generally used to obtain the history and perform the physical examination, is the hypothetic-deductive approach. This consists of generating one hypothesis after hearing the patient's chief complaint(s), or several possible working hypotheses. The practitioner then attempts to gather historical and physical information to either support or refute the potential working hypotheses. The goal is to narrow the number of working hypotheses to one.

The physical examination, while apparently objective, is no less riddled with social issues than the history. It has been noted that the assessment of the observer, instructions given to the patient, and sincerity of response are important. When, for example, an almost 30% difference is found in the sensitivity of a test such as sensory loss used to help diagnose a herniated lumbar nucleus pulposis for two different samples, it is difficult to know if the difference lies in the test itself or in the doctor-patient relationship. The more motivated patients are, the more likely they are to fairly represent their maximum capacity on a physical performance test. The less anxious patients are, the more likely they are to reach forward despite their pain.

Cooperman et al attempted to assess inter-tester and intra-tester reliability and validity of Lachman's test in determining the integrity of the anterior cruciate ligament (ACL). They found the test judgments had limited reliability. They were more reliable for predicting absence of ACL injury than the presence of ACL injury.

Another study analyzing a sample of patients with objectively determined anterior cruciate ligament test or chondral damage found patients were not correctly diagnosed using a battery of usual orthopedic tests. Under anesthesia, however, Lachman's test proved to be highly sensitive and specific. This suggests that even in the face of well-performed maneuvers, compensatory defense reactions from soft tissue may prevent stressing the targeted tissues in the manner necessary for adequate diagnosis.

Mieraue et. al. determined that the correlation between straight leg raising (SLR) and low back pain may be poor when evaluating children and adolescents with the exception of male adolescents with a history of low back pain. When evaluating various populations it has been observed that ipsilateral SLR is a highly sensitive indicator (72%-97%) of lumbar disc herniation, and contralateral SLR is highly specific for the same condition (88%-100%).

Brunarski evaluated two physical measurements, plumbline analysis and lateral bending dynamic roentgenograms. These two measures demonstrated greater predictive value and accuracy in differentiating patients with myofascial pain from asymptomatic patients than sacroiliac motion palpation and straight leg raising.

LeBoeuf evaluated eight different orthopedic tests and found that only one (heel to buttock test) had predictive value for low-back pain. Orthopedic tests that appeared to strain several adjacent anatomical structures were commonly positive. This may indicate that these tests have poor discriminative ability.

Three common cervical orthopedic tests used to determine the presence of cervical disc disease were evaluated as they related to radicular, neurologic and radiologic signs. Neck compression, axial manual traction and shoulder abduction tests were found to be highly specific for radicular pain, neurologic and radiologic signs. Despite their low sensitivity, these tests were deemed valuable in the clinical examination of a patient with neck and arm pain. In the presence of a negative finding from an accepted test, a practitioner needs to recognize that many tests have low sensitivity.

In conclusion, much of the basis of history taking and performing a physical examination stems from clinical experience rather than scientific data.

This experience first starts at the college level with a good understanding of the basic sciences and later through clinical experience under the tutelage of experienced practitioners in the college clinic. After graduation the practitioner will continue to gain experience through practice, continuing education programs, and consulting with other practitioners.

As clinicians we must remain flexible in our approach to the patient, and recognize consultative procedures that may assist in establishing an effective working diagnosis.

IV. RECOMMENDATIONS

A. History

1. Recording the case history is necessary for the practitioner to determine the overall health status of the patient and give a better understanding of the patient's concerns.

7.1.1. **Rating:** Strong positive recommendation
Evidence: E, L

2. The history generally include basic information such as age, sex, and other pertinent information depending on the situation and the chiropractor's judgment.

7.1.2. **Rating:** Strong positive recommendation
Evidence: E, L

3. The chiropractor should establish the reason(s) for the patient seeking chiropractic care.

7.1.3. **Rating:** Strong positive recommendation
Evidence: E, L

4. The process by which one determines the diagnosis should be adequately recorded and interpretable.

7.1.4 **Rating:** Positive recommendation
Evidence: Class II, III

5. The history plays a critical role in the diagnostic process. A well performed history will appropriately identify the region to be examined and the extent of the condition.

7.1.5. **Rating:** Established
Evidence: Class I, II, III

6. The components of the history may include any or all of the following, dependent on the presentation of the patient and the judgment of the practitioner.

   a. Data on identity, including age and sex.
   b. Chief complaint (problem list)
   c. History of present complaint
      History of trauma
      Description of chief complaint(s)
      Quality/character
      Intensity
      Frequency
      Location and radiation
      Onset
      Duration
      Palliative and provocative factors
   d.. Family history
      A family history including information of relatives known to have had the same problem(s) and cause of parents or siblings death and age at death.
   e. Past health history
      General state of health
      Prior illness/Disease history
      Surgical history
      Previous injuries, i.e. MVA, workers' comp.
      Past hospitalizations
      Previous care and diagnostic tests
      Medications
      Allergies
   f. Psycho-social history
      Occupation
      Activities
      Recreational activities
      Exercise
   g. Social history
      Marital status
      Level of education
      Social habits
   h.. Review of systems
      Musculoskeletal
      Cardiovascular
      Respiratory
      Gastrointestinal
      Genitourinary
      Central nervous system
      Eye, ear, nose and throat

Endocrine
Peripheral vascular disease
Psychiatric

7.1.6. **Rating:** Necessary
Evidence: Class I, II, III

B. Examination

1. Analytical procedures used by Chiropractors to classify and document vertebral subluxation and other malpositioned articulations and structures should be consistent with applicable state law.

7.2.1. **Rating**: Strong positive recommendation
Evidence: E, L

2. Practitioners may use any or all evaluative procedures pertinent to the physical examination, however sophisticated, dependent on individual training and the legal statutory framework within which they work, and clinical need.

7.2.2. **Rating**: Necessary
Evidence: Class II, III

3. Examination procedures regardless of chief complaint(s) may include:

a, Examination for vertebral subluxation
b. Evaluation of blood pressure and pulse rate
c. Recording of height and weight
d. Record of temperature in the presence of pertinent subjective complaints

7.2.3. **Rating**: Recommended
Evidence: Class III

4. When evaluating the head, evaluation may include examination of the neck and adjacent structures as well as appropriate vascular and cranial nerve testing.

7.2.4. **Rating**: Established
Evidence: Class II, III

5. Examination of the neck and adjacent structures may include:

a. Inspection and observation to include postural presentation of the region
b. Regional palpation
c. Range of motion including active and/or passive movement
d. Muscle strength
5. Provocative maneuvers which might include compression and stretching
6. Neurologic examination
7. Vascular examination

As is safe and effective in evaluating the patient.

7.2.5. **Rating**: Established
Evidence: Class II, III

6. Examination procedures for thoracic and/or chest structures may include:

a. Inspection and observation to include postural presentation of the region
b. Regional palpation
3. Auscultation of the chest in the presence of pertinent subjective complaints to be performed by the practitioner or appropriate specialist
4. Auscultation of heart sounds in the presence of pertinent subjective complaints to be performed by the practitioner or appropriate specialist
5. Auscultation and palpation of the abdomen
6. Range of motion including passive and/or active movements
7. Muscle strength
8. Provocative maneuvers which may include compression and stretching
9. Neurologic examination

As is safe and effective in evaluating the patient.

7.2.6. **Rating**: Established
Evidence: Class II, III

7. Examination procedures for lower back and adjacent structures may include:

1. Inspection and observation to include postural presentation of the region
2. Regional palpation
3. Evaluation of the abdominal aorta to include palpation and auscultation in the presence of pertinent subjective and objective findings
4. Evaluation of the abdominal/pelvic viscera to include palpation and/or auscultation in the presence of pertinent subjective complaints
5. Range of motion including passive and/or active movements
6. Muscle strength
7. Provocative maneuvers which may include compression and stretching
8. Neurologic examination
9. Vascular examination
10. Recording the circumference of the involved extremity in the presence of pertinent subjective complaints as is safe and effective in diagnosing the patient.

7.2.7. **Rating**: Established
Evidence: Class II, III

8. Examination procedures for extremity structures may include:

a. Vascular examination
b. Neurologic examination
c. Regional palpation
d. Range of motion including passive and/or active movements
e. Provocative maneuvers which may include compression and stretching
6. Recording the circumference measurements of the involved extremity in the presence of pertinent subjective complaints.

As is safe and effective in evaluating the patient.

7.2.8. **Rating**: Established

Evidence: Class I, II, III

V. REFERENCES

Anderson C: *Sensitivity, Specificity and Predictive Value*. *The Adult Spine: Principles and Practice*, New York: Raven Press, 1991.

Barrows HS, Norman CR, Neufeld VR, Feightner JW: The clinical reasoning of randomly selected physicians in general medical practice. *Clin Invest Med* 1982, 5:49.

Brunareki D: Chiropractic biomechanical evaluations: validity in myofascial low-back pain. *J Manip Physiol Ther* 1982, 5:155-61.

Cooperman JM: Reliability and validity of judgments of the integrity of the anterior cruciate ligament of the knee using the Lackman's test. *Phys Ther* 1990, 70:(4)225-232.

Corwin R, Krober M, Roth H: Patients' accuracy in reporting their past medical history: a study of 90 patients with peptic ulcer. *J Chron Dis* 1971, 23:875-879.

Cutler P: *Problem Solving in Clinical Medicine: from Data to Diagnosis*, 2nd ed. Baltimore: Williams and Wilkins, 1985, p.13.

Deboer K, et al: Reliability Study of Detection of Somatic Dysfunctions in the Cervical Spine. *JMPT*, March 1985, Vo. 8, #1.

Dishman R: Static and Dynamic Components of the Chiropractic Subluxation Complex: A Literature Review. *JMPT*, April 1988, Vol. 11 #2A.

Dorland's Illustrated Medical Dictionary, 23rd Edition, Saunders, 1957.

Durbridge TC, Edwards F, Edwards RG, Atkinson M: An evaluation of multiphasic screening on admission to hospital. Precis of a report to the National Health and Medical Research Council. *Med J Aust* 1976, 1:703.

Durbridge TC, et al: An Evaluation of Multiphasic Screening on Admission to Hospital. Precis of a report to the National Health and Medical Research Council. *Med J* August, 1976.

Fairbairn AS, Wood CH, Fletcher CM: Variability in answers to a questionnaire on respiratory symptoms. *Br J Prev Soc Med* 1959, 13:175-93.

Feinstein AR: Scientific methodology in clinical medicine - Acquisition of clinical data. *Clinical Methodology* 1964 Dec.61 (6):1162-1193.

Gates D: *Correlative Spinal Anatomy*, 1977.

Hardaker WT, Garrett WE, Bassett M: Evaluation of acute traumatic hemarthrosis of the knee joint. *South Med J* 1990 Jun. 83 (6): 640-4.

Hazaerd PG, Reid S, Fenwich J, Reeves J: Isokinetic trnk and lifting strength measurements: variability as an indicator of effort. *Spine* 1988, 13:(1)54-57.

Hildebrandt, RW: *Chiropractic Spinography*, Hilmark Publications, 1977.

Keating J, Bergman T, Jacobs C, Finer B, Larson K: Interexaminer reliability of eight evaluative dimensions of lumbar segmental abnormality. *J Manip Physiol Ther* 13 (8):463-70.

Kent C, Gentempo Jr. P: *The Documentary Basis for Diagnostic Imaging Procedures in the*

Subluxation-Based/Chiropractic Practice, I.C.A., 1992.

Koran L: The reliability of clinical methods, data and judgments. *New Eng J of Med* 1975, 293 (13):1642-46.

LeBoerf C: The sensitivity and specificity of seven lumbo-pelvic orthopedic tests and the arm-fossa test. *J Manip Physiol Ther* 1990, 13(3):138-143.

Manning A, Wyman JB, Heaton JW: How trustworthy are bowel histories: Comparison of recalled and recorded information. *BMJ* 1976, July:213-214.

McConnell D, et al: Low Agreement of findings in Musculoskeletal Examinations by a Group of Osteopathic Physicians using their own procedures. *JAOA*, 1980, Vol. 79(7) 441-50.

Mierau D, Cassidy JD, Yong-Hing K: Low-back pain and straight leg raising in children and adolescents. *Spine* 1989, 14 (5): 526-28.

Million R, Hall W, Haavik-Nilson K, Baker RD, Jason MIV: Assessment of the progress of the back pain patient. *Spine* 1982, 7:204-212.

Niebuhr BR, Marion R: Detecting sincerity of effort when measuring grip strength. *Spine* 1985, 8:765-772.

Palmer BJ: *The Subluxation Specific - The Adjustment Specific*, Palmer School of Chiropractic, 1934.

Palmer BJ: *Chiropractic Clinical Controlled Research*, Palmer School of Chiropractic, 1951.

Palmer BJ: *Palmer Technique of Chiropractic*, Palmer School of Chiropractic, 1920.

Pettibon B: *Introduction to Spinal Biomechanics*, 1989.

Pharaoh D: *Chiropractic Orthopedy*, Palmer School of Chiropractic, 1956.

Quebec Task Force: Scientific approach in the assessment and management of activity related spinal disorders. *Spine* 1987 12 (7):5-59.

Remier P: *Modern X-Ray Practice and Chiropractic Spinography*, Palmer School of Chiropractic, 1938.

Sackett DL, Haynes RB, Tugwell JP: *Clinical Epidemiology: a basic science for clinical medicine*, 1st ed., Toronto: Little, Brown and Company, 1985.

Sandler C: The importance of the history in the medical clinic and the cost of unnecessary tests. *Am Heart J* 1980, 100: 928.

Smith GA, Nilson RC, Sadoff SJ, Sadoff AM: Assessing sincerity of effort in maximal grip strength tests. *Am J Phys Med* 1989, 2:73-80.

Viikari-Juntura E, Porras M, Lassonen EM: Validity of clinical tests in the diagnosis of root compression in the diagnosis of cervical disc disease. *Spine* 1989, 14 (3):253-7.

CHAPTER 8
Record Keeping and Patient Consents

Chapter Outline

I. Overview

II. List of Subtopics

III. Literature Review

IV. Recommendations

V. Comments

VI. References

I. OVERVIEW

The health care record serves many important functions and is one of the critical components of the health care delivery system. The most important function is in the immediate care and care of the patient. The record also permits different members of a health care team, or successive health care providers, to have access to relevant data concerning the patient to see what procedures have been performed and with what results. The health care record is important for documenting the specific services received by the patient so that the provider can be reimbursed for them. Records should be maintained in a manner that makes them suitable for utilization review. The health record is helpful in the evaluation of practitioners, provides data for public health purposes, and may be used for the purpose of teaching and research. It is critical in a variety of legal contexts, including litigation by patients and malpractice claims.

Construction of an adequate patient chart involves the accumulation of essential information from the patient by interview, use of questionnaires, examination and special studies. There should also be transfer of pertinent information where available from previous or other care given to the patient. This chapter describes the documents, internal and external, that are used to arrive at a diagnosis, to determine and document necessity of care, and to provide a foundation for the chiropractic care plan. The chapter also discusses appropriate patient consents and other legal disclosures.

Once the initial patient work-up has been completed, all record/chart entries should be made in a systematic, organized and contemporaneous manner. Recommendations on what constitutes necessary information to be contained in the day-to-day patient record are offered. The information contained in such records provides a foundation for writing accurate reports to other health care providers, insurance companies, attorneys and other interested parties. The practitioner is encouraged to use a charting system that is effective and complete, yet practical and efficient.

The organization of the patient chart may be enhanced by using pre-printed forms and by having proper identifying information on each page. Minimum recommendations for legibility and clarity of chart entries are offered. The importance of confidentiality and professional courtesy with respect to patient records is emphasized and guidelines are offered.

Patient consent may be implied or expressed, depending upon the circumstances. Where it is expressed, it may be obtained either verbally or in writing. Often the process is facilitated by the use of pre-printed forms completed and signed by involved parties then kept as part of the health record as evidence of the consent process. The practitioner is encouraged to consult with legal counsel for proper document design and application. Less common forms of consent are various forms of diagnosis waivers and consent to participate in research.

In recent years, some public reimbursement programs, notably Medicare, are requiring that patients be informed before care is administered that the federal program may determine that they will not pay for a service, regardless of clinical necessary. Doctors of chiropractic may seek the patient's acknowledgement of this possibility on a waiver form before a Medicare patient receives chiropractic services.

At the discretion of the practitioner chiropractic records might include specific notations concerning the exact mode or modes of adjustive procedures used on each visit to help determine the outcome assessment of adjustive correction relative to the techniques applied. Such information may be helpful in the context of continued wellness care.

II. LIST OF SUBTOPICS

A. Internal Documentation

- Patient file
- Doctor/clinic identification
- Patient identification
- Patient demographics
- Health care coverages
- Patient history
- Examination findings
- Special studies
- Miscellaneous assessment & outcome instruments
- Clinical impression
- Care plan
- Chart/progress notes
- Re-examination/reassessment
- Financial records
- Internal memoranda

B. External Documentation

- Direct correspondence
- Health records
- Diagnostic imaging
- External reports

C. Chart/File Organization

- General considerations
- Use of pre-printed forms
- Legibility and clarity
- Use of abbreviations/ symbols

D. Maintenance of Records

- Confidentiality
- Records retention
- Administrative records
- Records transfer
- Clinic staff responsibilities

E. Patient Consents

- Informed consent
- Consent to treat minor child
- Authorization to release patient information
- Financial assignments
- Consent to participate in research
- Publication/photo/video consent
- Authority to admit observers

III. LITERATURE REVIEW

The literature search for this topic was accomplished through the use of CLIBCON indexing, referencing subject headings pertinent to the scope of the chapter. Other information was obtained through retrieval from personal libraries of committee members and advisors, especially with respect to recently published papers and monographs.

Much of the published literature on health record documentation and patient consents is either found in guidebooks, usually with significant contribution from the legal profession, or in popular publications containing sections dedicated to legal advice. Since 1979 there has been little information published on these topics in the chiropractic peer reviewed journals. A notable exception is the Journal of the Canadian Chiropractic Association which is refereed but also serves as an important conduit of such information to association members.

Probably the richest technical source of information relative to documentation and patient consents is found in legal publications. The legal standard found in these publications is supported with citation of case law. Publications such as this are not easily accessed by the average practitioner in the field, nor are they available in all chiropractic college libraries. The profession must rely on its legal consultants to assist in review of such literature.

IV. RECOMMENDATIONS

Disclaimer -- These guidelines may necessarily be superseded by statutory law in respective state or provincial jurisdictions. They do not purport to convey legal advice. It is recommended that each practitioner should obtain his/her own independent legal advice.

A. Internal Documentation
(Records generated within the chiropractor's office.)

1. The Patient File
When a new patient enters the office, a file is created which becomes the foundation of the patient's permanent record. Adequate systems may include personal patient data (e.g., name, address, phone numbers, age, sex, occupation); insurance and billing information; appropriate assignments and consent forms; case history; examination findings; imaging and laboratory findings; diagnosis; work chart for recording ongoing patient data obtained on each visit; the service rendered; health care plan; copies of insurance billings; reports; correspondence; case identification (e.g., by number) for easy storage and retrieval of patient's documents, etc.

8.1.1 **Rating:** Necessary
Evidence: Class I, II, III

A folder is used to house most of the patient's records. This may also be part of the record, if the practitioner writes patient data on the folder, such as patient personal information or x-ray/examination care plan data. The practitioner may attach a patient work chart to the inside of the folder along with the other items in the patient's file. On periodic file review, outdated portions may be removed and stored in an archive file. A permanent note should be kept in the active file indicating that the patient has additional records.

8.1.2 **Rating:** Recommended
Evidence: Class II, III

Doctor/Clinic Identification

Basic information identifying the practitioner or facility should appear on documents used to establish the doctor-patient relationship. This can be pre-printed on forms, affixed by rubber stamp or adhesive labels or typed or handwritten in ink. Basic information should include:

- practitioner's name/specialty
- specialty designation (if applicable)
- facility name (if different)
- legal trade name (if applicable)
- street address and mailing address (if different)
- telephone number(s)

8.1.3 **Rating:** Recommended

Evidence: Class I, II, III

Patient Identification

Clear identification of the patient with relevant demographic information (see item #4 below) is a necessary component of the chart. This information can be obtained with ease by using pre-printed forms for completion by the patient. Identifying information may include:

- date
- case/file number (if applicable)
- full name (prior/other names)
- birth date, age
- name of consenting parent or guardian (if patient is a minor or incapacitated)
- copy letter of guardianship (where appropriate)
- address(es)
- telephone number(s)
- social security number (if applicable)
- radiograph/lab identification (if applicable)
- contact in case of emergency (closest relationship name/phone number)

8.1.4 **Rating:** Recommended
Evidence: Class I, II, III

Patient Demographics

- sex (M or F)
- occupation (special skills)

8.1.5 **Rating:** Recommended
Evidence: Class I, II, III

- marital status
- race
- number of dependents
- employer, address, phone number
- spouse's occupation

8.1.6 **Rating:** Discretionary
Evidence: Class I, II, III

Health Care Coverage

Health care coverage information is important for the business function of a health care facility, and such records are a part of the health care record. However, the information obtained and the format used are at the discretion of the practitioner.

- current incident result of accident or injury?
- insurance company or responsible party (auto/work comp/health/other)
- group and policy numbers, effective date
- spouse's insurance company and policy information (if applicable)

8.1.7 **Rating:** Discretionary
Evidence: Class III

Patient History

This is the foundation of the clinical database for each patient. The practitioner may choose to enter this data on a formatted or unformatted page. There should be an adequate picture of the patient's subjective perception of the history. Important elements of the history may include:

- date history taken
- reason for seeking care/chief complaint
- description of accident/injurious event or other etiology
- past history, family history, social history (work history and recreational interests, hobbies as appropriate
- review of systems (as appropriate)
- past and present medical/chiropractic care and attempts at self-care
- signature or initials of person eliciting history

8.1.8 **Rating:** Recommended
Evidence: Class I, II, III

When possible, history questionnaires, drawings and other information personally completed by the patient should be included in the initial documentation.

8.1.9 **Rating:** Recommended
Evidence: I, II, III

Examination Findings

Objective information relative to the patient's history is obtained by physical assessment/examination of the area of complaint and related areas and/or systems. Gathering and recording this information may be facilitated by use of pre-printed and formatted examination forms. If abbreviations are used, a legend should be available. Such documentation should include the date of the examination and name or initials of the examining practitioner. If persons other than the primary examining practitioner perform and/or record elements of the objective examination, their names and/or initials should appear on the exam/data form. Such evaluations may include:

- chiropractic examination procedures
- vital signs
- physical examination
- instrumentation
- laboratory procedures

8.1.10 **Rating:** Recommended
Evidence: Class I, II, III

Findings of Special Studies

Documented results of special studies become a component part of the contemporaneous file. This documentation should include date of study, facility where performed, name of technician, name of interpreting practitioner, and relevant findings. Special studies ordered by practitioner may include:

- diagnostic imaging (e.g., plain film radiography; tomography or computed tomography; magnetic resonance imaging; diagnostic ultrasound; radionuclide bone scan)
- neurophysiologic/electrodiagnostic testing (e.g., nerve conduction velocities; electromyography; somatosensory evoked responses)
- other laboratory tests

8.1.11 **Rating:** Recommended

Evidence: Class I, II, III

Miscellaneous Assessment and Outcome Instruments

Various assessment and outcome instruments can contribute to clinical management and become part of the case record. Many of these instruments are used in a repeated or serial fashion, which makes it essential for the record to identify the date(s) of completion and name(s) of scoring practitioner/technician. Measurement instruments currently in use include:

- visual analog scale
- pain diagrams
- pain questionnaires (e.g., McGill)
- pain disability instruments (e.g., Oswestry, Neck Disability Index)
- health status indices (e.g., SF-36, Sickness Impact Profile)
- patient satisfaction indices
- other outcome measures

8.1.12 **Rating:** Recommended
Evidence: Class I, II, III

Clinical Impression

Upon completion of the subjective and objective data base, the practitioner formulates a clinical impression. This may be preliminary only, and may comprise more than one clinical finding. This clinical impression should be recorded within the file or in the contemporaneous visit record. The doctor of chiropractic should seek to relate any abnormal findings to the presence of vertebral subluxation(s). As the clinical impression may change with new clinical information or in response to care, it is important that each clinical impression be dated. The record may include:

- primary, secondary and/or tertiary elements of diagnosis/analysis
- appropriate diagnostic coding

8.1.13 **Rating:** Recommended
Evidence: Class I, II, III

Care Plan

This arises from the accumulation of clinical data and the formulation of the initial clinical impression. The plan may include further diagnostic work to monitor progress, or an intervention trial to test clinical impressions and assess appropriateness of adjustive procedures selected. The care plan documents the approach to management by the practitioner and staff (e.g., spinal adjusting, recommended exercise regime, lifestyle and dietary modifications). Any plan for referral to or consultation with other health care providers is appropriately listed in the record. The written care plan may appear on a form dedicated to the clinical work-up, or in the contemporaneous visit record, and may include:

- subluxation findings
- analysis/reassessment plan
- practitioner's care plan (modes and frequency of care)
- patient's education and self-care plan
- intra- or interdisciplinary referral or consultation

8.1.14 **Rating:** Recommended
Evidence: Class I, II, III

Chart/Progress Notes

Once the initial patient work-up has been completed, all record entries should be made in a systematic organized manner.

8.1.15 **Rating:** Necessary

Clinical Information. The patient's records must be sufficiently complete to provide reasonable information requested by a subsequent health care provider, insurance company, and/or attorney (e.g., progress notes, SOAP notes, SORE notes when/where applicable). A dated record of what occurred on each visit, and any significant changes in the clinical picture or assessment or care plan need to be noted. The method in which chart notes are recorded is a matter of preference for each practitioner.

8.1.16 **Rating:** Recommended
Evidence: Class I, II, III

There are many different chiropractic adjusting/manual techniques. It is important to record what area was adjusted. The doctor may also find it helpful to note the type of adjustive procedures utilized.

8.1.17 **Rating:** Recommended
Evidence: Class II, III

Anyone other than the attending practitioner who enters data into the contemporaneous chart must initial the entry.

8.1.18 **Rating:** Recommended
Evidence: Class I, II, III

Re-examination/Reassessment:
(See Chapter 10)

Relevant information from every reassessment and re-examination should be recorded in the patient file.

8.1.19 **Rating:** Necessary
Evidence: Class I, II, III

Financial Records

The precise information obtained and the means of storage and retrieval are at the discretion of the chiropractor.

8.1.20 **Rating:** Discretionary
Evidence: Class III

External Documentation

External documentation includes all records arising from outside the practitioner's office, but also includes any communication with third parties.

Direct Correspondence

Correspondence in the form of letters or memoranda that leave the office should have information identifying the practitioner and/or clinic, address, and telephone number and be contemporaneously dated. A copy must always be kept on file.

- introductory letter(s) to or from referring practitioner (DC, MD, etc.)
- general correspondence to or from other practitioners
- general correspondence to or from attorney(s)
- general correspondence to or from patient
- general correspondence to or from various payer groups

8.2.1 **Rating:** Recommended
Evidence: Class II, III

Health Records

- pertinent copies of health records from previous or concurrent health care providers
- special consultative reports
- reports of special diagnostic studies

8.2.2 **Rating:** Recommended
Evidence: Class II, III

Diagnostic Imaging
(See Chapter 13)

- When indicated and appropriate to chiropractic case management, a reasonable attempt should be made to obtain recent x-rays (or copies) relevant to the presenting problem of the patient, and summarize and record pertinent information.
- Copies of external radiology reports.

8.2.3 **Rating:** Recommended
Evidence: Class II, III

External Reports

Frequently a practitioner will be requested to write various reports. The information for these reports comes from patient records. Adequate reporting usually requires the practitioner to review the patient's history, examination findings, care procedures, progress notes/work chart and other reports that may have been written together with records from other health care providers that have treated or evaluated the patient. There are many types of reports that serve various needs. There are many acceptable styles and formats.

8.2.4 **Rating:** Recommended
Evidence: Class II, III

Chart/File Organization

General Considerations

Records should be kept in chronological order and entered as contemporaneously as possible. They should not be backdated or altered. Corrections or additions should be dated and initialed. The chart or file should be fully documented and contain all relevant, objective information; extraneous information should not be included. The record must be complete enough to provide the practitioner with information required for subsequent patient care or reporting to outside parties.

8.3.1 **Rating:** Necessary
Evidence: Class I, II, III

Use of Pre-Printed Forms

The use of forms can assist in tasks such as obtaining case history, noting examination findings and charting case progress. Use of forms is at the discretion of the individual practitioner but should favor comprehensiveness and completeness rather than brevity.

8.3.2 **Rating:** Discretionary
Evidence: Class II, III

Legibility and Clarity

Health records should be neat, organized and complete. Entries in charts should be written in ink. Entries must not be erased or altered with correction fluid (whiteout) or tape or adhesive labels, etc. If the contents of any document are changed, the practitioner should initial and date such changes in the corresponding margin.

8.3.3 **Rating:** Necessary
Evidence: Class I, II

Use of Abbreviations/Symbols

Use of abbreviations or coding can save record space and time. A legend of the codes or abbreviations should appear on the form or be available in the office in order that another practitioner or interested person can interpret and use the information. The legend can also be used for intra-office communications and as a dictation aid.

8.3.4 **Rating:** Recommended
Evidence: Class II, III

Maintenance of Records

Confidentiality

The rule of confidentiality requires that all information about a patient gathered by a practitioner as any part of the doctor-patient relationship be kept confidential unless its release is authorized by the patient or is compelled by law. The rule is an ethical responsibility as well as a legal one. Assurance of confidentiality is necessary if individuals are to be open and forthright with the practitioner. Patients rightly expect that such information as their health will remain private and secure from public scrutiny. Thus the principle that all doctor-patient communications are privileged and confidential.

8.4.1 **Rating:** Necessary
Evidence: Class I, II

Records Retention and Retrieval

Health records should be retained, and in a way that facilitates retrieval. To the extent possible, they should be kept in a centralized location. In most circumstances, recent records are maintained on premises either as hard copy or electronically, and after a period of time can be archived, microfilmed or stored on CD-rom, etc, and placed in storage. The length of time that records, in whatever form, must be kept varies. Many states/provinces have legislated minimum periods of time for retention of health records, usually between 4 to 15 years. When the decision is made to dispose of health records, the manner of disposal must protect patient confidentiality. If a chiropractic office closes or changes ownership, secure retention of the health record must be ensured.

8.4.2 **Rating:** Necessary
Evidence: Class I, II

Legibility and Clarity

Health records should be neat, organized and complete. Entries in charts should be written in ink. Entries must not be erased or altered with correction fluid (whiteout) or tape or adhesive labels, etc. If the contents of any document are changed, the practitioner should initial and date such changes in the corresponding margin.

8.4.3 **Rating:** Necessary
Evidence: Class I, II

Use of Abbreviations/Symbols

Use of abbreviations or coding can save record space and time. A legend of the codes or abbreviations should appear on the form or be available in the office in order that another practitioner or interested person can interpret and use the information. The legend can also be used for intra-office communications and as a dictation aid.

8.4.4 **Rating:** Recommended
Evidence: Class II, III

Even when legal time limits have elapsed, it is advisable to continue to retain records because of the valuable information they contain.

8.4.5 **Rating:** Discretionary
Evidence: Class III

Administrative Records

Administrative records are primarily those relating to the non-clinical side of practice, but there is some overlap into the doctor/patient relationship. Examples of administrative records may include: telephone logs, schedule and record of appointments, patient personal data information, insurance forms and billing, collection and patient billing, routine correspondence, a record filing system that makes for accurate retrieval of patient data. These records must be maintained in a legible and retrievable format.

8.4.6 **Rating:** Necessary
Evidence: Class I, II, III

Records Transfer

It is mandatory that health care data (excluding data and reports from outside sources) requested by another provider currently treating a present or former patient be forwarded upon receipt of an appropriate request and patient consent. In some jurisdictions, this duty to forward information to another treating health professional is imposed by statute also. However, even in the absence of a statutory requirement a practitioner has a responsibility to comply with such a request, and as expeditiously as possible.

8.4.7 **Rating:** Necessary
Evidence: Class I, II, III

Clinic Staff Responsibilities

The practitioner is responsible for staff actions regarding record keeping and consent forms, and for assuring that administrative tasks are handled correctly and promptly. Any employee involved in the preparation, organization, or filing of records should fully understand professional and legal requirements, including the rules of confidentiality.

8.4.8 **Rating:** Necessary
Evidence: Class I, II, III

Patient Consents

Informed Consent/Consent to Administer Care - Generally

Patient consent to the provision of care is always necessary. It is often implied rather than expressed. However, where there is risk of significant harm from the care proposed, this risk must be disclosed, understood, and accepted by the patient. Such informed consent is required for ethical and legal reasons. The best record of consent is one that is objectively documented.

8.5.1 **Rating:** Necessary
Evidence: Class I, II, III

Consent to Administer Care - Competence

A patient must be competent to give consent to care. The care of minors (age of majority varies from 14 to 21 according to jurisdiction) and mentally incompetent adults requires the prior consent of a guardian in most circumstances. This should not be interpreted to prevent a doctor of chiropractic from rendering emergency care.

8.5.2 **Rating:** Necessary
Evidence: I, II, III

Authorization to Release Patient Information

With the consent of a competent patient or guardian, records may, and in most situations must, be provided to third parties with a legitimate need for access. The patient consent should not be more than 90 days old, or as provided by law. Whenever health care information is released pursuant to authorization from a patient, documentation of the authorization should be requested and retained (except in some emergencies). If the request is for all or part of the health care record, the original record should never be released, unless compelled by law, only copies. Before the copy chart or other records are sent out, they should be reviewed to make certain they are complete.

8.5.3 **Rating:** Necessary
Evidence: Class I, II, III

Financial Assignments

While financial data is important for the business function of a health care facility, and such records are indeed part of the health care record, the information obtained and the method of acquiring such information is at the discretion of the practitioner. Any alteration of standard fees charged necessitates documentation (e.g., in cases of financial hardship).

8.5.4 **Rating:** Discretionary
Evidence Class III

Consent to Participate in Research

When a practitioner engages in research, the ethical basis of the doctor-patient relationship changes to an investigator-subject interaction. The new relationship must meet a new set of criteria different from clinical practice. If a patient is requested to participate in a research study or project, the request must be accompanied by informed consent that meets the minimum request for the protection of human subjects as established by competent authorities (e.g., NIH/NSF or state/provincial law).

8.5.5 **Rating:** Necessary
Evidence: Class I, II, III

Publication/Photo/Video Consent

All records from which a patient may be identified (e.g., photographs, videotapes, audio-tapes) should only be created once consent has been obtained. Such consents should identify the purposes of the record and the circumstances under which it will be released.
Records for clinical management

8.5.6 **Rating:** Recommended
Evidence: Class I, II, III

VI. COMMENTS

This chapter presents guidelines for the chiropractic profession in with regard to creation and maintenance of a patient chart/file. Fundamental training of the practitioner in charting skills exists in the education process, but reinforcement of the need for quality records must come through published literature, postgraduate seminars and risk management efforts. Unreasonably burdensome, record keeping in contemporary health care can take time away from the important doctor/patient relationship.

Today there is a heightened awareness of the need for good records because of accountability of all practitioners in managed care, intra-professional peer review, interactive claims management and an increasingly litigious society. This rapid expansion of clinician accountability underscores the need for mature systems, and dissemination of information on record-keeping throughout the chiropractic profession. It will be important for the sponsoring organizations of this consensus meeting on standards of practice to take the lead in the dissemination process.

VII. REFERENCES

Bolton SP: Informed consent revisited. *J Aust Chir Assoc* 1990, 20(4):135-38.

Campbell LK, Ladenheim CJ, Sherman RP, Sportelli L: *Risk Management in Chiropractic*, Virginia Health Services Publications, Ltd. 1990.

Carey P: Informed consent - the new reality. *J Can Chir Assoc* 1998, 32(2):91-94.

Coulehan JL, Block MR: *The Medical Interview: A Primer for Students of the Art*, Philadelphia: F.A. Davis Co., 1987.

Gatterman MI: *Chiropractic Management of Spine Related Disorders*, Baltimore: Williams & Wilkins, 1990.

Gatterman MI: Standards of practice relative to complications of and contradictions to spinal manipulative therapy. *J Can Chir Assoc* 1991, 35(4):232-236.

Gledhil SJ: Expert opinion and legal basis of standards of care determination. *J Chir Technique* 1990, 2(3):94-97.

Gotlib AC: The nature of the informed consent doctrine and the chiropractor. *J Can Chir Assoc* 1984, 28(2):272-274.

Gotlib AC: The chiropractor and third party access to confidential patient health records. *J Can Chir Assoc* 1984, 28(3):327.

Gunderson BV: The Case History. Orthopedic Brief. Council on Chiropractic Orthopedics of the American Chiropractic Association. 1989.

Hansen DT, Sollecito PC: Standard chart abbreviations in chiropractic practice. *J Chir Technique* 1991, 3(2):96-103.

Harrison JD: *Chiropractic Practice Liability: A Practical Guide to Successful Risk Management*, Arlington, VA: International Chiropractors Association, 1991.

Huffman EK: *Medical Record Management*, Berwyn, IL: Physician's Record Company, 1972.

Kranz KC: *Chiropractic and Hospital Privileges Protocol*, Arlington, VA: International Chiropractors Association, 1987.

LaBrot TM: *A Standard of Care for the Chiropractic Practice*, Phoenix: Self-published, 1990.

Lewkovich GN: Progress notes made easier. *Calif Chir J* 1989, July:32-35.

MacDonald MG, Meuer DC , Essig B: *Health Care Law: A practical guide*, New York: Matthew Bender & Co., 1986.

Michigan Chiropractic Society: *Chiropractic Care and Utilization Review Guidelines*, Lansing, MI, 1991.

Minnesota Chiropractic Association: *Standard of Practice*, Roseville, MN: 1991.

Murkowski K, Semlow DG: *Doctor's Guidebook to Risk Management*, Jackson, MI: Self-published. Associated Practice Liability Consultants, 1986.

Nixdorf D: Current standards of material risk. *J Can Chir Assoc* 1990, 34(2):87-89.

Nyiendo JA, Haldeman S: A critical study of the student interns' practice activities in a chiropractic college teaching clinic. *J Manip Physiol Ther* 1986, 9(3):197-207.
Ohio State Chiropractic Association: *The Chiropractic Manual for Insurance Claims Personnel*, Columbus, OH 1990.

Olson RE: *Chiropractic/Physical Therapy Treatment Standards, A Reference Guide,* Atlanta: Data Management Ventures, Inc., 1987.

Peyser MD (ed): *Chiropractic and the HMO environment in Connecticut*, Connecticut: Chiropractic Association, 1985.

Polit DF, Hungler BP: *Nursing Research Principles and Methods*, Philadelphia: J.B. Lippincott.

Reinke T, Jahn W: Commentary: Preventing legal suicide with medical records. *J Manip Physiol Ther* 1988, 11(6):511-513.

Rothman EH: *Manual of Narrative Report Writing. Chiropractic on paper: recordkeeping and the narrative report*, Portland, OR: Self-published. Western States Chiropractic College.
St. Paul Fire and Marine Ins. Co. Defensible Documentation. *Physical Therapy Today* 1991, Spring: 62-63.

Schafer RC (ed): *Basic Chiropractic Procedural Manual*, Des Moines: American Chiropractic Association, 1978: V4-10.

Schafer RC: *Chiropractic Physicians Guide: Clinical Malpractice*, Des Moines: National Chiropractic Mutual Insurance Company, 1983.

Schafer RC: *Chiropractic Paraprofessional Manual*, Des Moines: American Chiropractic Association, 1978.

Simmons DF: *The Chiropracto-Legal Story*, Tacoma, WA: Self-published, 1973.

Strachan G: Chiropractic physician records: Essential for defense and new practice areas. *DC Tracts* 1990, 2(6):315-321.

Thomas MM: Chiropractic research and the I.R.B. *J Chiropractic* 1987, 6:60-63.

Turnbull G: Peer Review: an outline. *NZ Chir J*.

CHAPTER 9
Clinical Impression

Chapter Outline

I. Overview

II. List of Subtopics

III. Literature Review

IV. Recommendations

V. References

I. OVERVIEW

This chapter will consider the use of the concepts of a "clinical impression," "chiropractic diagnosis," and "analysis" in the practice of chiropractic.

The application of diagnosis in chiropractic practice, the perspective of the practitioner relative to chiropractic diagnosis, and the diagnostic responsibility of the practitioner vary with respect to state laws, board regulations, and court rulings.

While the exact language may vary, it is clear, however, that the practitioner is dealing with the process of conveying the salient findings of his or her examination relative to the patient in question. The consequence of the chiropractic diagnosis, clinical impression, or analysis impacts directly on the management of the patient.

Protocols and guidelines for quality assurance and standards of practice are expressed and understood within historical, legal and professional perspectives of the profession. In addition, standards must be developed to reflect the advancement in the quality of chiropractic care, the protection of the patient and the continuing process of assessment of effectiveness.

Appropriate interpretation of a patient's case history and examination must be made to determine if the patient has a chiropractic problem and if so, to formulate an appropriate protocol for corrective care developing a clinical impression done by integrating and analyzing the patient's history and examination findings.

Guidelines for clinical impressions need to be established to distinguish chiropractic evaluation and care from that employed in other health care disciplines.

II. LIST OF SUBTOPICS

1. Necessity
2. Initial Responsibility
3. Subsequent Responsibility
4. Terminology
5. Content
6. Process
7. Dynamics
8. Communication
9. Patient Representation

III. LITERATURE REVIEW

Information regarding the evolution of concepts of diagnosis, clinical impressions, or analysis has been available from the writings of early chiropractic pioneers [Palmer, D.D.; Palmer, B.J., Firth] through to current chiropractic experts. It has also been described in a legislative framework.

Chiropractic Analysis

The concept of chiropractic analysis as something unique and distinct from a medical diagnosis was expressed as early as 1910 by Palmer and 1916 by Firth. The term has continued to be used in this way by the profession. The commonality in its use is based on the concept that structure, primarily the spine, affects function. Chiropractic analysis includes evaluation of the structural and functional components of the subluxation and their relation to the clinical status of the patient.

Chiropractic analysis can also be viewed in more general terms as the process of reaching a clinical impression or chiropractic diagnosis. This incorporates the complete art of clinical decision-making.

Chiropractic Diagnosis

Chiropractic practice is universally recognized as a portal of entry into the health care system which individual patients may access without referral from any other professional. In light of this fact, the chiropractic practitioner is charged with certain responsibilities, legal and professional, and possess certain rights and privileges shared by all doctors. The courts have not concerned themselves with which words a practitioner elects to use to describe a diagnostic situation but to insure that the provider strives to protect the public. Therefore the issue of diagnosis, clinical impression, or analysis is paramount for the reason that it is necessary prior to the implementation of an appropriate plan of care.

The purpose of a chiropractic diagnosis as described in legislative acts, government commission hearings and the literature is twofold: 1) to identify the problem to determine if it is amenable to chiropractic care; and 2) to determine if the patient should be referred.

Application of Chiropractic Diagnostic and Analytical Concepts

Williams, Slosberg, Winterstein, and Masarsky and Weber have all attempted to address the question of the role of diagnosis from the point of view of the practicing chiropractor. Harrison and Sportelli, et. al., have addressed the issue from the perspective of legal necessity as a component of legal defense. Herfert has addressed the question from the perspective of the relationship with third party payers.

It is clear that all of these authors advocate acceptance of the diagnostic responsibility of the chiropractic profession. The concern remains for the appropriate use of language and the context of a diagnostic statement. Choice of language -- diagnosis, clinical impression, analysis or assessment -- reflects the clinician's philosophical constructs. There is however, uniformity regarding the need for appropriate, responsible steps to be taken on the patients' behalf, regardless of the paradigm, to establish the clinical findings of each individual practitioner. It is the right of the patient to receive an appropriate evaluation and statement of their problem as a prerequisite for delivery of care.

The ethical, moral, legal and professional responsibility of a chiropractic practitioner does not change with the terminology used to express his or her clinical findings. The practitioner is required to assess the patient on presentation and respond to the clinical situation in a manner consistent with the best interests of the patient and the practitioner's clinical judgment.

IV. RECOMMENDATIONS

The analytic procedures employed in the chiropractic assessment may include, but are not limited to, the following:

<u>Physical Exams</u>:

- Palpation (Static osseous, Static muscle, Motion)
- Range of motion
- Postural
- Comparative leg length (Static, Flexed, Cervical syndrome)
- Manual muscle test
- Nerve function tests
- Vital signs

Instrumentation Exam:

- Range of motion (see Chapter 14)
- Thermography (see Chapter 14)
- Temperature-reading instrument (see Chapter 14)
- Muscle testing (see Chapter 14)
- Electromyography (see Chapter 14)
- Pressure algometry (see Chapter 14)
- Nerve-function tests (see Chapter 14)

Imaging Exam:

- Spinography (see Chapter 13)
- Videoflouroscopy (see Chapter 13)
- Computerized Tomography (see Chapter 13)
- Magnetic Resonance Imaging (see Chapter 13)
- Clinical Laboratory
- Urinalysis
- Blood tests (serum, whole blood, components, etc.)

A. Necessity

Arrival at a clinical impression or diagnosis, or diagnostic conclusion or analysis, is a necessary outcome of the patient encounter.

Comment: The responsibility of a chiropractic practitioner does not change with the terminology used to describe clinical findings. The practitioner is required to assess the patient upon the presentation and respond to the clinical situation in a manner consistent with the best interests of the patient, the practitioner's clinical judgment, and the law of the jurisdiction in question.

9.1.1. **Rating**: Necessary
Evidence: Class I, II, III
Consensus Level: 1

B. Initial Responsibility

Determining Appropriateness of Care: The doctor of chiropractic is responsible for determining the presence of vertebral subluxation and other malpositioned articulations and structures and to recommend a plan of care to reduce vertebral subluxation and other malpositioned articulations and structures. The chiropractor should make an assessment of the patient's initial clinical situation consistent with the patient's best interest and the attending doctor's clinical judgment.

The doctor of chiropractic should be expected to recognize and respond to emergency situations, as defined by the International Red Cross, and inform the patient of any unusual findings during examination/evaluation.

9.2.1 **Rating**: Strong positive recommendation
Evidence: E, L
Consensus Level: 1

C. Subsequent Responsibility

After the initial evaluation has been completed the practitioner begins a series of differentiations that result in many clinical decisions being implemented. This process is not an end in itself, but merely designates suspected conditions that become the focus for prognostic judgements, further assessment and patient management. Initiation of chiropractic care, additional studies, referral with or without continuing chiropractic care and cessation of chiropractic care are possible.

9.3.1 **Rating**: Necessary
Evidence: Class I, II, III
Consensus Level: 1

D. Terminology

The terminology utilized to describe a clinical impression, chiropractic diagnosis, clinical finding, conclusion, or analysis should be consistent with appropriate usage in chiropractic. If a practitioner is required to use specific terminology, or is prohibited from the use of such terminology by law, then that legal requirement is the guiding factor.

9.4.1. **Rating**: Recommended
Evidence: Class II, III
Consensus Level: 1

E. Content

Patients may have various conditions/symptoms/findings that result in a number of unrelated clinical impressions. Secondary diagnosis should be prioritized and addressed as needed and may be of greater clinical consequence to the patient.

9.5.1 **Rating**: Recommended
Evidence: Class II, III
Consensus Level: 1

The clinical impression, chiropractic diagnosis, clinical finding or analysis should reflect a classification scheme that consists of statements reflective of severity, region, and organ/tissue involvement.

9.5.2 **Rating**: Recommended
Evidence: Class II, III
Consensus Level: 1

Once a clinical assessment has been completed the doctor of chiropractic may elect to evaluate the patient on each visit. This evaluation is to determine the specific care for that visit and then to render care as appropriate. The doctor of chiropractic should employ a minimum of one analytical procedure on each visit.

- Modification in technique or evaluation procedures should be undertaken as necessary.
- Reassessment and reevaluations should be performed as the clinical need dictates and should be compared to the initial assessment.

9.5.3 **Rating**: Strong positive recommendation
Evidence: E, L
Consensus Level: 1

F. Process

When additional confirmatory tests are required to establish the clinical impression, diagnosis, diagnostic conclusion, or analysis, these studies should completed in as timely and efficient a manner as possible. Practitioners may perform such procedures consistent with their qualifications and the law, or they may seek to have such procedures performed by other qualified parties.

9.6.1 **Rating**: Recommended
Evidence: Class I, II, III
Consensus Level: 1

Where procedures relevant to a diagnosis, clinical impression, diagnostic conclusion, or analysis are not within the qualifications or competence of a practitioner, the practitioner should make appropriate consultations with others.

9.6.2 **Rating**: Recommended
Evidence: Class I, II, III
Consensus Level: 1

It is the responsibility of the attending doctor of chiropractic to be knowledgeable of and consistent with the methodology of his/her chosen analytic/technical approaches, to maintain a system to execute the effectiveness of his/her procedures and to maintain a high degree of technical excellence.

9.6.3 **Rating**: Strong positive recommendation
Evidence: E, L
Consensus Level: 1

The clinical impression, diagnosis, diagnostic conclusion, or analysis should be recorded in the patient's record and qualified as to its certainty.

9.6.4 **Rating**: Necessary
Evidence: Class I, II, III
Consensus Level: 1

G. Dynamics

The clinical impression, diagnosis, diagnostic conclusion, or analysis should be a working hypothesis that may change over time, given additional information and/or changes in condition of the patient.

9.7.1. **Rating**: Necessary
Evidence: Class I, II, III

Consensus Level: **1**

H. Communication

The practitioner should communicate the diagnosis or clinical impression or diagnostic conclusion or analysis, and its significance, to the patient in understandable terms, and convey such findings to other providers or agencies as the patient requests and consents to, or as the law requires.

9.8.1. **Rating**: Necessary
Evidence: Class I, II, III
Consensus Level: **1**

It is the responsibility of the doctor of chiropractic to educate patients as to the significance and consequence of vertebral subluxation. The chiropractor may communicate the causes, if possible, and the rationale for the detection and reduction of vertebral subluxation.

9.8.2. **Rating**: Strong Positive recommendation
Evidence: E, L
Consensus Level: **1**

I. Patient Representation

The reason the patient initially consults a doctor of chiropractic should be recorded in the patient record. The reason or patient symptomatology may direct the doctor of chiropractic to select or modify his/her adjusting procedures during the gathering of information process.

9.9.1. **Rating**: Strong positive recommendation
Evidence: E, L
Consensus Level: **1**

VI. REFERENCES

Attorney General vs. Beno: Docket No. 72852, Argued October 3, 1984 (Calendar No. 8) Decided August 27, 1985.

Bates B: *A Guide to Physical Examination*, Philadelphia: Lippincott, 1982.

Beech RA: Some thoughts about diagnosis. *Swiss Annals* 196 iv: 27-31.

Burns K, Johnson P: *Health Assessment in Clinical Practice*, Englewood Cliffs, NJ: Prentice-Hall 1980.

Chiropractic in New Zealand, Report of the Commission of Inquiry. Government Printer, Wellington, 1979.

Council on Chiropractic Education, Clinical Competency Document. Clinical Quality Assurance Panel, Oct. 1, 1989.

Coulehan J.: The treatment act: an analysis of the clinical art in chiropractic. *Journal of Manipulative and Physiological Therapeutics*, January 1991 14:(1):5-13.

Dinetenfass J: A Question of Diagnosis: The Acceptance of Chiropractic Analysis in New York State, 1963, *Chiropractic History* 1989, 9 (2).

Engel GL, Morgan WL: *Interviewing the Patient*, Philadelphia: WB Saunders, 1973.

Firth JN: *Chiropractic Diagnosis*, Indianapolis: published by author, 1929.
Firth JN: *Chiropractic Symptomology*, Indianapolis: published by author, 1919.

Firth JN: *A Textbook of Chiropractic Diagnosis*, Indianapolis: published by author, 1948.

Foreman SM, Stahl MJ: *Medico-Legal Issues in Chiropractic, in Seminars in Chiropractic*. Lawrence DJ, Foreman SM (eds), Summer 1990 (3), Baltimore: Williams and Wilkins.

Gatterman MI: *Chiropractic Management of Spine Related Disorders*, Baltimore: Williams and Wilkins, 1990.

Gitelman R: A chiropractic approach to biomechanical disorders of the lumbar spine and pelvis, in Haldeman, 5 (ed) *Modern Developments in the Principles and Practice of Chiropractic*, New York: Appleton-Century-Crofts, 1980.

Gledhill SJ: Expert opinion and legal basis of standards of care determination. *Chiropractic Technique* 1990, 2(3):94-97.

Haldeman S: *Modern Developments in Principles and Practice of Chiropractic*, New York: Appleton-Century-Crofts, 1980.

Hansen DT: Quality of Care and Chiropractic Necessities, in *Chiropractic Standards of Practice and Quality of Care*, Vear, HT (ed) Gaithersburg: Aspen, 1991, 85-113.

Harrison J: *Chiropractic practice liability*. Arlington: The International Chiropractors Association, 1990.

Herfert R: *Communicating the Vertebral Subluxation Complex*, published by the author, 1986.

Hirtle RL: Chiropractic Jurisprudence and Malpractice Considerations, in Vear (ed), *Chiropractic Standards of Practice and Quality of Care*, Gaithersburg: Aspen 1991:239-252.

Jamison JR: Diagnostic Decision Making in Clinical Practice, *Seminars in Chiropractic* 1991, 2:1-128,2.

Jamison JR: Science in chiropractic clinical practice: identifying a need. *J Manip Physiol Ther*, June 1991, 14(5):298-304.

Janse J: *Principles and Practice of Chiropractic: An Anthology*, Hildebrandt, RW (ed) Lombard, National College of Chiropractic, 1976.

Janse, Joseph: *Chiropractic Principles and Technic: for use by students and practitioners*, National College of Chiropractic, 1947.

Jaquet P: The importance of laboratory methods in chiropractic diagnosis. *Swiss Annals* 1971, V:215-229.

Jaquet P: *An Introduction to Clinical Chiropractic*, 2nd ed., Geneva: Jaquet and Grounauer, 1974.

Kapandji IA: *The Physiology of Joints, Vol. III*, LH Honore Transl. Churchill Livingstone, 1974.

Lamm, Lester C: Chiropractic Scope of Practice: What the Law Allows. *American Journal of Chiropractic Medicine*, December 1989, 2(4):S-14-S-15.

Lawrence DJ: Fourteen years of case reports, editorial. *J Manip Physiol Ther*, 1991, 14:447-449.

Leach RA: *The Chiropractic Theories: A Synopsis of Chiropractic Research*, 2nd ed., Baltimore: Williams & Wilkins, 1986.

Levine M: Chiropractic analysis vs. medical diagnosis. *ACA Journal of Chiropractic*, February, 1967.

MacDonald B, Cordry D: Development of a grand rounds program. *Journal of Chiropractic Education*, March 1991, 4(4):115-121.

Masarsky C, Weber M: Stop paradigm erosion. *J Manip Physiol Ther*, June 1991, 14(5):323-326.

Maxwell TD: Our diagnostic responsibility as a primary contact profession. *J Can Chirop Assoc* June 16-17, 1975.

Ohio State Chiropractic Assn. *The Chiropractic Manual for Insurance Personnel*, Columbus, OH: 1988, 1990.

Palmer DD: *The Science, Art, and Philosophy of Chiropractic*, Portland: published by the author, 1910.

Palmer BJ: *The Science of Chiropractic*, Davenport, IA: Palmer School of Chiropractic, 1920.

Panel of Advisors, ACA Council on Technique, Chiropractic Terminology: A Report, *ACA Journal of Chiropractic* 1988, 46-57.

Policy Handbook and Code of Ethics. International Chiropractors Association, Arlington, VA. April, 1991.

Schafer RC: *Physical Diagnosis*, Arlington, VA: The American Chiropractic Association, 1988.

Smallie P: *Chiropractic Diagnosis*, Stockton: World Wide Books, 1980.

Sportelli L, et al: *Risk Management in Chiropractic*, Fincastle, VA: Health Services Publications, Ltd., 1990.

Weinstein MC., Fineberg HV: *Clinical decision analysis*, Philadelphia: Saunders, 1980.

White AA, Panjabi MM: *Clinical Biomechanics of the Spine*, Philadelphia: JB Lippincott Co., 1978.

Williams S: *Chiropractic Science and Practice in the United States*, Arlington: The International Chiropractors Association, 1991.

Winterstein, JF: *Options*. Outreach: National College of Chiropractic, 1990 March, VI (3):1.

CHAPTER 10

Models of Care

Chapter Outline

I. OVERVIEW

This chapter provides a topical summary of typical chiropractic procedures in current use. Most chiropractic named technique procedures consist of a combination of various analytic and care components. This chapter does not serve to review and pass judgement on any particular named technique system as a whole. Indeed, the Board of Directors of the International Chiropractors Association has stated, as a matter of official ICA policy, that: "Doctors of chiropractic should be free to apply any chiropractic technique in which they are appropriately trained, to meet the needs of the patient." The choice of technique is an integral part of the discretion reserved to the judgement of the attending doctor.

Procedures are presented and ratings are made based on current available information and expert opinion. Clinical practice and scientific investigation are ongoing processes and it is understood that this document is a dynamic entity that will require modifications as new knowledge becomes available. There are three basic types of techniques, segmental, postural and tonal. Many of the techniques fall within more than one of these categories

Although this chapter does not include every possible chiropractic technique or procedure, an overall categorization of chiropractic approaches is presented. In addition, a more elaborate classification system is presented here for the non-manual chiropractic procedures.

II. LIST OF SUBTOPICS

A. Use of ineffective or unsafe mode of care

B. Chiropractic adjustment modes
   1. High velocity thrusts without recoil
   2. High velocity thrusts with recoil
   3. Low velocity thrusts without recoil
   4. Low velocity thrusts with recoil
   5. Sustained force
   6. Blocking techniques
   7. Manually assisted mechanical thrusts
   8. Mechanically assisted manual thrust
   9. Neurological reflex techniques
   10. Low velocity controlled vectored force

C. Non-manual Procedures
   1. Exercise and Rehabilitation
   2. Education Procedures
   3. Electrical Modalities
   4. Thermal Modalities
   5. Ultrasound
   6. Bracing, Casts, and Supports
   7. Traction
   8. Nutritional Advice
   9. Lifestyle Recommendation
   10. Wellness Care/Prevention - Health Promotion/Spinal Hygiene

III. LITERATURE

The literature reveals that there are many articles on adjusting modes, largely written by technical researchers and chiropractic college faculty. The majority of articles are, therefore, expository and educational and show a wide ranging interest in and discussion of the modes of care in chiropractic.

Specific literature on named chiropractic techniques has traditionally been proprietary and procedurally oriented. In addition, it has rarely been peer reviewed or indexed, which makes access difficult. This problem has been addressed in recent years by the chiropractic profession primarily through three vehicles.

Firstly, *the Journal of Chiropractic Technique* was established to provide a forum for articles relevant to chiropractic procedures. Secondly, a number of discussions, position papers and round tables have been sponsored by professional associations. The Consortium for Chiropractic Research, in collaboration with the Council on Technique and others, held a series of consensus conferences attended by technique teachers, academicians, chiropractic researchers, and private practitioners. See, for example, the proceedings of the 1990 Seattle Consensus Conference (Bergman 1990). Thirdly, a sophisticated standards of care project has been undertaken jointly by the RAND Corporation, the Consortium for Chiropractic Research, and the Foundation for Chiropractic Education and Research (Shekelle, et al., 1991a, Shekelle, et al., 1991b).

Kent and Vernon have developed perhaps the best summary of the matter of categorizing technique procedures as tonal, postural or segmental. In their text, *Case Studies in Chiropractic MRI*, they write:

> *Cooperstein described two broad approaches to chiropractic technique, the segmental approach and the postural approach. Murphy[2] added a third, the tonal approach. These conceptual models determine the nature of the analytical procedures employed, the type of adjustments applied, and the criteria for determining the success or failure of a given intervention. A summary of each follows:*
>
> ***1. The segmental model**. Subluxation is described in terms of alterations in specific intervertebral motion segments. I n segmental approaches, the involved motion segments may be identified by radiographic procedures which assess intesegmental dis-relationships, or by clinical examination procedures such as motion palpation. Examples of segmental approaches are the Gonstead and Diversified techniques.*
>
> ***2. Postural approaches.** In postural approaches, subluxation is seen as a postural distortion. Practitioners of postural approaches evaluated "global" subluxations using postural analysis and radiographic techniques which evaluated spinal curves and their relationship to the spine as a whole. Examples of techniques emphasizing a postural approach are Pettibon Spinal Biomechanics and Applied Spinal Bio-engineering.*
>
> ***3. Tonal approaches.** In 1910, D.D. Palmer wrote: Life is an expression of tone. Tone is the normal degree of nerve tension. Tone is expressed in function by normal elasticity, strength, and excitability...the cause of disease is any variation in tone. Tonal approaches tend to view the spine and nervous system as a functional unit. Tonal approaches emphasize the importance of functional outcomes, and acknowledge that clinical objectives may be achieved using a variety of adjusting methods. Examples of tonal approaches include Network Spinal Analysis and Torque-release Technique.*
>
> *In reviewing the preceding basic science and clinical models of the subluxation, it may be seen that the wide diversity of techniques in chiropractic may use different methods, but generally share the common objective of correcting spinal nerve interference caused by vertebral subluxation. Commonality and accountability may be achieved through the*

development of models which emphasize clinical outcomes yet afford the practitioner flexibility in determining how those objectives are achieved. Such outcomes include, but are not limited to, evidence of functional integrity of the nervous system, and improvement in general health and quality of life indicators. Research resources should be directed toward the development of models and clinical strategies which result in more predictable and more efficient practice procedures.

IV. RECOMMENDATIONS

1. The chiropractor shall not use any mode of care which has been demonstrated by critical scientific study and field experience to be unsafe or ineffective in addressing vertebral subluxation and other malpositioned articulations and structures.

10.1.1 **Rating**: Established
Evidence: E, L

B. Chiropractic Adjustment Modes

The following recommendations refer to the application of techniques as employed in the correction of vertebral subluxation and other malpositioned articulations and structures.

1. High velocity thrusts without recoil

10.2.1 **Rating**: Established
Evidence: E, L

High velocity thrusts with recoil

10.2.2 **Rating**: Established
Evidence: E, L

3. Low velocity thrusts without recoil

10.2.3 **Rating**: Established
Evidence: E, L

4. Low velocity thrusts with recoil

10.2.4 **Rating**: Established
Evidence: E, L

5. Sustained force

10.2.5 **Rating**: Established
Evidence: E, L

6. Blocking techniques

10.2.6 **Rating**: Established
Evidence: E, L

7. Manually assisted mechanical thrust

10.2.7 **Rating**: Established
Evidence: E, L

8. Mechanically assisted manual thrust

10.2.8 **Rating**: Established
Evidence: E, L

9. Neurological reflex techniques

10.2.9 **Rating**: Established
Evidence: E, L

10. Low velocity controlled vectored force without recoil (see previous page)

10.2.10 **Rating**: Established
Evidence: E, L

C. Manual Reflex and Muscle Relaxation Procedures

1. Muscle Energy Techniques: A variety of procedures fall under this classification including post-facilitation stretch, post-isometric relaxation, and reciprocal inhibition, among others. In addition, there are several chiropractic techniques that use procedures mechanically and physiologically similar to these as part of their therapeutic armamentarium. The rationale for such procedures is based on the concept of reciprocal innervation and inhibition between agonist and antagonist muscles. Care is directed at finding such sites and having the patient do movements and muscle contractions, typically against some kind of active resistance in order to cause a relaxation of a hypertonic muscle. These techniques are commonly in use and are the subject of much investigation.

10.3.1 **Rating**: Established
Evidence: Class II, III

2. Myofascial Ischemic Compression Procedures: Ischemic compression involves placing a sustained compressive force on a tight or contracted muscle. This is thought to relax the muscle and thereby reduce stress to any joints to which the muscle is attached. The chiropractic profession has employed myofascial ischemic compression procedures and other soft tissue procedures as part of a care regimen for a long time (e.g., Receptor-tonus Technique, myofascial trigger point therapy).

10.3.2 **Rating**: Established
Evidence: Class II, III

3. Miscellaneous Soft Tissue Techniques: There are many different kinds of muscle work in widespread use. They involve applying manual pressure in order to relieve muscle spasm. Some common techniques of muscle work include: massage (superficial, effleurage, petrissage, percussion), pressure point work (accupressure and shiatsu),

and deep tissue techniques (Rolfing). There is little controversy regarding the clinical utility of such procedures for relaxation and uncomplicated musculoskeletal dysfunction. However, comparative clinical investigations are sparse. Light massage has occasionally been used as a placebo control in manipulation studies.

10.3.3 **Rating**: Established
Evidence: Class II, III

4. Non-Manual Procedures

a. Exercise and Rehabilitation

(1) **Mobility and Stretching Exercise:** Activity mobility maintenance and stretching by the patient are traditionally encouraged in chiropractic practice. Training, counseling and advice in stretching and mobility exercises are common, and various descriptions of chiropractic programs exist in the literature. Trials on exercise in chiropractic settings have not been published, but there is function and performance information available in exercise physiology and sports medicine literature.

10.4.1 **Rating**: Established
Evidence: Class I, II, III

(2) **Strengthening, Conditioning and Rehabilitation:** Active conditioning exercise is thought to be helpful for both healing and prevention of many mechanical back and neck problems. Conditioning and spinal stabilization programs are becoming more common for chiropractic management of low-back conditions. In addition, numerous programs are in place that involve job stimulation and work hardening protocols that are directed at chiropractic management and conditioning for specific tasks.

10.4.2 **Rating**: Established
Evidence: Class I, II, III

(3) **Passive Stretch:** Passive stretch is gentle sustained muscle lengthening applied by the practitioner or therapist. Its use is common within the chiropractic profession. Practitioners, especially within the field of sports chiropractic, teach and use these procedures frequently.

10.4.3 **Rating**: Established
Evidence: Class I, II, III

5. Educational Programs

1. Back School/Spinal Hygiene Courses: Knowledge about how to take care of one's health problems and how to modify behavior or lifestyle is likely to be beneficial for most patients. Back school programs and patient education have traditionally been an integral part of chiropractic case management. It is supportable when used as an appropriate teaching aid.

10.5.1 **Rating**: Established
Evidence: Class I, II, III

D. Prevention and Wellness Services

1. Wellness Care/Disease Prevention/Health Promotion: A relatively new area of interest in chiropractic as a distant service, prevention has long been a primary consideration of the chiropractic profession's approach to health care. Typical disease prevention programs, smoking cessation, weight reduction efforts and the like fit well within chiropractic practice scopes. Organizations such as the American Chiropractic Association, International Chiropractors' Association and the Chiropractic Forum of the American Public Health Association have adopted policies or expressed support for such programs and practitioners with a particular expertise and interest in this area are increasing in number.

10.5.2 **Rating**: Established
Evidence: Class II, III

2. Nutritional Counseling: Nutritional training is included in the chiropractic curriculum. As a general issue concerning scope of practice, there is little disagreement regarding the capability or qualifications of practitioners to counsel patients concerning nutritional matters.

10.5.3 **Rating**: Established
Evidence: Class I, II, III

Comment: Specific nutritional therapy is an extensive field that requires a great deal of delineation. This should be addressed in the future.

10.5.4 **Rating**: Established
Evidence: Class II, III

D. Ancillary Procedures

6. Electrical Modalities:
Electrical modalities have been a part of chiropractic education in some colleges and they are included in scope of practice regulations in many jurisdictions.

10.5.5 **Rating**: Established
Evidence: Class I, II, III

7. Thermal Modalities
These include cryotherapy, infrared, hydrotherapy, hydrocollator and others. These procedures are recognized within the chiropractic scope of practice in most jurisdictions. Protocols are documented and standardized.

10.5.6 **Rating**: Established
Evidence: Class I, II, III

8. Ultrasound
Ultrasound is a conservative procedure. It is included as a physiotheraputic modality in some chiropractic statutes.

10.5.8 **Rating**: Established
Evidence: Class I, II, III

9. Bracing and Supports
Supports, braces, orthotics and the like may be useful components of chiropractic care.

10.5.9 **Rating**: Established
Evidence: Class I, II, III

10. Traction
Traction may be employed to stretch muscles, joints, and intervertebral discs. Its use is typically included in chiropractic education..

10.5.10 **Rating**: Established
Evidence: Class I, II, III

VI. COMMENTS

Chiropractic modes of care encompass a wide variety of approaches. As chiropractic addresses health care from a perspective involving the role that body structure plays in overall physiologic function, many procedures emphasize manual care procedures such as adjusting and soft tissue work. However, the profession has traditionally maintained a strong interest in wellness care and disease prevention, as well as lifestyle and ergonomic issues. Therefore education, conditioning, nutrition, counseling and other approaches are often used by many practitioners..

It should be emphasized that chiropractic practitioners are typically well trained in a variety of standard assessment procedures, as well as specialized neurological and structural evaluation protocols. There has traditionally been an emphasis in chiropractic practice on lifestyle, wellness, prevention, and other natural approaches to health care.

It is not the intent of this document to exclude any particular technique or procedure, but rather to provide general guidelines for the assessment of the safety and effectiveness of generic methodologies utilized by the chiropractic profession. As a living document, this chapter will be subject to periodic review as new and innovative methodologies are developed and submitted for evaluation.

VII. REFERENCES

Anderson R, Meeker W, et al: Mets-analysis of randomized clinical trials on manipulation for low back pain. *J Manip Physiol Ther* 1992, 15(3): 181-194.

Bartol KM: A model for categorization of chiropractic procedures. *J Chiropractic Technique* 1991, 3(2): 78-80.

Bergman T (ed): Special Issue on Seattle Consensus Conference. *J Chiropractic Technique* 1990, 2(3).

Boone WR, Dobson GJ: A proposed vertebral subluxation model reflecting traditional concepts and recent advances in health and science. *Journal of Vertebral Subluxation Research* 1996, 1(1):19.

Brennan PC, Kokjohn K, Kalatinger CJ, et al: Enhanced Phagocytic cell respiratory burst induced by spinal manipulation: potential role of substance p. *J Manip Physiol Ther* 1991, 14(7).

Bronfort G, Nielsen N, Bendixt B, Madsen F, Weeks B: Chiropractic treatment of asthma: a controlled clinical trial. Proceedings of International Conference on Spinal Manipulation FCER, Arlington, VA., 1989.

Bryner P: Technique System Application: The Gonstead Approach. *Chiropractic Technique* Aug 1991, Vol. 3(3) pp. 134.

Byrd RC: Positive therapeutic effect of intercessory prayer in a coronary care unit population. *Southern Med J* 1988, 81 (7):826-829.

Cauwenbergs P: Vertebral subluxation and the anatomic relationships of the autonomic nervous system. In Gatterman M (ed): Foundations of Chiropractic Subluxation. Mosby Year Book, Inc. 1995, St. Louis, MO.

Changjiang I, Yici W, Wenquin L, et al: Study on cervical visual disturbance and its manipulative treatment. *Journal of Traditional Chinese Medicine* 1984, 4:205.

Clarkson J: Low Back Pain Related to Cervical Subluxations. *Arch Cal Chiro* 1973, Vol. 3(2), pp. 28-32.

Cleveland C, Luttges M: Spinal connection effects on motor and sensory functions. In Mazzerelli J (ed): *Chiropractic Interprofessional Research*, Edizioni Minerva Medica, Torino Italy: 1985, 21-32.

Cooperstein R: Innominate Vertical Length Differentials as a Function of Pelvic Torsion and Pelvic Carrying Angle. *Transactions of the Consortium for Chiropractic Research*, Jun 1990.

Coopenstein R: Contemporary approach to understanding chiropractic technique. In: Lawrence DJ (ed): Advances in Chiropractic, Vol. 2, St Louis, MO:Mosby, 1995.

Cox W: Overview of the Gonstead Technique. *Chiropractic, Interprofessional Research* 1982, pp. 41-6.

Cox JM: *Low-Back Pain, Mechanism, Diagnosis and Treatment*, 4th ed, Williams & Wilkins, 1985.

Cremata E, Plaugher G, Cox W: Technique System Application: The Gonstead Approach. *Chiropractic Technique* Feb 1991, Vol. 3(1), pp. 19-25.

Epstein D: The spinal meningeal functional unit: tension and stress adaptation. *Digest Chiro Econ* 1986;29(3):58.

Epstein D: Network chiropractic explores the meningeal critical. Part 1: anatomy and physiology of the meningeal functional unit. *Digest Chiro Econ* 1994; 26(4):78.

Fracheboud R: A Survey of Anterior Thoracic Adjustments. *Journal of Chiropractic Research* 1988, Vol. 1, pp. 89-92.

Frost EAM, Hsu C, Saadonski D: Acupuncture therapy: comparative values in acute and chronic pain. *NY State J Med* 1976, 76:695-697.

Fuhr AW, Smith DB: Accuracy of piezoelectric accelerometer measuring displacement of a spinal adjusting instrument. *J Manip Physiol Ther* 1986, 9(2):15-21.

Fuhr A, Smith D: Accuracy of Piezoelectric Accelerometers Measuring Displacement of a Spinal Adjusting Instrument. *Journal of Manipulative and Physiological Therapeutics* Mar 1986, Vol. 9(1) pp. 15-21.

Gemmell H, Jacobson B, Heng B: Effectiveness of Toftness Sacral Apex Adjustment in Correcting Fixation of the Sacroiliac Joint: Preliminary Report. *Am J Chiro Med* Mar 1990, Vol 3(1), pp. 5-8.

Gillman G, Bergstrand J: Visual recovery following chiropractic intervention. *Journal of Behavioral Optometry* 1990 1(3):3.

Gitelman R: A Chiropractic Approach to Biomechanical Disorders of the Lumbar Spine and Pelvis. Book Excerpt 1979, pp. 297-330.

Gorman RF: The treatment of presumptive optic nerve ischemia by spinal manipulation. *JMPT* 1995, 18(3):172.

Greenman P: *Principles of Manual Medicine*, Baltimore: Williams & Wilkins, 1989.

Grieve G: *Modern Manual Therapy*, Edinburgh: Churchill Livingstone, 1986.

Haldeman S: The Compression Subluxation. *J Can Chiro Assoc* 1976, Vol 20(2), pp. 32-7.

Haldeman S (ed): *Modern Developments in the Principles and Practice of Chiropractic*, 2nd ed. Appleton-Lange, 1992.

Hasselberg PD: Chiropractic in New Zealand, *New Zealand Commission of Inquiry*, Wellington, 1979.

Herbst R: *Gonstead Chiropractic Science and Art*, Book Excerpt 1971, pp. 249-60.

Herbst R: *Gonstead Chiropractic Science and Art,* Book Excerpt 1970, pp. 237-48.

Holder JM, Talsky M: Torque-release technique. Seminar notes 1995.

Hyman CA: Chiropractic adjustments and infantile colic: a case study. In Proceedings of the 4th National Conference on Chiropractic and Pediatrics. International Chiropractors Association. Arlington, VA. 1994.

Kaminski M: Validation of chiropractic methods. *J Manip Physiol Ther* 1987, 10(2):61-64.

Keating J: Technique System Application: The Gonstead Approach. *Chiropractic Technique* Aug 1991, Vol 3(3), pp. 135-6.

Kent C: Models of vertebral subluxation: a review. *Journal of Vertebral Subluxation Research* 1996, 1(1):11.

Kirk CR, Lawrence DJ, Volvo NL: *States Manual of Spinal, Pelvic, and Extravertibral Technique*, 2nd ed., Lombard, IL: Lombard National College of Chiropractic, 1985.

Klougart N, Nilsson N, Jacobsen J: Infantile colic treated by chiropractors: a prospective study of 316 cases. *JMPT* 1989, 12(4):281.

Koes BW, Bouter LM, Beckerman H, van der Heijden G, Knipschild PG: Physiotherapy exercises and back pain a blinded review. *Brit Med J* 1991, 302:1572-76.

Kokjohn K, Schmid DM, Triano JJ, Brennan PC: The effect of spinal manipulation on pain and postoglandin levels in women with primary dysmenorrhea. *JMPT* 1992 15(5):279.

Korr IM (ed): The neurobiologic mechanism in manipulative therapy. Plenum Press. 1978 New York.

Krumhansl BR, Nowacek CJ. Manipulation under anesthesia. In: Grieve GP. (ed.) *Modern Manual Therapy of the Vertibral Column*, Edinburgh: Churchill Livingston, 1986, 777-786.

Lantz C: Back to basics. A review of the evolution of chiropractic concepts of subluxation. *Topics in Clinical Chiropractic* June 1995, 2(2):1.

Lantz C: The vertebral subluxation complex. *JMPT* Jan 1990, 13(1):56.

Lantz C: The vertebral subluxation complex part II. *Chiropractic Research Journal* 1990, 1(4):19.

Lantz C: The vertebral subluxation complex part I. *Chiropractic Research Journal* 1989, 1(3):23.

Leach RA: *The Chiropractic Theories: a Synopsis of Chiropractic Research*, 2nd ed., Baltimore: Williams & Wilkins, 1986.

Leach RA: *The Chiropractic Theories*. Williams and Wilkins. Baltimore, MD 1990.

Leboeuf C. Brown P, Herman A, et. al: Chiropractic care of children with nocturnal enuresis: a prospective outcome study. *J Manip Physiol Ther* 1991, 14(2):110-115.

Liebenson C: Active muscular relaxation techniques. Part II: clinical application. *J Manip Physiol Ther* 1990, 13(1):2-6.

Liebenson C: Active muscular relaxation techniques. Part I: basic principles and methods. *J Manip Physiol Ther* 1989, 12(6):446-454.

Lopes M, Plaugher G, Ray S: Closed Reduction of Lumbar Retrolisthesis: A Report of Two Cases. Proceedings of the Int'l Conference on Spinal Manipulation (Wash D.C.) Apr 1991, pp. 110-4.

Maitland GD: *Vertebral Manipulation*, 4th ed. London: Butterworths, 1977.

Malik D, Slack J, Walk L, Brooks S: Effectiveness of Chiropractic Adjustment and Physical Therapy to Treat Spinal Subluxation. *PC Northern J Clin Chiro* 1985, Vol 3(2), pp. 25-9.

Mansel D, Cremata E, Carison J, Szlazak M: Effect of Unilateral Spinal Adjustments on Goniometrically-Assessed Cervical Lateral-Flexion End-Range Asymmetries in Otherwise Asymptomatic Subjects. *Journal of Manipulative and Physiological Therapeutics* Dec 1989, Vol 12(6), pp. 419-27.

Mayer TG, Gatchel RJ, et al: A prospective two-year study of functional restoration in industrial low-back pain. *J Am Med Assoc* 1987, 258:1763-1767.

Meeker WC: Chiropractic manipulation: techniques and rationale for the cervical spine. In White A (ed): *Cervical Spine and Upper Extremity in Sports and Industry*. Daly City: San Francisco Spine Institute, 1990.
Mootz RD: Chiropractic Models: Current understanding of vertebral subluxation and manipulable spinal lesions. In Sweere J (ed): *Chiropractic Family Practice*, Gaithersburg: Aspen Publishers, 1992.

Morey LW: Osteopathic manipulation under general anesthesia. *J Amer Osteopathic Assoc* 1973, 73:116-127.

Morey LW: Manipulation under general anesthesia. *Osteopathic Annals* 1976,3:127-132.

Murphy D: Seminar notes, 1995.

North American Spine Society's ad hoc committee on diagnostic and therapeutic procedures: Common diagnostic and therapeutic procedures of the lumbosacral spine. *Spine* 1991, 16(10):1161-1167.

Nyiendo J, Phillips RB, Meeker WC, et al: A comparison of patients and patient complaints at six chiropractic colleges. *J Manip Physiol Ther* 1989, 12(2):79-85.

Palmer DD: Textbook of the Art, Science and Philosophy of Chiropractic. The Chiropractor’s Adjuster. Portland, OR: Portland Publishing House, 1910.

Parker G, Tupling H, Pryor D: A controller trial of cervical manipulation for migraine. *Aust NZ J Med* 1978,8(6):589-593.

Pettibon B: Introduction to Spinal Biomechanics. Tacoma, WA: Pettibon Spinal Biomechanics Institute.

Phillips RB, Mootz RD, Nyiendo J, et al.: A comparison of patients and patient complaints presenting to private chiropractic practitioner's offices.

Plaugher C: Inter and Intraexaminer Agreement Using Gonstead Line Marking Methods. *Chiropractic: The Journal of Chiropractic Research and Clinical Investigation*, Oct 1991, Vol 7(3), pp. 62.

Plaugher G, Hendricks A: The Inter and Intraexaminer Reliability of the Gonstead Pelvic Marking System. *J Manip Physiol Ther* Nov 1991, Vol 14(9), pp. 503-8.

Plaugher G, Lopes M, Melch P, Cremata E: The Inter and Intraexaminer Reliability of a Paraspinal Skin Temperature Differential Instrument. *J Manip Physiol Ther* Jul 1991, Vol 14(6), pp. 361-7.
Plaugher G (ed): Textbook of Clinical Chiropractic: A Specific Biomechanical Approach. Baltimore, MD: Williams and Wilkins.

Pluhar GR, Schobert PD: Vertebral subluxation and colic: a case study. *Chiropractic: The Journal of Chiropractic Research and Clinical Investigation* 1991 7(3):75.

Quebec Task Force on Spinal Disorders: Scientific Approach to the Assessment and Management of Activity-related Spinal Disorders. *Spine Supplement* (1987, 12(7s).
Richards G, Thompson J, Osterbauer P, Fuhr A: Use of Pre- and Post-CT Scans and Clinical Findings to Monitor Low Force Chiropractic Care of Patients with Sciatic Neuropathy and Lumbar Disc Herniation: A Review. *Journal of Manipulative and Physiological Therapeutics* Jan 1990, Vol 13(1), pp. 58.

Rinzler SH, Travell J: Therapy directed at the somatic component of cardiac pain. *Am Heart J* 1948, 35:248.

Rogers JT, Rogers JC: The role of osteopathic manipulative therapy in the treatment of coronary heart disease. *J Am Osteop Assoc* 1976, 76:71-81.

Rumney IC: Manipulation of the spine and appendages under anesthesia: an evaluation. *J Amer Osteopathic Assoc* 1986,68:235-245.

Sandoz R: Some Critical Reflections on Subluxations and Adjustments. *An Swiss Chiro Assoc* 1989, Vol 3, pp. 7-29.

Sato A: The reflex effects of spinal somatic nerve stimulation on visceral function. Proceedings of the scientific symposium of the world Chiropractic Congress. May 4-5, 1991. Toronto, Canada.

Schaefer RC (ed): *Basic Chiropractic Procedural Manual*, 4th ed. Arlington: American Chiropractic Association, 1984.

Schutte B, Teese H, Jamison J: Chiropractic adjustments and esophoria: a retrospective study and theoretical discussion. *J Aust Chiro Assoc*. Dec 1989 19(4):126.

Shekelle PG, Adams AH, et. al: *The Appropriateness of Spinal Manipulation for Low-Back Pain: Project Overview and Literature Review (R-4025/1-CCR/FCER)*, Santa Monica: RAND: 1991a.

Shekelle PG, Adams AH, et. al: *The Appropriateness of Spinal Manipulation for Low-Back Pain: Indications and Ratings by a Multidisciplinary Expert Panel (R-4025/2-CCR/FCER)*, Santa Monica: RAND, 1991b.

Siehl D. Olson DR, Ross HE, Rockwood EE: Manipulation of the lumbar spine with the patient under general anesthesia: evaluation by electromyography and clinical-neurologic examination of its use for lumbar nerve root compression syndrome. *J Amer Osteopathic Assoc* 1971, 70:433-440.

Smith DB, Fuhr AW, Davis BP: Skin accelerometer displacement and relative bone movement of adjacent vertebrae in response to chiropractic percussion thrusts. *J Manip Physiol Ther* 1989, 12(1):26-37.

Speiser R, Aragona R, Heffeman J: The application of therapeutic exercises based on lateral flexion roentgenography to restore biomechanical function in the lumbar spine. *Chiro Res J* 1990*;* 1(4):7.
Speiser R, Aragona R: Applied spinal bioengineering (ASBE) methodology utilizing pre-and post-stress loading roentgenographs and biomechanical physiological rehabilitative spinal exercises. Arlington, VA. Proceedings of the International Conference on Spinal Manipulation. 1989.

States AZ: Spinal and Pelvic Techniques. Lombard, IL: National College of Chiropractic.

Stonebrink RD: *Evaluation and Manipulative Management of Common Musculoskeletal Disorders*, Portland: Stonebrink, 1990.

Terrett A, Webb M: Vertebrobasilar Accidents (VA) Following Cervical Spine Adjustment Manipulation. *Journal Australian Chiropractic Association* 1982, Vol 12(50), pp 24-7.

Travell, JG, Simons D: *Myofacial Pain and Dysfunction. The Trigger Point Manual*, Baltimore: Williams & Wilkins 1983.

Ulman D: Homeopathy: *Medicine for the 21st Century*, Berkeley: North Atlantic Books, 1988.

Vernon H, Dhami M, Howley TP, Annett R: Spinal manipulation and betaendorphin: a controlled study of the effect of a spinal manipulation on betaendorphin levels in normal males. *J Manip Physiol Ther* 1986, 9(2):115-124.

White AH, Anderson R (eds): *Conservative Cure of Low-Back Pain*, Baltimore: Williams & Wilkins, 1991.

Wiles MR: Visceral disorders related to the spine. In Gatterman M (ed): *Chiropractic Management of Spine Related Disorders.* Williams and Wilkins. Baltimore, MD 1990.

Yates, RG, Lamping DL, et.al: Effects of chiropractic treatment on blood pressure and anxiety: a randomized controlled trial. *J Manip Physiol Ther* 1988, 11(6):484-488.

CHAPTER 11

Frequency and Duration of Care

Chapter Outline

Please do not attempt to use the following guidelines without reading the entire manual.

I. OVERVIEW

Specific parameters of care appropriate for each individual case are impossible to define. Each case must be evaluated with complicating factors, concomitant conditions and all other extenuating circumstances taken into consideration in order to assure the patient maximum benefit through chiropractic care.

The following guidelines should serve only as a general guide for parameters of care. Furthermore, these guidelines are **not** meant to provide cut-off points for care, but rather to assist the analyst in understanding the widely varying patient needs and circumstances requiring varying courses of adjustive care. The clinical necessity of care is based, as had been extensively discussed in previous chapters, in objective findings indicating the presence of subluxation.

Patients may progress at a rate not anticipated in these guidelines. Exacerbation may prolong normal rate of recovery, such as extreme physical activity on the job or injuries like falls, slips or lifting injuries. On the other hand, patients sometimes respond more quickly than expected. The need for documentation is paramount to good communication between the doctor and the insurance company. An admitting analysis and finding(s) may be given initially until patient response to care confirms or alters the initial clinical finding, category of condition and/or its degree of severity. The responsibility of upgrading or downgrading a patient's clinical status rests with the attending doctor.

Principles of Case Management

The primary missions of health care delivery are to provide sufficient care to restore health, maintain it, and prevent the occurrence or recurrence of injury and illness. To meet these objectives, the practitioner uses a myriad of procedures and skills that collectively can be grouped into three categories -- passive intervention, active intervention, and patient education. The practical boundaries on what will constitute necessary and sufficient care are situational. However, guidelines framing expectations of care outcome can be drawn from the literature and adapted by practical experience on a case-by-case basis.

Chiropractic shows the unique ability to determine sub-clinical spinal disorders such as any of the components of the vertebral subluxation complex, known to precede symptoms/end stage conditions eliminating the need for the most part of crisis intervention. A key principle is that chronicity should be prevented wherever possible. Patients who are at risk for becoming chronic show characteristic patterns involving their illness and life situations.

II. LIST OF SUBTOPICS

A. Over Utilization
B. Under Utilization
C. Pediatrics
D. Geriatrics

III. RECOMMENDATIONS

The frequency of how many times a particular patient needs to see their chiropractor is based on the subjective findings, if applicable and the objective clinical findings and the opinion of the doctor.

There is no set template on the number of visits needed to obtain maximum chiropractic improvement for the population as a whole. Each patient who presents themselves at the chiropractic clinic is unique and different and must be treated as such.

Some of the factors which need to be taken into consideration is the age of the patient, type of work or daily activities, trauma or aggravation, stability and function ability of supporting structures (muscles and ligaments) the structural integrity of the spine and its articulations (degeneration, demineralization, biomechanical loss or failure). These and other factors are the considerations which go into making a plan of care/number of visits for each patient.

After the patient is examined using the applicable procedures of x-ray, instrumentation and examination the doctor will correlate the objective information. Based on the findings and the doctors clinical expertise a frequency of care will be set for that particular patient.

After a patient starts an initial frequency of care they will be re-examined/reassessed at proper intervals. This is done to determine the patients response to care and if the frequency can be reduced or increased and or if a referral is necessary. The re-exam/re-assessment may be performed several times during the course of care until the patient reaches maximum chiropractic improvement(MCI). Maximum improvement varies with each patient and will depend on those factors noted above. Once a patient reaches MCI they are released from care and recommended to a PRN basis or other type program upon which they and the attending doctor of chiropractic agree.

The following shall serve as a guideline. It is important to note that with proper documentation additional care or alteration of care schedule may be warranted for the categories of conditions and levels of care listed herein.

Additional Definitions

Phase I, II, III, IV: These phases refer to the radiographic presentation of the (subluxation) degeneration which occur in the spine. (Hadley MD).

Acute: New condition, not exceeding 12 months duration

Chronic: Old condition, duration of longer than 12 months

Trauma: Onset due to accidental/intentional injury.

Non-trauma: Symptoms which arise insidiously.

Clinical: That condition which has overt signs and symptoms.

Subclinical: A condition the signs of which require investigation and in which overt symptoms have yet to occur, and would go unnoticed with progressive degeneration until it becomes clinical.

Duration of Care

Initial: 14-45 days as necessitated by subjective and/or objective findings and documentation

Reconstruction: 45-180 days as necessitated by subjective and/or objective findings and documentation

Supportive: As necessitated by subjective and/or objective findings and documentation

11.1.1 **Rating**: Strong Positive Recommendation
Strength: E, L, C

A. Over-utilization

The delivery of care exceeding the previously discussed parameters, without justification, would constitute over-utilization.

11.2.1 **Rating**: Strong Positive Recommendation
Strength: Class E, L

B. Under-utilization

The delivery of care below the clinical minimum; withholding of care without justification, would constitute under-utilization

11.3.1 **Rating**: Strong Positive Recommendation
Strength: Class E, L

C. Pediatrics

Vertebral subluxations and other malpositioned articulations and structures have many possible causes, one of which can often be the birth process. According to Towbin, "The birth process, even under optimal controlled conditions, is potentially a traumatic, crippling event for the fetus. Mechanical stress imposed by obstetrical manipulation -- even the application of standard orthodox procedures -- may prove intolerable to the fetus. The view has been expressed clinically that most neonatal injuries observed in the delivery room are neurological." Towbin has also related the birth process to Sudden Infant Death Syndrome caused by spine damage to the nervous system. Gutmann found that 80% of the children he examined shortly after birth, or as infants, were suffering from "subluxation" of C1, causing all manner of conditions. Suh and others note that chiropractic care should begin at birth, when subluxation is likely to occur. Ressel advises that early chiropractic care is essential, as abnormal spine and nerve system habits (vertebral subluxation) are caused very early in life. Janse proposes that proper spinal health in the children of today will insure a better next generation. Given the chiropractor's objective and the overwhelming supportive evidence mentioned above, chiropractic care can begin shortly after birth and be followed by a lifetime of continuing care.

11.4.1 **Rating**: Strong Positive Recommendation
Strength: Class E, L

D. Geriatrics

The care of elderly patients is a special responsibility of the doctor of chiropractic and requires appropriate additional attention to age-related factors and possible complications. Chiropractic care is a strongly indicated element in maintaining mobility in elderly patients and thus fostering a healthier physical profile as well as a more positive mental attitude. Furthermore, the drugless nature of chiropractic care assist senior citizens in avoiding the otherwise widespread drug-related complications of other forms of care related to the spine and nervous system

11.4.2 **Rating:** Strong Positive Recommendation
Strength: Class E, L,

IV. CHRONIC CARE

The chronic pain/dysfunction patient suffering from spinal or structural injury or disease is frequently the most challenging and difficult responsibility confronted within the health care industry.

Care of the chronic pain dysfunction patient must be balanced between the extremes of reducing patient dependency on the chiropractor and providing maximum relief or reduction in symptoms whereby the patient will approach pre-injury productivity and self-worth. The rationale for chiropractic management in chronic pain dysfunction syndromes of articular origin is well established in the scientific literature.

Chronic musculoskeletal conditions are frequently progressive and degenerative if inappropriately managed. A current search of the literature has not substantiated the scientific efficacy of the long term use of specific pharmaceuticals in chronic pain syndromes. Additionally, commonly used pharmacological agents may hasten the deterioration process if used inappropriately for prolonged periods. The doctor of chiropractic works to manage the patient's subjective complaints, and maintain or increase the patient's ability to be productive in his or her work environment and activities of daily living, through a conservative approach that does not rely on invasive surgical procedures or prolonged pharmaceutical usage, and thus avoids the adverse effects which may result from their use.

The doctor of chiropractic is uniquely suited to care for and rehabilitate the chronic pain patient without the use of drugs or surgery. Long term chiropractic management, when appropriately delivered, based on a case by case evaluation, provides benefits to the patient which are not addressed by any other health care discipline.

The following neurophysiological and biomechanical principles support the rational for long term chiropractic management of the biomechanically compromised patient suffering from a chronic pain syndrome.

1. Prevention of joint adhesions and subsequent proteoglycan degradation in the hyaline cartilage and intrinsic spinal ligaments.

   Multiple research universities have demonstrated that immobilized joints rapidly undergo cartilaginous degradation with deterioration of the hyaline cartilage surface, producing additional degenerative change and increased pathology.

2. Facilitation of normal articular neuroreceptive fields.

   The neuroreceptive field is described as all the receptors which supply sensory input to the spinal cord and brain, from the skin, ligaments, muscles, and intrinsic joint structures in a given spinal segment level. Loss of normal function in a given spinal joint produces alteration of the receptive field with a loss of neural network connections, producing a deafferentation state and loss of central sensory integration, at the thalamocortical level. Appropriate chiropractic care provides neural input for the receptive fields and inhibits further loss due to deafferentation.

3. Prevention and inhibition of sensory-motor pain engrams.

Chronic pain produces reflexive spasms through polysynaptic internuncial stimulation of the alpha motor neurons to surrounding intrinsic musculature. When this nocifensive spasm is left unaddressed, metabolic depletion occurs producing an alteration of the muscle and ligament cytoarchitecture with infiltration of fibrotic tissue. Prolongation of the chronic pain stimulus produces nociceptive pools within the spinal cord which are easily recruited through seemingly insignificant exacerbations. Long term chiropractic management inhibits and frequently prevents excessive nociceptor pool facilitation in all but the most severely injured.

4. Insuring proper articular coupled biomechanics in functional rehabilitation programs.

   Management of the patient in chronic pain may include chiropractic supervision of rehabilitation programs. Failure to recognize pathomechanical dysfunction within spinal articulations increases likelihood of exacerbation and progression of degenerative effects seen in the chronic pain patient. Biomechanical integrity of the spine and extremity articulations is essential to produce optimum rehabilitation success in these patients.

The doctor of chiropractic must be acutely aware of the psychosocial motivation of the patient in chronic pain. The chiropractor must guide the patient away from hostility and pain nurturing by increasing the patient's activity level and by fostering a need for his or her own active participation in the rehabilitative process. A care regime which allows the patient to become excessively dependent on the doctor for psychosocial support, beyond the requirements of his or her impairment, is unacceptable. Care utilization parameters must be determined on a case by case basis.

The need for long term care should be based on the presence of a condition/injury or illness which has been documented by peer acceptable criteria and has been determined to be permanent and/or progressive.

The necessity of long term palliative or supportive care should accomplish one or more of the following goals in order to be considered necessary and appropriate:

1. Care of an exacerbation to return the patient to pre-exacerbation status.
2. Improvement or maintenance of activities of daily living.
3. Improvement or maintenance of work status.
4. Increase of functional strength.
5. Increase stamina, endurance and activity tolerance.
6. Increase functional range of motion.
7. Improve mental attitude.
8. Decrease need for, or amount of, medication.
9. Prevention of surgical intervention when appropriate.
10. To attain optimal expression of life.

V. COMMENTS

In the course of the management of a chiropractic case the objective indicators of vertebral subluxation(s) and other malpositioned articulations and structures demonstrated during Level I (see glossary for definition of levels of care) care may decrease. As the patient's clinical indicators are minimized and spinal function improves and stabilizes, the frequency of care is reduced and the patient is advanced to Level II care. Some of the variables considered during the evaluation of the patient's status include, but are not limited to age, occupation/lifestyle, past metabolic history, past history of injuries/fractures/surgeries, genetic predisposition, amorphic spinal structure, cortical and medullary bone irregularities, bone density irregularities, articular irregularities, joint irregularities, chronic adaptive postural and structural changes, chronicity, the number of spinal subluxations present, patient tolerance to active care, and the degree of patient cooperation.

When a patient has demonstrated sufficient reduction of clinical indicators of vertebral subluxation and other malpositioned articulations and structures, they should be advanced from Level II care. The chiropractor should then recommend Level III care.

Chiropractic clinical experience, since 1895, has demonstrated that periodic chiropractic assessment in a Level III regimen does have merit. The current body of research in this area supports the observation that initial degenerative changes are measurable within one week of the occurrence of vertebral subluxation and other malpositioned articulations and structures. Vertebral subluxations and other malpositioned articulations and structures, regardless of their origin, will initiate negative physiological changes. Weekly or semi-monthly office visits are appropriate. A chiropractor views the detection, location, control, reduction and correction of vertebral subluxations and other malpositioned articulations and structures during all levels of care to be vital toward the optimum expression of health.

At some point during a patient's care, the practitioner may note that those clinical indications of vertebral subluxation and other malpositioned articulations and structures (including, but not limited to those found by motion and static palpation, instrumentation, radiography, etc.) are becoming either more or less noticeable. In order to ascertain the optimal elapsed time period between chiropractic office visits, the practitioner would then begin the process of decreasing or increasing visit frequency. Should the indicators for the presence of a vertebral subluxation and other malpositioned articulations and structures be imperceptible or absent, in the clinical opinion of the practitioner, office visit frequency would be decreased.

At some point in this process, however, the indicators for the presence of a vertebral subluxation and other malpositioned articulations and structures may again be manifested, necessitating a chiropractic adjustment and a reassessment of visit frequency. As a result, the patient may be reclassified from Level III care to Level II care, Level II care to Level I care, or Level III care to Level I care. Visit frequency, duration, and level of considerations may also be influenced by a number of factors in addition to clinical indicators. These include, but are not limited to: age, occupation, lifestyle, past history, genetic predisposition, spinal structure, number of subluxations present, chronicity, compromise of bony integrity and degree of patient compliance.

The concerns of the public regarding health care have shifted to an active responsibility for their physical well-being. Patients who understand the major objective of chiropractic knowingly choose this approach to help them maximize their health potential. Scientific evidence identifies components of the vertebral subluxation and other malpositioned articulations and structures and may reveal physiologic changes that occur after the correction of the vertebral subluxation and other malpositioned articulations and structures. Moreover, it is observed clinically that dramatic changes may occur after the correction of a vertebral subluxation and other malpositioned articulations and structures. Most chiropractors have observed changes after spinal adjustments that affect major body systems and the patient's complex metabolic system.

The clinical explanation for these changes is associated with improved natural functions.

When interference to the nervous system is reduced, the body's capacity to heal and thrive is rekindled. Vertebral subluxations and other malpositioned articulations and structures may occur during the birth process, therefore, it is imperative that chiropractic care should begin as soon as possible. Chiropractic care should continue, in accordance with the patient's needs and the chiropractor's clinical opinion, for the life of the patient.

VI. REFERENCES

Agran PF: Motor vehicle occupant injuries in noncrash events. *Pediatrics* Jun 1981, 67(6):838.

Anrig C: Development and Mechanisms of Injury to the Pediatric Spine. *A.R.C.S. Symposium* April, 1992.

Aragona, R: Lecture Notes: Applied Spinal Biomechanical Engineering. *Postgraduate Seminar*, Manchester, NH, 1987.

Anderson-Peacock E: Chiropractic care of children with headaches: five case reports. *Journal of Clinical Chiropractic Pediatrics* Jan 1996, 1(1):18.

Anrig-Howe C: Scientific ramifications for providing pre-natal and neonatal chiropractic care. *Chiropractic Pediatrics* 1(2):7, 1994.

Baiduc, H: How Chiropractic Care Can Promote Wellness, Northwestern College of Chiropractic.

Banks B, Beck R, Columbus M, et al: Sudden Infant Death Syndrome: A Literature Review with Chiropractic Implications. *J Manip Physiol Ther* 1987; 10(5):246.

Barge FH: Scoliotic screening: the chiropractic approach. *Chiropractic Pediatrics* 1997; 2(4):4.

Beighton-Grahame-Bird, MDS: *Hypermobility & Joints*, England: Springer-Vellog, England, 1983.

Biedermann H: Kinematic imbalances due to suboccipital strain in newborns. *Manual Medicine* 1992, 6:151.
Blume K, Holder JM: Attention deficit disordersBbiogenic aspects. *Chiropractic Pediatrics* 1994, 1(2):17 .

Bonci A, Wynne C: The Interface between Sudden Infant Death Syndrome and Chiropractic. *Journal of Chiropractic Research* 1989, 5(3):78.

Burke, D: Spinal Cord Trauma in Children. *Paraplegia* 1970, 8:1-4.

Burns RE: *Spinal Synopsis*, 1980, pp. 148-150.

Byers, RK: Spinal Cord Injuries During Birth. *Develop Med Child Neural* 1975, 17:103-110.

Byers, RK: Spinal Cord Injuries During Birth. *Develop Med Child Neural* 1975, 17(1):103.

Caffey J: The Whiplash Shaken Body Syndrome. *Pediatrics* 1974, 54:396-403.

Cailliet R: Rehabilitation Forum, 1987.

Campbell MK: Rehabilitation of Soft Tissue Injuries. In Hammer WI (ed.): *Functional Soft Tissues Examination and Treatment by Manual Methods: The Extremities*, Gaithersburg: Aspen 1991, pp 277-291.

Cassidy & Wedge: The Epidemiology and Natural History of Low Back Pain and Spinal Degeneration, Kirkaidy-Willis W.H., ed. *Managing Low Back Pain*, New York: Churchill Livingstone, 1988, pp. 3-14.

Chesire DJE: The Paediatric Syndrome of Traumatic Myelopahty with Demonstrable Vertebral Injury. *Paraplegia* 1977-78; 15:74.

Christensen KD: *Chiropractic Rehabilitation Volume I: Protocols*, Publication Division, CRA Ridgefield, pp 45, 1991.

Clow BJE: Pediatric cervical acceleration/deceleration injuries. *Journal of Clinical Chiropractic Pediatrics* Jan 1996, 1(1):36.

Cohen E: Case studyBdiabetes. *Chiropractic Pediatrics* 1994, 1(2):17.

Coulter I: Chiropractic Utilization: A Statistical Analysis. *Am J Chiro Med* March 1989, Vol. 29f, pp. 13-21.

Coulter ID, Hurwitz E, Aronow HU, et. Al: Chiropractic patients in comprehensive home-based geriatric assessment, follow-up and health protion program. *Topics in Clinical Chiropractic* 1996, 3(2):46.

Deyo RA, Diehl AK, Rosenthal M: How many days of bed rest for acute low back pain? A randomized clinical trial. *New Eng J Med* 1986, 315:1064-70.
Dishman R: Review of the Literature Supporting a Scientific Basis for the Chiropractic Subluxation Complex. *JMPT* 1985, Vol 8(3), pp. 163-174.

Dvorak D: Sudden infant death syndrome. *Chiropractic Pediatrics* 1997, 2(4):10.

Eriksen K: Correction of juvenile idiopathic scoliosis after primary upper cervical chiropractic care: a case report. *Chiropractic Research Journal* 1996, 3(3):25.

Evans DK: Anterior Cervical Subluxation. *JBJS,* August 1976, Vol 58-B, No. 3, pp. 318-321.

Fallon JM, Fysh PN: Chiropractic care of the newborn with cogenital torticollis. *Journal of Clinical Chiropractic Pediatrics* 1997, 2(1):116.

Fallon JM: Developmental-behavioral pediatrics: the chiropractors role. *Journal of Clinical Chiropractic Pediatrics* 1997, 2(11):122.

Faucret B, Mao W, et. al.: Determination for Bony Subluxations by Clinical, Neurological, and Chiropractic Procedures. *JMPT* September 1990, Vol 3(3), pp. 165-176.

Flesia JM: President, Renaissance International, President, Chiropractic Basic Science Research Foundation, Vertebral Subluxation Degeneration Complex, A Review of Therapeutic Necessity for VSC Well Patient Care, In: Seminar notes (The New Renaissance, Global Chiropractic ... One Patient At A Time), pp. 7-36 including the 496 various papers there referenced.

Froehle R: Ear infection: a retrospective study examining improvement from chiropractic care and anlyzing for influencing factors. *JMPT* 1996, 19(3):169.

Frymoyer J: Back pain and sciatics. *N Engl J Med* 1988, 318-291-300.

Furberg CD: The impact of clinical trails on clinical practice. *Drug Res* 1989, 39:986-8.

Fysh PN: Chronic recurrent otitis media: case series of five patients with recommendations for case management. *Journal of Clinical Chiropractic Pediatrics* 1996, 1(2):66.

Gilles FH, Bina M, Sotrel A: Infantile Atlanto-Occipital Instability. *Am J Dis Child* 1979, 133:30.

Glass RB, Sivit CJ, Sturm PF, et al: Lumbar spine injury in a pediatric population: difficulties with computed tomographic diagnosis. *J Trauma* Nov 1994, 37(5):815.

Gutmann, G: Blocked Atiantal Nerve Syndrome in Infants and Small Children. *ICA Review* 1990, 46(4):37.

Gutmann, G: Blocked Atiantal Nerve Syndrome in Babies and Infants. *Manuelle Medizin* 1987, 25:5-10.

Hadley LA: *Anatomico-Roentgenographic Studies of the Spine*, pp. 127-130, Fourth Printing, Springfield, IL: C.C.

Thomas Pub. 1979.

Haldeman S: The Neurophysiology of Spinal Pain Syndromes, in *Modern Developments in the Principals and Practice of Chiropractic*, New York: Appleton-Century-Crofts, pp. 119-141.

Hildebrandt R: Chiropractic Physicians as Members of the Health Care Delivery System: The Case for Increased Utilization. *JMPT* March 1980, Vol 3(1), pp. 23-32.

Hill SA, Miller CA, Kosnik EJ, Hunt WE: Pediatric neck injuries. A clinical study. *J Neurosurg* Apr 1994, 60(4):700.

Horst PA: The posturegraph: an anlytical tool for posture evaluation. *Journal of Clinical Chiropractic Pediatrics* Jan 1996, 1(1):33.

Hyman CA: Chiropractic adjustments and the reduction of petit mal seizures in a five-year-old male: a case study. *Journal of Clinical Chiropractic Pediatric* Jan 1996, 1(1):28.

Jamison J: *The Chiropractor as Health Information Resource. Health Promotion for Chiropractic Practice*, Gaithersburg, MD: Aspen Pub., Inc.) 1991, pp. 35-36.

Jamison J: Chiropractic as Conventional Health Care. *J Aus Chir Assn* 1989, Vol 15(2), pp. 55-59.

Jamison J: Preventive Chiropractic and the Chiropractic Management of Visceral Conditions: Is the Cost to Chiropractic Acceptance Justified by the Benefits to Health Care? *Chiro J Austr* 1991, 9(3): 95-101.

Janse J: Chiropractic and Children. *The Journal of CCA* September 1979, Vol. 23, #3.

Jirout J: Studies of the Dynamics of the spine. Gustovshov, Germany.

Jirout J: Roentgen Studies of the Cervical Spine, Radiologic Clinic, Dept. of Neuroradiology, Charles Univ. Prague, Czechoslovakia. Gustav-Fischer-Veriag, Stuggart, Germany, (Translated German to English by author).

Johnson D: Johnson Report - Korr & the Fasciliatative Lesion, Medical Faculty, University College, Galway, Ireland.

Kirkaidy-Willis WH, ed. The Mediation of Pain, *Managing Low Back Pain*, New York: Churchill Livingstone, 1988, pp. 77-82.

Korr IM: The Neurologic Mechanisms in Manipulative Therapy, Dept. of Spinal Biomechanics, Michigan State Univ., College of Osteopathic Medicine, Plenum Press, NY.

Lang MG (chm) et al.: Oregon chiropractic practices and utilization guidelines for neuromusculoskeletal conditions, Oregon Chiropractic Practice and Utilization Guidelines Committee.

Lawrence, J.S., et. al.: Osteoarthritis; Prevalence in the Population and Relationships Between Symptoms and X-ray Changes. *Ann Rheus Dos* 1966, 25:1-24.

Leblanc F (ed): Scientific approach to the assessment and management of activity-related spinal disorders. *Spine* 1987, 12:16-21.

Leventhal HR: Birth Injuries of the Spinal Cord. *J Pediatrics* 1960, 56:446-453.

Lewit K: *1985 Manipulative Therapy in Rehabilitation of the Locomotor System*, London and Boston: Butterworths, 1982.

Luttges, M: Research Notes from Dr. C. M. Suh and Research Film #1:, Biochemist, Dept. of Aerospace Engineering Sciences, Univ. of Colorado.

Marko S: Adjusting the newborn infant with jaundice. *Chiropractic Pediatrics* Sept. 1996, 2(3):9.

Mayer T, Gatchel R: *Functional Restoration for Spinal Disorders: A Sports Medicine Approach*, Philadelphia: Lea & Febiger, 1988.

McMullen M: Physical stresses of childhood that could lead to need for chiropractic care. *Proceedings of the National Conference oon Chiropractic and Pediatrics.* Arlington, VA: International Chiropractors Association, 1991.

Minnesota Chiropractic Association: *Standards of Practice*. Roseville, MN, 1991.

Mulley AG, Eagel KA: What is inappropriate care? *JAMA* 1988, 260-540-1.
Nash, CL: Acute Cervical Soft-Tissue Injury and Late Deformity. *Journal of Bone & Joint Surgery*, March 1979 Vol. 61-A, #2.

Ohio State Chiropractic Association. The chiropractic manual for insurance personnel, Columbus, Ohio, 1988, 1990.

Orenstein JB, Klein BL, Gotschall CS, et al: Age and outcome in pediatric cervical spine injury: 11-year experience. *Pediatric Emerg Care* June 1994, 10(3):131.

Peet, JB: *Chiropractic Pediatric Reference Manual*, Vermont: Rose Publications, 1991.

Peet, JB: Adjusting the hyperactive/ADD pediatric patient. *Chiropractic Pediatrics* 1997, 2(4):12.

Peet, J: Brachial plexus injury in an infant with Down=s syndrome: a case study. *Chiropractic Pediatrics* 1994, 1(2):11.

Peet, J: A literature review of chiropractic and children. *Chiropractic Pediatrics* 1997, 2(4):12.

Peet J: Adjusting the febrile pediatric patient. *Chiropractic Pediatrics* Sept 1996, 2(3):11.

Peet J: Case study: chiropractic results with a child with recurring otitis media accompanied by effusion. *Chiropractic Pediatrics* 1996, 2(2):8.

Petrie JG: Flexion Injuries of the Cervical Spine. *JBJS* December, 1964 Vol. 46-A, #8.

Racheskey I, Boyce WT, Duncan B, et al: Clinical prediction of cervical spine injuries in children. Radiographic abnormalities. *Am J Dis Child* Feb 1987, 141(2):199.

Reed W, Beavers S, Reddy S, Kern G: Chiropractic management of primary nocturnal eneuresis. *JMPT* 1994, 17(9):596.

Ressel OJ: Disc Regeneration: Reversability is Possible in Spinal Osteoarthritis. *ICA Int'l Rev Chiro* March/April 1989, pp. 39-61.

Riley JF, Abern DK, Follick MJ: Chronic pain and functional impairment: Assessing beliefs about their relationship. Arch Phys Med Rehabil, 69:579-82, 1988.

Roberts MA, Manshadi FF, Bushnell DL, Hines ME: Neurobehavioral dysfunction following mild traumatic brain injury in childhood: a case report with positive findings on positron emmission tromography (PET). *Brain Inj* Jul 1995, 9(5):427.

Roland M, Morris R: A study of the natural history of back pain, part I. Development of a reliable and sensitive measure of disability in low-back pain. *Spine* 1983, 8:141-4.

Roland M, Morris R: A study of the natural history of back pain, part II. Development of guidelines for trials of treatment in primary care. *Spine* 1983, 8:145-50.

Saal J: Diagnostic studies of industrial low-back injuries. Top Acute Care Trauma. *Rehabil* 1988, 2:31-49.

Saal JS, Saal JA: Strength training and flexibility. In White A. Anderson R (eds): *Conservative care of low-back pain*, Baltimore: Williams and Wilkins, 1991, pp 65-77.

Saal JA, Saal JS: Rehabilitation of the patient. In White A, Anderson R (eds): *Conservative Care of Low-Back Pain*, Baltimore: Williams & Wilkins, 1991, pp 25-29.

Schneier M, Burns R: Atlanto-occipital Hypermobility in Sudden Infant Death Syndrome. *Chiropractic J Chirop Res Clin Inves* July, 1991, Vol. 7, #2.

Schneier M, Burns R: Atlanto-occipital Hypermobility in Sudden Infant Death Syndrome. *The Journal of Chiropractic Reearch and Clinical Investigation.* 1991, 7(2):33.

Sharpless SK: Compression on Spinal Roots, In: Goldstein, M.ED., *The Research Status of Spinal Manipulation Therapy*, Bethesda, MD: NINCDS, 1975.

Shekelle PG, et. al.: A Community-Based Study of the Use of Chiropractic Services. *Am J Pub Health* 1991, pp. 439-442.

Silverman FW, et. al.: *Essentials of Calley's Pediatric X-ray Diagnosis*, Yearbook Medical Publishers, 1990.

Spigelblatt L, Laineammara G, Pless I, Guyver A: The use of alternative medicine by children. *Pediatrics* 1994, 94:811.

Stephens D, Gorman F: The prospective treatment of visual perception deficit by chiropractic spinal manipulation: a report of two cases. *Chiropractic Journal of Australia*, 1996, 26(3):82.

Stiga J: Sudden Infant Death Syndrome. *American Chiropractor* October 1983: 28.

Stoddard A: *Manual of Osteopathic Practice*, 2nd edition, London: Hutchinson & Co., 1983.

Sudden Infant Death Syndrome: A Literature Review with Chiropractic Implications. *Journal of Manipulative and Physiological Therapeutics*, October 1987, Vol. 10, #5.
Sutt GH Ph.D.: Chiropractic Research - A first report.

Towbin A: Latent Spinal Cord and Brain Stem Injury in Newborn Infants. *Develop Med Child Neural* 1969, 11:54-68.

Triano J, Cramer G: Patient Information: Anatomy and Biomechanics. In White A. Anderson R. (eds): *Conservative Care of Low-Back Pain*, Baltimore: Williams & Wilkins, 1991, pp. 45-57.

Vallone S, Fallon JM: Treatment protocols for the chiropractic care of common pediatric conditions: otitis media and asthma. *Journal of Clinical Chiropractic Pediatrics* 1997, 2(1):113.

Vear H: The Role of Chiropractic in Preventive Health Care. *J Can Chiro Assoc* 1974, Vol. 18(4), pp. 10-3.

Videman T: Experimental Models of Osteoarthritis: The Role of Immobilization. *Clinical Biomechanics* 1987, 2:223-229; and the various papers by Videman there referenced.

Waddell G: A new clinical model for the treatment of low-back pain. *Spine* 1984, 2:632-44.

Webb JK, et. al., Hidden Flexion Injury of the Cervical Spine. *JBJS* August, 1976, Vol. 58-B, #3, pp. 322-327.

Webster LL: Subluxation at Birth and Early Childhood. *Int'l Chiropractic Pediatric Assn* March, 1989, 5231 E. Memorial Drive, Suite 210, Stone Mt., GA.

Webster LL: Case studyBMental retardation/cerebral palsy. *Chiropractic Pediatric* 1994, 1(2):11.

Wennberg JE, Barnes BA, Zubkoff M: Professional uncertainty and the problem of supplier-induced demand. *Soc Sci Med* 1982, 16:811-24.

White AW: *Back school and other conservative approaches to low back pain*, St. Louis: Mosby, 1983, pp 48-9.

Yashon D : *Spinal Injury, Birth Injury*, Professor of Neurosurgery, Ohio State University, 18, 347-352, Appleton-Century-Crofts.

CHAPTER 12

Reassessment

Chapter Outline

I. Overview

II. List of Subtopics

III. Literature Review

IV. Recommendations

V. References

I. OVERVIEW

Reassessment refers to patient evaluations performed after the initiation of patient care. Reassessment is essential for monitoring the patient's progress and is also termed "outcomes assessment." Clinical research addresses the development and application of reassessment instruments and procedures. Appropriate application of these to clinical practice is of great importance.

The primary reason for reassessment is to evaluate the patient's clinical state. From this and a knowledge of prior condition, rate of progress and specific procedures utilized to manage the patient's condition, more informed decisions can be made regarding the appropriateness of care, efficiency of care rendered, need for continued care, and the need to modify care. A number of questions have been raised with regard to reassessment such as: Why should patients be reassessed, what specifically should be reassessed, when should reassessment be performed, and how should reassessment be conducted? In considering these topics, it is important to keep in mind the distinctive qualities of chiropractic as a manual healing art.

Examinations that are conducted during the entrance evaluation of the patient for chiropractic care give the chiropractor a starting point from which to monitor the patient's progress. There are many different kinds of examination procedures used to give indications of the presence of vertebral subluxation and other malpositioned articulations and structures. With information supplied in the case history and patient observation processes, the chiropractor will decide which examinations will furnish the best data.

Different patterns and types of reassessments can be done during care. It is inherent in chiropractic care that the patient be regularly reassessed as to their need for chiropractic adjustment.

The dynamic nature of the recuperative process requires that periodic reassessment be performed to track the patient's progress and determine the need for continued care or the need to modify the management program. Follow-up reassessment is performed at the end of the management program or when the patient has attained maximal improvement. Such an assessment is often performed to ascertain the degree of residual deficit, such as disability ratings, impairment ratings or the degree of recovery.

II. LIST OF SUBTOPICS

A. Reassessments -- General Principles
B. Interactive Reassessment
C. Periodic Assessment
D. Discussion of Outside Reviews by Other Professionals

III. LITERATURE REVIEW

In the absence of definitive data based on large-scale, longitudinal studies, the frequency of reassessment is left implicitly to the judgement of the attending doctor. Currently, justification for any particular pattern of reassessment must be culled from the clinical research literature and expert opinion. A representative selection of the literature is referenced at the end of this chapter.

In clinical practice there is typically a single assessment in the initial patient evaluation, but it is not uncommon for several consecutive assessments to be conducted to create a baseline for the patient's progress. The approach taken may depend upon the patient's condition. For example, a patient with severe, acute pain due to an apparent lumbar disc herniation will have little tolerance for multiple session evaluations to establish a baseline for management. By contrast, the establishment of a baseline for juvenile scoliosis patients typically requires evaluations over a period of several months.

Patients are reassessed for a number of reasons. Primary among them is the ongoing need for the practitioner to determine the necessity and appropriateness of further care. Reassessment gives the practitioner an opportunity to assess the effectiveness or success of the chosen care plan by providing a monitor of patient progress, either improvement or deterioration. It is important to determine whether improvement is occurring at an appropriate rate. If not, appropriate changes in the care plan can be made, including possible referral.

A reassessment is often performed to satisfy the requirements of third-party payers. Their concerns are often the justification for continued care, determination of patient progress, and determination of disability rating.

As a general rule, reassessment will focus on those areas in which positive findings were obtained during the initial clinical evaluations. Exceptions to this occur when additional signs or symptoms develop during the course of care which mandate re-evaluation of previously negative tests or the use of procedures not previously employed. When the natural history of a condition is known, reassessment can provide valuable insight into the effectiveness of the care program in altering its course.

It is unreasonable to adopt the approach that every known test is performed on the initial examination and subsequently repeated with each reassessment. Good clinical judgement combined with careful observation will direct the practitioner to those areas and procedures which will provide the most valuable information. The clinical tests used during reassessment will depend on the nature of the condition being evaluated.

"Interactive assessment" includes procedures which direct care for that patient visit. These typically include procedures which provide indications for chiropractic care, such as palpation, instrumentation, leg check and other methods of spinal motion assessment.

Periodic reassessment includes: 1) repetition of actions or clinical procedures which upon prior examination provided information about the chief complaint and which led to the clinical impression. Examples include range of motion, tenderness and positive pain provocation signs; 2) repetition of tests wherein abnormalities were detected on initial examination (e.g., deep tendon reflexes); 3) new procedures not previously performed but indicated by the patient's clinical condition; 4) special studies (e.g., C.T. scan) which may impact the course of care when there has been a failure to improve or deterioration in the patient's condition.

Spinal radiography is used widely as a chiropractic diagnostic and clinical reassessment tool. Existing criteria and practice have evolved empirically from clinical experience and convention. However, such procedures are widely used. As in all health care, if we depend entirely upon scientific method to determine the inclusion or exclusion of evaluation procedures, we would be left with a paucity of procedures with which to arrive at a working clinical impression.

The way in which reassessments are made needs considerable clarification. Interactive procedures should be simple and allow for assessment in an ongoing practice. Analog pain scales provide a tool for regular pain assessment, whereas pain questionnaires are more cumbersome and difficult to administer on an ongoing basis. Periodic evaluations may have more formal structure and detail. They may include more extensive questionnaires regarding pain, patient satisfaction and activities of daily living, functional disability assessment, and more extensive physical examination procedures. The evaluative procedures selected will depend upon the nature and role of reassessment.

Frequency of periodic reassessment is determined by several factors such as the severity or urgency of the condition or the likelihood of progression and degeneration. Scoliosis is an excellent example of a condition in which the frequency of reassessment varies with the severity and location of the condition, the age of the patient and history of prior progression. Truly life-threatening conditions requiring continuous monitoring, or even daily monitoring, are at times found in chiropractic practice. Severe acute conditions should be assessed frequently. A patient's need for reassessment may also change during the course of care, depending upon progress. If the patient's condition demonstrates marked improvement, then reassessment should become less frequent. Conversely, if the patient deteriorates, reassessment should be performed as soon as possible to determine an appropriate course of action.

The practitioner's role in integrating information from diverse sources and prescribing or administering care can be assisted by reassessment information contributed by a variety of individuals. Some aspects of reassessment may involve appropriately trained and qualified employees of the attending practitioner. Others may require the assistance of specialized facilities, such as advanced imaging centers. The chiropractic practitioner assumes the role of team captain, coordinating the efforts of a health care team in the evaluation, diagnosis and management of the patient.

IV. RECOMMENDATIONS

1. Reassessment

In a chiropractic practice, the initial assessment is documented and recorded. The purpose of these findings is to give the chiropractor information concerning the presence and location of vertebral subluxation and other malpositioned articulations and structures, in the context of the patient’s general health status.

The chiropractor must determine on a per/visit and periodic basis, how the patient's care is progressing, therefore, reassessment examinations are performed. This process provides quantitative and qualitative information about the patient's progress which is utilized to determine the frequency and duration of chiropractic care.

12.1.1 **Rating**: Positive recommendation
Strength: E, L

B. Performing the Reassessment

As a general rule, reassessment examinations are made by performing those procedures appropriate to the current status of the patient relative to vertebral subluxation(s) and other malpositioned articulations and structures. The reassessment findings are then compared to the previous findings to determine the patient's progress.

12.2.1 **Rating**: Strong positive recommendation
Strength: E, L

Reassessments are an integral component of case management and should be made following an appropriate period of care.

12.2.2 **Rating**: Strong positive recommendation
Evidence: E, L

C. The necessity for and the content of reassessments are determined by the patient's response. Patients responding as expected might be reassessed later and with fewer tests; those not responding or responding more slowly should be re-evaluated sooner and possible more thoroughly. A knowledge of the natural history of the condition greatly facilitates decisions concerning the timing of reassessment.

12.3.1 **Rating**: Strong positive recommendation
Evidence: E, L

Appropriate reassessments shall be made as soon as possible if the patient demonstrates a marked worsening of clinical status.

12.3.2 **Rating**: Strong positive recommendation
Evidence: E, L

Appropriate reassessment should be made if the patient begins to manifest clinical signs or symptoms in areas not previously evaluated.

12.3.3 **Rating**: Strong positive recommendation
Evidence: E, L

Reassessment should be performed by persons appropriately trained and qualified in the specific procedures.

12.3.4 **Rating**: Strong positive recommendation
Evidence: E, L

Reassessment should be performed, as closely as possible, in the same manner as the initial assessment.

12.3.5 **Rating**: Recommended
Evidence: Class I, II, III

Reassessments performed solely to satisfy third party interests should be performed with due regard for all the recommendations presented in this chapter.

12.3.6 **Rating**: Recommended
Evidence: Class I, II, III

Interactive reassessment should be performed during each patient encounter for the purpose of confirming or modifying a clinical impression.

D. Interactive Reassessment

12.4.1 **Rating**: Strong positive recommendation
Evidence: E, L

E. Frequency of Reassessment

1. Per-visit reassessment should include at least one analytical procedure previously used. A chosen testing procedure is performed each time the patient is in the chiropractor's office for chiropractic care. The reassessment provides information necessary to perform an adjustment on a per-visit basis.

12.5.1 **Rating**: Strong Positive Recommendation
Strength: E, L

2. Partial reassessment involves duplication of two or more preceding positive analytical procedures. Partial reassessment may be done periodically.

12.5.2 **Rating**: Positive Recommendation
Strength: E

3. Full reassessment involves duplication of three or more preceding positive analytical procedures. Any additional or complimentary analytical procedures can be performed based on the current clinical status. Full reassessment may be done every 6 to 12 weeks during Phase I care. Subsequent levels of care may allow longer periods between full reassessments. (Refer to Chapter 8).

12.5.3 **Rating**: Strong positive recommendation
Strength: E, L
Comment: If a patient's presentation indicates very frequent chiropractic adjustments or chiropractic manipulations, he or she may require more frequent reassessment. As indications require less frequent adjustments/chiropractic manipulations, reassessments will be performed less frequently.

4. Discussion of Outside Review by Other Professionals

It is widely accepted that abuses are occurring in the review process involving paper reviews and independent chiropractic evaluations. The solution, however, must be a legislative endeavor.

12.6.1 **Rating**: Strong positive recommendation
Strength: E

V. REFERENCES

Adams AH: Methodological considerations in the selection of outcome measures for chiropractic practice. *ICSM Proceedings*, April 1991.

Arnold L: *Chiropractic Procedures Examination*, Seminole, FL: Seminole Printing, Inc., 1978.

Banks RJ, LeBoeuf C, Webb MN: Recently graduated chiropractors in Australia, Part 3: interprofessional referrals. *J Aust Chiro Assoc* 1988; 18(1):14-16.

Beech R: The fundamentals of the short-leg syndrome. *Annals of the Swiss Chiropractic Association* 1965, 3: 7-36.

Bolton SP: When to x-ray? A case report. *J Aust Chiro Assoc* 1989; 19(1):2-4.

Brunarski D: Chiropractic biomechanical evaluations: validity in myofascial low back pain. *J of Manipulative and Physiological Therapeutics* 1982, 5(4): 155-60.

Burns K, Johnston P: *Health Assessment in Clinical Practice*, Englewood Cliffs, NJ: Prentice-Hall, Inc., 1980.

Burton AK: Sciatic syndromes; a preliminary report of a search for criteria for identification and assessment. *Brit Osteopathic J* 1983; 15:87-94.

Christensen K: *Clinical Chiropractic Orthopedics*, Dubuque, IA: Foot Levelers, Inc., 1984.

Cox JM: *Low-Back Pain*, Baltimore: Williams and Wilkins, 1987.

Dailey E, Buehler M: Plain film assessment of spinal stenosis: method comparison with lumbar CT. *J of Manipulative and Physiological Therapeutics* 1989, 12: 192-9.

Daniel M, Long C, Murphy W, Kores R, Hutcherson W: Therapists' and chronic pain patients' perceptions of treatment outcome. *J Nervous Mental Di* 1983; 171(12):729-733.

Deboer K, Harmon R, Savoie S, Tuttle C: Inter and intra-examiner reliability of leg-length differential measurement: a preliminary study. *J of Manipulative and Physiological Therapeutics* June 1983, 6(2): 61-6.

DeGiacoma F: *Chiropractic analysis through palpation*, Glenhead, NY: New York Chiropractic College, 1979.

DeGowin EL, DeGowin RL: *Diagnostic Examination*, Macmillan Publishing Company, Inc., 1981.

Donelson R, Grant W et al.: Pain response to repeated end-range sagittal spinal motion. *Spine* (Sup 1991); 16(65): 5206-5212.

Drummond D, Ranallo F, Lonstein J, Brooks HL, Cameron J: Radiation hazards in scoliosis management. *Spine* 1983; 8(7):741-748.

Evans JH, Kagan A: The development of a functional rating scale to measure the treatment outcome of chronic spinal patients. *Spine* 1986; 11(3):277-281.

Gatterman M: *Chiropractic Management of Spine Related Disorders*, Baltimore: Williams & Wilkins, 1990.

Gehlbach SH: *Interpreting the Medical Literature*, Macmillan Publishing Company, 1988.

Gillet H: A cineradiographic study of the kinematic relationship between the cervical vertebrae. *Bulletin of European Chiropractor's Union* 1980, 28(3):44-6.

Greenstein G, Hsieh C-Y, Danielson C, Phillips RB, Lueder R: Intra-examiner reliability using the flexcurve to determine lumbar lordosis, sagittal mobility and a range of motion index. *Proc ICSM* 1990, FCER 1701 Clarendon Blvd., Arlington, VA.

Haney PL, Mootz RD: A case report on nonresolving conservative care of low-back pain and sciatic radicular syndrome. *J Manip Physiol Ther* 1985; 8(2):109-114.

Hansen DT, Ayres JR: *Chiropractic Outcome Measure. Chiropractic Technique.* Baltimore: Williams & Wilkins, 1991.

Hildebrandt R: Chiropractic spinography and postural roentgenology - Part 1: history and development. *J of Manipulative and Physiological Therapeutics* June 1980, 3(2): 87-92.

Hildebrandt RW: The chiropractic spinography issue (letter). *J Manip Physiol Therap* 1981; 4(4):171-172.

Homewood A: A posturometer survey. *J of Canadian Chiropractic Association* 1964, 9(1):9-10.

Hsieh C, Phillips R: Reliability of manual muscle testing with a computerized dynamometer. *J of Manipulative and Physiological Therapeutics* February 1990, 13(2):72-82.

Hsieh C-Y, Phillips RB, Adams AH, Pope MH: Functional outcomes of low-back pain: comparison of four treatment groups in a randomized controlled trial. *J Manip Physiol Ther* 1992; 15(1):4-9.

Inglis B, Faser B, Penfold B: Chiropractic in New Zealand. Report of the Commission of Inquiry. Government Pringer, Wellington, New Zealand 1979.

Jackson R, Schafer R: *Basic Chiropractic Paraprofessional Manual*, Arlington, VA: American Chiropractic Association, 1978.

Jamison JR: Chiropractic's functional integration into conventional health care. some implications. *J Manip Physiol Ther* 1987; 10(1): 5-10.

Jansen R, Nansel D, Slosberg M: Normal paraspinal tissue compliance: the reliability of a new clinical and experimental instrument. *J of Manipulative and Physiological Therapeutics* 1990, 13(5): 243-246.

Kent C, Gentempo P: *The Documentary Basis for Diagnostic Imaging Procedures in the Subluxation-Based Chiropractic Practice*, Arlington VA: ICA, 1992.

Kent C, Gentempo P, Grostic J, Grassam I, Gregg R, Hoffman J, Hoffman: A Consensus Approach to Subluxation Based Chiropractic: Phase 1 Questionnaire Results. *Chiropractic Research Journal* 1995, 3(1).

Kobrossi T, Schut B: The use of the objective structured clinical examination (OSCE) at the Canadian Memorial Chiropractic College outpatient clinic. *J of Canadian Chiropractic Association* 1987, 31: 21-5.

LeBoeuf C, Gardner V: Chronic low-back pain: orthopaedic and chiropractic test results. *Aust Chiro Assoc* 1989; 19(1):9-16.

Marback N: Complications in a low-back case. *ACA Journal of Chiropractic* 1980; 14:131-134.

Mayer TG: Using physical measurements to assess low-back pain. *J of Musculoskeletal Med* June 1985:44-49.

McGregor M, Minor S: Anatomical and functional perspectives of the cervical spine: Part I: the "normal" cervical spine. *J of Canadian Chiropractic Association* 1989, 33:123-9.

Meade TW, Dyer S, Browne W, Townsend J, Frank AO: Low-back pain of mechanical origin: randomized comparison of chiropractic and hospital outpatient treatments. *Brit Med J* 1990, 300:1431-1437.

Mellin G: Physical therapy for chronic low-back pain: correlations between spinal mobility and treatment outcome. *Scand J Rehabil Med* 1985, 17(4):163-166.

Mennell JM: The validation of the diagnosis "joint dysfunction" in the synovial joints of the cervical spine. *J Manip Physiol Ther* 1990, 13(1):7-12.

Mrozek J, Wiles M A reliability assessment of four-quadrant weight-scale measurements. *Journal Canadian Chiropractic Association* 1982, 26(3): 97-100.

Nash CL, Gregg EC, Brown RH, Pillai K: Risks of exposure to x-rays in patients undergoing long-term treatment for scoliosis. *J Bone Joint Surg* 1979, 61A:371-374.

Palmer M, Epler M: Clinical Assessment Procedures in Physical Therapy. Philadelphia: Lippincott Company, 1990.

Pressman A, Adams A: *Clinical Assessment of Nutritional Status: A Working Manual*, New York: Management Enterprises, 1982.

Quebec Task Force on Spinal Disorders. *Spine Supplement 1,* Harper & Row Publishers, 1987:12.

Rae PS, Waddell G, Venner RM: A simple technique for measuring lumbar spinal flexion. *Journal of the Royal College of Surgeons of Edinburgh* 1984, 29(5):281-284.

Richards D, Thompson J, Osterbauer P, Fuhr A: Use of pre- and post-CT scans and clinical findings to monitor low force chiropractic care of patients with sciatic neuropathy and lumbar disc herniations: a review...*J of Manipulative and Physiological Therapeutics* January 1990, 13(1):58.

Robinson GK, Lantz CA: Videofluoroscopy in chiropractic management of cervical syndrome. *J Chiro Res Clin Invest* 1991, 6(4):93-97.

Sandoz R: The choice of appropriate clinical criteria for assessing the progress of a chiropractic case. *Annals of the Swiss Chiropractic Association* 1985, 8:53-73.

Sawyer CE, Bergman TF, Good DW: Attitudes and habits of chiropractors concerning referral to other health care providers. *J Manip Physiol Ther* 1988, 11(6):480-483.

Wallace H, Pierce WV, Wagnon R: Cervical flexion and extension analysis using digitized videofluoroscopy. *J of Chiropractic Research and Clinical Investigation* January 1992, 94-97.

CHAPTER 13

Outcome Assessment

Chapter Outline

I. Overview

II. List of Subtopics

III. Literature Review

IV. Recommendations

V. Comments

VI. References

I. OVERVIEW

Health care should be characterized by quality, effectiveness, and cost efficiency Health care should also be based on the fundamental values and wishes of the patient, provided those wishes do not conflict with basic legal, ethical or professional obligations and standards of the provider. The future focus of health care services will be on normalizing biologic function and postponing the inevitable physical decline of the patient, maximizing the body's inherent recuperative and regenerative powers.

To ensure effectiveness and efficiency, multilevel outcome assessments of health care services are being regularly be instituted. Patients, practitioners, payers, state boards, health care institutions, government agencies, etc. are increasingly involved in gathering and evaluating assessment data, as well as recommending and implementing changes in health care delivery based on those and related findings. Outcomes management has evolved into a technology of patient experience designed to provide all interested parties with better insight into the consequences of health care choices on a patient's life.

Chiropractic emerged over one hundred years ago as a vitalistic and natural approach to health care. Throughout much chiropractic's history, doctors of chiropractic based their approach almost exclusively on rationalism and uncontrolled empiricism. As evidenced by the recent explosion in the number of controlled studies and publications, the chiropractic profession has recognized the need and importance of outcomes assessments to enhance the quality and effectiveness of chiropractic care as well as to evolve chiropractic standards of care.

The objective of chiropractic care is the detection, analysis, control, reduction and correction of the vertebral subluxation complex. The vertebral subluxation not only compromises the function of the spine but also interferes with the function of the nervous system and all related systems. Correction of vertebral subluxations contributes to health by restoring spinal function and eliminating interference to body physiology. Through vertebral subluxation correction, the body, therefore, has greater adaptive ability.

The intent of this chapter is to present those outcome measures which serve to assess the patient-chiropractor health care process. The patient-chiropractor relationship represents one segment of the entire framework of chiropractic outcomes assessment.

Outcomes assessment is a data-driven process which quantifies the quality and effectiveness of fulfilling the objective of the Chiropractor's practice. Those objectives include measuring the quantifiable changes resulting from vertebral subluxation and other malpositioned articulations and structures reduction. Outcome objectives also include data on the implications of vertebral subluxation and other malpositioned articulations and structures reduction on patient health status, i.e., change in regimen.

Donabedian (1982) discussed health care quality in terms of structure (organization), process (procedures) and outcomes (benefits and harms). He defined outcomes to mean a change in a patient's current or future health status that can be attributed to antecedent health care. By using a broad operational definition of health, such things as improvement in social and psychological function can be added to the more traditional measures of physical and physiological function. Coile (1990) writes that while the history of quality care in the U.S. may have focused on the first two concepts, the current trend is swinging to assessment of outcomes as a way to hold health care practitioners accountable for their work. Ellwood (1988) agrees that outcomes are integral to definitions of quality health care.

Chiropractic clinicians and researchers have also recognized and stressed the importance of emphasizing outcome assessments. (McLachlan, 1991; Hansen, 1991; Adams, 1991; Jose, 1991). This trend is consistent with chiropractic practice because the chiropractic profession has always philosophically emphasized health in its broader definitions and championed the positive potential of human beings in optimally comprehending their environment.

The broad perspective on health outcomes leads to contemplation of a very large number of assessment or measurement procedures ranging from the social to the physical and physiological sciences. Discussion of all possible outcome assessments is beyond the scope of this chapter. General health assessment measures are very important and will be discussed. In general, a parsimonious view of outcomes is taken, still with the idea that the needs of the patient, the practitioner and society are all important in assuring the overall quality of chiropractic care.

Outcome assessments vary considerably depending on the scope of clinical phenomena one might want to measure and the target patient population. General health outcome assessments, which have received considerable attention in recent years, attempt to measure a number of attributes deemed important to the overall concept of health. Health outcomes are important to patients, whereas physicians traditionally use more specific outcomes such as laboratory test results to assess the effects of care.

At first glance, it would seem that the results of clinical and laboratory tests and the analytical findings themselves would make ideal outcome measures. But this point of view is too narrow, emphasizing mostly physiological mechanisms more important to the practitioner's decision-making process than to the broader needs of patients and society.

There is a distinction between procedures used for analyzing a patient’s condition and those used for assessing the outcome of care. The purpose of a chiropractic diagnosis is to categorize a patient’s condition so that the doctor can formulate an appropriate chiropractic care plan. Different findings usually imply different programs of care. In contrast, the purpose of an outcome assessment is to measure a change in patient status as a result of care.

The same outcome assessment may be used to measure the effect of different care approaches for any number of findings (for example, a general health questionnaire). Also, a clinical impression or description may not change even though the health status of the patient may improve under care. On the other hand, if the goal of care is to eliminate the identified disorder (i.e., "cure" the patient), then the appropriate analytical and outcome procedures may be one and the same.

The discussion and recommendations in the chapters on imaging, instrumentation, clinical laboratory, clinical impression, and reassessment also have a bearing on the general topic of outcome assessment. Because those chapters deal in some details with evaluative procedures potentially useful as outcome procedures, and with other case management considerations, some procedures may be only briefly mentioned here.

Appropriate standardized outcome assessments are useful in normal clinical practice for they can:

- **$** Consistently evaluate the effect of care over time
- **$** Help indicate the point of maximum improvement
- **$** Uncover problems related to care such as noncompliance
- **$** Document improvement to the patient, doctor, and third parties
- **$** Suggest modifications of the goals of care if necessary
- **$** Quantify the clinical experience of the doctor
- **$** Justify the type, dose, and duration of care

- $ Help provide a data-base for clinical research
- $ Assist in establishing standards of care for specific conditions.

This chapter will recommend methods of assessing outcomes of chiropractic care based upon defined criteria, scientific evidence, and expert opinion that are valid, reliable, clinically useful in chiropractic practice, and able to be interpreted by those interested in the role of chiropractic health care in society.

II. LIST OF SUBTOPICS

A. Functional Outcome Assessments

B. Patient Perception Outcome Assessments

- $ Pain
- $ Satisfaction

C. General Health Outcome Assessments

D. Physiological Outcomes

- $ Range of Motion (regional)
- $ Thermography
- $ Muscle Function
- $ Postural Evaluations

E. Subluxation Assessment

- $ Vertebral Position Assessed Radiographically
- $ Abnormal Segmental Motion/Lack of Joint End-play
- $ Abnormal Segmental Motion Assessed Radiography
- $ Soft Tissue Compliance and Tenderness
- $ Asymmetric or Hypertonic Muscle Contraction
- $ Pain, facet syndrome, trigger points, etc.

III. LITERATURE REVIEW

Studies of patients seeking chiropractic care suggest that painful conditions of the spine and extremities are the leading symptoms presented (Nyiendo, 1989, Phillips, in press). However, chiropractic adjustive care have been shown to have value for patients with a variety of ailments. Spinal adjustment results in mechanical, neurological, trophic and psychosocial effects (Mootz, 1992, Stonebrink, 1990).

There are over 30 randomized trials in the literature comparing manipulation and mobilization to other forms of care for low-back pain (Shekelle et al., 1991a; Anderson et al., 1992). The majority show manipulation to be more effective than the many interventions to which it has been compared.

The peer-reviewed literature in recent years has attracted papers dealing with case reports, theoretical models, and controlled studies related to non-musculoskeletal disorders.

Gillman and Bergstrand published a case report involving an elderly male with traumatic vision loss. Optometric and ophthalmologic examination revealed that no conventional treatment was appropriate. The lost vision returned following chiropractic care. The authors stated, Behaviorial optometrists have often been interested in the work of chiropractors and the resulting vision changes. Schutte, Tesse and Jamison did a retrospective review of 12 children with ecophoria, and concluded that such patients may respond to cervical spine adjustments.

Changjiang et al reported on 114 cases of patients with cervical spondylosis who had an associated visual disorders. Visual improvement was not noted following manipulative treatment in 83% of these cases. Furthermore, of the 54 cases followed up for a minimum of six months, 95% showed a stable therapeutic effect. Cases of blind eyes regaining vision were included in the report. Gorman published a case report where a 62 year old male with a 1 week history of monocular visual defect experienced dramatic visual improvement after a week of spinal manipulation Gorman stated, Spinal manipulation can affect the function of the optic nerve in some patients presumably by increasing vascular perfusion.

Pikalov and Kharin compared the results of spinal manipulative therapy with traditional medical care in patients with endoscopically confirmed ulcer disease. Both groups received the same dietary regimen. Weekly endoscopic exams were performed. The group receiving spine care experienced pain relief earlier than the medical group. Clinical remission was observed an average of 10 days earlier in the SMT group than the medical group.

Kokjohn et al studied the effect of spinal manipulationon pain and prostoglandin levels in women with primary dysmenorrhea. 45 subjects were included in the study. 24 were assigned to the experimental group, and 21 to the control group. The controls received a sham manipulation. The authors found that immediately after treatment, the perception of pain and the level of menstrual distress were significantly reduced. It was suggested that further studies be performed over a longer time frame.

A prospective, uncontrolled study of 316 infants with infantile colic showed a satisfactory result in 94% of cases receiving chiropractic care. The results occurred within 2 weeks. Other authors have offered case reports of results obtained in patients with colic.

In 1997 landmark research was published validating the role of the chiropractic adjustment in the care of children with otitis media. This historic study of chiropractic adjustive care on children with this condition employed tympanography as an objectifying measure and studied 332 subjects. The results of this study indicate a strong correlation between the chiropractic adjustment and the resolution of this very common condition (Fallon, 1997).

There is evidence that adjustment stimulates certain metabolic activity within some types of white blood cells (Brennan, 1990). There is also preliminary evidence suggesting a relationship between adjustment and serum beta-endorphin levels and other circulating pituitary hormones (Vernon, 1989). A randomized controlled study on a small number of patients with elevated blood pressure demonstrated a significant reduction in post-treatment blood pressure for subjects adjusted in the thoracic spine employing an Activator adjusting instrument (Yates, 1988).}

The exact number of named chiropractic techniques is thought to be about 200. However, there is a great deal of overlap, and a number of techniques involve only minor modifications of others. Additionally, many named techniques have both analytical and therapeutic components. Only the care portions of technique procedures are presented here. Analysis and other diagnostic considerations are discussed in other chapters (see History and Physical Examination, Diagnostic

Imaging, Clinical Laboratory, Clinical Impression, Frequency of Care, and Outcomes Assessment.)

Exercise has been the subject of a number of clinical trials and was recently the subject of meta-analysis which showed most exercise regimens to be far less consistent in beneficial effects than studies on manipulation (Koes, et al., 1991; Anderson, 1992). However, many exercise and education protocols are in widespread use and considered standard approaches within the medical community (White and Anderson, 1991, Mayer and Gatchell, 1987). Physiotherapeutic modalities are relatively standardized (Schaefer, 1984, Stonebrink, 1990) and are generally used as ancillary procedures in chiropractic practice.

Functional Outcome Assessments

Assessing a patient's function is a logical way to assess the behavioral effects of a disease and the outcome of care. Usually, patient functioning is verbally discussed between the patient and practitioner, but new questionnaire techniques may make such information more objective. For this chapter, functional outcome assessments refer to questionnaires designed to measure a patient's limitations in performing the usual human tasks of living. Functional questionnaires seek to quantify symptoms, function and behavior directly, rather than to infer them from less relevant physiological tests.

There are a large number of functional scales described in the scientific literature. Deyo (1990) presented an excellent review and summary of many functional assessments used in back pain research. Of particular note are the Pain Disability Index (Tait, 1987), the Million Disability Questionnaire (Million, 1982), the Oswestry Disability Questionnaire (Fairbank, 1980), the Roland Morris Disability Questionnaire (Roland, 1983), the Waddell Disability Index (Waddell, 1982), and the Dallas Pain Questionnaire (Lawlis, 1989). A modification of the Oswestry Questionnaire to make it useful for neck function was recently published by Vernon (1991).

A very detailed discussion of the validity, reliability, responsiveness, relevance, feasibility, and safety of the many functional scales is beyond the scope of this chapter. For further information the book Measuring Health: A Guide to Rating Scales and Questionnaires (McDowell and Newell, 1987) is very useful. In general, while there may be some gaps in the research base for many individual functional questionnaires, the usefulness of these types of instruments is apparent.

In terms of responsiveness, which is the ability of an instrument to document changes in health status, it is instructive to examine the clinical trials with respect to manipulative/adjustive care methods.

There are at least 28 randomized clinical trials of spinal manipulative therapy (SMT) for painful complaints in the scientific literature (Shekelle, 1991; Haldeman, 1991; Ottenbacher, 1985; Anderson, 1992). In one meta-analysis (Anderson, 1992), the authors categorized the outcome assessments in 23 randomized trials into eight categories.

The outcomes of health care may be characterized as falling into one of the following categories: death, disease, disability, discomfort, dissatisfaction, and destitution (Lohr, 1988). A more positive taxonomy would simply use the opposites of these words, e.g., survival rates, lack of disease, ability, comfort, satisfaction, and thrift. While easily understood in general, operational definitions and assessment procedures for outcomes of care that match the attributes mentioned above are more difficult to obtain.

For this review, a citation search was derived from original research, review papers and books from the chiropractic, medical and scientific literature. The topic and its research base is large. A great deal of material was referenced from Interstudy, an organization devoted to the scientific development of outcome assessments. Personal experience and opinions of those conducting clinical trials in the chiropractic community were also considered.

The literature on outcome assessments can be divided into studies that have concentrated on the development of procedures, those that have tested procedures for validity and reliability, and those that have used the procedures in assessing the effects of care in randomized clinical trials. The latter studies provide the best information on responsiveness.

The literature review will be divided into five major subtopics, reflecting the nature of the outcome assessment procedures under discussion; (1) functional outcome assessments; (2) patient perception outcome assessments; (3) general health outcome assessments; (4) physiological outcome assessments; and (5) the subluxation syndrome as an outcome assessment.

Disease-specific physiological measurements related to intervention outcomes number in the hundreds if not thousands, so only a small number of most relevant procedures deemed important to chiropractic practice are described here. Others are described in other chapters. The subluxation syndrome as an outcome assessment has elements of function, perception and physiology, but requires special consideration because of its importance to chiropractic clinical theory and practice.

It is difficult to conceptually separate some of the physiological outcomes from those related more specifically to the subluxation syndrome. Some readers may therefore disagree with the committee's categorization and feel that some procedures under physiological outcomes should be relegated to the subluxation syndrome category. The argument exists because there are different opinions about just how comprehensive the definition of the subluxation syndrome should be in terms of encompassing different types of spinal and locomotor patho-physiology or dysfunction.

Economic outcomes (assessing the costs and cost-effectiveness of care) are becoming increasingly important. Indeed, some have argued that cost accountability is more important to port of pain, overall clinical improvement assessed by the patient, overall clinical improvement assessed by the practitioner, range of trunk flexion, range of trunk extension, straight leg raising, work activities, and activities of daily living.

In general, the outcomes showing the greatest improvement with care by spinal adjustment or manipulation were the functional measures (activities of daily living) and patients' report of pain. Outcome assessments in the form of ranges of trunk motion did not indicate as much improvement on the average, although improvement was certainly demonstrated in a proportion of studies. Clinical trials using the straight leg raising test as an indicator of improvement demonstrated mixed results, which is not surprising given the very mixed nature of the patients' complaints.

Most clinical trial investigators created their own functional scales and so did not use standardized outcome assessments of known validity and reliability. Berquist-Ullman (1977) used patients' reports of pain and dysfunctions. Rasmussen (1979) used a measure of pain, spinal mobility, function and "fitness for work." Coxhead et al. (1981) reported measures of patient report of pain and return to work. Ongley et al. (1987) reported disability scores, and visual analog scales. MacDonald et al. (1990) used a disability scale and a linear analog pain scale. Nevertheless, most trials demonstrated a responsiveness to care.

Hadler et al. (1987) used the standard Roland Morris Disability scale while Meade et al. (1990) used the Oswestry Disability Questionnaire. Hsieh (1991) concluded that the Roland Morris Questionnaire and the Oswesyry Questionnaire gave consistent but slightly different results in a chiropractic clinical trial.

Clinicians contemplating the use of functional instruments should be aware of differences between them and be able to choose the most appropriate assessment for their specific situation.

Patient Perceptions Outcome Assessments

Patient perceptions of pain and satisfaction have not traditionally been considered very important as outcomes in any quantitative fashion. This is probably because it was felt that patient perceptions were too subjective and variable to be of much use. This is despite the fact that clinical impressions of the value of treatments are most likely based on favorable comments by patients to their practitioners. Currently, however, health services researchers have discovered that patient perceptions, measured with appropriate procedures, may be an excellent way to measure many aspects of the quality of care (Donabedian, 1980; Cherkin, 1990).

Pain: Pain is a perception. Pain upon palpation and motion tests directed by the doctor of chiropractic are important indicators of joint malfunction and malposition. Such tests are unique to chiropractic practice and are used not only to determine the articular misalignment but to determine techniques and need for adjustive procedures. In the assessment of a chiropractic case these assume an important analytical role. Low-back and neck pain probably represent about two thirds of all chiropractic patient concerns (Nyiendo 1989).

There is a great deal of research in the scientific literature on pain measurement (McDowell, 1987; Melzack, 1983; Vernon, 1990). Indeed, many orthopedic and neurologic examination procedures rely upon patients' report of pain provocation. To discuss the entire range of potential assessment methods is again beyond the scope of this chapter, but details may be found in the references noted above and in other chapters.

Pain has a number of dimensions including severity (intensity), duration, and frequency. The dimension that is most commonly assessed is severity (Jensen, 1986). Methods run the gamut from single questions to complex surveys. In most cases, the patients report their own perception of pain.

Visual Analog Scales (VAS) consist of a 10cm line anchored by two pain descriptors at either end of the line. Patients are asked to mark on the line a point that represents their perceived pain intensity. The properties of VAS have been extensively studied (Huskisson, 1982).

Numerical Rating Scales ask the patient to choose a number between 0-100 that represents their pain intensity. Another pain scale uses 11 ranked levels numbered 0-11 graphically depicted in boxes.

The so-called "Behavioral Rating Scale" has six levels, each with a description such as for the third level, "pain present, cannot be ignored, but does not interfere with everyday activities." Verbal rating scales use single word descriptors in three, four, five or more ranks.

One commonly used scale from the McGill/Melzack Pain Questionnaire called the Present Pain Intensity scale uses the words, "none, mild, discomforting, horrible, and excruciating."

An interesting comparison among the scales mentioned above indicated there were few differences between them, except that the "Visual Analog Scale" and the "Numerical Rating Scale" were more practical (Jensen, 1986).

Pain diaries can be useful to measure other dimensions of pain. Patients are instructed to daily indicate on a form the intensity, duration and frequency of their pain complaints. Parker (1978) used a patient report headache diary of severity, duration and frequency and a disability score calculated from it. Plain diaries may also be very useful for single-case time-series research designs (Keating, 1985).

A famous pain measurement instrument is the McGill/Melzack Pain Questionnaire (Melzack, 1975). It has been used in back pain treatment research and to describe chiropractic patients (Nyiendo, 1990). The McGill Questionnaire consists of twenty categories of words that describe qualities of pain. Patients indicate which words apply in their case. At least six different pain variables can be calculated from the instrument. While relatively well-studied in terms of validity and reliability (McDowell, 1987), it may present some practical difficulties in clinical practice because it should be administered by an interviewer.

Most, if not all, clinical trials of SMT have utilized some way of measuring pain. For example, Coyer and Curwen (1955) used an outcome of "well" defined by lack of signs and symptoms of low-back pain presumably judged by the practitioner in consultation with the patient. Edwards (1969) assessed care on a five point scale of signs and symptoms judged by the doctor. Glover et al. (1974) used a scale of pain relief from 1-100%. Doran and Newell (1975) used a patient-reported six level pain relief scale. Koes et al. (1991) reported a randomized clinical trial for back and neck pain using severity of complaints and "global perceived effect," a subjective assessment of overall improvement. Lopes et al. (1991) in another clinical trial for cervical pain assessed pain and range of motion comparing a single manipulation to a mobilization. Both favorably affect range of motion, but pain measures favored manipulation.

Patient Satisfaction: Patient satisfaction is an important perception having not only to do with the actual effectiveness of care, but also the setting and the process of receiving care (Donabedian, 1980). Patient satisfaction may be an important marker of quality of care (Cleary, 1988), and it is increasingly evident that patient satisfaction is a consumer marketing target for managed care organizations.

Patient satisfaction outcomes have been studied by Ware and others (Ware, 1978; Lochman, 1983). Clearly, there are a number of dimensions that can be measured. They include: interpersonal manner, technical quality, efficacy/outcomes, accessibility/convenience, finances, continuity, physical environment, and availability. The Patient Satisfaction Questionnaire measures all eight dimensions (Ware, 1983). Ware also developed four questions that measure general satisfaction with care. According to Cherkin (1990), the Visit-Specific Satisfaction Questionnaire (Ware, 1988) is probably very appropriate for chiropractic outcomes.

Deyo (1986) developed a patient satisfaction scale specifically for patients with low-back pain. Recently, Cherkin (in press) developed and validated a back pain patient questionnaire that addressed three key dimensions of satisfaction: caring, information, and effectiveness.

One of the valuable aspects of assessing patient satisfaction is its global nature. For the great majority of ambulatory patients, certain dimensions of satisfaction may be assessed regardless of the nature of the health complaint or the doctor’s clinical finding. Works by Sawyer (1991), Cherkin (1989), and Kane (1974) have suggested high levels of satisfaction with chiropractic care.

General Health Outcome Assessments

Assessment of general health status is philosophically congruent with the chiropractic viewpoint; that is, an emphasis on health as opposed to disease. General health has been notoriously difficult to define in operational terms, but progress in recent years has led to the development of a number of useful instruments that are increasingly being used as assessments of the outcome of health care (Nelson, 1989; Bronfort, 1991). A full detailed discussion of health status measurement is beyond the present scope, but an excellent review of the difficult conceptual issues and examples of various scales may be found in the book edited by Spilker entitled, Quality of Life Assessments in Clinical Trials (1990), and in other references (Kirschner, 1987).

The Sickness Impact Profile (SIP) (Bergner, 1981) is an extensively studied patient survey of a number of behavioral and psychosocial dimensions thought to reflect general health status; sleep and rest, eating, work, home management, recreation and pastimes, ambulation, mobility, body care and movement, social interaction, alertness behavior, emotional behavior, and communication. It has been used in back pain research (Deyo, 1986) as well as in other areas.

Another measure of general health was developed during the Medical Outcomes Study (Stewart, 1988) and has now been modified by Interstudy (1990). The SF36 questionnaire measures three major health attributes (functional status, well-being, and overall evaluation of health) and eight health concepts which yield eight indices: physical functioning, social functioning, role limitations due to physical problems, role limitations due to emotional problems, mental health, energy/fatigue, pain, and general health perception (Interstudy, 1990). The SF36 appears to be a useful way to standardize assessments across many types of clinical settings and for a variety of types of patients. The SF36 has been and is being used in several chiropractic outcome studies (Nyiendo, 1991; Kassak, 1991; Jose, 1991).

Another useful general health measure is the set of COOP Charts (Nelson, 1987). These utilize simple representative pictures as choices to answers that yield nine indices of general health. Three focus on specific dimensions of function, two are related to symptoms or feelings, three are concerned with perceptions, and one is a health covariate. They appear to be very practical, easy to administer and score and correlate well with other less practical measures.

Physiological Outcome Assessments

Range of Motion (regional): A standard examination of spinal and other joint physiology may include the measurement of the range of motion (ROM) that can be obtained by the patient. ROM is used to assess disability and impairment because of the assumed relationship to spinal function (AMA, 1988). Lack of motion is also considered a dysfunction that can be effectively addressed by a variety of manual and rehabilitative procedures. Commonly, these include chiropractic adjustments. h this section, regional trunk and neck mobility along with peripheral joint mobility will be considered. Segmental spinal joint mobility is addressed in the section on subluxation syndrome.

Devices and methods of measuring ROM range from the simple to the sublime. Standard joint goniometers are common, but now there are more sophisticated tools, many with electronic data recording capabilities. Mobility can be assessed with the patient actively involved, or as the passive object being mobilized. One or all planes of motion may be assessed.

The reliability of a number of common methods of measuring trunk mobility of the lumbar spine was reviewed by Liebenson (1989). He concluded that the modified Schober technique, inclinometers, flexible rulers, and spondylometers had received the most scientific support. The fingertip-to-floor method was not considered valid because of errors introduced by hip motion, hamstring flexibility and arm length. Zachman (1989) compared a simple goniometer and the "rangiometer" and assessed examiner reliability for cervical ROMs. The "rangiometer" was considered moderately reliable. Nansel (1989) concluded that taking the mean of five repeated measures of cervical lateral flexion with an inclinometer was also a reliable method.

The responsiveness of kinematic measurements of the range of regional spine motion (neck or trunk mobility) has been repeatedly demonstrated in clinical trials (Anderson, in press; Ottenbacher, 1985), and under laboratory conditions. Nansel et al. (1989) measured cervical lateral bending asymmetries with a simple goniometer and found they could be reduced by lower cervical adjustments. In additional study, rotational asymmetries in the transverse plane were reduced by upper cervical adjustments (Nansel, 1991).

Evans (1978) reported outcomes of spinal flexion, while Sims-Williams (1978,1979) used spinal mobility and straight leg raising. Zylbergold (1981) made use of assessments of spinal mobility, and Nwuga (1982) used measures of spinal mobility and straight leg raising. Farrell (1982) used a functional rating questionnaire and lumbar motions as outcomes. Godfrey et al. (1984) utilized spinal mobility, while Gibson (1985) measured spinal flexion.

Arkuszewski (1986) used six signs and symptoms on a three point scale: posture, gait, pain, active spinal mobility, manual examination of spine, and a neurological evaluation. Waagen (1986) used a global index of spinal mobility created by summing the results of all planes of motion. Mathews (1987) also measure spinal mobility. Hoehler (1981) used measures of spinal mobility, straight leg raising, activities of daily living, and patient report of effectiveness.

While most studies of SMT have concentrated on lumbar spinal mobility, a number of trials assessed motion in the cervical spine. Brodin (1982) measured neck pain and cervical mobility as outcomes. Nordemar (1981) and Meal (1986) used neck pain and cervical mobility. Howe (1983) assessed measures of cervical mobility and improvement in pain and stiffness. Lopex (1991) also assessed range of motion and pain immediately after manipulation.

Training and practice are required to conduct a valid and reliable assessment of ROM. Clinicians should be aware of the range of errors inherent in a chosen method. Also, such issues as patient positioning, patient motivation and proper interpretation of the instrument must be addressed. The cost of measuring devices can range from $15.00 to many thousands of dollars depending on the sophistication. Done skillfully, measuring ROM is generally safe.

Muscle Function: The evaluation of muscle function encompasses a number of parameters: strength, work and power, and endurance (Sapega, 1990). Several modes of muscle contraction can be tested separately. These are termed isotonic, isokinetic, and isometric. The distinctions center upon the nature of the applied load or by the velocity and direction of change in the length of the muscle. Concentric contractions indicate a shortening of the muscle whereas eccentric contractions occur as the muscle is lengthening. Various sophisticated machines can now measure various combinations of these muscle function parameters in the extremities and the spine.

Quite a number of factors can affect the validity and reliability of muscle function testing. These include but are not limited to: stabilization and positioning of the body, velocity of test movements, gravitational influences, familiarity with testing procedures, inertial forces, calibration, time of day, and patient motivation (Sapega, 1990).

Most manual muscle testing procedures which are commonly used in the chiropractic profession combine elements of isometric testing with eccentric dynamic variable resistance. Manual methods are qualitative. It has been shown that examiners interpret muscular strength or weakness more on the basis of total effort they exert while overcoming a patient's resistance than on either the peak or average force (Sapega, 1990). This lessens the validity of manual tests as true tests of muscular strength (Nicholas, 1978). In one study, patients with as much as a 50% decrease in strength were rated as normal by manual methods (Watkins, 1984). Trained examiners found it difficult to detect differences of less than 25% between paired limbs (Beasley, 1956).

The reliability of manual muscle testing was assessed with a dynamometer in a chiropractic setting (Hsieh, 1990). The authors concluded that the "patient initiated" method yielded satisfactory scores for tests of the iliopsoas, the clavicular portion of the pectoralis major, and the external rotators of the hip. Dynamometers have also shown fair to good reliability in other studies (Sapega, 1990). There are no clinical reliability studies of manual muscle testing as used in some chiropractic techniques where a dichotomous decision ("strong" vs "weak") is required. There are no clinical trials of a retrospective or prospective nature demonstrating the responsiveness of manual muscle testing to chiropractic care.

Instrumental measures of muscle function are further described in the chapter on instrumentation. Each method has advantages and disadvantages, but most have demonstrated adequate reliability when strict protocols are followed, and the ability to demonstrate changes in patients undergoing exercise or musculoskeletal rehabilitation.

Manual muscle tests are practical and generally safe. The instrumented methods can be inexpensive in the case of handheld dynamometers to many thousands of dollars for the more sophisticated computerized measurement systems. If risks are minimized by following proper testing protocols the instrumented methods are also safe.

Posture: Postural measures are defined here to include measurements of humans of generally topographical nature. Anatomical relations include apparent limb length inequality, the shape of the spine (degree of lordosis, scoliosis, kyphosis) etc.

Apparent leg length inequality (specifically, lower limb length inequality) is often used as an indication for chiropractic care. There are many assessment methods; some are discussed in the chapter on instrumentation. The topic has been extensively reviewed by Mannello (1991). A range of clinical reliability has been established for some methods.

Two studies indicate that adjustments/manual procedures may increase cervical lordosis (measured radiographically) (Leach, 1983; Owens, 1990).

Subluxation Assessment: The "vertebral subluxation" has been referred to as an event in which a vertebra has moved outside of its normal juxtaposition with the vertebra above or below. The normal architecture of the intervertebral foramina, which are formed by two interlocking arches above and below, is altered by this aberrant position and could cause impingement on the spinal nerve. If impingement occurred, this would interfere with the conduction of impulses innately generated within the brain and subsequently passing through neural tissue with the result that tissues supplied by the affected nerves could suffer some form of functional insult.

The term chiropractic was named by a minister, Dr. Samuel Weed and means "done by hand." Interpretations of this definition vary with the state laws governing chiropractic and correlates with the chiropractic scope of practice and school of thought. The chiropractic paradigm statement referenced in the Forward represents the clearest, most concise consensus statement regarding chiropractic's self-definition and has relevance in the discussion of every aspect of the guidelines process including outcomes assessment.

The effects and importance of the vertebral subluxation can be divided into three major categories:

A. Immediate local effects which may include irritation, inflammation, and degeneration at the vertebral level.

B. Mechanical effects which include aberrations in motion, posture and overall mechanical function of the spine.

C. Physiologic effects which especially include disturbances in the nervous and circulatory systems.

As a result of the numerous structural and functional studies, these general effects of the vertebral subluxation have been focused into five categories:

1. Spinal Kinesiopathology which generally refers to the abnormal position and motion of the vertebra involved in the subluxation.

   Outcomes assessment parameters would include palpation analyses, X-ray analyses, computed tomography and MRI imaging, postural aberrations, goniometric assessment, videofluroscopic analyses, range of motion assessment, leg length check analyses.

2. Neuropathophysiology refers to abnormal nervous system function which is the most significant component of the vertebral subluxation.

   Assessment criteria would include somatic pain, paresthesia, hyperesthesia, hypesthesia through case history and questionnaire determination, somatic motor assessment through muscle analyses and complete neurologic assessment of the neuraxis as well as complete afferent and efferent assessment. In addition, MRI and CT Scans provide evidence of nerve structural damage which correlates with the neuropathophysiologic component. Visceromotor determinations via heat sensitive devices, thermography and thermometry. Additional research and quality assurance studies are needed in this area. Further research on the piezoelectric and pyroelectric effects of bone and corresponding effects on nerve function also need further study.

3. Myopathology refers to the abnormal changes in muscle function due to the vertebral subluxation.

   Outcomes assessment criteria include, palpation, dynamometer testing, surface EMG (electro-myograph) determinations, neuropressure algometry and pain sensitivity, range of motion determination, paraspinal tissue compliance, gain symmetry, Cybex testing.

4. Histopathology represents the abnormal changes to soft tissues involved in the vertebral subluxation.

   Assessment protocols primarily include the determination of disc and ligament-integrity by means of X-ray and other imaging methods.

5. Pathophysiology refers to the generalized abnormal changes generated in the spine and body as a consequence of the vertebral subluxation.

   Spinal pathophysiology is assessed primarily through radiographic, and other imaging determinations of bone degeneration. Pathophysiology peripheral to the spine remains the subject of scientific investigation. Continued research into the involvement of the nervous system in modulating immune function will represent significant outcome measure in the future.

Succinctly, the foundation of chiropractic rests on the premise that structural distortion causes interference to normal nerve transmission and results in the symptoms and tissue changes of disease. The basic chiropractic analysis consists of manual palpation of the bony elements of the spine, manual assessment of the motion of the spine and individual vertebra, and palpation of the numerous muscles which attach and control spine and vertebral motion. Additional analytic tools for the field chiropractor would include X-ray, devices to assess spinal and vertebral motion and posture, as well as instruments used to assess muscle function and skin temperature. Additional research will generate techniques and devices which can effectively assess physiologic dysfunction resulting from the vertebral subluxation.

Assessment of vertebral subluxations from this analysis, necessitates a choice of adjusting techniques by the chiropractor to safely and effectively eliminate the vertebral subluxation. A discussion of the various chiropractic adjusting techniques and their effectiveness is outside the scope of this document. However, outcomes assessment for the chiropractor will depend on the specific analysis used to determine the presence of the vertebral subluxation as well as the exact adjustment methodology utilized in correcting the subluxation.

Exactness in chiropractic analysis, vertebral subluxation determination, and chiropractic adjustment protocol are essential components to practitioner based outcomes assessment. Schafer (1984) has noted that "it is this exactness of differentiation and specificity of correction that has been stressed by the chiropractic profession and has distinguished it from other health sciences that also use manipulation, mechanical therapy, physical therapy, or similar procedures."

The most exact criteria, indicative of vertebral subluxations, utilized by the field chiropractor focus on structural alterations in the spine. Therefore, the most measurable and exact data for outcomes assessment of chiropractic adjustments stems from structural criteria. However, such structural or mechanical faults are not the major criteria constituting the vertebral subluxation. Aberrant physiology, most notably neurophysiology, signifies a critical negative effect of the vertebral subluxation on homeostasis. This altered physiology for which there is no underlying structural pathology has been termed by Whatmore and Kohi (1974) physiopathology.

Functional disorders and functional illness have their origin in such physiopathology "Signal transmission in a complex system of neurons and endocrine fluids and signaling factors within this physiologic system are considered basic factors in the etiology of functional disorders." Fries and Crapo (1981) emphasize that the similarity among chronic diseases is that they all represent gradual long term breakdown of the body's physiologic functions; a process that begins imperceptibly, long before the first symptoms arise. Outcomes of chiropractic care based on data collected from functional analyses represent less exact means of assessment for the field chiropractor.

Improved function, elimination of functional disorders, quality of life, etc., represent outcomes of chiropractic care best assessed by process external to the chiropractic care best assessed by process external to the chiropractor-patient relationship, e.g. government agencies, insurance companies, hospital studies, etc. An extensive collection of scientific studies supporting the functional disorders resulting from the vertebral subluxation have been reviewed elsewhere.

Least exact methods of outcome assessment of the chiropractor-patient relationship stem from pain and symptom determinations. Pain and symptoms are not necessary correlates to the vertebral subluxation. However, elimination of the vertebral subluxation and the improved spinal and general physiologic function that results, can generally reduce and eliminate patient pain and symptoms. Although pain and symptom relief represent the major patient rationale for seeking chiropractic care, an outcome objective of the chiropractor is patient compliance with a cooperative chiropractic health care program which is not necessarily pain and symptom related. Patient based assessment of chiropractic care utilizes questionnaires, satisfaction, pain ratings such as the Oswestry Pain Questionnaire, Dallas and McGill Questionnaires, visual-analog scales, and general health and performance status assessments by the COOP and SF-36 systems and traditional methods of measuring physical and physiological function.

A philosophical premise within chiropractic is the vitalistic principle which recognizes that an "innate intelligence" actively organizes and maintains all living things. Vitalism permeated ancient medical writings and was apparent in the works of Hippocrates who believed that a "vital spirit" was responsible for "life" and the "natural self-healing tendency of the body." The vitalistic principle was essentially replaced in the Twentieth Century by a chemical-mechanistic concept of life in which living things were viewed as machines whose capabilities were constrained to those functions permitted by this model. Vitalistic attributes such as autonomy and self-healing do not exist in this model. Becker (1990) believes that this paradigm has ruled the allopathic model, "limiting both the methods that could be used to bring about a cure and our perceptions of the ability of the human body to heal itself." The mechanistic paradigm has failed in many ways to prevent disease as well as to cure patients. Dissatisfaction with the mechanistic concept has resulted in a vitalistic resurgence emphasizing proper nutrition, exercises, meditation as well as a "reaffirmation of the innate healing ability of living things."

The chiropractic profession has recognized the importance of a proper functioning spine to insure homeostasis within the nervous system, since it is through the nervous system that the innate self-healing capacity can be expressed. Proper function, rather than simply symptomatic relief, is the paradigm objective of the chiropractic standard of care. Questionnaires and surveys of patient function and quality of life, similar to SF-36 and COOP charts, represent the best means, currently available, for outcome assessment of the vitalistic component of chiropractic care. Both the COOP charts and the SF-36 address health concepts such as functional status, overall health and well-being, and quality of life. Health attributes relating to function include: physical, emotional, role and social functioning. Pain, overall physical and mental health, health changes, vitality and energy, etc., make up the overall health and well-being component. Quality of life perceptions, social support and health changes provide measures for a quality of life assessment. These documents can be tailored to individual practices but should have a standardized component for external agency data assessment and evaluation.

IV. RECOMMENDATIONS

A. Functional Outcome Assessments (By Questionnaire)

As a category, functional outcome assessments of everyday tasks are very suitable for evaluating care of dysfunctions of the spine, spinal nerves and related structures and tissues. Many questionnaires could be used; choice should depend upon the validity, reliability, responsiveness, and practicality demonstrated in the scientific literature.

13.1.1 **Rating**: Established
Evidence: Class I, II, III

B. Patient Perception Outcome Assessments

Pain: Pain measurement is generally a relevant, valid, reliable, responsive, and safe outcome assessment. Practicality may vary depending on the specific procedure used.

13.2.1 **Rating**: Established
Evidence: Class I, II, III

Patient Satisfaction Measures: Patient satisfaction measures are an important marker of quality and are useful in clinical practice. Satisfaction is best assessed using standard questionnaires measuring a number of dimensions. Scales may be found in the scientific literature. Although additional research as satisfaction relates to chiropractic practice is required, validity, reliability, responsiveness, relevance, safety and practicality are scientifically supported.

13.2.2 **Rating**: Established
Evidence: Class I, II, III

C. Vitalistic Assessment

General Health/Quality of Life Assessment: Due to a lack of measures capable of assessing innate self-healing capacities, surveys and questionnaires, such as the SF-36 and

COOP charts, which do not focus on pain and symptomatology, may be used as acceptable, safe and valid measures of outcome of chiropractic care.

13.3.1 **Rating**: Strong Positive Recommendation
Evidence: Class: E, L

D. Patient Compliance Assessment

Chiropractic Health Care Assessment: Practitioner based assessment forms and surveys should be utilized which measure patient compliance with chiropractic designed programs for Level III care and which measure patient growth in understanding of the components of health and chiropractic.

13.4.1 **Rating**: Strong Positive Recommendation
Evidence: Class: E, L

E. General Health Outcome Assessments

As a category of outcomes, general health is possible and desirable to assess. Depending on the particular scale chosen, validity, reliability, and responsiveness have been demonstrated. The measures are safe; some are more practical than others. General health assessments should be used along with condition specific assessments.

13.5.1 **Rating**: Established
Evidence: Class I, II, III

F. Physiological Outcomes

Range of Motion: Depending upon the method applied, assessment of range of motion is a valid, reliable, responsive, safe outcome assessment. Depending on the level of automation, practical considerations may vary.

13.6.1. **Rating**: Established
Evidence: Class I, II, III

Thermography: Thermographic exams of the trunk and extremities with infrared or liquid crystal may be valid as a chiropractic assessment tool. The procedures are generally safe. Thermograms should be interpreted by those trained in the procedure.

13.6.2 **Rating**: Established
Evidence: Class III

Muscle Function: There are many methods of assessing the parameters of muscle function. Manual methods have not been explored adequately enough to assure validity, reliability, relevance and responsiveness to care. Manual methods, however, are practical and generally safe and tend to be popular. Studies with automated methods (e.g. Cybex, etc.) have suggested a greater level of confidence, but require expert training, and are time-consuming.

13.6.3 **Rating**: Established
Evidence: Class I, II, III

Postural Evaluations: Certain postural parameters may be responsive to care, but validity, reliability and relevance issues still need to be addressed scientifically. Depending on the method, postural observations are practical and safe.

13.6.4 **Rating**: Established
Evidence: Class II, III

G. Subluxation Assessment

The subluxation assessment provides decision-making information for application of chiropractic care methods, primarily adjustments. Regarding outcome assessments, the various components must be considered separately. These are discussed below.

Vertebral Position Assessed Radiographically: The clinical relevance of small changes in vertebral position are of importance chiropractically. Responsiveness of vertebral position to adjustive care has been established in many cases. Observational studies have not ruled it out. Many practitioners accept measurement of vertebral position as routine and customary. This risk/benefit ratio of using radiographs for measuring vertebral position as an outcome assessment should be carefully considered.

13.7.1 **Rating**: Established
Evidence: Class II, III

Abnormal Segmental Motion/Lack of Joint End-play Assessed by Palpation: There are a few validity studies of joint palpation. There are studies suggesting that palpatory signs diminish with care, but the degree of responsiveness has been difficult to quantify. In skilled hands, palpation is safe and yields valuable information to the doctor of chiropractic.

13.7.2 **Rating**: Established
Evidence: Class II, III

Soft-Tissue Compliance and Tenderness: Clinical studies indicate a relationship between tenderness and painful neuromusculoskeletal conditions. Clinical reliability has been established. Compliance and tenderness appear to be responsive to care. Algometers, tissue compliance meters, and palpatory methods are practical and safe.

13.7.4 **Rating**: Established
Evidence: Class II, III

Asymmetric or Hypertonic Muscle Contraction: There is no question that surface EMG procedures measure some aspects of muscle activity. Surface methods are safe.

13.7.5 **Rating**: Established
Evidence: Class II, III

H. Principles of Application

Outcome assessments should only be performed and interpreted by appropriately trained and qualified individuals.

13.8.1 **Rating**: Necessary
Evidence: Class II, III

When outcome assessments are used, consideration must be made for their established test properties, for patient compliance, and for the nature of the condition(s) being assessed.

13.8.2 **Rating**: Necessary
Evidence: Class II, III

Patient outcomes should be assessed at appropriate intervals during case management depending upon the nature of the condition and the patient's progress.

13.8.3 **Rating**: Discretionary
Evidence: Class II, III

Generic functional and health status outcome measurements are helpful for comparing outcomes across different patient populations and methods of care intervention. Outcome information is very valuable to doctors of chiropractic, and to the chiropractic profession. Therefore, whenever feasible, a general health outcome of chiropractic care should be assessed by a standardized, commonly accepted method; and whenever feasible, a condition specific outcome of chiropractic care should be assessed by a standardized, commonly accepted method.

13.8.4 **Rating**: Recommended
Evidence: Class II, III

V. COMMENTS

Many of the rated measures used to assess the outcome of chiropractic patient care concentrate on the structural components of the vertebral subluxation and other malpositioned articulations and structures. However, chiropractors recognize the vital importance of a properly functioning spine and nervous system to promote the expression of an individual's self-healing capabilities.

Scientific literature has illuminated the significant relationship between spinal function and neurophysiology. Nerve interference impacts on total body function. The next century promises to provide valid and reliable measures for chiropractors to assess aberrations in nerve function resulting from the vertebral subluxation and other malpositioned articulations and structures. Vitalistic forces, which are best expressed through a nervous system free of interference, represent the most exciting future possibilities for outcome assessment.

The continued validation and evaluation of the efficacy of these techniques should be endorsed by the profession in order to provide the best possible methodologies for patient care.

Multilevel outcomes assessment methods will be necessary to insure quality control and effectiveness in future health care delivery systems, especially chiropractic care.

The significant values derived from any outcomes assessment lie within the processes for data evaluation and implementation of appropriate changes. An ever evolving increase in the quality, effectiveness, and cost efficiency of Chiropractic care must be realized from the outcomes assessment process.

VI. REFERENCES

Adams A: Methodological considerations in the selection of outcome measures for chiropractic practice. Proceedings of the 1991 International Conference of Spinal Manipulation. April 12, 1991, Arlington, Virginia. Foundation for Chiropractic Education and Research.

Adams A, Loper D, Willd S, Lawless P, Loueks J: Intra and Interexaminer Reliability of Plumb Line Posture Analysis Measurements Using a 3 Dimensional Electrogoniometer. *Res For* 1988, 4(3) 60-72.

Ahern D, Follick M, Council J, Laser-Wolston N: Reliability of lumbar paravertebral EMG assessment in chronic low-back pain. *Arch Phys Med Rehabil* 1986, 67:62.

Aldis G, Hill JM: Analysis of a chiropractor's data. Journal and Proceedings. Royal Sox. New South Wales. 1979, 112:93. (Reprinted in *J Manip Physiol Ther* 1980, 3(3):177.)

American Academy of Neurology, Therapeutics and Technology Assessment Subcommittee: Assessment: Thermography in Neurologic Practice. *Neurology* 1990, 40:523.

Anderson R, Meeker W, Wirick B, Mootz R, Kirk D, Adams A: A Meta-Analysis of Clinical Trials of Spinal Manipulation. *J Manip Physiol Ther* 1992, 15(3):300.

Anderson R: Anatomic rotation at the atlanto-occipital joint. Eleventh Annual Biomechanics Conference on the Spine. Boulder, CO. De6. 6, 1980. pp.113.

Arkuszewski A: The efficacy of manual treatment in low-back pain: A clinical trial. *Manual Medicine* 1986, 2:68-71.

Assendelft W, Koes B, Van den Heidjen G, Gouter L: The Efficacy of Spinal Manipulative Therapy for Treatment of Low-back and Neck Pain: A Criteria Based Meta-Analysis. (In Press). Presented at the World Chiropractic Congress, Toronto, Canada, 1991.

Athenstaedt H: Piezoelectric and Pyroelectric Characteristics of Bone and Nerve. *Nature* 11/28/70, Vol 228, p. 830-834.

Awerbuch M: Thermography - Its current diagnostic status in musculoskeletal medicine. *Med J Aust* 1991, 154(7):441.

Baker J, Triano J: Selectively Restricted Spinal Motion. Proceedings of the Int'l Conference on Spinal Manipulation, FCER Arlington, Va. Apr. 1991, p. 271.

Bassett CA, Biophysical Principles Affecting Bone Structure. The Biochemistry and Physiology of Bone, 2nd Ed. Academic Press 1971.

Beal M, Vorro J, Johnson W: Chronic Cervical Dysfunction: Correlation of Myoelectric Findings with Clinical Progress. *J of Amer Osteo Assoc* July, 1989, Vol: 89, p. 891-900.

Beasley W: Influence of method on estimates of normal knee extensor force among normal and postpolio children. *Phy Ther Rev* 1956, 36:21-41.

Becker R: *The Body Electric Electromagnetism and the Foundation of Life*, New York: Quill, 1985.

Becker R: *Cross Currents*, Los Angeles: Tareher, Inc., 1990.

BenEliyahu DJ: Thermographic Imaging of Pathoneurophysiology Due to Cervical Disc Herniation. *JMPT* 1989, 12:482-490.

BenEliyahu CJ: Proc. of the Int'l Conf. on Spinal Manipulation, FCER, Arlington, Va. Apr. 1991, 26-29.

Bergmann TF (ed): Proceedings of the March 1990 Consensus Conference of Validation of Chiropractic Methods. *Chiropractic Technique* 1990. 2(3):71-161.

Bergner M, Bobbitt R, Carter W, Gilson B: The sickness impact profile: Development and final revision of a health status measure. *Medical Care* 1981, 19(8):787.

Bergquist-Ullman M, Larson U: Acute low-back pain in industry. *Acta Orthop Scand (Suppl)* 1977, 170:1-110.

Biederman H: Comments on the reliability of muscle activity comparisons in EMG biofeedback research with back pain patients. *Biofeed Self-Regul* 1984, 9(4):451.

Boline PD, Keating JC, Brist J, Denver G: Interexaminer Reliability of Palpatory Evaluations of the Lumbar Spine. *AJCM* 1988, 1(1) p. 5-11.

Bombardier C, Tugwell P: Methodological Considerations in Functional Assessment. *J Rheum (Suppl 15)* 1987, 14:6.

Brand N, Gizoni C: Moire contourography and infrared thermography: Changes resulting from chiropractic adjustments. *J Manip Physiol Ther* 1982, 5:113.

Brieg A, et. al.: Effect of Mechanical Stresses on the Spinal cord in Cervical Spondylosis. *J Neurosurg* 1966 25:45-56.

Brieg A: *Adverse Mechanical Tension in the CNS*, Stockholm: Wiley, 1978.

Brighton P, Graham R, Bird H: *Hypermobility of the Joints*, New York: Springer-Veriag, 1983.

Brodin H: Cervical pain and mobilization. *Int J Rehab Research* 1984, 7:190-191.

Bronfort G, Hochumsen O: The functional radiographic examination of patients with low-back pain: A study of different forms of variation. *J Manip Physiol Ther* 1984, 7(2):89.

Bronfort G: An overview of short multi-dimensional health status outcomes instruments. Proceedings of the 1991 International Conference on Spinal Manipulation. April 12, 1991, Arlington, Virginia. Foundation for Chiropractic Education and Research.

Caillet: *Soft Tissue Pain and Disability*, Philadelphia: F.A. Davis, 1982.

Carmichael J: Clinical Case Reports in the Use of Computed Tomography for the Quantification of Leg Length Inequality: The CT Scanogram. Proc. of the Intl's Conf. on Spinal Manipulation, FCER, Arlington, Va. April, 1991, 191.

Chang-Yu J, Hsieh DC, Phillips RB, Adams A, Pope MH: Functional Outcomes of Low Back Pain: Comparison of Four Treatment Groups in a Randomized Controlled Trial. *JMPT* Jan. 1992, Vol 15 #1:4-10.

Cherkin D, Deyro R, Berg A: Evaluation of a physician education intervention to improve primary care for low-back pain. II. Impact on Patients. *Spine* (in press).

Cherkin D, MacCormack F: Patient evaluations of low-back pain care from family physicians and chiropractors. *West J Med* 1989, 150:351.

Cherkin D: Patient satisfaction as an outcome measure. *Chiro Tech* 1990, 2(3):138.

Cleary P, McNeil B: Patient satisfaction as an indicator of quality care. *Inquiry* 1988, 25:25.

Clendening L: *Source Book of Medical History*, New York: Dover Pub., 1942

Coile RC: *The New Medicine: Reshaping Medical Practice and Health Care Management*, Rockville, MD: Aspen Publishers, 1990.

Cooperstein R, Gardner R, Hansel D: Concordance of Two Methods of Motion Palpation with Goniometrically-Assessed Cervical Lateral Flexion Asymmetry. Proc. of the Int'l. Conf. on Spinal Manipulation. FCER, Arlington, Va. Apl. 1991; 235-239.

Cram J: *Clinical EMG: Muscle Scanning for Surface Recordings*, Seattle: Biofeedbk. Inst. of Seattle, 1986.

Cramer G, Howe J, Gleen W, Greenstein J, Marx P, Johnson S, Huntoon R, Cantu J, Emde J, Aoys M: Comparison of Computed Tomography to Magnetic Resonance Imaging in Evaluation of the Intervertebral Foramen. Proc. of the Int'l Conf. on Spinal Manipulation. FCER, Arlington, Va. Apr. 1991: 186.

Coxhead CE, Inskip H, Meade TW, North WRS, Troup JDG: Multicentre trial of physiotherapy in the management of sciatic symptoms. *Lancet* 1981, 1:1065-1068, May 16.

Coyer AB, Curwen IHM: Low-back pain treated by manipulation. *Br Med J* 1955, 1:705-707.

Cram J, Engstrom D: Patterns of neuromuscular activity in pain and nonpain patients. *Clinical Biofeedback and Health* 1986, 9(2):106.

Cram J, Lloyd J, Cahn T: The reliability of EMG muscle scanning. *International Journal of Psychosomatics* 1990, 37:68.

DeBoer K, Harmon R, Chambers R, Swank L: Inter- and intra-examiner reliability study of paraspinal infrared temperature measurements in normal students. *Research Forum*, Autumn: 4, 1985.

DeJarnette M: *Sacro-occipital technic*, Nebraska City, Nebraska: Privately Published, 1984.

DeJarnette B: *The Philosophy, Art and Science of Sacral Occipital Technique*, Nebraska City, Neb., 1967.

Deyo R, Diehl A: Patient satisfaction with medical care for low-back pain. *Spine* 1986, 11:28.

Deyo R, Diehl A: Reproducibility and responsiveness of health status measures. *Controlled Clinical Trials* 1991, 12:142

Deyo R: Comparative validity of the sickness impact profile and shorter scales for functional assessment in low-back pain. *Spine* 1986, 11(9):951.

Deyo R: Measuring the functional status of patients with low-back pain. *Arch Phys Med Rehab* 1988, 69:1044.

Deyo RA: Measuring the Functional Status of Patients with Low Back Pain. *Chiro Tech* 1990, Vol. 2, #3:127.

Deibert P, England R: Crystalligraphic study: thermal changes and the osteopathic lesion. *J Am Osteo Assoc* 1972, 72:223.

Diakow P: Thermographic Assessment of Sacroiliac Syndrome: Report of a Case. *J Cand Chiro Assoc* 1990, Vol. 34(3): 131.

Dolce J, Raczynski J Neuromuscular activity and electromyography in painful backs: Psychological and biomechanical models in assessment and treatment. *Psychological Bulletin* 1985, 97(3):502.

Donabedian A: The Quality of Medical Care. In: Graham NO (ed): *Quality Assurance in Hospitals*, Rockville, MD: Aspen Publishers, 1982.

Donahue J: Using the Kaminski Model for Evaluating Philosophical Thought. *JMPT* June 1992, Vol. 15 #5.

Doran DML, Newell DJ: Manipulation in the treatment of low-back pain: a multicentre study. *Br Med J* 1975, 2:161-164.

Dorland's Medical Dictionary, 26th Ed. Philadelphia: WB Saunders, 1985.

Dreyer P, Lantz CA: Chiropractic Management of Herniated Disc. Restoration of Disc Protrusion and Management of Disc Integrity as Substantiated by MRI. Proc. of the Intl'l Conf. on Spinal Manipulation. FCER, Arlington, Va. April. 1991:57.

Dvorak J, Froelich D, Penning L, Baumgartner H, Panjabi MM: Functional radiographic diagnosis of the cervical spine: flexion/extension. *Spine* (1988) 13(7):748.

Eddy, J: Designing a Practice Policy. Standard, Guidelines, Options and Clinical Decision Making. *JAMA* 6/13/90, Vol. 263 #2:3077.

Edwards BC: Low-back pain resulting from lumbar spine conditions: a comparison of treatment results. *Aust J Physiother* 1969, 15:104-110.

Ellestad S, Nagle R, Boesler D, Kilmore M: Electromyographic and skin resistance responses to osteopathic manipulative treatment for low-back pain. *J Amer Osteo Ass* 1988, 88(8):991.

Ellwood P: Outcomes Management: A Technology of Patient Experience. *N Eng J Med* 1988, 318:23.

Evans DK: Anterior cervical subluxation. *J Bone Joint Surg (Br)* 1976, 58(3):318.

Evans DP, Burke MS, Lloye KN, Roberts EE, Roberts GM: Lumbar spinal manipulation on trial: Part 1 - clinical assessment. *Rheumatology and Rehabilitation* 1978, 14:46-53.

Fairbanks J, Davies J, Couper J, O'Brien J: The Oswestry low-back pain disability questionnaire. *Physiotherapy* 1980, 66:271.

Farrell JP, Twomey LT: Acute low-back pain: comparison of two conservative treatment approaches. *Med J Aust* 1982, 1:160-164.

Feinstein AR: The need for humanized science in evaluating medication. *Lancet* 1972, 2:241-243.

Fischer A: Tissue compliance meter for objective, quantitative documentation of soft tissue consistency and pathology. *Arch Phys Med Rehabil* 1987, 68:122-125.

Fischer A: Clinical use of tissue compliance meter for documentation of soft tissue pathology. *Clin J Pain* 1987, 3:23-30.

Fischer A: Pressure algometry over normal muscles. Standard values, validity and reproducibility of pressure threshold. *Pain* 1987, 30:115-126.

Fischer A: Application of pressure algometry in manual medicine. *Manual Medicine* 1990, 5:145-150.

Fischer A: Pain and spasm alleviation by physiotherapy. *Arch Phys Med Rehabil* 1988, 69-735.

Flesia J: The Vertebral Subluxation Complex and Patient Aided Home Care. ICA 1992 Convention/Marseilles Prod. Inc. 1990.

Fries J, Crapo L: *Vitality and Aging: Implications of the Rectangular Curve*, San Francisco: WH Freeman, 1981.

Fuhr A, Osterbauer P: A Clinical Approach to the Validation of Activator Methods. Proc. of the Int'l Conf. on Spinal Manipulation. FCER, Arlington, Va. Apr. 1991, 349.

Ganger M, McDowell S: An Investigation of the Effect of Chiropractic Treatment Upon the Mobility of the Spine. *Eur J Chiro* 1985, Vol. 33(3): 143-164.

Gates D: *Spinal Palpation*, Lakemont, GA: CHB, 1981.

Gerzog W, Conway P, Willcox B: Effects of Different Treatment Modalities on Gait Symmetry and Clinical Measures for Sacroiliac Joint Patients. *JMPT*, Feb. 1991 Vol. 14 #2:104-109.

Gibson T, Grahame R, Harkness J, Woo P, Blagrave P, Hills R: Controlled comparison of shortwave diathermy treatment with osteopathic treatment in non-specific low-back pain. *Lancet* 1985, 1258-1261.

Giles L, Taylor J: Low-back pain associated with leg length inequality. *Spine* 1981, 6(5):510.

Glover JL, Morris JG, Khosla T: Back pain: a randomized clinical trial of rotational manipulation of the trunk. *Br J Ind Med* 1974, 31:59-64.

Godfrey CM, Morgan PP, Schatzker J: A randomized trial of manipulation for low-back pain in a medical setting. *Spine* 1984, 9:301-304.

Green JD, Harle TS, Harris JH: Anterior subluxation of the cervical spine: hyperflexion sprain. *AJNR* 1981 2:243.

Grostic JD, DeBoer KF: Roentgenographic measurement of atlas laterality and rotation: a retrospective pre-and post-manipulation study. *J Manipulative Physiol Ther* June 1982, 5(2):63.

Guides to the evaluation of permanent impairment, 3rd edition. Chicago: American Medical Association, 1988.

Haas M: The reliability of reliability. *J Manip Physiol Ther* 1991, 14:199.

Haas M, Nylendo J: Diagnostic Utility of the McGill Questionnaire and the Oswestry Disability Questionnaire for Classification of Low Back Pain Syndrome. *JMPT* Feb. 1992, Vol. 15, #22:
90-98.

Haas M, Nyiendo J: Lumbar motion trends and correlation with low-back pain. A roentgenological evaluation of quantitative segmental motion in lateral bending. Proceedings of the 1991 World Chiropractic Congress, April 29, 1991, Toronto, World Federation of Chiropractic.

Haas M, Nyiendo J, Peterson C, Thiel H, Sellers T, Cassidy D, Yong-Hing K: Interrater reliability of roentgenological evaluation of the lumbar spine in lateral bending. *J Manip Physiol Ther* 1990, 13(4):179.

Hadler NM, Curtis P, Gillings B, Stinnett S: A benefit of spinal manipulation as adjunctive therapy for acute low-back pain: a stratified controlled trial. *Spine* 1987, 12:703-706.

Hadley L: *Anatomical and Roentgenographic Studies of the Spine*, Illinois: Thomas, 1981.

Hadley L: Intersegmental Joint Subluxation, Bony Impingement and Foramen Encroachment with Nerve Root Change. *Am J of Roent & Rad Ther* 1951, 15:377-402.

Haldeman S: *Spinal Manipulation Therapy in the Management of Low Back Pain*, HE Finnegan ed. Toronto: Lippincott, 1973.

Haldeman S, Phillips R: Spinal manipulative therapy in the management of low-back pain. In: Frymoyer J (ed): *The adult spine: Principles and Practice*, New York: Raven Press, 1991.

Hansen D: Outcome assessments in clinical decision making. Proceedings of the 1991 International Conference on Spinal Manipulation. April 12, 1991, Arlington, Virginia. Foundation for Chiropractic Education and Research.

Hansen D: Development and Use of Clinical Algorithms in Chiropractic. *JMPT* Oct. 1991, Vol. 14 #8:478-82.

Harrison: The efficacy of cervical extension-compression traction combined with diversified manipulation and drop table adjustments in the... *J Manipulative Physiol Ther* Sept 1994, 17(7):454-64 [Abstract Online]

Harrison DD, Jackson BL, Troyanovich S, Robertson G, de George D, Barker WF: The efficacy of cervical extension-compression traction combined with diversified manipulation and drop table adjustments in the rehabilitation of cervical lordosis: a pilot study. *J Manipulative Physiol Ther* Sept 1994, 17(7):454.

Herbst R: *Gonstead Chiropractic Science and Art*, Mt. Horib, WI: Scich Pub., 1971.

Herzog W, Conway P, Wilcox B: Effects of different treatment modalities on gait symmetry and clinical measures for sacroiliac joint patients. *J Manip Physiol Ther* 1991, 14(2):104.

Hoehler FK, Tobis JS, Buerger AA: Spinal manipulation for low-back pain. *JAMA* 1981, 2245:1835-1383.

Hoffman R, Kent D, Deyo R: Diagnostic accuracy and clinical utility of thermography for lumbar radiculopathy: A meta-analysis. *Spine* 1991, 16(6):675.

Homewood AE: *The Neurodynamics of the Vertebral Subluxation Complex*, 3rd ed. St. Petersburg, FL: Valkyrie Press, 1977.

Hosek R et al: A triple-bind study of the effects of specific upper cerival adjusting. Presented at the Conservative Health Science Conference, Pasadena TX, November 17-18, 1984.

Howe DH, Newcombe RG, Wade MT: Manipulation of the cervical spine - a pilot study. *Journal of the Royal College of General Practitioners* 1983, 33:547-579.

Hsieh CY: Instrumentation of Reported Low Back Pain Clinical Trials. Proc. of the 1989 Int'l Conf. on Spinal Manipulation, 1989: 2-14.

Hsieh J, Phillips R: Reliability of manual muscle testing with a computerized dynamometer. *J Manip Physiol Ther* 1990, 13(2):72.

Hsieh J: Functional outcomes of low-back pain: A comparison of four treatment groups in a controlled randomized trial. Proceedings of the World Federation of Chiropractic, April 29, 1991, Toronto. World Federation of Chiropractic.

Huskisson S: Measurement of pain. *J Rheum* 1982, 9:678.

Interstudy: An Introduction to Interstudy's Outcomes Management System Development Plans, Excelsior, MN: Interstudy, October, 1990.

Interstudy: User's Manual SF-36 Health Status Questionnaire, Excelsior, MN.: Interstudy, April 10, 1989.

Jackson: Chiropractic biophysics lateral cervical film analysis reliability. *J Manipulative Physiol Ther* (1993 Jul-Aug) 16(6):384-91 [Abstract Online]

Jackson BL, Barker W, Bentz J, Gambale AG: Inter- and intra-examiner reliability of the upper cervical x-ray marking system: a second look. *J Manipulative Physiol Ther* Aug 1987, 10(4):157.

Jackson BL, Harrison DD. Robertson GA, Barker WF: Chiropractic biophysics lateral cervical film analysis reliability. *J Manipulative Physiol Ther* Jul-Aug 1993, 16(6):384.

Jaeger B, Reeves JL: Quantification of changes in myofascial trigger point sensitivity with the pressure algometer following passive stretch. *Pain* 1986, 27:203-210.

Jaeschke R, Singer J, Guyatt G: A Comparison of Seven-Point and Visual Analog Scales: Data from a Randomized Trial. *Controlled Clinical Trials* 1990, Vol. 11:43-51.

Jansen R, Nansel D, Slosbert M Normal paraspinal tissue compliance: The reliability of a new clinical and experimental instrument. *J Manip Physiol Ther* 1990, 13(5):243.

Jensen M, Karoly P, Braver S: The measurement of clinical pain intensity: A comparison of six methods. *Pain* 1986, 27:117.

Jirout J: Studies of the Dynamics of the Spine. *Acta Rad* 1956, 46:55-60.

Jose W: Outcome Measures for Chiropractic Health Care Part I: Introduction to Outcomes Assessment and General Health Assessment Instruments. *Spinal Manip Sum* 1991, Vol. 7 #22:1-5.

Jose W, Adams A, Meeker W: The three-site outcomes assessment project: Status report. Proceedings of the 1991 International Conference on Spinal Manipulation. April 1, 1991, Arlington, Virginia. Foundation for Chiropractic Education and Research.

Jose W: What is outcomes assessment and why should we do it? Proceedings of the 1991 International Conference on Spinal Manipulation, April 12, 1991, Arlington, Virginia. Foundation for Chiropractic Education and Research.

Jull G, Bogduk N, Marsland A: The accuracy of manual diagnosis for cervical zygapophysial joint pain syndromes. *Med J Aust* 1988, 148:233.

Jull G, Bullock M: A motion profile of the lumbar spine in an aging population assessed by manual examination. *Physiotherapy Practice* 1987, 3:70-81.

Kane R, Olsen D, Leymaster C, et al: Manipulating the patient: A comparison of the effectiveness of physician and chiropractor care. *Lancet* 1974, 1 (June):1333.

Kapandji IA: *The Physiology of Joints, Vol. III*, LH Honore Transl. Churchill Livingstone, 1974.

Kassak K: Outcomes measurement assessment: The experience of NWCC. Proceedings of the 1991 International Conference on Spinal Manipulation. April 12, 1991, Arlington, Virginia. Foundation for Chiropractic Education and Research.

Keating JC: Beyond the Theosophy of Chiropractic. *JMPT* 1989, Vol. 12 #4:322.

Keating JC: Traditional Barriers to Standards of Knowledge Production in Chiropractic. *Chiro Tech* 8/90: Vol. 2 #3:78.

Keating JC: Rationalism and Empiricism vs. the Philosophy of Science in Chiropractic. *Chiro Hist* 1990, Vol. 10 #2:23.

Keating J, Bergmann T, Jacobs G, Finer B, Larson K: Interexaminer reliability of eight evaluative dimensions of lumbar segmental abnormality. *J Manip Physiol Ther* 1990, 13(8):463.

Keating J, Giljium K, Menke M, Lonezak R, Meeker W: Toward an experimental chiropractic: Time-series designs. *J Manip Physiol Ther* 1985, 8(4):229.

Kelso A, Johnston W: Use of thermograms to support assessment of somatic dysfunction or effects of osteopathic manipulative treatment: A preliminary report. *J Am Osteo Assoc* 1982, 82:182.

Kent C, Gentempo P: The Documentary Basis for Diagnostic Imaging Procedures in the Subluxation Based Chiropractic Practice. *ICA*, 1992.

Kirkaldy-Willis W, Yong-Hong K, Reilly J: *Pathology and Pathogenesis of Lumbar Spondylosis and Stenosis*, 1978, 3:319.

Kirschner B, Guyatt G: A Methodologic Framework for Assessing Health Indices. *J Chron Dis* 1987, 38:27.

Koes B, Bouter L, Mameren, Essers A, Hofhuizen D, Houben J, Verstegen G, Knipschild: A randomized clinical trial of physiotherapy and manual therapy for chronic back and neck complaints: Results of the physical outcome measures. Proceedings of the 1991 World Chiropractic Congress. April 29, 1991, Toronto. World Federation of Chiropractic.

Korr I: The Spinal Cord as Organizer of Disease, Process I. *JAOA*, 1976. Vol. 76.

Korr I: The Peripheral Nervous System, II. *JAOA*, 1979, Vol. 79.

Korr I: Hyperactivity of Sympathetic Innervation as Common Factor in Disease. *JAOA*, 12/1979 Vol. 79.

Korr I: Axonal Transporty and Neurotrophic Function in Relation to Somatic Dysfunction. *JAOA*, 1981, Vol. 80 #7.

Lawlis G, Cuencas R, Selby D, McCoy C: The Development of the Dallas Pain Questionnaire: An Assessment of the Impact of Spinal Pain on Behavior. *Spine* 1989, 14 #5:511.

Lawlis G, Cuencas R, Selby D, McCoy C: The development of the Dallas Pain Questionnaire. An assessment of the impact of spinal pain on behavior. *Spine* 1989, 14(5):511.

Lawson D, Sanders G: Stability of paraspinal tissue compliance measurements. Proceedings of the 1991 International Conference on Spinal Manipulation. April 12, 1991, Arlington, Virginia. Foundation for Chiropractic Education and Research.

Leach R: An evaluation of the effect of chiropractic manipulative therapy on hypolordosis of the cervical spine. *J Manip Physiol Ther* 1983, 6:17.

Leach R: Thoraco-lumbar asymmetry detected in low-back pain patients with hand-held post-style electrodes. Proceedings of the 1991 International Conference on Spinal Manipulation, April 12, Arlington, Va. Foundation for Chiropractic Education and Research.

LeBoeuf C: The sensitivity of seven lumbo-pelvic orthopedic tests and the arm-fossa test. *J Manip Physiol Ther* 1990, 13(3):138.

LeBoeuf C: The reliability of specific sacro-occipital technique diagnostic tests. *J Manip Physiol Ther* 1991, 14(9):512.

Liebenson C, Phillips R: The reliability of range of motion measurements for human spine flexion: A review. *Chiro Tech* 1989, 1(3):69.

Lochman J: Factors related to patients' satisfaction with their medical care. *J Commun Health* 1983, 9(2):91.

Lohr K: Outcomes measurement: Concepts and questions. *Inquiry* 1988, 25(1):37.

Lopes A, Cassidy D, Yong-Hing K: The immediate effect of manipulation versus mobilization on pain and range of motion in the cervical spine: A randomized controlled trial. Proceedings of the 1991 World Chiropractic Congress. April 29, 1991, Toronto. World Federation of Chiropractic.

Lovell F, Rothstein J, Personius W: Reliability of Clinical Measurements of Lumbar Lordosis Taken With a Flexible Rule. *Phys Ther* Feb. 1989, Vol. 69 #2:96.

MacDonald RS, Bell CM: An open controlled assessment of osteopathic manipulation in nonspecific low-back pain. *Spine* 1990, 15(5):364.

Mannello D: Leg Length Inequality: A Review. Proceedings of the Sixth Annual Conference on Research and Education. June 21-23, 1990. Monterey, CA. Consortium for Chiropractic Research.

Matheson D, Jordan P, Murray M: Reliability of scanning EMG of the paraspinal muscles within and between sessions. *Psychophysiology* 1988, 25:467.

Mathews JA, Mills B, Jenkins VM, Grimes AM, Morkel MJ, Mathews W, Scott CM, Sittampalam Y: Back pain and sciatica: controlled trials of manipulation, traction and sclerosant and epidural injections. *Br J Rheumatol* 1987, 26:416-423.

McDowell I, Newell C: *Measuring Health: A guide to rating scales and questionnaires*, New York: Oxford Press, 1987.

McLachlan C: Enhanced patient decision-making: A role for outcomes management systems. Proceedings of the 1991 International Conference on Spinal Manipulation. April 12, 1991, Arlington, Virginia. Foundation for Chiropractic Education and Research.

Meade TW, Dyer S, Browne W, Townsend J, Frank AO: Low-back pain of mechanical origin: Randomised comparison of chiropractic and hospital outpatient treatment. *Brit Med J* 1990, 300(6737):1431-37.

Mealy K, Brennan H, Fenelon GCC: Early mobilization of acute whiplash injuries. *Br Med J* 1986, 292:656-657.

Meeker W, Gahlinger P: Neuromusculoskeletal thermography: A valuable diagnostic tool? *J Manip Physiol Ther* 1986, 9:257.

Meeker W: Inter- and intra-examiner reliability of thermography. Proceedings of the Fifth Annual Conservative Health Science Research Conference. Davenport, Iowa, October 17, 1986. Palmer College of Chiropractic and the Foundation for Chiropractic Education and Research.

Meeker W, Matheson D, Wong: Lack of evidence for a relationship between low-back pain and asymmetrical muscle activity using a scanning electromyography. Proceedings of the Scientific Symposium of the 1991 World Chiropractic Congress, April 29, 1991, Toronto, Canada. World Federation of Chiropractic.

Melzack P (ed): *Pain measurement and assessment*, New York: Raven Press, 1983.

Melzack R: The McGill Pain Questionnaire: Major properties and scoring Methods. *Pain* 1975, 1:277.

Miol S, Grockman J, Fournier G, Vernon H: A Comparison of Two Objective Measures in Assessing Cervical Range of Motion. Proc. of the Int'l Conf. on Spinal Manipulation. FCER, Arlington, Va. Apr. 1991:79-81.

Million R, Hall W, Nilsen K, Baker R, Jayson M: Assessment of progress of back pain patients. *Spine* 1982, 7:204.

Mootz R, Meeker W: Minimizing radiation exposure to patients in chiropractic practice. *ACA Journal of Chiropractic*, April 1989

Nansel D, Cremata E, Carlson, Szlazak M: Effect of unilateral spinal adjustments on goniometrically-assessed cervical lateral end-range asymmetries in otherwise asymptomatic subjects. *J Manip Physiol Ther* 1989, 12(6):419-427.

Nansel D: Side-specific and level-specific effects of spinal adjustments on cervical lateral-flexion and rotational passive end-range asymmetries. Proceedings of the 1991 World Chiropractic Congress. April 29, 1991, Toronto, World Federation of Chiropractic.

Nansel D, Waldorf T, Cooperstein R: Effect of cervical spinal adjustments on lumbar paraspinal muscle tone - Evidence for facilitation of intersegmental tonic neck reflexes. *J Manip Physiol Ther* (In Press).

Nansel D, Peneff A, Quitoriano J: Effectiveness of Upper vs. Lower Cervical Adjustments with Respect to the Amelioration of Passive Rotational vs. Lateral-Flexion End Range Asymmetries in Otherwise Asymptomatic Subjects. *JMPT* Feb. 92, 15 #2:99-105.

Nelson E, Berwick D: The measurement of health status in clinical practice. *Medical Care* 1989, 27(3):S77

Nelson E, Wasson J, Kirk J: Assessment of function in routine clinical practice. Description of the COOP Chart method and preliminary findings. *J Chronic Dis* 1987, 40(81):55S.

Nicholas J, Sapega A, Kraus H, Webb J: Factors influencing manual muscle tests in physical therapy. The magnitude and duration of force applied. *J Bone Joint Surg* 1978, 60A:186-190.

Nordemar R, Thorner C: Treatment of acute cervical pain: a comparative group study. *Pain* 1981, 10:93-101.

Nouwen A, Bush C: The relationship between paraspinal EMG and chronic low-back pain. *Pain* 1984, 20:109.

Nwuga VBC: Relative therapeutic efficacy of vertebral manipulation and conventional treatment in back pain management. *Am J Phys Med* 1982, 61: 273-278.

Nyiendo J: A comparison of low-back pain profiles of chiropractic teaching clinic patients with patients attending private clinicians. *J Manip Physiol Ther* 1990, 13(8): 437.

Nyiendo J, Haas M, Jones R: Using the Low-back Pain Type Specification Protocol in a Pilot Study of Outcome

Assessment for Low-back (Chiropractic) Patients. Proceedings of the 1991 International Conference on Spinal Manipulation. April 12, 1991, Arlington, Virginia. Foundation for Chiropractic Education and Research.

Nyiendo J, Haas M, Jones R: Using the SF36D (General health status questionnaire) in a pilot study of outcome assessment for low-back pain (chiropractic) patients. Proceedings of the 1991 International Conference on Spinal Manipulation. April 12, 1991, Arlington, Virginia. Foundation for Chiropractic Education and Research.

Nyiendo J, Phillips R, Meeker W, Konsler G, Jansen R, Menon M: A Comparison of patients and patient complaints at six chiropractic teaching clinics. *J Manip Physiol Ther* 1989, 12(2):79.

Nyiendo J: Economic measures used in determining effectiveness and efficiency of chiropractic methods. *Chiro Tech* 1990, 2(3):143.

Ohrbach R, Gale E: Pressure pain threshold in normal muscles: reliability, measurement effects, and topographic differences. *Pain* 1989, 37:257-263.

Ongley MJ, Klein RG, Dorman TA, Eek B, Hubert LJ: A new approach to the treatment of chronic low-back pain. *Lancet* 1987, 2:143-146.

Ottenbacher K, DiFabio R: Efficacy of spinal manipulation/mobilization therapy: A meta-analysis. *Spine* 1985, 10(9): 833.

Owens E, Leach R: Changes in cervical curvature determined radiographically following chiropractic adjustment. Proceedings of the 1991 International Conference on Spinal Manipulation, April 12, 1991, Arlington Virginia. Foundation for Chiropractic Education and Research.

Owens E: Line drawing analyses of static cervical x-ray used in chiropractic. Proceedings of the Sixth Annual Conference on Research and Education. June 21-23, 1991, Monterey, CA. Consortium for Chiropractic Research.

Palmer DD: *The Chiropractors Adjustor: The Science, Art and Philosophy of Chiropractic*, Portland, OR: Portland Print, 1910.

Palmer BJ: *Chiropractic Philosophy, Science and Art*, Davenport, IA: Chiro. Fountainhead, 1955.

Panjabi MM, White A, Brand R: A Note on Defining Body Part Configurations. *J of Biomech* 1974, Vol 7: 385.

Panzer D: Lumbar motion palpation: A literature review. Proceedings of the Sixth Annual Conference on Research and Education. June 21023, 1991, Monterey, CA. Consortium for Chiropractic Research.

Parker G, Tupling H, Pryor D: A controlled trial of cervical manipulation for migraine. *Aust NZ J Med* 1978, 8:589.

Phillips R, Howe J, Bustin G, Mick T, Rosenfeld I, Mills T: Stress x-rays and the low-back patient. *J Manip Physiol Ther* 1990, 13(3):127.

Plaugher G: Skin temperature assessment for neuromusculoskeletal abnormalities of the spinal column: A Review. Proceedings of the Sixth Annual Conference on Research and Education, June 21-23, 1991, Monterey, CA. Consortium for Chiropractic Research.

Plaugher G, Hendricks AH: The interexaminer reliability of the Gonstead pelvic marking system. *J Manipulative Physiol Ther* Nov-Dec 1991, 14(9):503.

Plaugher G, Lopes M, Melch P, Cremeta E: The inter and intra-examiner reliability of a paraspinal skin temperature differential instrument. *J Manip Physiol Ther* 1991, 14(6): 361.

Plaugher G, Cremata E, Phillips R: A retrospective consecutive case analysis of pretreatment and comparative static radiological parameters following chiropractic adjustments. *J Manip Physiol Ther* 1990, 13(9):498.

Rasmussen TG: Manipulation in treatment of low-back pain (a randomized clinical trial). *Maneulle Med* 1978, 1:8-10.

Reeves J, Jaeger B, Graff-Radford S: Reliability of the pressure algometer as a measure of myofascial trigger point sensitivity. *Pain* 1986, 24:313-321.

Roberts F, Roberts E, Lloyd K, Burke M, Evans D: Lumbar spinal manipulation on trial. Part II. Radiological Assessment. *Rheumatol Rehabil* 1978, 17:54.

Robinson R, Herzog W, Nigg B: Use of Force Platform Variables to Quantify the Effects of Chiropractic Manipulation on Gait Symmetry. *JMPT* Aug. 1987, Vol. 10 #4:172.

Rochester RC: Inter- and intra-examiner reliability of the upper cervical x-ray marking system: a third and expanded look. *Chiropractic Research Journal* 1994, 3(1):23.

Roszman T, Carlson SL: Neural-Immune Interactions: Circuits and Networks. *Prog in Neuro Endol Immuno* 1991, Vol. 2:69-78.

Russell G, Raso V, Hill D, Mclvor J: A Comparison of Four Computerized Methods for Measuring Vertebral Rotation. *Spine* Jan. 1990, Vol 15 #1:24-27.

Rydevik BL: The Effects of Compression on the Physiology of Nerve Roots. *JMPT* Jan. 1992, Vol. 15 #1:2-66.

Sandoz R: The choice of appropriate clinical criteria for assessing the progress of a chiropractic case. *Annals of the Swiss Chiropractic Association*, 1985, 8:53.

Sandoz R: Some Physical Measurements and Effects of Spinal Adjustments. *Ann Swiss Chiro Assoc* 1976, 6 #2.

Sandoz R: The Natural History of a Spinal Degenerative Lesion. *Swiss Annals*, 1989:149-197.

Sapega A: Muscle performance evaluation in orthopedic practice. *J Bone Joint Surg* 1990, 72A(10):1562-1574.

Sawyer C: Patient Satisfaction as a Chiropractic Research Outcome. Procceedings of the 1991 International Conference on Spinal Manipulation. April 12, 1991, Arlington, Virginia. Foundation for Chiropractic Education and Research.

Schafer, RC: *Basic Chiropractic Procedural Manual*, 4th Edition, Arlington, VA: 1984.

Schafer R, Faye L: *Motion Palpation and Chiropractic Technic. Principles of Dynamic Chiropractic*, Huntington Beach, CA: Motion Palp Inst, 1981.

Schafer R, Faye L: *Motion palpation and chiropractic technic: Principles of dynamic chiropractic*, Huntington Beach, CA: The Motion Palpation Institute, 1989.

Shambaugh P: Changes in electrical activity in muscle resulting from chiropractic adjustment: A pilot study. *J Manip Physiol Ther* 1987, 19(6):300.

Sharpless SK: Susceptibility of Spinal Roots to Compression Block. Res. Status of Spinal Manipulative Therapy. Wash. 1975, HIH Workshop NINCDS Monograph #15:155-161.

Shekelle P, Adams A, Chassin M, Hurwitz, Phillips R, Brook R: The appropriateness of spinal manipulation for low-back pain. Publication R04-25/1CCR/FCER. Rand Corporation, 1991.

Sher AT: Anterior cervical subluxation: an unstable position. *AJR* 1979, 133:275.

Sigler DC, Howe JW: Inter- and intra-examiner reliability of the upper cervical x-ray marking system. *J Manipulative Physiol Ther* June 1985, 8(2):75.

Simms R, Goldenberg K, Felson D, Mason J: Tenderness in 75 anatomic sites. *Arthritis Rheum* 1988, 31:182-187.

Sims-Williams H, Jayson MIV, Young SMS, Baddeley H, Collins E: Controlled trial of mobilization and manipulation for low-back pain: hospital patients. *Br Med J* 1979, 2:1318-1320.

Spilker B (ed): *Quality of life assessments in clinical trials*, New York: Raven Press, 1990.

Stephenson, RW: *Chiropractic Textbook*, Davenport, Iowa, 1948.

Stewart A, Hays R, Ware J: The M.O.S. short form general health survey: Reliability and validity in a patient population. *Medical Care* 1988, 26(7):724.

Stiga JP, Flexia JM: *The Vertebral Subluxation Complex: Research Insights*, Colo. Springs, CO: Renaissance International, 1982,

Strauss J: Chiropractic Philosophy, *FACE* 1991.

Sucher B: Thoracic outlet syndrome-A myofascial variant: Part 1. Pathology and diagnosis. *JAOA* 1990, 90(8):686.

Suh: Researching the Fundamentals of Chiropractic. *J Bio Conf Spine* U. of Col. #5:1-52, 1974.

Tait R, Pollard C, Margolis R, Duckro P, Krause S: Pain disability index: Psychometric and validity data. *Arch Phys Med Rehabil* 1987, 68:438.

Terret T, Vernon H: Manipulation and pain tolerance: A controlled study of the effect of spinal manipulation on paraspinal pain tolerance levels. *Am J Phys Med* 1984, 63(5):217.

Thabe J: Electromyography as Tool to Document Diagnostic Findings and Therapeutic Results Associated with Somatic Dysfunction in the Upper Cervical Spinal Joints and Sacro-Iliac Joints. *Manual Med* 1986, 2:53-58.

Triano J: The subluxation syndrome: Outcome measure of chiropractic diagnosis and treatment. *Chiro Tech* 1990, 2(3):114.

Triano J, Schultz A: Correlation of objective measures of trunk motion and muscle function with low-back disability ratings. *Spine* 1987, 12(6):561.

Vernon H: Applying research-based assessments of pain and loss of function to the issue of developing standards of care in chiropractic. *Chiro Tech* 1990, 2(3):121.

Vernon H, Aker P, Burns, Viljakaanen, Short: Pressure pain threshold evaluation of the effect of spinal manipulation and treatment of the effect of chronic neck pain: A pilot study. *J Manip Physiol Ther* 1990, 13(1):13.

Vernon H, Mior S: The neck disability index: A study of reliability and validity. *J Manip Physiol Ther* 199, 14(7):409.

Vlasuk S: Standards for thermography in chiropractic practice. In: Vear H (ed): *Chiropractic Standards of Practice and Quality of Care*, Gaithersburg, MD: Aspen Publishers, 1991.

Waagen GN, Haldeman S, Cook G, Lopez D, DeBoer KF: Short term of chiropractic adjustments for the relief of chronic low-back pain. *Manual Medicine* 1986, 2:63-67.

Waddell G, Main C: Assessment of severity in low-back disorders. *Spine* 1984, 9:204.

Waldorf T, Devlin L, Nansel D: The comparative assessment of paraspinal tissue compliance in asymptomatic female and male subjects in both prone and standing positions. *J Manip Physiol Ther* 1991, 14(9):457-461.

Wallace H, Clapper J, Wood J, Wagnon R: A Method for Measuring Changes in Cervical Flexion and Extension Using

Videofluoroscopy. Proc. of the Int'l Conf. on Spinal Manipulation, FCER, Arlington, Va. Apr. 1991, 175-182.

Ware J, Davies-Avery A, Stewart A: The measurement and meaning of patient satisfaction. *Health and Medical Care Services Review* 1978, 1:1.

Ware J, Hays R: Methods for measuring patient satisfaction with specific medical encounters. *Medical Care* 1988, 26:393.

Ware J, Snyder M, Wright W, et al.: Defining and measuring patient satisfaction with medical care. *Evaluation and Program Planning* 1983, 6:247.

Watkins M, Harris B, Kozlowski B: Isokinetic testing in patients with hemiparesis. A pilot study. *Phys Ther* 1984, 64:184-189.

Webster, N: *New Universal Unabridged Dictionary*, 2nd Ed. Wrol. Pub., 1983.

Whatmore G, Kohil D: *The Physiopathology and Treatment of Functional Disorders*, San Francisco: Grune & Stratoon, 1974.

White, Panjabi NM: *Clinical Biomechanics of the Spine*, Philadelphia: Lippincott, 1978.

Youngquist M, Fuhr A, Osterbauer P: Interexaminer reliability of an isolation test for the identification of upper cervical subluxation. *J Manip Physiol Ther* 1989, 12(2), 93.

Zachman Z, Traina A, Keating J, Bolles S, Braun-Porter L: Interexaminer reliability and concurrent validity of two instruments for the measurement of cervical ranges of motion. *J Manip Physiol Ther* 1989, 12(3):205

Zengel F, Davis BP: Biomechanical analysis by chiropractic radiography: Part II. Effects of x-ray projectional distortion on apparent vertebral rotation. *J Manipulative Physiol Ther* Oct 1988, 11(5):380.

Zengel F, Davis BP: Biomechanical analysis by chiropractic radiography: Part III. Lack of effect of projectional distortion on Gonstead vertebral endplate lines. *J Manipulative Physiol Ther* Dec 1988, 11(6):469.

Zylbergold RS, Piper MC: Lumbar disc disease: Comparative analysis of physical therapy treatment. *Arch Phys Med Rehabil* 1981, 62:176-179.

CHAPTER 14
Professional Development

Chapter Outline

I. OVERVIEW

The chiropractic profession has evolved and continues to develop within a similar dynamic process as have other professions. Research in the areas of professional education and continuing education has delineated characteristics of professionalism. These characteristics focus upon the central themes of education, credentialing, professional organizations, ethical considerations and legal reinforcement. Each characteristic speaks to the dynamic development of a profession as it moves toward greater organization, influence, and responsibility to the public that it serves.

This chapter will relate these common characteristics of professionalism to the chiropractic profession and will present models to be used for future development.

II. LIST OF SUBTOPICS

A. Continuing Education

III. LITERATURE REVIEW

The literature search was conducted through primary sources, printed indexes, computerized bibliographic databases and in a library card catalog. Printed indexes searched included the Index to Chiropractic Literature 1980-1990, the Chiropractic Literature Index 1970-1979, and the Chiropractic Research Archives Collection (Vols 1-3). The computerized database searched was Medline, the National Library of Medicine's current medical literature database. Finally, searches for relevant materials were conducted in the card catalog of the David D. Palmer Health Sciences Library.

Both specific thesaurus terms and "keyword" terms were searches in these resources. A sampling of thesaurus, keyword terms and concepts searched included: professional development; continuing education; credentialing; continuing competency; life-long learning programs; diplomate/specialization programs; certification programs; extern programs; preceptorship; residency programs; performance measurement; licensure; licensure and reciprocity; professional associations; ethics and advertising; social responsibility; professional responsibility; peer review; information literacy.

A. Chiropractic Education

The doctor of chiropractic is educated in the basic and clinical sciences as well as in related health subjects. Chiropractic science concerns itself with the relationship between structure (primarily the spine) and function (primarily the nervous system) as that relationship may affect the restoration and preservation of health. The purpose of chiropractic professional education is to prepare the doctor of chiropractic to serve as a primary care, portal of entry practitioner into the health care delivery system. He/she must be well educated to evaluate the patient, to provide care, and to consult with or refer to other health care providers.

All applicants to chiropractic colleges must have successfully completed a minimum of 60 semester hours, or equivalent, of college credits from a nationally recognized accrediting body.

The Council of Chiropractic Education, the national accrediting agency for chiropractic colleges recognized by the U.S. Department of Education for this purpose, produces a standards document specifying requirements for chiropractic educational institutions and programs. However, there is no CCE standard regarding residency or specialty programs. At present, criteria governing postgraduate educational programs are at the discretion of the respective colleges. Numerous national organizations have established chiropractic specialty councils with specific guidelines and requirements determination by those organizations.

The needs of society require that chiropractic practitioners be able to carry out their duties according to the highest possible standards of character, competence and practice. Chiropractic is a philosophy, science, and art based on the application of a complex body of scientific knowledge. Competence in solving problems, capacity to use complex knowledge and a sensitive awareness of ethical problems are related to the entire lifelong learning process of the individual practitioner.

B. Credentialing

Credentialing is a formal means by which the capabilities of the individual practitioner to perform duties at an acceptable level are recognized. The major instrument for licensure within the chiropractic profession is the state government which fulfills this function with guidance from the profession in setting examination policies and testing the applicants.

In all states an applicant for license to practice must supply evidence of successful completion of an approved program of chiropractic education leading to the doctor of chiropractic degree, and proficiency by passing required examinations to demonstrate mastery of basic and practical elements of chiropractic as defined in that state.

National testing for the profession is conducted by the National Board of Chiropractic Examiners. The National Board examinations address basic and clinical sciences. The examination scores are recognized by all states in partial fulfillment of licensure requirements. A subsequent component of licensure is continuing education. The purpose of continuing professional education is to update theoretical knowledge, technique skills and clinical applications. To be effective continuing education should enhance successful clinical performance of practitioners. In addition, continuing education must be truly "continuing," not sporadic or opportunistic, and must be self-directed, with each professional being the ultimate monitor of his or her own learning. The ultimate test of a continuing education program is in the improvement of clinical outcomes and thus the quality of service.

Currently many states require evidence of board-approved continuing education for license renewal. This requirement may range from 24 to 40 hours every two years with some states requiring specific areas of focus for credit hours. While it is recognized that mandatory continuing education requirement for license renewal does not equate with continuing competency, it is the consensus of licensing boards that practitioners need to remain knowledgeable and maintain skills current with standards within the profession.

Postgraduate continuing education is offered in many fields including, including but not limited to, chiropractic neurology, adjustive techniques, pediatrics, fitness and sports injuries, nutrition, and occupational health. These courses are taught and monitored by chiropractic educational institutions and have specific requirements for practitioners to meet board certification status. However, postgraduate specialty programs and credentialing requires individual evaluation with respect to reliability, standardization of education, and its implication regarding quality of care.

C. Ethical Considerations

Ethical principles in chiropractic care focus on patient rights. A code of ethics addresses the professional principles each practitioner should adopt in all interactions with patients, the public, and other practitioners. The International Chiropractors Association has adopted a code of professional ethics that is made available to every member and may be easily referenced by non-members and the general public. ICA holds that ethical professional conduct is an essential component of quality health care in all health professions.

Fundamental values and ethical principles in health care focus around three main principles: beneficence, justice and respect for persons. Respect for persons encompasses a central theme of treating patients as individuals with rights. Patients have the right to know, the right to privacy, and the right to acknowledge and make choices about care. Central to this concept is informed consent, confidentiality and presenting patients with information regarding conditions and remedial care.

This concept also speaks to the practitioner's need to maintain the patient's autonomy by sharing knowledge, providing self-help measures, and avoiding physician dependency. Justice demands universal fairness. Health care resources and opportunities for care should be available regardless of race, creed, and/or economic status. Inherent in this concept is the practitioner's responsibility to maintain standards of quality care, including the consistency of care. Beneficence focuses on the doctor's duty to care. Inherent in this responsibility is the duty "to do good and avoid doing harm."

Both national chiropractic associations and all state chiropractic associations have codified ethics for their members. State licensing boards have laws and administrative rules that include ethical considerations which the practitioner must adhere to for continued licensure.

The practitioner's demeanor and behavior impact greatly on the patient. There is a moral, ethical and professional obligation to treat each patient with skill, dedication and respect. Health care professionals should remain aware of those issues if they are to establish appropriate patient-provider relationships. An optimal supportive doctor/patient relationship is generated by an honest, caring and concerned attitude.

Advertising and marketing are common within all health care professions. Promotion of chiropractic should be in a responsible, informative, and professional manner. State law dictates that advertising should not be false, misleading or deceptive. In addition, promises of cure or statements that would create unjustified expectations of beneficial care should be avoided.

D. Research

Chiropractic researchers, clinicians, and administrators have emphasized the paucity of well-designed research studies in the field of chiropractic practice, and the importance of clinical research to the profession. Individual practitioners have important roles to play in research. Practice experience provides the opportunity to report on clinical phenomena and observations and propose diagnostic and care outcomes in the literature. Clinicians, professional organizations, and chiropractic academic personnel should continue to be involved in and supportive of research activities conjoint with other health care professionals.

V. RECOMMENDATIONS

A. Continuing Education

1. It is expected that every practitioner shall participate in continuing education.

14.1.1	**Rating**:	Necessary
	Evidence:	Class I, II, III

2. Continuing education should be ongoing and should facilitate enhanced clinical performance.

14.1.2	**Rating**:	Recommended

Evidence: Class I, II, III

3. Completion of mandatory continuing education requirements for license renewal does not necessarily assure continuing competency. Those requirements should include assessment of outcomes by administering institutions/organizations to evaluate the effectiveness of their programs.

14.1.3 **Rating**: Recommended
Evidence: Class I, II, III

4. Continuing education should allow for a variety of instructional formats.

14.1.4 **Rating**: Recommended
Evidence: Class II, III

5. Practitioners should continue to educate themselves through critical reading and review of clinical and/or scientific literature.

14.1.5 **Rating**: Recommended
Evidence: Class II, III

B. Postgraduate Education

1. All chiropractic colleges are encouraged to provide residency programs for qualified graduates for the purpose of advanced research, education and clinical practice.

14.2.1 **Rating**: Recommended
Evidence: Class II, III

2. Colleges should provide opportunities for postgraduate programs for professional development which may lead to certification or specialty status.

14.2.2 **Rating**: Recommended
Evidence: Class II, III

3. Practitioners are encouraged to participate in certification or specialty postgraduate education programs (e.g., specialty programs).

14.2.3 **Rating**: Discretionary
Evidence: Class II, III

4. Proprietary programs should affiliate with accredited educational institutions for the purposes of development, evaluation and implementation.

14.2.5 **Rating**: Recommended
Evidence: Class II, III

C. Graduate Education

1. Practitioners are encouraged to participate in programs providing graduate education (e.g., masters or doctorate) offered by accredited educational institutions.

14.3.1 **Rating**: Discretionary

Evidence: Class II, III

D. Professional Organizations

1. Practitioners should be members of one or more professional associations.

14.4.1 **Rating**: Recommended
Evidence: Class II, III

Comment: Professional organizations and associations provide a structure of responsibility through which members develop and maintain awareness of professional developments and gain enhanced professional competence. Practitioners also develop leadership abilities by participating in sponsored conventions, conferences, workshops and other gatherings; receive publications pertinent to the profession; support and encourage legislative programs and otherwise influence public policy in the interests of the public and the profession.

E. Ethics/Standards of Conduct

1. Practitioners should conduct themselves in a manner consistent with a professional code of ethics which addresses morality, honesty and all aspects of professional conduct.

14.5.1 **Rating**: Necessary
Evidence: Class I, II, III

2. Practitioners who advertise should do so in a lawful manner.

14.5.2 **Rating**: Necessary
Evidence: Class I, II, III

Comment: The responsibility for regulation of advertising lies with professional associations and licensing boards. Professional organizations can assist by enforcing guidelines established for the membership; the state licensing boards promulgate rules to aid the profession and safeguard the public. Violation of state or provincial laws can result in fines or suspension or revocation of a license.

F. Research

1. Practitioners are encouraged to participate in research and support institutions/organizations conducting research for the purpose of professional development and improved patient care. Valid research requires appropriate research protocols as approved by recognized institutional review boards.

14.6.1 **Rating**: Recommended
Evidence: Class II, III

V. REFERENCES

Council on Chiropractic Education. *Standards for Chiropractic Institutions*, West Des Moines, IA: Council on Chiropractic Education, 1990.

Davis I: Ethics: an analysis and a theory. *J Chiro* Apr 1990, 27(4): 20-23.

Federation of Chiropractic Licensing Boards. Official Directory of the Federation of Chiropractic Licensing Boards. Kremmling, CO, Federation of Chiropractic Licensing Boards, 1989. Annual.

Haldeman S. ed.: *Modern Development in the Principles and Practice of Chiropractic*; based on a conference sponsored by the International Chiropractors Association, Anaheim, CA. Feb 1979. New York: Appleton-Century-Crofts, 1980. 390 pp.

Haldeman S: Philosophy and the future of chiropractic. *J Chiro* 1990 Jul, 27(7): 23-28.

Hildebrandt R: Chiropractic continuing education: a critical review. *Am J Chiro Med* 1989 Sep, 2(3):89-92.

Houle CO: *Continuing Learning in the Professions*, San Francisco: Jossey-Bass, 1980. 390 pp.

International Chiropractors Association, Code of Ethics, 2000, Arlington, VA

Kelner M, Hall O, Coulter I: *Chiropractors: Do They Help? A Study of Their Education and Practice*, Toronto: Fitzhenry & Whiteside, 1980. 303 pp.

Kumerow RP: *Inspector General Report Regarding State Licensure and Discipline of Chiropractors*, 1989.

Lawrence DJ: Research and responsibility. *J Manipulative Physiol Ther* 1984 Sep, 7(3): 179-181.

Mauer EL: *Selected Ethics and Protocols in Chiropractic*, Gaithersburg, MD: Aspen Publishers, Inc. 1991. 273 pp.

Rosenthal SF: *A Sociology of Chiropractic*, Lewiston, NY: Edwin Mellen Press, 1986. 15 pp.

Thompson IE: Fundamental ethical principles in health care. *Br Med J (Clin Res)* 1987 Aug 8, 295(6594):388-9.

Vear HJ, ed.: *Chiropractic Standards of Practice and Quality of Care*, Gaithersburg, MD: Aspen Publishers, Inc., 1991. 303 pp.

CHAPTER 15
Diagnostic Imaging

Chapter Outline

I. OVERVIEW

The purpose of all imaging technologies utilized by the chiropractic profession is primarily to gain analytical information concerning the vertebral subluxation and other malpositioned articulations and structures. Historically, basic radiography has been the sole imaging modality used. Although basic radiography continues to be the primary imaging technology for chiropractic analysis, recent developments in imaging technology have provided additional methods for gaining visual information about the vertebral subluxation and other malpositioned articulations and structures.

This document presents the current knowledge concerning the proper utilization of imaging technology with particular emphasis on the clinical rationale, necessity, and significance of these technologies. It is not intended for this document to be a definitive work, but rather a basic framework which will be expanded as new information is gained through ongoing research in this subject area.

Analysis of the vertebral subluxation complex often depends upon examination procedures requiring interpretation by the chiropractor.

Traditionally Chiropractic has defined the vertebral subluxation in terms of four criteria:

1. Loss of juxtaposition of a vertebra with the one above, the one below, or both.

2. Occlusion of an opening.

3. Nerve impingement.

4. Interference with the transmission of mental impulses.

A contemporary definition of the vertebral subluxation complex proposes a minimum five components:

1. Spinal kinesiopathology consisting of abnormal vertebral position, motion, or lack of motion.

2. Neuropathology due to compression, stretching, or irritation of neural tissue.

3. Myopathology characterized by hyperactivity, spasm, weakness, atrophy, or fibrosis.

4. Histopathology including swelling, inflammation, degeneration, and other abnormalities occurring at the cellular and tissue level.

5. Bio-chemical changes/pathology consisting of local damage to the spine and contiguous soft tissues, and pathology in peripheral structures such as viscera, muscles, and glands. (Lantz)

Both models incorporate biomechanical, bio-chemical and pathophysiological components. In clinical practice, documenting and quantifying these changes poses a formidable challenge. A number of procedures have been employed in chiropractic practice to detect and characterize vertebral subluxations including but not limited to:

1. Detection of biomechanical and structural abnormalities

    A. Postural analysis
    B. Static palpation
    C. Motion palpation
    D. Static radiography
    E. Functional radiology, including videofluoroscopy
    F. Computed tomography
    G. Magnetic resonance imaging

2. Detection of neurophysiological changes

    A. Orthopedic examination
    B. Neurological examination
        1. Reflexes
        2. Muscle tests
        3. Dermatome examination
        4. Functional leg checks
        5. Nerve tracing
    C. Thermography
    D. Electrodiagnostic studies

II. RATIONALE FOR UTILIZATION OF IMAGING TECHNOLOGIES

A. Prime Directive

Imaging methods shall be utilized for the purpose of obtaining information concerning the vertebral subluxation and other malpositioned articulations and structures, primarily the misalignment component, although advanced imaging can also provide important information regarding foraminal alteration, nerve impingement, and aberrant motion.

The use of such procedures shall be based on gathering clinical evidence that vertebral subluxation and other malpositioned articulations and structures is present in the patient. The danger of ionizing radiation, present in most imaging, contraindicates the use of these procedures without clinical justification. The use of non-ionizing procedures should be governed by accepted clinical protocol with the primary concern being for the patient's safety.

B. Secondary Directives

1. Selection of Adjusting Technique

Imaging procedures may be utilized to provide information concerning the physical structure of the patient's spinal column, skull, and pelvis and/or other articulations of the skeleton, for the purpose of selecting or modifying an adjusting technique appropriate to the unique anatomic structure of that patient.

2. Contraindication Disclosure

Imaging procedures may be utilized to disclose possible contraindications to the application of adjustic forces to the spine.

C. Tertiary Directive

To protect the patient's overall welfare, the doctor shall inform the patient of all findings disclosed by an imaging procedure.

The doctor shall inform the patient of those findings which are normally found in such an examination, and distinguish those normal findings from any which are unusual.

III. RISK/BENEFIT ANALYSIS

The risk/benefit analysis is a theoretical model that governs the practice of health care. It provides a paradigm within which the merits of a health care procedure can be discussed. Simply put, only those procedures which are predicted to have a greater likelihood of providing a benefit to the patient than they have of causing the patient harm are justified. It is theoretical since the risk/benefit odds associated with a procedure and any one individual patient cannot be specifically quantified.

A. Adult patients

The risk associated with obtaining a radiographic image utilizing maximum safety procedures, of the adult patient, is minimal. With demonstration of clinical necessity, the benefit of such a procedure to the analysis of the vertebral subluxation and other malpositioned articulations and structures, and thereby to the patient, is high. The risk/benefit analysis favors the use of radiographic producers in the adult patient.

14 x 36 FULL SPINE RADIOGRAPHY

Full spine radiography has always been an integral part of the science of chiropractic. Studies preclude common misconception about full spine radiography. Advances in technology continue to reduce radiation exposure in these procedures. Plaugher/Lopes states, “With the advances in taking full spine radiographs, the patient is exposed to less radiation than standard sectional views when the entire spine must be visualized.”

In certain circumstances, the doctor of chiropractic has employed so-called "split screen" techniques. Split screens compensate for differences in body part thickness by using intensifying speeds of different speeds in the same cassette. For example, lower speed screens may be used in the cervical region, and faster screens in the lumbar-pelvic region. Today, such techniques are obsolete. Instead, supplemental filtration is used to compensate for differences in body part thickness, and single-speed screens are used. Dosimetry studies using supplemental filtration and single-speed screens revealed that the 14 x 36 AP spinograph actually resulted in lower radiation levels than sectional AP films of like sized subjects.

As Hildebrandt observed, "It has been shown that it is possible to produce reasonably good diagnostic quality full-spine roentgenographs with less radiation exposure to the patient than when the same full spine areas are exposed by smaller sectional views." Phillips states, "Anteroposterior views of the spine on a 14 x 36 inch exposure can be produced with acceptable quality." Hildebrandt cites a comparative study conducted by the Bureau of Radiological Health stating, "In this study, it was shown that it was in fact possible to obtain diagnostic full-spine films with a skin dose exposure as low as 128.8 mR, while separate lumbar and thoracic films taken according to standard exposure practices delivered 166.1 and 184.5 mR respectively. Buehler and Hrejsa evaluated lead-acrylic compensating filters in chiropractic full spine radiography. They concluded that this system "is capable of producing full spine radiographs with good to above average imaging quality." It was further noted that this filtration system was generally equivalent in radiation dose reduction to other systems.

The criticism that the distortion inherent in 14 x 36 radiographs precludes accurate biomechanical assessment also seems unfounded. Plaugher and Hendricks evaluated the inter-examiner reliability of the Gonstead pelvic marking system. Concordance on exact numerical values was poor. However, from a clinical standpoint, agreement for categorizing listings was impressive. Inter-examiner concordance for listings of the ilia, sacrum, symphysis pubis, and femur head height was evaluated by calculating the kappa values for each. The resulting kappa values ranged from .4849 (moderate) to .8161 (excellent).

In addition to Gonstead pelvic analysis, proponents of 14 x 36 full spine radiography also use the procedure to evaluate vertebral body rotation and lateral flexion malposition. Zengel and Davis investigated how projectional distortion affects such determinations. They concluded, "as long as a given osseous segment is compared to its adjacent segment (as in analysis for subluxation), the apparent vertebral rotation may be regarded as a sufficiently accurate representation of the actual rotation of the vertebra." In reference to vertebral endplate lines used to assess lateral flexion malpositions, these authors stated, "In every instance, off centering produced no measurable effect on the position of the constructed Gonstead lines. We therefore conclude that these lines may be confidently used. No correction for projectional distortion seems necessary." Logan and Barge analytical methods have been used in chiropractic to determine vertebral rotation. The Bunnell method is a recognized medical procedure employed by that profession to determine rotational deviations.

CERVICAL SPINE RADIOGRAPHY

Sigler and Howe conducted an inter- and intra- examiner reliability study of a method for measuring atlas laterality. Twenty x-rays were marked by three different doctors. This study concluded that because of the ranges of error, differences produced using this system will be just as likely due to marking error as from actual atlas position change. Although frequently cited by those opposing upper cervical spinographic analysis, this study has several significant shortcomings. These include small sample size and a conclusion which cannot properly be drawn from the data presented.

Other studies have yielded results supporting the reliability of cervical spinographic techniques. Grostic and DeBoer did a retrospective study of 523 patients evaluating roentgenographic measurements of atlas laterality and rotation pre and post adjustment. Statistically significant changes in the postulated direction of atlas positioning were reported. Jackson et al studied the inter- and intra-examiner reliability of upper cervical x-ray marking. Six practitioners evaluated thirty radiographs. The study revealed very good intra- and inter- examiner reliability for the procedure employed. Leach investigated the effect of chiropractic care on hypolordosis of the cervical spine. A significant improvement in the cervical curve was noted in patients receiving chiropractic care. Barge's observations in Cobb angle reductions in scoliosis also reported reduced cervical angulation through chiropractic adjustive care. Before and after x-rays in torticollis often indicate improved cervical alignment following a course of chiropractic adjustive care.

The radiation burden for upper cervical spinography is minimal, particularly when compared to radiation intensive imaging techniques such as CT scanning. Although it is sometimes argued that post adjustment studies double the radiation dose to the patient, this is generally untrue. Post adjustment studies typically involve fewer exposures than the initial series. Although cervical spine radiography does expose radiosensitive tissues (such as the thyroid gland) to the useful beam, the information gained generally justifies the study. This is particularly true when rare earth screens and fast films are employed, and when the presentation of future chronic spinal distortions are anticipated.

B. Pediatric patients

The risk associated with obtaining a radiographic image of the pediatric patient, those under 16, is higher than that of the adult patient due to the fact that ionizing radiation is more damaging to rapidly dividing cells. The benefits of such procedures are the same as they are for the adult patient. The risk/benefit analysis favors discretion in the use of radiographic procedures in the pediatric patient.

The doctor of chiropractic is responsible for determining the safety and appropriateness of chiropractic care. This responsibility includes the detection and characterization of vertebral subluxations and other malpositioned articulations and structures as well as examining for conditions where chiropractic care is contraindicated or referral to another health care provider is indicated. In children, the accurate evaluation and early intervention in certain spinal cases provides a defensible rationale for employing x-ray analysis as some structural distortions, such as scoliosis, can most effectively be addressed in the childhood years

RADIATION SAFETY

Plain film radiography has been the mainstay of imaging in most chiropractic practices. Growing concern for the hazards of ionizing radiation and the availability of alternative imaging techniques may cause this to change. According to a recent National Research Council report, low doses of x-radiation pose a human cancer risk three to four times higher than previously reported. The report also noted that some fetuses exposed to radiation face a higher than expected risk of mental retardation.

This does not mean that the chiropractor should abandon plain film radiography. It does mean developing increased awareness of the judicious use of ionizing radiation, and implementing radiographic procedures which minimize risk and maximize the amount of information obtained from the study. Radiation protection is particularly important when x-raying infants, children, adolescents, and adults in their reproductive years. It has been stated that "For examination of the skeleton, there is no modality to match the time and cost effectiveness of the plain film radiograph."

The Bureau of Radiological Health emphasizes the importance of clinical judgment in selecting radiographic procedures. The Bureau also recognizes the right of the attending doctor to make benefits vs. risks determinations in selecting radiographic procedures. A Bureau publication states, in part:

In almost every medical situation, when the physician feels there is reasonable expectation of obtaining useful information from roentgenological examination that would affect the care of the individual, potential radiation hazard is not a primary consideration. . .The physician should retain complete freedom of judgment in the selection of roentgenologic procedures, and (the physician) should conform with good technical practices.

In selecting any examination, it has been suggested that a given procedure be considered "necessary" under the following circumstances:

1. The outcome of the test will be used in determining the nature of the care administered.

2. The test itself is reliable.

3. More cost effective procedures that are equally reliable or more reliable are not available.

The following are indications for pediatric radiologic examination:

1. History of trauma with clinical signs suggestive of fracture or dislocation.

2. Clinical suspicion of infection or neoplasm.

3. Clinical evidence of a congenital or developmental anomaly which could alter the nature of the chiropractic care rendered, or which may itself require care.

4. When clinical findings are equivocal, and the suspected condition can be detected or ruled out by plain film radiography.

5. When other examination procedures fail to disclose the nature of the condition, and the patient is not responding favorably to care.

6. To characterize the biomechanical component of the vertebral subluxation and other malpositioned articulations and structures complex when such characterization is necessary to render chiropractic care, and less hazardous alternative examinations are not available.

7. To evaluate patient response to chiropractic care when such evaluation may alter the nature of the care being rendered, and less hazardous alternative examinations are not available.

PEDIATRIC RADIOLOGY OF THE SKELETON

Trauma is the most frequent indication for skeletal radiographic evaluation. In addition, congenital, neoplastic, and infectious conditions may warrant x-ray studies. Accurate interpretation of pediatric radiographs is dependent upon an understanding of the appearance of ossification centers at various stages of development, and an appreciation of normal radiographic anatomy. A history of spinal curvatures, such as scoliosis, also indicates the possible need for x-ray evaluation of the pediatric spine.

Evaluation of pediatric spine films also requires that the doctor interpreting the films understand the pitfalls involved in imaging pediatric spines. Patient motion is an ever-present problem. Even when short exposure times are used to limit the effects of motion on the finished radiograph, a true postural study may be difficult to obtain. Immobilization of an uncooperative patient may yield a film that is useful diagnostically, but may not accurately depict subluxation related pathomechanics.

VARIATIONS IN DEVELOPMENT

A lack of segmentation of the primitive sclerotome results in a "block vertebra." In this condition, two vertebrae appear structurally as one, and function as one. The failure of the non-segmented vertebra to contribute to the composite motion of the region affected may lead to hypermobility and degenerative changes at other segmental levels. When non-segmentation occurs at the occipito-atlanto articulation, the term "occipitalization" is applied. While non-segmentation by itself rarely produces neurological compromise, brainstem or cord compression have been reported in cases of upper cervical fusion.

Other variations may also occur in the upper cervical spine. In children, the atlanto-dental interspace should not exceed 5 mm. An increase may be due to congenital absence of the transverse ligament as seen in Down's syndrome. Although previously considered of little clinical significance, increased participation by such children in athletic activity requires careful assessment of the upper cervical spine. Flexion-extension studies are advocated for such children to assess possible atlantoaxial subluxation. Juvenile rheumatoid arthritis or traumatic rupture of transverse ligament may also result in an increased atlanto-dental interspace.

Variations also occur in the development of the odontoid process. The tip of the dens develops from an ossification center which appears at age 2 and unites at 10 to 12 years. If such union does not occur, a terminal ossicle remains. If the dens remains ununited at its base, the condition is termed os odontoideum. Instability and cord compression may result. Hypoplasia or congenital absence of the dens may also occur, resulting in an unstable articulation.

A number of additional variations have been reported which may be encountered by the chiropractor:

1. Klippel-Feil Syndrome. This condition is characterized by multiple block vertebrae of the cervical spine. The patient may present with a short neck, low hairline, and genitourinary anomalies. The condition predisposes the spine to injury and possible cord damage.

2. Sprengel's deformity. Congenital non-descent of the scapula can often be detected clinically. Radiographs will demonstrate an omovertebral bone in 30-40% of cases.

3. Cervical ribs. Ribs may arise from a lower cervical segment. These ribs may cause neurovascular compression (scalenus anticus syndrome) later in life. In children they are usually asymptomatic.

4. Butterfly vertebra. A sagittal cleft in a vertebral body may occur, usually in the thoracic or lumbar spine. Most are asymptomatic and clinically insignificant.

5. Hemivertebra. Failure of the lateral half of a vertebral body to develop produces a lateral hemivertebra. The inevitable consequence is a scoliosis. Rarely, a dorsal or ventral hemivertebra occurs, which may cause an alteration of lordotic and kyphotic curves.

6. Spina bifida. Spina bifida occulta is a failure of fusion of the posterior elements of a spinal segment without meningeal protrusion. It is often seen at the L-5 level, and is usually of minimal to no clinical significance. It does not generally perceived to increase susceptibility to athletic injury. As with any other abnormal structural variation the presence of spina bifida occulta may warrant examination in greater detail than would a normal spine. Spina bifida manifesta or vera, however, leaves the cord unprotected and is a serious condition.

7. Facet tropism. Asymmetry of the facets at the L5/SI level may produce asymmetrical biomechanics and joint dysfunction.

8. Knife clasp deformity. Spina bifida occulta in association with an elongated LS spinous process may result in painful and limited extension.

9. Transitional vertebrae. Lumbarization of SI or sacralization of L5 may occur. Tini, Wieser, and Zinn examined 4000 radiographs and concluded that persons with transitional vertebra did not exhibit any more backaches than controls. Abnormal mechanics produced by the condition, however, may lead to premature disc degeneration at other levels.

10. Defects in the pars interarticulars that may lead to spondylolisthesis may also indicate need for restrictive exercise activities and competitive sports due to susceptibility to injuries.

In addition to structural variation, functional variation in the pediatric spine warrants careful consideration by the chiropractor. Sullivan et al examined lateral cervical radiographs on 100 normal children, and discovered that in 20% of cases C2 appeared subluxated anteriorly on C3. This phenomenon is usually observed in children under 9 years of age, and is due to the more horizontal facet orientation in the younger child. It is particularly pronounced in flexion.

Cattell reported that 15% of normal pediatric spines demonstrate absence of the cervical lordotic curve or a single level kyphosis. Whether these "normal" findings represent early changes predisposing to subluxation degeneration has not been explored. Following subjects with these purportedly "normal" "pseudosubluxations" throughout life, and comparing the incidence of degenerative changes in the spine with controls is suggested as an area for additional research.

PEDIATRIC SPINE FRACTURES

Children under 16 account for 7% or less of injuries to the spine. Although pediatric spine injuries are relatively uncommon, their prompt recognition and proper management are essential in chiropractic practice.

Motor vehicle (including motorcycle) accidents account for over 50% of the injuries, with team sports, diving injuries, and gunshot wounds accounting for most of the rest. The most common areas of injury are the cervical spine and the thoracolumbar junction. It is suggested that in cases of spinal trauma, plain AP and lateral radiographs be taken of the entire cervical, thoracic, and lumbar spine. This is due to the high occurrence of contiguous and non-contiguous injuries. If an abnormality is detected on plain film, computed tomography (CT) may be useful in characterizing bony abnormalities. In cases of neurological involvement, magnetic resonance (MR) imaging is the technique of choice.

Denis et al reported that 50% of deaths due to pediatric spine injuries were associated with injuries to the occipito-atlanto complex. According to Henrys et al upper cervical injuries are more common in children and adolescents. The Powers ratio can be used to assess such injuries on plain radiographs. Jefferson fractures are rare in children. Two cases, aged 7 and 12 years, have been reported in the literature. The most frequently encountered fracture of the axis is the dens fracture although five cases of bilateral pedicle (hangman) fractures in children were reported by Pizzutillo et al. Lower cervical spine fractures are seen more frequently in adolescents than young children. Most are associated with flexion-compression injuries in collision sports.

A variety of fractures may present in the pediatric thoracic and lumbar spine. The most common vertebral fracture seen in children under 10 years of age is the compression fracture. The cause is a compressive flexion force. Seatbelt injuries result in a compressive distractive force. Fracture through the bone as well as soft tissue damage may result. Unlike the compression fracture, which usually does not result in significant morbidity, the seat belt fracture may require bracing, casting, or surgery. Spondylolysis has been related to extension-flexion injuries, and its early detection can help prevent a lifetime of chronic problems. Gunshot injuries and child abuse are other causes of spine fractures. Avulsion fractures of the spinous processes in the cervical spine and compression fractures in the thoracic and lumbar region may occur as a consequence of violent shaking.

PEDIATRIC SPINE NEOPLASMS

Spine tumors in children are uncommon. While it is estimated that 80% of adults will seek professional care at some time for back pain, only 2% of children and adolescents presenting at an orthopedic clinic complained of back pain. Spine tumors in children may be primary benign tumors, primary malignant tumors, or metastatic tumors.

Primary Benign Tumors

a. Osteochondroma. This tumor is simply an exostosis. It is the most common benign tumor of bone, although only 2% occur in the spine. They rarely cause symptoms.

Osteoid osteoma. About 1% of spine tumors are osteoid osteomas, seen more frequently in males than females, and usually appearing between the ages of 10 and 25 years. The posterior elements are involved more frequently than the vertebral body.

The lumbar spine is affected more frequently than the cervical or thoracic region. Localized pain, worse at night, and relieved by aspirin is characteristic. Osteoid osteoma is the most frequent cause of a painful scoliosis.

Osteoblastoma. Approximately 40% of these lesions occur in the spine. Most patients are under 30 years of age, and the posterior elements are involved more frequently than the vertebral bodies. Like osteoid osteoma, pain is frequently the presenting symptom. Unlike osteoid osteoma, however, the pain is not worse at night. Neurological deficit is present in over 50% of cases.

b. Aneurysmal bone cyst. Although these tumors account for only 1% of primary bone tumors, 11 to 22% occur in the spine. These lesions are usually painful. Neurological deficit may result from the expansile nature of the lesion.

c. Eosinophilic qranuloma. This lesion occurs in the second or third decade of life, and may not be a true neoplasm. The clinical presentation is often that of an adolescent with back pain. Vertebra plana often occurs, but neurological deficit is rare. In the absence of neurological deficit, the condition is self limited, and reconstitution of height is the rule. This condition was previously reported as Calve's disease, incorrectly believed to be a form of juvenile ischemic necrosis.

Primary and Metastatic Malignant Tumors

Multiple myeloma. This tumor usually occurs in patients over 50 years of age, but rarely is seen in young patients. Multiple lytic lesions and altered serum proteins are characteristic.

Ewings sarcoma. This tumor rarely involves the spine, but when it does, localized painis usually present. The 5-20 year old age group is most affected. Metastasis may occur. This is an aggressive and potentially fatal tumor.

Lymphoma. This rare condition may be seen in young adults. An "ivory vertebral' appearance is characteristic. Metastasis may occur. This is another potentially fatal tumor.

Osteosarcoma. Primary involvement of the spine is rare, and spinal osteosarcoma is usually due to metastasis. Less than 2% originate in the spine. The condition is most commonly seen in the second decade of life. Spinal involvement may be difficult to treat. The condition is potentially fatal.

Chondrosarcoma, fibrosarcoma, and chordoma rarely occur in children or adolescents. Metastasis to the spine in children is most frequently from neuroblastoma and leukemia.

PEDIATRIC SPINE INFECTIONS

Infections in the pediatric and adolescent spine are uncommon in the United States. When infections do occur, the route is usually hematogenous. There are four main categories of pediatric spinal infections.

Discitis. This condition usually follows a benign course. Low grade fever, irritability, back rigidity, muscle spasm, and tenderness may present clinically. Care consists primarily of immobilization and rest. Antibiotics are sometimes employed.

. Non-tuberculous vertebral osteomyelitis. This rare condition is far more serious than disc space infection. Toxemia may be evident. High fever may occur, and the child appears very ill. Back pain may or may not be present. Staphylococcus aureus is the most common bacteria isolated.

Tuberculosis of the pediatric spine. The age of onset of this condition is usually between 2 and 5 years of age. The usual site is the thoracic and lumbar vertebral bodies. A reversal of the height:width ratio of the vertebral bodies may occur. The condition may lead to neurological involvement and skeletal deformity.

Spinal epidural abscess. These are among the most serious infections of the spine, and may lead to paraplegia and death. The patients often present with pain, high fevers, and appear very ill. Unlike osteomyelitis, however, plain film radiographs often appear normal. Magnetic resonance imaging is the technique of choice in such cases.

ADOLESCENT IDIOPATHIC SCOLIOSIS

Scoliosis may be due to muscular imbalance, structural asymmetry such as congenital malformations, decompensation of adaptational curves, or may be idiopathic. At one time adolescent idiopathic scoliosis was now considered a purely hereditary condition. Recent investigators have reported abnormal proprioceptive function believed due to a posterior column abnormality. Abnormal writing reflex functions may be related to balance mechanisms located in the brain stem or in the spine. Abnormal vibratory sensation in both upper and lower extremities suggests that the lesion is located in the cervical spinal cord. The role of the vertebral subluxation and other malpositioned articulations and structures complex in this process deserves further study as evidence is accumulating to indicate positive outcomes achieved through chiropractic care.

SCHEURMANN'S SYNDROME

This condition is sometimes known as juvenile kyphosis. The etiology is controversial, but is generally believed due to an abnormality of the cartilagineous end plate. This results in anterior Schmorl's node formation. The 13-17 age group is most frequently affected.

LEGG-CALVE-PERTHES DISEASE

Legg-Calve-Perthes disease is an avascular necrosis affecting the capital femoral epiphysis. Males are affected more than females. The condition is usually unilateral. Weight bearing may lead to deformity. The disease is self-limited.

OTHER EPIPHYSEAL DISORDERS

Numerous eponymic disorders of developing epiphyseal centers have been described. Some are believed due to trauma or overuse (e.g. Sever's disease of the Os calcis and Osgood-Schlatter's disease of the tibial tubercle). Others are believed due to osteonecrosis.

SPONDYLOLYSIS AND SPONDYLOLISTHESIS

The incidence of spondylolysis is 4 to 6%. It is several seen before the age of 5, and most cases occur during the adolescent growth spurt. Most authors now view spondylolysis as a stress fracture. Anterior displacement of the involved vertebral body may lead to spondylolisthesis and pathomechanical changes. The association of the condition with back pain is highly variable.

Plain film radiography is the mainstay of imaging in most chiropractic practices. The use of ionizing radiation in examining any patient, including children and adolescents, should be based on clinical need. The primary responsibilities of the doctor of chiropractic include determining the safety and appropriateness of chiropractic care, locating and correcting vertebral subluxations and other malpositioned articulations and structures, and the correction of aberrations from normal that may lead to future spinal curvatures. The judicious use of various imaging techniques may be invaluable in achieving these objectives.

A. Pregnant women

The risk/benefit analysis favors avoidance of radiographic procedures in the pregnant woman, especially in the 1st trimester.

A Bureau of Radiological Health publication states: In almost every medical situation, when the physician feels there is reasonable expectation of obtaining useful information from roentgenological examination that would affect the care of the individual, potential radiation hazard is not a primary consideration...the physician should retain complete freedom of judgment in the selection of roentgenologic procedures, and (the physician) should conform with good technical practices.

B. Radiation therapy patients

The risk/benefit analysis favors discretion in use of radiographic procedures in the radiation therapy patient.

C. Rebalancing of the risk/benefit analysis equation

The risk/benefit analysis is a dynamic thought process, and as such, is subject to a rebalancing that may countermand the general guidelines as in the following situations:

1. Trauma: The presence of trauma may increase the benefit portion to an extent which supercedes the risk portion and provide, for the use of radiographic procedures in a patient for whom such procedures were previously contraindicated.

2. Negative changes in the patient's general health: The presence of negative changes in the patient's general health may increase the benefit portion to an extent which supersedes the risk portion and provide for the use of radiographic procedure in a patient for whom such procedures were previously contraindicated.

3. Surgery: Surgical procedures may increase the benefit portion to an extent which supersedes the risk portion and provide for the use of radiographic procedures in a patient for whom such procedures were previously contraindicated.

4. Unusual or unexpected reaction to an adjustive procedure: A severe reaction to an adjustive procedure may increase the benefit portion to an extent which supersedes the risk portion and provide for the use of radiographic procedures in a patient for whom such procedures were previously contraindicated.

5. Patient history: A family history of back pain, spondylolythesis, congenital abnormalities, scoliosis and other curvatures may also increase the benefit portion.

IV. LIST OF SUBTOPICS

A. Plain film radiography
B. Video fluoroscopy
C. Magnetic resonance imaging
D. Computed tomography
E. Ultrasonography
F. Contrast studies
G. Radioisotopic scanning
H. Services/billing

V. RECOMMENDATIONS

A. Plain film radiography

Purpose:

1. To provide information concerning the hard tissue components of the spine, skull and pelvis, or other skeletal structure.

2. To provide information concerning the misalignment component of the vertebral subluxation, or other articulation.

3. To provide information concerning the foraminal alteration component of the vertebral subluxation.

4. To provide information concerning the dynamics of spinal motion.

6. To provide information concerning abnormal spinal contours.

7. To detect anomalous structures that may contribute to spinal distortions, sacral plateau abnormalities, etc.

Clinical Necessity

Plain film radiography may be employed when clinical data indicates the likely presence of a condition which may affect patient care. This includes biomechanical assessment as well as determining the presence of spinal and/or extraspinal pathology, injury, or developmental variation.

Technical consideration

1. Machine selection: General guidelines (ALARA & AHARA) provide for the use of machine that will produce the best image possible with the lowest patient dosage.

   a. Single phase units: These units are acceptable but provide for greater patient exposure than other types of equipment.

   b. Three phase units: These units provide superior image quality with patient dosages which are lower than single phase.

   c. Medium or high frequency units: These units provide image quality that is superior to single phase, with patient dosages comparable to three phase, and the advantage of easier installation.

2. Film/screen combinations: General guidelines provide for the use for a film/screen combination that will provide for acceptable image quality with the maximum reduction

in patient dose.

3. KVP/MAS Selection: General guidelines provide for the use of a fixed KVP/variable MAS technique to provide maximum image quality with optimum patient safety.

    a KVP: An optimum kilovoltage should be utilized for the region of interest. This selection should be based on the machine and film/screen manufacturer's specifications.

    1. MAS: Milliampere seconds should be governed by the measured thickness of the region of interest or by an automatic exposure control (ARC) system. This selection should be based on the machine and film/screen manufacturer's specifications.

4. FFD/SID Selection: General guidelines provide for the use of a distance appropriate to the OFD/PFD.

    a. A shorter distance (40") is appropriate when the OFD/PFD is zero.

    b. A longer distance is appropriate when the OFD/PFD is anything other than zero.

5. Filtration: General guidelines provide for the use of filtration to reduce patient dose.

    a. Inherent filtration: This is primarily a manufacturer's specification in accordance with the WCRP recommendation #33.

    b. Added filtration: This should be utilized to reduce the patient dose over region of interest where the use of a shield would limit analytical value, and for visually equalizing areas of the patient's body which are of unequal radiographic density.

6. Grids: General guidelines provide for the use of grids to prevent secondary radiation from reaching the film. The use of grids improves radiographic quality and should be employed as per manufacturer's specification.

7. Shielding: General guidelines provide for the use of shielding to eliminate patient dose over radiosensitive areas.

    a. Collimation: Maximum collimation to limit the primary beam to the area of interest is the primary method of eliminating unnecessary radiation exposure.

    b. Gonadal shielding: This is most appropriate for the male patient, since the gonads are not in the region of interest of a spinograph. It may also be used on the female patient if the doctor is not seeking to obtain analytical information from an area which would be obscured by the shield.

    c. Lead apron shielding: A lead apron may be employed to eliminate possible primary beam exposure of the patient in areas other than the region of interest. This type of shielding is of little practical value however, if close collimation is employed.

8. Processing: General guidelines provide for the use of optimum darkroom technique to obtain the maximum image quality. Manual or automatic processing techniques are acceptable.

Analysis

1. Minimum initial study: Regional studies generally include a minimum of two views taken at opposition of 90 degrees. Exceptions, however, are not uncommon, such as examination of the pelvis and some post-adjustment films which need only be a single view. The clinical judgement of the attending doctor shall determine the needs of each patient, with due regard to minimizing radiation exposure.

2. Extra views: Additional views shall be added as clinically indicated to provide full analysis.

3. Regional studies: Views may be obtained either by region of interest or in full spine as required by the technique selected. Due to the dangers inherent in the radiographic process, only those areas of clinical interest shall be x-rayed.

4. Postural studies: Views may be obtained in various postural positions as clinically required. It is acknowledged and accepted that this may result in more than one view per projection with posture being the variable.

7. Repeat studies: Due to the dangers inherent in radiation exposure, repeat studies should only be used as clinically required.

15.1.1. **Rating**: Strong Positive Recommendation
Strength: I, L

B. Videofluoroscopy

The first known fluoroscopic image was produced by Roentgen in 1895. Roentgen placed his hand between an x-ray source and a fluorescent screen, and was astonished to see an image of the bones of his hand on the screen. One year later fluoroscopic screens became available, and the technique was employed for 'real time', observation of human structures. In the 1950's, electronic image intensification systems became readily available. Using electronic image intensification, the fluoroscopic image is amplified, resulting in an improvement in image quality and a reduction in radiation levels. When the image is recorded on motion picture film, the procedure is termed cineradiography. If a video recording is made, the term videofluoroscopy is employed.

In chiropractic, a leading pioneer in spinal fluoroscopy was Earl Rich. Fred Illi employed the technique in studying spinal biomechanics. Joseph Howe conducted fluoroscopic studies of the spine, and reported instances where the technique revealed abnormalities not demonstrated on plain films. Current chiropractic interest in fluoroscopy is evidenced by the formation of the Joint Motion Study Research Society, and the offering of certificate courses in videofluoroscopy by CCE accredited chiropractic colleges.

TECHNIQUE

A videofluoroscopic system consists of an x-ray generator capable of operating at low (1/4 to 5) milliamperage settings, an x-ray tube assembly, an image intensifier tube, a television camera, a

VCR, and a monitor. The heart of the system is the image intensifier tube. This tube permits imaging at very low radiation levels. It is used instead of intensifying screens and film as an image receptor.

An image intensifier tube consists of four key components in an evacuated glass envelope:

1. Input phosphor and photocathode. The input phosphor is similar to the intensifying screen used in conventional radiography. It emits light when energized by x-rays. When light from this screen strikes the photocathode, electrons are emitted.

2. Electrostatic focusing lens. A series of electrically charged plates focus the electron beam as it flows toward the output phosphor.

3. Accelerating anode. This positively charged electrode is located in the neck of the tube. It accelerates the electrons toward the output screen.

4. Output phosphor. The output phosphor produces light when energized by electrons. It is coupled to a television camera.

The signal from the video camera is fed to a monitor and VCR, where it can be observed and recorded.

CLINICAL APPLICATIONS

In considering the use of any examination employing ionizing radiation, the clinician should ask:

1. Does the potential yield of information justify the exposure?

2. Will the outcome of the study affect the care or management of the case?

3. Are less hazardous, equally reliable techniques available?

Several authors have addressed these issues. Observational and case studies have appeared in the literature comparing the diagnostic yield of fluoroscopic studies vs. plain films. In addition, studies have been published reporting abnormalities detected by fluoroscopy which could not be appreciated on plain films.

Bland states, "Clearly, cineradiography is the best method for the study of biomechanics and dynamics of motion in the cervical spine. . .The determination of normal motion, sites of greatest and least motion, contribution by joints, discs, ligaments, tendons, and muscles to motion (and their limitations), and the biomechanics of normal motion of the occiput-atlas-axis complex all have been studied very successfully through cineradiography." According to Ochs, "Cineradiography, using film or videotape, is shown in a study of 34 painful or injured necks to be a valuable clinical tool. It is useful in fracture management, analysis of instability and demonstration of solid healing. A video tape system featuring instant replay, clear image and low radiation exposure was found to be ideal for routine use."

Buonocare, Hartman, and Nelson examined the cervical spines of 107 patients using cineradiography, including 57 who sustained flexion-extension injuries. They concluded, "The ability to demonstrate localized abnormal motion in the cervical spine allows one to predict soft-tissue injuries and the quality of spinal fusions, spinal stability, and early subluxation of the cervical spine-conditions that may not be identified on static roentgenograms nor at physical examination."

Jones studied abnormalities of the upper cervical spine using cineradiography, and concluded, "Cineradiography has been used to detect instability not ascertainable by routine roentgenograms obtained in flexion and extension...." In a case study of abnormal atlanto-axial motion, Tasharski noted, "Interpretation by means of standard static radiographs failed to disclose the nature of the functional post-traumatic disorder. Cinefluorographic visualization of the articulation in motion demonstrated abnormal mobility." Woesner and Mitts also concluded that fluoroscopic studies often revealed abnormalities undetected on plain films.

They stated, "There were, however, a significant number of instances in which cineroentgenography demonstrated abnormal motion not detected on conventional roentgenograms. Cineroentgenography is, therefore, a valuable adjunctive technique and its continued utilization in the analysis of cervical spine motion is justified."

Numerous applications for spinal fluoroscopy have been reported in the medical literature. These include recording the effects of cervical spine traction, evaluating cervical spine stenosis, laminectomies, examining athletes presenting with pain, to assist in surgical planning, evaluating atlanto-axial rotatory fixation, examining the effects of cervical collars, characterizing joint disorders in the cervical spine, studying degenerative disease of the cervical spine, and determining the effects of occipitalization and odontoid hypoplasia on spinal motion.

In addition to the studies cited, applications for fluoroscopy in chiropractic have been reported in chiropractic trade publications, indexed peer reviewed literature, and presented at chiropractic symposia. Gillet, Henderson, Dorman and Howe used fluoroscopy to study cervical spine kinetics. Shippel and Robinson described a case where fluoroscopy and magnetic resonance imaging were used to evaluate cervical spine instability. Leung used fluoroscopy to evaluate the cervical spine and concluded, "Cineradiography has been found to be the method of examination that conveys most functional abnormalities. The diagnostic value of cineradiography is substantiated. The effect of chiropractic adjustment in removal of cervical fixations was proven with cineradiography."

Chiropractors Foreman and Croft in their textbook Whiplash Injuries state, "This motion study of the spine may be quite useful in detecting abnormal biomechanics secondary to ligamentous damage that may be unappreciated with plain film radiography." Cineradiography or fluorovideoradiography plays an important role in the diagnosis of aberrant spinal biomechanics that may be secondary to chronic muscle contracture, scar tissue formation, or ligamentous instability."

Antos, Robinson, Keating and Jacobs presented the results of an interexaminer reliability study of cinefluoroscopic detection of fixation in the mid-cervical spine. Two examiners reviewed fifty videotapes of fluoroscopic examinations of the cervical spine. The examiners achieved 84% agreement for the presence of fixation, 96% agreement for the absence of fixation, and 93% total agreement. The Kappa value was .80 ($p<.0001$). Only the C4/C5 level was examined. The authors concluded, "The current data indicate that VF determination of fixation in the cervical spine is a reliable procedure."

Other chiropractic authors have described applications for fluoroscopy. Taylor and Skippings used the procedure to study paradoxical motion of the atlas in flexion. Betge described applications for fluoroscopy in the analysis of dysfunctions of the cervical spine. Masters and Mertz both used fluoroscopy to evaluate spinal motion. Robinson and Sweat have also published articles concerning chiropractic applications for fluoroscopy.

In addition to patient evaluation studies, fluoroscopy has also been used to study normal motion in the spine. Bronfort and Jochumsen used cineradiography to evaluate intermediate stages and extremes of intervertebral motion in the lumbar spine. Fielding and Howe described normal motion of the cervical spine based on cineradiographic examinations.

Persons critical of the use of videofluoroscopy to evaluate joint motion, particularly in the cervical spine, appear to be applying a more burdensome standard than that required of other imaging techniques. It is suggested that such critics consider the following:

1. Videofluoroscopy is not a new procedure. Fluoroscopic studies of the spine have been reported in the medical literature for several decades.

   Numerous observational and case studies have been published in indexed peer reviewed journals.

1. At least one chiropractic study concluded that fluoroscopy was a reliable technique for evaluating fixation in the mid-cervical spine.

   Many investigators have reported that fluoroscopic studies revealed abnormalities (some potentially lethal) that could not be appreciated on plain films.

   An evaluation of diagnostic procedures for spinal disorders published in Spine concluded that cineradiology's usefulness - in conditions where radicular compression was presumed, spinal stenosis was confirmed, and in symptomatic post-surgical patients, has been demonstrated in non-randomized controlled trials. The same report noted that it was common practice to use the technique in cases of localized spinal pain and pain radiating to an extremity.

   Diagnostic imaging is by its very nature an "observational" procedure requiring a skilled examiner to interpret the findings.

   Imaging studies are one part of the data set used by a clinician to make a diagnosis and formulate a care plan. The findings of any imaging study must be integrated with the history, physical, and laboratory findings in a given case. Thus the claim that fluoroscopy is not "...a diagnostic entity unto itself" could be applied to any imaging technique.

THE ISSUE OF RADIATION EXPOSURE

Critics of videofluoroscopy frequently express concern for the radiation exposure produced by the procedure. According to Robinson, 60 seconds of videofluoroscopy is equivalent to 2 to 7 plain films. Pierce states that videofluoroscopy of the cervical spine can be performed at 1/4 MA.
This would result in radiation levels even lower than those reported by Robinson. Howe states that "The radiation dose to the patient is not significantly higher than that incurred in plain film studies."

The issue of radiation exposure is clouded by authors claiming that fluoroscopy is "...a functional study only..." and that "...it is quite possible to miss subtle pathology." The assumption is made that a full complement of plain films will be taken in addition to the fluoroscopic study. If, however, up to 60 seconds of low milliamperage fluoroscopy is substituted for the static flexion/extension views normally taken in a Davis series, the radiation burden to the patient will be roughly equivalent, and the potential diagnostic yield far greater. Even if fluoroscopy is used in addition to a full Davis series, the diagnostic yield may justify the exposure in cases where the plain films fail to demonstrate an abnormality which is suspected clinically.

INDICATIONS FOR VIDEOFLUOROSCOPY

Any technique involving exposure to ionizing radiation should be used judiciously. Several authors have suggested indications for videofluoroscopic studies. They include:

1. Flexion-extension injuries

2. Direct injury

3. Postoperative evaluation

4. Assessment of hypermobility associated with subluxation when such information cannot be obtained by other more cost-effective means

5. Suspected ligamentous instability

6. Presumed radicular compression

7. Spinal stenosis

8. Scoliosis, structural and functional curvature evaluation.

TECHNICAL CONSIDERATIONS

For chiropractors employing videofluoroscopy:

1. Fluoroscopic studies should not be routinely employed. The decision to order a fluoroscopic study should be based on demonstrated clinical need.

2. All fluoroscopy should be performed with electronic image intensification.

3. The beam should be collimated to the smallest possible size which will demonstrate the area of clinical interest.

4. Gonad shielding should be employed when it will not obliterate the structures under examination.

5. The fluoroscopic image should be recorded on videotape or other appropriate medium to enable the chiropractor to review the study without requiring excessive repetition of a given movement.

6. "Beam on" time should be kept to the minimum necessary to characterize the abnormality.

   Chiropractors performing videofluoroscopic studies should have training in fluoroscopic technique and interpretation.

Technical Considerations

1. Machine selection: General guidelines provide for the use of recently manufactured equipment which is capable of low dose image acquisition.

2. Factor selection: Optimum factors should be selected as per manufacturer's specifications.

3. Shielding: General guidelines provide for the use of shielding to eliminate patient dose over radiosensitive areas outside of the area in interest.

Analysis

Stress study similarity: Although similar to the analysis of plain film stress studies, which are generally taught in the chiropractic curriculum, the interpretation of videofluoroscopy should be done by a doctor trained in the specific analysis of this type of study.

Series

1. Adjunctive procedure: Videofluoroscopy should be used as an adjunctive procedure to plain film studies, and not as a replacement for those studies.

2. Repeat studies: Due to the dangers inherent in radiation exposure, repeat studies should only be used as clinically required.

15.2.1. **Rating**: Positive recommendation
Strengths: E, L

C. Magnetic Resonance Imaging (MRI)

Provides information concerning both hard and soft tissue spinal structure in a single imaging format.

Clinical Necessity

MR imaging may be employed to visualize soft tissue structures (e.g., nerve roots) and hard tissue structures (e.g., bone) in a single imaging format.

Technical Consideration

1. Machine selection: Due to the great expense associated with MR imaging units, it is unlikely that they will be purchased by private practitioners.

2. Factor selection: Optimum factors should be selected as per manufacturer's specifications.

3. Safety: At this time there are no known detrimental effects associated with this procedure, taking into account manufacturer's published contraindications.

Analysis

MR image interpretation has only recently been introduced in the chiropractic college curriculum; for this reason, interpretation should be done by a doctor trained in the specific analysis of this type of study.

Series

Due primarily to the high cost per image, MR image studies should be limited to those cases in which standard analytical measures are inadequate.

15.3.1. **Rating**: Discretionary
Strength: E, L

D. Computerized Tomography (CT)

Clinical Necessity

1. CT imaging may be employed to visualize spinal structures in planes other than those available through plain film radiography.

2. Current usage provides information concerning pathological states. However, it is possible to obtain information concerning the misalignment, foraminal alteration and nerve impingement, components of the classically defined vertebral subluxation and other malpositioned articulations and structures, through the use of CT images.

Technical Consideration

Machine selection: Due to the expense associated with CT imaging units, it is unlikely that they will be purchased by private practitioners.

2. Factor selection: Optimum factors should be selected as per manufacturer's specifications.

Safety: Since CT is an x-ray imaging modality, patient protection protocols associated with all ionizing radiation imaging equipment apply.

Analysis

CT image interpretation is taught to a small degree in the chiropractic college curriculum; for this reason, primary interpretation of these images should be done by a doctor specifically trained in the analysis of this type of study.

Series

Due to the concern for radiation safety, CT image studies should be limited to those cases in which standard analytical measures are inadequate.

15.4.1. **Rating**: Discretionary
Strength: E

E. Ultrasonography

Ultrasonography may be used to visualize soft tissue structures of the musculoskeletal system. It is an established procedure for the evaluation of extraspinal soft tissues structures, such as the thyroid gland and the abdominal aorta. In spine imaging, it has been used to measure the central canal to determine stenosis. Other spinal applications are under investigation.

Clinical Necessity

Investigational, ultrasonography has been used for visualizing soft tissue structures of the musculoskeletal system. This use may ultimately provide information which would be germane to chiropractic practice.

15.5.1. **Rating**: Investigational
Strength: E

F. Contrast studies

A doctor of chiropractic may refer a patient for contrast studies when clinically indicated.

15.6.1. **Rating**: Discretionary

G. Radioisotope scanning (Nuclear medicine)

A doctor of chiropractic may refer a patient for nuclear medicine studies when clinically indicated.

15.7.1. **Rating**: Discretionary

H. Services/Billing

1. Technical Component

   The technical component is that part of the radiographic service that includes: providing the facilities, equipment, personnel, and supplies necessary to obtain a satisfactory image.

2. Professional Component

   The professional component is that part of the radiographic service that includes the analysis and documentation of the findings evident on the radiographic image.

   1. Medical radiologist use: As some chiropractors use the services of a medical radiologist in obtaining radiographs, it is conceivable that two professional charges may exist for the same study. This does not represent an unethical practice as each provider is producing a unique non-duplicative impression of the radiograph. The medical radiologist is commenting on the medical/pathological significance germane to his/her specialty, and the chiropractor on the vertebral subluxation and other malpositioned articulations and structures analysis germane to his/her specialty.

   2. Specialist in Chiropractic Imaging use: Some chiropractors may choose to consult with a chiropractic radiologist for further clarification. As the chiropractic radiologist is a doctor who has completed post graduate studies to obtain a level of interpretive proficiency greater than that taught on the basic chiropractic college level, the use of such a professional is acceptable and may ethically result in two professional charges per study.

3. Standards for Billing

   a. Codes: The standard current procedural terminology (CPT) codes used in general radiology are used for third party reimbursement of chiropractic radiographic procedures.

      1. The use of these codes may be broken into: technical component only, professional component only, or global (combined technical and professional components).

15.8.1. **Rating**: Strong positive recommendation
Strength: E

VI. SUMMARY

A. Discussion

Diagnostic imaging is an important part of the chiropractic examination. Imaging studies may be used to assess the biomechanical component of the vertebral subluxation and other malpositioned articulations and structures complex, as well as determine the presence of traumatic injuries, pathology, and developmental variants which may affect patient care. This includes spinal and extraspinal structures. Procedures which involve the use of ionizing radiation should be employed only when clinical need is established by the history and clinical assessment. The potential benefits of a proposed imaging procedure should be carefully weighed against the risks and cost. The most cost effective procedure which will provide the information needed should be employed whenever possible.

VII. REFERENCES

ACR Board of Directors. *Policy statement on videofluoroscopy* -Adopted September 14, 1989.

Aldrete JA: Diagnostic ultrasound in pain management: an overview. *Am J Pain Management* 1994, 4(4):160.

Alexander C: Scheurmann's disease. A traumatic spondylodystrophy? *Skel Radiol* 1977, 1:209.

Anderson DJ, Adcock DF, Chovil AC, Farrell JJ: Ultrasound lumbar canal measurement in hospital employees with back pain. *Br J Ind Med* 1988, 45(R):552.

Angtuaco E, McConnell J, Chadduck W, Flanagan S: MR imaging of spinal epidural sepsis. *Am J Roentgenol* 1987, 149:1249.

Antos J, Robinson GK, Keating JC, Jacobs GE: *Interexaminer reliability of cinefluoroscopic detection of fixation in the mid-cervical spine*. Proceedinas of the Scientific Symposium on Spinal Biomechanics, International Chiropractors Association, 1989. p. 41.

Antos J, Robinson K, Keating J, Jacobs G: Interrater reliability of fluoroscopic detection of fixation in the cervical spine. *Chiropractic Technique* 1990, 2(2):53.

Apel D, Tolo V: Infections of the spine in childhood and adolescence. *Spine: State of the Art Reviews.* 1990, 4(1):85.

Armstrong and Wastic: *Diagnostic Imaging*. Blackwell Scientific Publications, 2nd Ed., 1987.

Bale J, Bell W, Dunn V et al: Magnetic resonance imaging of the spine in children. *Arch Neurol* 1986, 43(12):1253.

Ball and Moore: *Essential Physics for Radiographers*, Blackwell Scientific Publications, 2nd Ed., 1987.

Bard G, Jones MD: Cineradiographic analysis of laminectomy in cervical spine. *AMA Arch Surg* 1968, 97:672.

Bard G, Jones MD: Cineradiographic recording of traction of the cervical spine. *Arch Phys Med* 1964, 45:403.

Barge FH: *AIdiopathic@ Scoliosis: Identifiable Causes Detection and Correction*, Baldwin Brothers Inc., 2^{nd} ed. 1986.

Batzdorf U, Batzdorf A: Analysis of cervical spine curvature in patients with cervical spondylosis. *Neurosurgery* 1988, 22(5):827.

Becker E, Griffiths HJ: Radiologic diagnosis of pain in the athlete. *Clin in Sports Med* 1987, 6(4):699.

Betge G: The value of cineradiographic motion studies in the diagnosis of dysfunction of the cervical spine. *J Clin Chiro* 1979, 2(6):40.

Bland JH: *Disorders of the Cervical Spine*, Philadelphia: W.B. Saunders Co, 1987. p. 144.

Bohlman H: Acute fractures and dislocations of the cervical spine: An analysis of three hundred hospitalized patients and review of the literature. *J Bone Joint Surg* 1979, 61A:1119.

Boston H Jr., Bianco A Jr., Rhodes K: Disc space infections in children. *Orthop Clin North Am* 1975, 6:953.

Bronfort G, Jochumson OH: The functional radiographic examination of patients with low back pain. *JMPT 1984, 7(2):89.*

Brunton FJ, Wilkerson JA, Wise KS, Simonis RB: Cineradiography in cervical spondylosis as a means of determining the level for anterior fusion. *J Bone and Joint Surg* 1982, 64-B(4):399.

Buehler MT, Hrejsa AF: Application of lead-acrylic compensating filters in chiropractic full spine radiography: a technical report. *J Manipulative Physiol Ther* (1985 Sep) 8(3):l75-80.

Bunnell W: The natural history of idiopathic scoliosis. *Clin Orthop* 1988, 229:20.

Buonocare E, Hartman JT, Nelson CL: Cineradiograms of cervical spine in diagnosis of soft-tissue injuries. *JAMA* 1966, 198(1):143.

Cailliet, R: *Scoliosis: Diagnosis and Management*, 1975. FA Davis Company 2nd printing 1977.

Campanna R, Albisinni U, Picci P: Aneurysmal bone cysts of the cervical spine. *J Bone Joint Surg* 1985, 67A:527.

Castellvi A, Goldstein L, Chan D: Lumbosacral transitional vertebrae and their relationship with lumbar extradural defects. *Spine* 1984, 9:493.

Chance G: Note on a type of flexion fracture of the spine. *Br J Radiol* 1948, 21:452.

Chovil AC, Anderson DJ, Adoock DF: Ultrasonic measurement of lumbar canal diameter: a screening tool for low back disorders? *South Med J* 1969, 82(8):977.

Council on Chiropractic Imaging Handbook, International Chiropractors Association, 1992.

Cullen J: Spinal lesions in battered babies. *J Bone Joint* sula 1975, 57B:364.

Denis F, Winter R, Lonstein J: *Pediatric spinal injuries*, Proceedings of 22nd Annual Meeting of Scoliosis Research Society. September 15-19, 1987. Vancouver, BC, Canada.

DeSouza Dias L, Frost H: Osteoblastoma of the spine: A review and report of eight new cases. *Clin Orthop* 1973, 141.

Dich V, Nelson J, Haltalin K: Osteomyelitis in infants and children. A review of 163 cases. *Am J Dis Child* 1975, 129:1273.

Duneker S, Brown O, Thompson N: Craniovertebral anomalies. *Clin Neurosurg* 27:430, 1980.

Duthoy M, Lund G: MR imaging of the spine in children. *Eur J Radiol* 1988, 8(3):188.

Ebrall P, Molyneux T: Rotary subluxation of the atlas: an explorationof the diagnostic potential of the CT scan. *Chiropractic Journal of Australia* 1993, 23:42.

Eiken N: *Roentgen Diagnosis of Bones*, Chicago: Year Book Medical Publishers, 1975.

Eisenberg RL: Radiology: An Illustrated History. *Mosby Year Book*, St. Louis 1992.

Ellett W: *Biological Effects of Ionizing Radiation (BEIR V)*, National Research Council. Washington, DC, 1990.

Engel JM, Engel, GM, Gunn DR: Ultrasound of the spine in focal stenosis and disc disease. *Spine* 1985, 10(10):928.

Evans D, Bethem D: Cervical spine injuries in children. *J Pediat Orthop* 1989, 9:563.

Fallon J: The role of the chiropractic adjustment in the care and treatment of 332 children with otitis media. *Journal of Clinical Chiropractic Peditrics* 1997; 2(2):167-184.

Farfan H, Sullivan J: The relationship of facet orientation to intervertebral disc failure. *Can J Surg* 1967, 10:179.

Fielding J, Hensinger R: *Fractures of the cervical spine*, In Rockwood C, Wilkins K, King K (eds) *Children's Fractures*, Philadelphia: J.B. Lippencott, 1984.

Fielding JW, Hawkins RJ: Atlanta-axial rotatory fixation. *J Bone and Joint Surg* 1977, 59-A(1):37.

Fielding J, Fietti V, Hughes J, Gabrielian J: Primary osteogenic sarcoma in the cervical spine. *J Bone Joint Surg* 1976, 58A:892.

Fielding JW: Normal and selected abnormal motion of cervical spine from second cervical vertebra based on cineroentgenography. *J Bone and Joint Surg* 1964, 46-A:1779.

Fischer AQ, Carpenter DW, Hartlage PL, Carroll JE, Stephens S: Muscle imaging in neuromuscular disease using computerized real-time sonography. *Muscle Nerve* 1988, 11(3):270.

Fisher E, Green C Jr, Winston K: Spinal epidural abscess in children. *Neurosurgery* 1981, 9:257.

Fitz C: Diagnostic imaging of children with spinal disorders. *Pediatr Clin North Am* 1985, 32(6):1537.

Foreman SM, Croft AC: *Whiplash Injuries: The Cervical Acceleration/Deceleration Syndrome*, Baltimore: Williams and Wilkins, 1988. p. 114, 133.

Fornage BD, Touche DH, Segal P, Rifkin MD: Ultrasonography in the evaluation of muscular trauma. *J Ultrasound Med* 1983, 2(12):549.

Friedlander G, Southwick W: *Tumors of the spine*, In Rothman R, Simeone F(eds): *The Spine*, 2nd ed. Philadelphia: W.B. Saunders, 1982.

Fullerton GD, Potte JL: Computed tomography. In: Putnam CE, Ravin CE (eds): *Textbook of Diagnostic Imaging*. WB Saunders, Philadephia, 1994.

Galasko C: Tumors of the spine. *Spine: State of the Art Reviews* 1990, 4(1):101.

Gillet H: A cineradiographic study of the kinetic relationship between the cervical vertebrae. *Bull Eur Chiro Union* 1980, 28(3):44.

Glasser O: *Dr. W. C. Roentgen*, Springfield, IL: Charles C. Thomas, 1945.

Graif M, Seton A, Nerubai J, Horoszowski H, Itzchak Y: Sciatic nerve: sonographic evaluation and anatomic-pathologic considerations. *Radiology* 1991, 181(2):405.

Green N: Adolescent idiopathic scoliosis. *Spine: State of the Art Review Series* 1990, 4(1):211.

Grenier N, Kressel HY, Scheibler ML, Grossman RI, Dalinka M: Normal degenerative posterior spinal structures: MR Imaging. *Radiology* 1987, 162(2):517.

Grostic JD, DeBoer KF: Roentgenographic measurement of atlas laterality and rotation: a retrospective pre- and post-manipulation study. *J Manipulative Physiol Ther* (1987 Aug) 10(4): pp. 157-63.

Hadley L: *Anatomico-roentgenographic Studies of the Spine*, Springfield, IL: Charles C. Thomas.

Haldeman, S: *Modern Development in the Principles and Practice of Chiropractic* (ed.). Appleton-Century-Crofts, 1980.

Hay M, Paterson D, Taylor T: Aneurysmal bone cysts of the spine. *J Bone Joint* 1978, 6OB:406.

Henderson DJ, Dormon TM: Functional roentgenometric evaluation spine in the saggital plane. *JMPT* 1985, 8(4):219.

Henrys P, Lyne E, Lifton C, Salciccioli G: Clinical review of cervical spine injuries in children. *Clin Orthop* 1977, 129:172.

Hensinger R, Lange J, McEwan G: Klippel-Feil syndrome: A constellation of associated anomalies. *J Bone Joint Surg* 1974, 56:1246.

Hildebrandt RW: *Chiropractic Spinography*, Des Plaines, IL: Hilmark Publications, 1977, pp. 18.

Howe JW: Cineradiographic evaluation of normal and abnormal cervical spinal function. *J of Clinical Chiro* 1972, 2:76.

Hubbard D: Injuries of the spine in children and adolescents. *Clin Orthop* 1974, 100:56.

Ippolito E, Ponseti I: Juvenile kyphosis: Histological and histochemical studies. *J Bone Joint Surg* 1981, 63A:175.

Jackson B, Harrison D, Robertson G, Barker W: Chiropractic Biophysics lateral cervical film analysis reliability. *J Manipulative Physiol Ther* 193 Jul, 16(6):384-391.

Jackson BL, Barker W, Bentz J, Gambale AG: Inter- and intra-examiner reliability of the upper cervical x-ray marking system: a second look. *J Manipulative Physiol Ther* (1987 Aug) 10(4): pp. 157-63.

Janin Y, Epstein J, Carris R, Kahn A: Osteoid osteoma and osteoblastoma of the spine. *Neurosurgery* 1981, 8:31.

Jenkinson S: Undescended scapula with associated omovertebral bone: Sprengells deformity. *J La State Med Soc* 1977, 129:13.

Jirout, Jan: Roentgen Studies of the Dynamics of the Cervical Spine. *Renaissance International*, 1985.

Jones MD: Cineradiographic studies of abnormalities of high cervical spine. *AMA Arch Surg* 1967, 94:206.

Jones MD: Cervical spine cineradiography after traffic accidents. *Arch of Surg* 1962, 85:974.

Jones MD: Cineradiographic studies of collar immobilized cervical spine. *J Neurosurg* 1960, 17:633.

Jones MD, Stone BS, Bard G: Occipitalization of atlas with hypoplastic odontoid process, a cineroentgenographic study. *Calif Med* 1966, 104:309.

Jones MD: Cineradiographic studies of various joint diseases in the cervical spine. *Arthritis & Rheumatism*. 1961, 4:422.

Jones MD: Cineradiographic studies of degenerative disease of the cervical spine. *J Canad Assoc Radiol* 1961, 12:52.

Kaplan PA, Anderson JC, Norris MA, Matamoros A Jr: Ultrasonography of post-traumatic soft tissue lesions. *Radiol Clin North Am* 1989, 27(5):973.

Karnaze MG, Gado MH, Sartor KJ, Hodges FJ 3d: Comparison of MR and CT myelography in imaging the cervical and thoracic spine. Kent, Gentempo: MR Imaging of Subluxation Degeneration. *Chiropractic Research Journal,* 1990.

Kent, Gentempo: *The Documentary Basis for Diagnostic Imaging Procedures in the Subluxation Based Chiropractic Practice*. International Chiropractors Association, 1992.

Kewalramani L, Krauss J: Cervical spine injuries resulting from collision sports. *Paraplegia* 1981, 19:303.

Kewalramani L, Tori J: Spinal cord trauma in children: Neurologic patterns, radiologic features, and pathomechanics of injury. *Spine* 1980, 5:11.

Klose U, Requardt H, Schroth G, Deimling M: MR tomographic demonstration of liquor pulsation. *ROFO* 1987, 147(3): 313.

Kleirunan P, Zito J: Avulsion of the spinous process caused by infant abuse. *Radiology* 1984, 151:389.

Koentges A: Computerized axial tomography of the spine in the differential diagnosis of vertebral subluxations. Annals of the Swiss Chiropractors= Association, 1985, 8:25.

Kopits S, Perovic M, McKusick P: Congenital atlantoaxial dislocations in various forms, of dwarfism. *J Bone Joint Surg* 1972, 54A:1349.

Koyangi I, Isu T, Iwasaki Y, Akino M, et al: Radiological diagnosis of chronic spinal cord compressive lesion at thoraco-lumbar junction. *No Shinkei Geka* 198, 16(11):1227.

Kricun R, Kricun ME: Computed tomography. In: Kricun ME (ed): *Imaging Modalities in Spinal Disorders*. W.B. Saunders, Philadelphia, 1988.

Kulkarni MV, Narayana PA, MCArdle CB, Yeakley JW, et al: Cervical spiine MR imaging using multislice gradient echo imaging: comparison with cardiac gated spin echo. *Magn Reson Imaging 1988, 6(5):517.*

Leach RA: An evaluation of the effect of chiropractic manipulative therapy on hypolordosis of the cervical spine. *Manipulative Physiol Ther* (1983 Mar) 6 (1): pp. 17-23.

Leach RA: *The Chiropractic Theories*, Williams and Wilkins, 2nd Ed., 1986.

Letts M, MacDonald P: Sports injuries to the pediatric spine. *Spine: State of the Art Reviews* 1990, 4(1):49.

Leung ST: The value of cineradiographic motion studies in diagnosis of dysfunctions of the cervical spine. *Bull Eur Chiro Union* 1977, 25(2):28.

Logan, HB: *Logan Basic Methods*, text book of 1950. Publisher unknown. Available from Logan Chiropractic College, Chesterfield, MO.

Lord J, Rosati L: Thoracic outlet syndromes. *Clinical Symposia* 1971, 23(2):7.

Lovell W, Winter R: *Pediatric Orthopedics*, Philadelphia: J.B. Lippencott, 1978.

Makley J, Carter J: Eosinophilic granuloma of bone. *Clin Orthop* 1986, 204:37.

Mann D: Spine fractures in children and adolescents. *Spine: State of the Art Reviews* 1990, 4(1):25.

Martell W, Molt J, Cassidy J: Roentgenologic manifestations of juvenile rheumatoid arthritis. *AJR* 1962, 88:400.

Martinez S, Morgan C, Gehwiler J, et al: Unusual fractures and dislocations of the axis vertebra. *Skeletal Radiol* 1979, 3:206.

Masters B: A cineradiographic study of the kinetic relationship between the cervical vertebrae. *Bull Eur Chiro Union*

1980, 28(1):11.

Maurer E: Biological Effects of X-ray Exposure. *American Journal of Chiropractic Medicine*, 1988.

McAfee P, Yuan H, Frederickson B, Lubicky J: The value of computed tomography in thoracolumbar fractures. *J Bone Joint Surg* 1983, 65A:461.

McRae D: The significance of abnormalities of the cervical spine. *AJR* 1960, 84:3.

Mehta M, Murray O: Scoliosis provoked by painful vertebral lesions. *Skeletal Radiol* 1977, 1:223.

Minderhound J, Braakman R, Pennig L: os odontoideum: Clinical, radiographic, and therapeutic aspects. *J Neurol Sci* 1961, 8:521.

Modic MT, Ross JS, Masaryk TJ: Imaging of degenerative disease of the cervical spine. *Clin Orthop* 1989, (239):109.

Murray R, Jacobson H: *The Radiology of Skeletal Disorders*, New York: Churchill Livingstone, 1977.

Nathan F, Bickel W: Spontaneous axial subluxation in a child as the first sign of juvenile rheumatoid arthritis. *J Bone Joint Surg* (Am) 1968, 50(8):1675.

Novick G, Pavlov H, Bullough P: Osteochondroma of the cervical spine: Case reports. *Skeletal Radiol* 1982, 8:13.

Ochs CW: Radiographic examination of the cervical spine in motion. *US Navy Med* 1974, 64:21.

Papavasiliou V: Traumatic subluxation of the cervical spine during childhood. *Orthop Clin North Am* 1978, 9:945.

Pasto ME, Goldberg, B: Chapter 15--Sonography. In Kricun ME: *Imaging Modalities in Spinal Disorders*, New York: W.B. Saunders Co., 1988.

Pennecot G, Leonard P, Peyrot S, et al: Traumatic ligamentous instability of the cervical spine in children. *J Ped Orthop* 1984, 4:346.

Pizzutillo P, Rocha E, D'Astous J, et al: Bilateral fracture of the pedicle of the second cervical vertebra in the young child. *J Bone Joint Surg* 1986, 6SA:892.

Plaugher G, Hendricks AH: *The interexaminer reliability of the Gonstead pelvic marking system.* Proceedings of the 1990 International Conference on Spinal Manipulation. Arlington, VA, 1990, pp. 93-8.

Porter RW , Hilbert C, Wellman P: Backache and the lumbar spinal canal. *Spine* 1980, 5(2):99.

Pottine K, Klassen R: osteoid osteoma and osteoblastoma of the spine. *J Bone Joint Surg* 1986, 68A:354.

Powers B, Miller M, Kramer R et al: Traumatic anterior atlanto-occipital dislocation. *Neurosurgery* 1979, 4:12.

Reimer R, Chabner B, Young R: Lymphoma presenting in bone. *Ann Internal Med* 1977, 87:50.

Resnick D, Niwayama G: Intravertebral disk herniations: cartilaginous (Schmorl's) nodes. *Radiology* 1978, 126:57.

Ressel OJ: Disc regneration: reversibility is possible in spinal osteoarthritis. *ICA Review* 1989 45(2):39.

Richards G, Thompson J, Oserbauer P, Fuhr A: Use of pre- and post- CT scans and clinical findings to monitor low force chiropractic care of patients with sciatic neuropathy and lumbar disc herniation: a review. *J Manipulative Physiol Ther* 1990, 13:58.

Robinson GK: Interpretation of videofluoroscopic joint motion studies in the cervical spine C-2 to C-7. *The Verdict*

February 1988.
Rushong SC: *Radiologic Science for Technologists*, 4th Ed., The C.V Mosby Company, 1988.

Schmorl G, Junghans H: *The Human Spine in Health and Disease*, New York: Grune and Stratton, 1971.

Scientific approach to the assessment and management of activity related spinal disorders. Chapter 3. *Spine* 12(75) Figure 3-1.

Selman, Joseph: *The Fundamentals of X-ray and Radium Physics*, 7th Ed., Charles C. Thomas Publishers, 1986.

Shaff AM: Video fluroscopy as a method of detec ting occipitoatlantal instability in Down=ssyndrome for Special Olympics *Chiropractic Sports Medicine* 1994, 8(4):144.

Sherk H, Nicholson J, Chung S: Fractures of the odontoid process in young children. *J Bone Joint Surg* 1978, 6OA:921.

Shippel AH, Robinson GK: Radiological and magnetic resonance imaging of cervical spine instability: A case report. *JMPT* 1987, 10(6):316.

Sigler DC, Howe JW: Inter- and intra-examiner reliability of the upper cervical x-ray marking system. *J Manipulative Physiol Ther* (1985 Jun) 8(2): pp. 75-80.

Starr W: Spina bifida occulta and enlargement of the fifth lumbar spinous process. *Clin Orthop* 81:71, 1971.

Sturm RE, Morgan RH: Screen intensification systems and their limitations. *Am J Roent* 1949, 62:613.

Sullivan C, Brewer A, Harris L: Hypermobility of the cervical spine in children: A pitfall in the diagnosis of clinical dislocation. *Am J Surg* 1958, 95:636.

Suzuki S, Yamamuro T, Shikata 3, Shimizu X, Iida H: Ultrasound measurement of vertebral rotation in idiopathic scoliosis. *J Bone Joint Surg* 1989, 71-B(2):252.

Takahashi M, Sakamoto Y, Miyawaki M, Bussaka H: Increased MR signal intensity secondary to chronic cervical cord compression. *Neuroradiology* 1987, 29(6):550.

Tasharski CC: Dynamic atlanto-axial aberration: a case study and cinefluorographic approach to diagnosis. *JMPT* 1981, 4(2):65.

Taylor M, Skippings R: Paradoxical motion of atlas in flexion: a fluoroscopic study of chiropractic patients. *Euro J Chiro* 1987, 35:116.

Tini P, Wieser C, Zinn W: The transitional vertebra of the lumbosacral spine: Its radiological classification, incidence, prevalence, and clinical significance. *Rheumatol Rehabit* 1977, 16:180.

Troyanovich S, Robertson G, Harrison D, Holland B: Intra- and interexaminer reliability of the Chiropractic Biophysics lateral lumbar radiographic mensuration procuedure. *J Manipulative Physiol Ther* Oct. 1995, 18(8):519-524.

Van Mameren H, Sanches H, Beursgens J, Drukker J: Cervical spine motion in the sagittal plane II. *Spine* 1992, 17(5):467.

Vernon H: Static and dynamic roentgenography in the diagnosis of degenerative disc disease: a review and comparative assessment. *JMPT* 1982, 5(4)39.

Walker B: The use computer-assisted tomography of the lumbar spine in a chiropractic practice. *Journal of the Australian Chiropractic Association* 1985, 15:86.

Wallace H,m Wagnon R, Pierce W: Inter-examiner reliability using videofluoroscope to measure cervical spine kinematics: a sagittal plane (lateral view). *Proceedings of the International Conference on Spinal Manipulation* May 1992, pages 7-8.

White AA, Johnson RM, Panjabi MM, Southwick WO: Biomechanical analysis of clinical stability in the cervical spine. *Clin Orthop* 1975, (109):85.

White J, Gardner V, Takeda H: Back pain in the pediatric patient: Assessment and differential diagnosis. *Spine: State of the Art Review Series* 1990, 4(1):1.

Wiesel S, Rothman R: Occipitoatlantal hypermobility. *Spine 1979,* 4:187.

Wiltse L, Widell E, Jackson D: Fatigue fracture, the basic lesion in isthmic spondylolisthesis. *J Bone Joint Surg* 1975, 57:17.

Wood J, Wagner N: A review of methods of radiographic analysis of cervical sagittal motion. *Chiropractic Technique* 1992, 4(3):83.

Woesner ME, Mitts MG: The evaluation of cervical spine motion below C-2: a comparison of cineroentgenographic methods. *Am J Roent Rad Thor, Nuc Med* 1972, 115(1):148.

X-Ray Examinations--A Guide to Good Practice. U.S. Department of Health, Education, and Welfare, Public Health Service. Washington, DC, 1971.

Yochum T, Rowe L: *Essentials of Skeletal Radiology*, Baltimore: Williams and Wilkins, 1987.

Zengel F, Davis BP: Biomechanical analysis by chiropractic radiography: Part II. Effects of x-ray projectional distortion on apparent vertebral rotation. *J Manipulative Physiol Ther* (1988 Oct) 11(5): pp. 380-9.

Zengel F, Davis BP: Biomechanical analysis by chiropractic radiography: Part III. Lack of effect of projectional distortion on Gonstead vertebral end-plate lines. *J Manipulative Physiol Ther* (1988 Dec) 11(6): pp. 469-73.

VIII. TABLES

TABLE 1

Technical Factors for the Production of Quality Radiographs

Collimation. Maximum collimation of the primary beam is used to expose only necessary areas and to exclude the eyes, breasts, and gonads whenever possible.

Filtration. Density equalizing filtration is used to minimize excess exposure to thinner body parts.

c) Lead Shielding. The breasts and gonads (male and female) are adequately protected with lead shields whenever possible.

d) P-A Projection. The posterior-to-anterior projection is employed whenever possible to further reduce radiation exposure to the breast, eye, and thyroid.

e) Rare-earth Screens. Rare-earth screens with matching film of the same spectral sensitivity and in the 800-1200 speed category is used.

f) Focal-Film Distance. FFDs of less than or equal to 72 are commonly used.

g) High kV. Exposures frequently greater than 90kV are used to reduce radiation exposure.

h) Adequate Grid. Use of a 12:1 grid allows higher kV values to be employed and is optimal for scatter absorption in the 90-100 kV range. However, a 10:1 grid is acceptable.

i) Technical Details. Careful attention to radiographic and darkroom procedures is employed to minimize retake examinations.

Chapter Outline

1. OVERVIEW

In coming to an analytical conclusion about the nature of a patient's possible subluxations, the chiropractor uses many methods, including those of history-taking, inspection, palpation and instrumentation. Through information gained from research and personal experience, the chiropractor generally assigns a personal value to each procedure in any particular circumstance. The intent of this chapter is to describe and evaluate the various instruments that are presently used by chiropractors in the examination of their patients.

Appropriate Use of Instruments

Instruments are all designed with various levels of sophistication and make use of underlying assumptions. Sapega has observed that many clinical tools available today are capable of generating more measurements than can be meaningfully understood. The technological explosion in health care delivery has advanced far beyond valid clinical utility.

The meaningful interpretation of changes in a subject's test results requires the reliability and validity of the procedures. The most effective means to ensure reliability is through test standardization and close attention to the correspondence of test conditions to those of the actual demands that the patient's lifestyle makes on his performance. The test clearly must be relevant to the individual's activities that have been impaired or to normative data and should be able to discriminate healthy from unhealthy people.

Evaluating Instruments

Several qualities are found in common for instruments that ultimately prove to be clinically useful. Focusing on these qualities rather than on specific named instruments simplifies the task of evaluating instruments individually. They include the following:

1. Validity is the most clinically important quality. A test is valid when it accurately measures the desired function, and when that function is pertinent to the patient's condition.

2. Discriminability is determined by the ability to distinguish healthy from unhealthy individuals. In order to accomplish this, a normative date base consisting of studies of people from both groups is required. The relative frequency of false-positive (i.e., healthy persons who test positive) and false-negative tests (i.e., unhealthy persons who test negative) occurring for each group also helps to define a test's discriminability.

3. Accuracy of a measure is determined by comparison to a known value. Repeated use of some devices and the simple effects of passing time may cause loss of calibration which will alter accuracy.

4. Precision describes the variation of a measure across the range over which it is intended to be used. Both accuracy and precision can change over the possible ranges of test applications.

5. Reliability of a measure depends both on the accuracy of the instrument and the characteristics of the variable being measured.

For each category of instrument discussed below, knowledge of how each performs with respect to the above test qualities is presumed.

Patient Motivation

Test results should be interpreted in conjunction with observations of the quality of patient performance and cooperation made while the test is being performed. As a result, only adequately trained ersonnel who can integrate clinically meaningful observations should perform most tests. Quality of patient performance, repeated measures testing and correlation of findings with other clinical information permit an accurate evaluation of patient motivations. Specific reasons for poor test performance include legitimate reduced capability, misunderstood instructions, apprehension of the test setting, fear of pain arising from the test and questions of secondary gain.

II. LIST OF SUBTOPICS

A. Spinal Kinesiopathology
   1. Electrogoniometry
   2. Inclinometry
   3. Goniometry
   4. Optically-Based Systems
   5. Muscle Strength Testing
      a. Manual or instruments
      b. Dynamometer
      c. Modular-isometric

B. Neurophysiological
   1. Temperature Reading Device
   2. Thermography
   3. Current Perception Threshold Devices
   4. Electroencephalography
   5. Algometer

C. Myological
   1. Tissue Compliance Measurements
   2. Surface Electromyography
   3. Surface Electrodiagnostic Procedures
   4. Needle Electrodiagnostic Procedures
   5. Electrocardiography

D. Other Instrument Measures

   1. Doppler Ultrasound
   2. Plethysmography
   3. Spirometry
   4. Plumbline Devices
   5. Bilateral Weight Scales

III. DOCUMENTATION

Perceptual Measurements

A. Questionnaires as Instruments:

Physical signs can be rather insensitive measure of a patient's disability. Standardized rating scales and questionnaires afford a simple means of appraising many aspects of patient life and health. Instruments commonly used in the chiropractic community assess any of the components of the vertebral subluxation and other malpositioned articulations and structures complex, pain, activities of daily living (ADL), somatization, depression and anxiety. Generally, questionnaires may be divided into two categories, self-reporting and practitioner-administered. Self-reporting questionnaires are often self-normalizing but suffer from reactivity which may result in an unintentional change in the patient's response when exposed to the same questions repeatedly. Practitioner-administered questionnaires benefit from the involvement of a trained observer whose skill can help in interpreting the patient's response. In administering either format, several error sources should be considered including 1) patient motivation; 2) acquiescence to positively worded items; and 3) patient's seeking social approval. Overall, functional questionnaires offer standardization of measurement, comprehensiveness, and generally good reproducibility and validity.

There is no consensus on the use of a particular questionnaire for a specific clinical problem. For the measurement of the same clinical problem, different questionnaires may not yield interchangeable findings. Screening questionnaires may be used to obtain a broad patient overview in a comprehensive and timely manner. With the recent intensive development in the outcome measurement field, future field standardization on use of questionnaires is to be expected.

Pressure Algometry

Pressure algometry is a comparatively new procedure which uses a pressure manometer to estimate pain threshold from applied pressures to the myofascial structures. Normative data shows that pressure pain thresholds are highly symmetrical and are generally lower in females than in males. Reeves et al. have reported reliability coefficients ranging from 0.71 to 0.97. Pressure pain threshold levels are sensitive to a variety of care interventions. Good inter-rater and test-retest reliability has been shown.

Functional Measurements

1. Measurement of Position/Clinical Anthropometry

    1. Posture
    Studies in ergonomics have shown that trunk, head and joint positions adopted during work can be used as an objective index for evaluating the intensity of physical work stress, mental concentration of manual dexterity. The choice of a particular position may be the most important factor contributing to whether an attempted physical activity is risky or safe. Individual instruments and automated measures are available to quantify posture or body segment position.

    2. Plumbline analysis
    The plumbline was one of the first tools to be used in chiropractic to analyze posture. The plumbline provides a visual frame of reference for the influence of the center of gravity from each body segment, enabling the clinician to detect postural deviation, asymmetry and suspect areas of postural stress. Patients are observed in the anterior, posterior and lateral stances.

    4. Bilateral weight scales used to determine spinal balance and disturbed proproceptive reflex balance mechanisms.

Measurement of Movement

In the general course of patient care, range of motion is examined using goniometers, inclinometers and optical based systems. Most devices quantify the regional movement of a part and express it as an angular displacement about some center of rotation.

1. Goniometers

The degree of peripheral joint movement can be measured throughout active or passive ranges. Its usefulness is greatest in the extremities, particularly the small joint of the hands and feet. The reference point for measurement is the long axis of the part being measured and is determined by judgment. Accuracy is limited to a range of 10 to 15 degrees. Usage for spinal measurements is no longer considered acceptable practice because of the advent of better methods.

2. Inclinometers

Inclinometers use the constant vertical direction of gravity as a reference and require only that a side rests against the body segment surface. Digital or analog, and mechanical or electronic versions are available. Greater accuracy of measurement is available to ranges of 3 to 5 degree being possible under typical clinical conditions. Inclinometers are the more suitable instrument for assessing spinal function and are capable of separating components of motion, e.g., pelvic versus lumbar.

3. Optically based systems

Aside from research applications, the most prevalent clinical use of opto-electronic systems is in conjunction with the use of force plates for assessing gait abnormalities. Video-monitoring is often used in industrial practice to capture the salient features and at least semi-quantify motions and postures at the work station. Work related spine injuries, carpal tunnel syndrome and other cumulative trauma disorders are frequent areas of concern where these methods are used. The primary parameters of importance are joint angle, angular velocity and angular acceleration. Coupled with appropriate software and external load measurements, joint loads and patterns of behavior can provide information on relative risk of work related tasks.

2. Measurement of Strength

The term strength denotes the capacity for active development of muscle tension and through the resulting muscle force generates joint torque. Computerized muscle dynamometer systems quantify more variables than the average physician can properly interpret. In the case of employment-related tests, the evaluation must closely simulate critical job tasks.

The emphasis on computerized muscle-dynamometry systems (isometric, isokinetic, isotonic and isoinertial) has overshadowed earlier isometric and psychophysical testing methods. No single method of strength evaluation is decidedly superior or more valid for measuring muscular strength. Each method also has a number of advantages and disadvantages. For valid interpretation of test results, the unique characteristics of each must be kept in mind. It has yet to be shown conclusively that testing can clearly predict that a patient can return to a certain activity level and will have less risk of re-injury under actual functional conditions. Only continued research and development of broader normative data bases than are now available will finally test the underlying assumptions currently used in these clinical applications.

1. Manual hand-held strength testing

Manual muscle strength testing provides only a rough approximation of capability and its use is limited. Accuracy in manual assessment requires differences in strength of 35% or more. Hand-held dynamometers, while not eliminating all the problems of manual testing, provide greater degrees of accuracy and reliability.

3. Instrumented strength measurement testing

Patient assessment naturally falls into three categories: 1) preventive evaluation (as in employee job-matching); 2) post-injury evaluation; and 3) outcome monitoring following care. Significant clinical information can be obtained toward these objectives, but careless interpretation of test data can result in inappropriate clinical decisions. Acute disorders are a contraindication to strength test protocols. The average discrepancy between symmetrical muscle groups for healthy populations has been reported as much as 12%. When evaluating an individual's performance, differences of 20% or more may be needed to discriminate abnormalities.

a. Isometric testing

There are several technical concerns in the performance of isometric tests: 1) the inertial effects at the onset of the test; 2) patient fatigue; 3) patient posture; and 4) patient motivation. The objective of the test is to identify and record the maximum voluntary contraction force that can be sustained. At this time, the tasks that can be adequately represented with isometric tests are sagittally symmetric. Up to 70% of work postures can be approximated symmetrically. Normative data for occupational classifications of lifting activities as well as for reciprocal trunk strength ratios are available. Normative data is used to evaluate extremity strength for post-injury assessment or seasonal sports fitness. Bilateral differences greater than 15-20% indicate abnormality.

The patient's motivation to supply a maximum effort can be assessed by repeated measurement and acceptable maximum effort protocols. Quantitative knowledge of the patient's posture during the performance of the strength task is critical to any effort to relate the test result to joint loads or NIOSH standards.

b. Isokinetic testing

The primary measurement obtained is the torque generated which is only valid during the controlled part of the motion. The maximum voluntary effort will coincide with the greatest mechanical advantage of the joint for the motion that is being attempted. There are two technical concerns with isokinetic measurements. They are: 1) gravitational effects; and 2) torque overshoot. Both may be corrected through computerized correction routines and damper setting. Standard isokinetic measurements are commonly taken at increments of 30 degrees per second using 2-6 repetitions with the maximum single torque value used as the measure of performance. As with isometric evaluation, the normal extensor/flexer trunk ratio falls when impairment is present. Kannus, Nuan and Mayhew feel the side-to-side comparison of extremity testing has some importance.

c. Isoinertial testing

While no testing method yet devised allows an assessment of free dynamic motion such as would occur at a work site or in sports, isoinertial equipment may come closer than others. Several authors have examined the ability to predict performance by controlling torque during movement. Isoinertial systems can be made capable of monitoring position, velocity and torque simultaneously. Measures of regional coupled motions appear to hold promise in discriminating fatigue effects from healthy movement. Likewise, velocity measurements appear to be sensitive to lumbar spine disorders. Normative data is available for a number of occupational subgroups, including sedentary workers.

THERMOGRAPHY

Since the introduction of the neurocalometer by Zvins in 1924, skin temperature measurements have played a significant role in the clinical practice of chiropractic. In the 1960s, thermographic imaging was being used by investigators to evaluate spinal lesions. Sensory nerve irritation is believed to produce reflex vasoconstriction of the arterioles, of the skin, altering thermographic patterns. Urrichio described thermography as a physiological test that aids primarily in the diagnosis of sensory nerve irritation. He stated that when a sensory nerve is irritated, the sympathetic nerve associated with it causes vasoconstriction of the capillaries under the skin.

Early thermographic research in spinal disorders resulted in equivocal findings. Karpmen et al noted that "Traumatic back injuries were readily evaluated thermographically," and reported that "No patient ... had a normal thermogram in association with an abnormal x-ray film."

Standardized protocols and computer assisted analysis have dramatically improved the diagnostic sensitivity of thermography in neuromuscular disorders. Uematsu et al developed a computer-calculated method of collecting thermographic data. They compiled normative data on 90 asymptomatic patients. Readings were obtained from 40 matched regions of the body surface. They then examined thermal asymmetries in 144 patients with low back pain. When asymmetries exceeded more than one standard deviation from the mean temperature of homologous regions in control subjects, the positive predictive value in detecting nerve root impingement was 94.7%. The specificity, or proportion of persons without the condition who have a negative test result, was 87.5%. Chafetz et al compared thermographic examination with CT of the lumbar spine. Fifteen asymptomatic subjects and 19 patients with CT scans demonstrating thecal sac contour distortion or nerve root displacement were examined. All 19 patients with positive CT scans had abnormal thermograms, a sensitivity of 100%. The specificity, however, was 60%.

Several other investigators have compared thermographic finding with those of other diagnostic modalities. Weinstein and Weinstein compared cervical thermography with EMG, CT, myelography, and surgical exploration. 500 patients with neck or upper extremity complaints were studied. 197 (39.4%) were found to be positive for root pathology. Of these, 190 (96.4%) were ultimately confirmed by EMO, CT, myelography, and/or surgery.

Hubbard conducted a study of 85 thermographic examinations. A high correlation was reported (94%) between pain distribution patterns and cervical and lumbar thermograms. The thermographic results were well correlated with EMO, myelography and CT studies. 52 control thermographic studies were performed on young asymptomatic patients, and 90% were reported as "normal."

At least two state Appellate Court decisions have found that evidence relating to liquid crystal thermography results are admissible as evidence to demonstrate injury resulting from automobile accidents. See Fay v. Mincey, 454 So.2d 587 (Fla. 2nd DCA 1984); Crawford v. Shivashankar, 474 So.2d 873 (Fla. 1st DCA 1985).

To strengthen the value of thermography as a diagnostic tool in the evaluation of soft tissue lesions, there are procedural elements that must be effectively addressed:

1. Strict protocols must be followed to minimize artifacts.
2. Interpretation requires a high level of training and experience.
3. The examination is relatively time consuming.
4. The use of thermographic imaging to evaluate motor nerve involvement is not supported in the literature.

The principal application for thermography in the evaluation of soft tissue lesions appears to be in demonstrating and characterizing sensory nerve involvement.

Body heat loss to the environment takes place passively by convection, conduction and radiation. Regional body temperature is governed by the interaction of central autonomic control mechanisms and multi-segmental spinal vasomotor reflexes. Regional variations of sympathetic thermoregulation produce a complex pattern of temperature distribution including cephalocaudal, diurnal and circadian patterns. Accurate measure requires accommodation of the skin to room temperature, which should be kept at between 33.5 to 34 C. For reproducible measures, the patient needs to establish constant patterns of work and rest and follow-up testing should be performed at the same time of day. Measurements of skin temperature and the amount of heat radiated from anatomically symmetrical regions yields useful information about the relative circulatory volume to each part. Areas of increased cutaneous temperature have been ascribed to vasodilation occurring during a migraine headache, inflammation or muscle spasm. Decreased cutaneous temperature may reflect vasoconstriction, vascular obstruction, fibrous and fatty replacement. An abundance of literature is available documenting employment of thermography as a screening tool; e.g., detection of deep vein thrombosis, identification of allergic reaction, qualification of vascular phenomena, and the identification of pain.

1. Thermocouple devices

   Several thermocouple devices have been marketed to be used for the determination of local paraspinal temperature variations. Patterns of heat along the spinal column and their changes following spinal adjustments, provide useful data in some chiropractic techniques.

2. Telethermography

   Measurement of skin temperature differences across the torso, head and extremities as a means of evaluating functional changes from somatic lesions. Various forms of "gold standard" comparison have been used including surgical confirmation of disc herniation and percentage agreement of statistical correlation with other more widely accepted diagnostic procedures. Normative data are available; for example, see Chang et al., 1985, Feldman and Nickolff 1984, Goodman et al., 1986, and Uematsu et al., 1988. A number of efforts to evaluate diagnostic truth from telethermographic measures have been made. The results of comparative studies of thermography and other diagnostic procedures for nerve root entrapments are quite varied. Where some studies claim that thermography has little diagnostic and uncertain prognostic value in the evaluation of low back pain and radiculopathy, others praise its sensitivity and positive predictive value. Thermographic images have been used in the diagnosis of myofascial pain syndromes and their respective pain referral zones. Perhaps the strongest evidence for use of telethermography is for cases of suspected neurodystrophy. There has been a high correlation between the thermographically defined referral zones and those as described in the literature. Additional zones, not previously identified, have also been recognized.

GALVANIC SKIN RESPONSE (GSR)

Devices to detect differences in paraspinal regional electrical skin resistance have been employed by the chiropractic profession for many decades. Loci of lowered skin resistance were thought to be related to areas of cutaneous hyper of hyposympathetic activity.

ELECTROPHYSIOLOGIC RECORDINGS

Numerous variables affect all electrophysiologic recordings: 1) the size and location of the recording electrode; 2) the configuration of the electrode position relative to the structure being recorded; 3) characteristic resistance of the tissues; 4) the pathophysiology of the patient's problem and 5) artifacts.

1. Electrodiagnosis

Several specialized procedures are available to evaluate select neuromuscular functions. These include measures of myoelectric activity during muscular loading, fatigue studies, conduction velocity tests, H-wave and F-wave responses, and evoked potentials. Generally these studies can be simply grouped as either 1) stimulation studies; or 2) electromyography (EMG). The clinical procedures are sometimes divided according to whether needle or surface electrodes are used. The International Chiropractors Association does not support the use of needle electrodes in chiropractic practice because of the invasive nature of the procedure.

Surface electrode studies may be used in many cases, but are traditionally applied to the examination of nerve conduction velocities, reflex studies and kinesiological evaluations. In kinesiological applications, up to 16% of the surface recordings from the upper leg muscles, for example, is from co-contraction activity. Surface electrodes may be used with repetitive stimulation to examine suspected myoneural junction disorders. Somatosensory evoked potential (SEP) are performed with surface electrodes. SEP serve to discern between peripheral and cord (dorsal column) lesion sites. Needle electrode studies are classically termed electromyography. This technique may be used in all varieties of electrodiagnostic studies, but it is required to detect denervation, myoneural junction disorders, cerebellar and brainstem tremors, anterior cord disease and motor unit potentials.

2. Nerve stimulation studies

Nerve stimulation studies can be performed using either surface or needle electrodes. Basic information may be gained about the neuromuscular peripheral sensory and motor components using conduction velocity and reflex responses of the nerve (i.e., H-reflex and F-waves). Practically, this information may be used to evaluate the nerve trunk integrity as well as significant compression, or temporal dispersion from entrapment of utabolic neuropathy. Both sensory and motor studies permit analysis of wave form, amplitude and duration of the impulse. Nerve compression from lumbar root lesions can be quantified. While nerve conduction velocity is a poor index for radicular syndromes, F-waves and H-reflexes are more useful. Similar use can be made for study of complaints from the upper extremity. Sensitivity and specificity for each of the following electrodiagnostic procedures are well studied. Sequencing of tests often increases the diagnostic yield. Timing of tests performed with respect to the onset of symptoms is important since their appearance and disappearance can be temporally dependent.

Evoked, transforaminal responses (surface or needle): Peripheral motor nerve fibers of major nerve trunks from the extremities may be evaluated by use of the F-wave of Maglodery. Adequate assessment requires a sequence of supramaximal stimuli with measure of several response latencies. These signals may be absent in diseases of compression affecting the anterior horn or peripheral nerve.

For lesions involving the peripheral motor or sensory fibers from L5/S1 or SI/S2, the Hoffman reflex may be used. A series of progressively increasing sub-threshold to supra-threshold stimuli are used to evaluate sensory and motor fiber responses.

Nerve conduction studies (surface or needle NCV): Motor nerves can be evaluated for site and severity of lesions from mechanical or pathological causes. Stimulation of major nerve trunks at a series of sites along their path can locate the region affected. Characteristic wave form and relative conduction velocity changes may also be important to differentiate between causes of nerve damage. Sensory nerve conduction is studied in a similar fashion.

Somatosensory evoked potentials (Surface or Needle SSEP): Similar to conduction velocities, these procedures stimulate the peripheral nerve either at accessible nerve trunks or by dermatomal sensory nerve endings. Responses may be monitored along the nerve pathway traversing the IVF, spinal cord, brainstem and cortex.

3. Electromyography

Kinesiologic studies: A surface measurement that monitors myoelectric volitional responses can be used to examine superficial layer muscle recruitment and fatigue. When calibrated against known exertional efforts, biomechanical estimates of muscle tensions for simple isometric tasks can be made. Clinical applications to the evaluation of spine related disorders has been proposed under the heading of surface paraspinal scanning EMG using either poststyle or adhesive tape-on electrodes.

SURFACE VS. NEEDLE TECHNIQUES

Electromyography is the technique of recording electrical potentials associated with muscular activity. Electrodes may be inserted in the muscle being monitored, or surface electrodes may be placed on the skin overlying the muscles being studied. Both techniques have been used in the examination of paraspinal and peripheral muscles. Needle techniques are frequently used to evaluate abnormalities in peripheral muscle activity. Such abnormalities may be due to spinal disease, nerve root involvement, peripheral nerve entrapment, or disease of the muscle itself. In contrast, surface techniques are most commonly employed in kinesiological studies, biofeedback applications, and chiropractic analysis. The following table summarizes the features of each technique:

SURFACE ELECTRODES

Record composite potentials of muscles working together.

Non-invasive; painless.

Easy to duplicate protocols for longitudinal studies.

Some high frequency loss.

No insertion potentials.

Very good test-retest reliability.

In summary, needle techniques are appropriate for the evaluation of specific muscles, while surface electrodes are appropriate for kinesiological studies of the "global" function of groups of muscles.

Cobb et al reported that pain was more likely to demonstrate change in surface electrode EMG activity than needle EMG potentials. They concluded that "...muscle spasm (even when mild) is accompanied by muscular hyperactivity which can be evaluated by suitable electromyographic techniques. Our data suggest that surface electrodes allow better sampling than Teflon coated needles..." and that "...integration procedures allow better quantification than does the visual evaluation of an EMG..." Komi and Buskirk compared the test-retest reliability of needle vs. surface electrode electromyographic measurements. The average test-retest reliability for surface electrodes was 0.88, compared to 0.62 for inserted electrodes. Spector conducted a study of the reliability of surface electrode paraspinal electromyography. Results of the study yielded correlation coefficients ranging between 0.73 and 0.97. Thompson et al of the Mayo Clinic found EMG scanning correlates highly with attached electrode technique. Surface techniques, therefore, appear superior to inserted electrode methods for longitudinal studies where case progress and care response are being evaluated.

NORMATIVE DATA

Cram has published normative data for paraspinal EMG potentials in pain and non-pain populations. His protocol was limited to scanning five sites. These sites were the cervical paraspinals, T-1, T-6, T-10, and L-3. In addition to calculating the mean, criteria for mild, moderate, and radical elevations are offered. The cutoff for mild elevation is the first standard deviation. For a moderate elevation, it is the second standard deviation. For a radical elevation, it is the third standard deviation. Test-retest reliability was also reported by Cram. The median for the correlation coefficients of EMG scans was .83.

In an effort to more specifically characterize paraspinal activity (Kent) developed a protocol for scanning 15 paraspinal sites. These include C-l, C-3, C-5, C-7, T-1, T-2, T-4, T-6, T-8, T-10, T-12, L-1, L-3, L-5, S-1. This protocol scans every other segmental level, plus the transitional areas of the spine.

Kent collected normative data using this protocol. A ProScan 2000 two channel EMO scanner was employed. This equipment has an input impedence of 1,000,000 megohms, and noise rejection exceeding 180 db. A bandwidth of 100-200 HZ. was employed. The preamplifier is mounted in the electrode assembly, eliminating the noise which may be induced in cables when the preamplifier is separate from the electrode assembly. The two channel system permits simultaneous recording of potentials on both sides of the spine.

Each electrode/preamplifier assembly has three silver/silver chloride electrodes in a triangular configuration. Two are active electrodes, and one is a ground reference electrode. By maintaining a constant distance between active and ground reference electrodes, artifacts caused by inconsistent electrode placement are minimized. During data collection, an electrode assembly applied to each side of the spine, approximately 1 cm lateral to levels scanned except C-1. At the C-l level, an electrode assembly is placed over each atlas transverse process, inferior to the mastoid process.

52 student volunteers at Palmer College of Chiropractic-West met the criteria for participation and were scanned. Prospective subjects were required to complete a questionnaire concerning back or neck pain which they had experienced. The prospective subjects were not advised of the criteria for selection when presented with the questionnaire. To be included in the normative population, a

subject had to be free of any back or neck pain of greater than 48 hours duration for a period of at least one year. The subjects selected ranged from 21-42 years of age. The mean age was 26.6 years. 33 subjects were males and 19 subjects were females.

The mean and standard deviation of the potentials at each site were calculated. Proprietary software incorporated into the ProScan 2000 EMG scanner compares the readings of a patient being examined with the normative data. This information can be incorporated into a printed report, and/or stored on a hard disk. In the analysis of paraspinal EMG potentials, two parameters are considered: amplitude (signal intensity) and symmetry (comparison of the left side to the right).

PAIN AND PARASPINAL EMG ACTIVITY

The relationship between altered paraspinal EMG potentials and pain has been explored by several investigators. Price et al reported that abnormal patterns of EMG activity were associated with areas of pain and tenderness in the back. It was suggested that these changes may have resulted from attempts by the patient to relieve pain by altering position.

Muscle tension backache is thought to be due to a "vicious cycle" of pain producing spasm, and spasm producing pain. Calliet states that increased involuntary muscle activity is an etiologic factor in chronic pain. Price et al suggested that splinting and tensing of muscles causes diminished blood flow resulting in ischemic pain. Muscle spasm appears to be a "common denominator" in a variety of myogenic pain syndromes including fibrositis, myalgis, and myofascial pain syndrome. Muscle spasm is accompanied by elevated EMG levels.

Although elevated potentials associated with spasm may be seen in patients with back pain, other investigators have found that symmetry of EMG potentials may also be clinically significant. Wolf et al reported that low back pain may result in low or asymmetrical EMG potentials, as well as elevated readings. Triano and Luttges described four types of EMG patterns considering both amplitude and symmetry. Kent and Hyde described low amplitude symmetrical readings and high amplitude asymmetrical readings in patients presenting for chiropractic care.

EMG CHANGES FOLLOWING ADJUSTMENT OR MANIPULATION

Ellestad et al studied the effect of manipulation on surface electrode electromyographic potentials in patients with low back pain and pain free controls. 20 subjects with low back pain of at least 2 weeks but no longer than six months duration were examined. The pain was localized in the erector spinae musculature between L-2 and S-1. 20 controls who denied any low back symptoms within the six months preceding the study were also examined.

Active EMG electrodes were placed 2 cm lateral to the spinous processes of L-3 and L-5. One electrode was placed on side of the spinous process of each level. A ground electrode was also applied to each patient. EMG recordings were made with each subject standing, prone, and in active lumbar extension.

High velocity low amplitude techniques were applied to 10 pain patients and 10 pain free subjects. The remaining 20 patients and controls received no care. The paraspinal EMG activity of those individuals receiving manipulation was significantly reduced. Further, the reduction in EMG potentials were noted as well in the pain free group, albeit to a lesser degree. No significant changes in paraspinal EMG activity were observed in the non-treatment groups.

Shambaugh conducted a pilot study where surface electrodes were used to measure paraspinal EMG activity before and after chiropractic adjustment. Shambaugh concluded, "Results of this study show that significant changes in muscle electrical activity occur as a consequence of adjusting."

PARASPINAL EMG SCANNING AND VERTEBRAL SUBLUXATION

Paraspinal EMG scanning may be useful in documenting the muscular dysfunction of the vertebral subluxation complex and monitoring the muscular responses of a patient to a course of chiropractic care. Traditional chiropractic philosophy defines the vertebral subluxation in terms of four criteria:

1. Loss of juxtaposition of a vertebra with the one above, the one below, or both
2. Occlusion of an opening
3. Impingement of nerve
4. Interference with the transmission of mental impulses.

A contemporary definition of the vertebral subluxation complex proposes at least five components:

1. Spinal Kinesiopathology
2. Neuropathology
3. Myopathology
4. Histopathology
5. Bio-chemical Changes/Pathology

Both definitions incorporate biomechanical and pathophysiological manifestations.

A number of procedures have been utilized in chiropractic practice to detect and evaluate vertebral subluxations:

A. To detect biomechanical changes

    1. Postural analysis
    2. Static palpation
    3. Motion palpation
    4. Static radiograph
    5. Functional radiograph
    6. Computed tomography
    7. Magnetic resonance imaging

B. To detect neurophysiological changes

    1. Orthopedic examination
    2. Neurological examination
        a. Reflexes
        b. Muscle strength tests
        c. Dermatome examination
        d. Functional leg checks
    3. Thermography
    4. Electromyography.

The reliability of these procedures vary greatly. Some techniques, while potentially valuable to individual practitioners do not exhibit acceptable levels of test-retest reliability. The reliability of others may depend on the skill of the examiner and the protocols employed.

For decades, chiropractors were taught to explore the paravertebral muscles for "taut and tender" fibres surrounding areas of vertebral subluxation. Useful as such techniques may be in clinical practice, they are subject to charges of subjectivity. It has been proposed that surface electrode EMG scanning may be used to monitor patient progress under chiropractic care, to determine the severity of myospasm, and to quantify muscular activity.

INDICATIONS

Gentempo and Kent published specific indications for paraspinal EMG scanning in chiropractic practice. The test is indicated if any three of the following are present:

1. Palpable paraspinal muscle spasm.
2. Palpable asymmetry of the paraspinal muscles.
3. Asymmetrical range(s) of motion.
4. Paraspinal muscle tenderness (pain on pressure).
5. Paraspinal pain reported by patient.
6. History of trauma to the spine.
7. Diagnosis of nerve root irritation evidenced by abnormal neurological examination findings.
8. Clinical presentation of an antalgic gait or lean.
9. Diminished or asymmetrical paraspinal muscle strength demonstrated by manual or electronic muscle testing.
10. Thermographic evidence of paraspinal muscle dysfunction.

CONCLUSION

Surface electrode paraspinal EMG scanning is an accepted clinical tool to evaluate the changes in paraspinal muscle activity frequently encountered in chiropractic. It is a means of quantifying palpation findings, and as a tool in single patient time series case studies. Longitudinal studies to determine patient response to chiropractic care represent another potential area for clinical research. Further, paraspinal EMG scanning appears useful in detecting areas of muscle spasm. Like any diagnostic tool, paraspinal EMG scan data must be correlated with other clinical findings, and cannot be relied upon as the sole basis for a chiropractic diagnosis.

OTHER INSTRUMENT MEASURES

Several other types of examining instruments are in use within the chiropractic profession. As none of these are widespread, only the fundamentals of their use will be described.

1. Non-invasive vascular measures

   Both plethysmography and doppler ultrasonic measures allow objective evaluation of vascular disorders by quantifying segmental limb blood pressures, velocities or pulse wave forms.

Doppler ultrasound:

Doppler ultrasound is the most simple and versatile method available for screening examinations of suspected vascular disease of the peripheral vessels; however, doppler spectral analysis (Duplex scanning) is more accurate for cerebrovascular and visceral arterial disease.

For lower extremity claudication, doppler will identify significant occlusive arterial disease with a high degree of reproducibility. Special procedures of value include the ankle/arm index and lower extremity, multi-segmental pressure analysis. The latter examines for a pressure gradient greater than 3 mm Hg across appropriate intervals (200). Hemodynamic deficit may be further evaluated using hyperemia procedures.

IV. RECOMMENDATIONS

All recommendations are made based upon the assumption that the operator/examiner is appropriately trained, versed in the technical issues affecting the qualities of safety, validity, discriminability, accuracy, precision and reliability of the measures. Standardized test protocols and periodic instrument calibration is important to ensure clinical utility of the information. Interpretation should be made by the attending clinician in all cases.

Perceptual Measurements

A. Questionnaires as Instruments

Questionnaire instruments are safe and effective. Several instruments have been fully validated, are widely used and well established. Their use is supported by both Class I (modified to the discipline of measurement) and Class II evidence.

16.1.1 **Rating**: Established
Strength **Level** Type A.

B. Screening Questionnaire

Their use is safe and effective, supported by Class II and III evidence.

16.2.1 **Rating**: Established
Strength Type C.

C. Algometer (pain pressure threshold)

Manually applying pressure into the spinal and paraspinal tissues to produce tenderness in support of vertebral subluxation and other malpositioned articulations and structures analysis has been used nearly since the chiropractic profession began. A Pressure Pain Threshold meter yields a measurement when the recipient feels a change from pressure to tenderness as it produces mechanical irritation of the deep somatic structures. Fisher has shown that pressure pain thresholds are highly symmetrical. Reliability coefficients were shown to be 0.71 to 0.97 by Reeves et al. It has been shown to be very useful in measuring change in paraspinal tissue tenderness following spinal adjustments.

16.3.1. **Rating**: Established
Evidence: E, L, C

FUNCTIONAL MEASUREMENTS: SPINAL KINESIOPATHOLOGY

A. Measurement of position/Clinical Anthropometric (Posture)

1. Electrogoniometry (e.g., Metrecom)

The electrogoniometer (EGM) - EGM is a computerinterfaced, electromechanical device which quantifies the location of points in three dimensional space and then calculates various numerical descriptors of postural alignment. The EGM has been found to be reliable and valid in measuring lines in inanimate objects and found to be more reliable than the manual goniometer for measuring joint range-of-motion. The EGM has been found to be accurate and reliable in determining leg lengths. Adams et al found that the intra and inter-examiner reliability of the EGM for plumb line postural analysis was very high for specific and general postural measurements. Wagnon reports that the instrument is reliable for measuring skeletal-muscular parameters, subject only to the skill of the operator in locating anatomical landmarks.

16.4.1 **Rating**: Established
Evidence: E, L, C

2. Inclinometry

An inclinometer is a hand-held device that uses the constant vertical component of gravity as a reference and yields a measure of motion when held against the area being motion tested. Accuracy has been shown to be within 3 to 5 degrees.

16.4.2. **Rating**: Established
Evidence: E, L, C

3. Goniometry

A goniometer is a large protractor that may be held in the proximity of the area being motion tested to provide a means by which to determine degrees of motion. A 10-15 degree of accuracy is common. Due to its lack of accuracy and reliability, the Goniometer has been largely replaced by the Inclinometer.

16.4.3. **Rating**: Established
Evidence: E, L, C

4. Optically Based Systems

Optically based systems are established for evaluating specific gait abnormalities or risky positions related to work tasks. They are safe and effective when evaluated by specially trained personnel and are supported by Class II evidence.

16.4.4. **Rating**: Established
Strength Type B

B. Muscle strength testing

Many chiropractic techniques utilize manual muscle testing for evaluation of vertebral subluxation. These techniques typically use manual muscle testing for the purpose of vertebral subluxation and other malpositioned articulations and structures analysis and are typically limited to gross bilateral differences in patient resistance or a virtually total lack of resistance that is easily detectable by the experienced practitioner. Manual and mechanized muscle testing may also be used to demonstrate subtle changes in muscle strength as a result of nerve function.

1. Manual - Manual evaluation of muscle strength gives only an approximation of capability. One reference indicates that a difference of 35% in muscle strength must exist to be detected by manual testing.

16.5.1. **Rating**: Estabished
Evidence: E, L

2. Hand-held (Dynamometer) - The dynamometer is a hand-held device which produces greater reliability and accuracy than manual testing.

6.5.2. **Rating**: Estabished
Evidence: E, L

3. Modular - Isometric (e.g., Dynatron 2000, myo-logic), Isokinetic, Isoinertial.

16.5.3. **Rating**: Established
Evidence: E, L

Physiologic and Electrophysiologic Measurements

A Temperature reading devices

Highly significant temperature changes have been noted in spinal and paraspinal tissues following a chiropractic adjustment. Hand-held thermographic devices "have been evaluated and shown to have moderate to excellent inter-examiner reliability over short time durations."

Early chiropractic investigators recognized three basic physiological concepts that underlie the value of cutaneous thermography:

- the body is segmented into "dermatomes";
- side-to-side skin temperatures are generally symmetrical unless dysfunction exists; and
- any anomalous deviation from a gradually increasing paraspinal skin temperature from S-2 to C-1 may be indicative of the vertebral subluxation and other malpositioned articulations and structures or other dysfunction.

1. Thermocouple: The use of thermocouple instrumentation in chiropractic practice is well established.
2.
   a. Single-channel (e.g., chirometer)

   b. Dual-channel (e.g., Neurocalograph (NCGH), Thermoscribe, Analograph)

   The dual probe devices give a bilateral comparative temperature reading of the paraspinal tissues. However, the instrument requires skin contact.

16.6.1. **Rating**: Established
Evidence: E, L

2. Infrared Thermography

Infrared instruments detect and record changes in temperature rapidly and require no skin contact, and are relevant to chiropractic practice.

1. Single-channel (dermathermagraph) double-channel (e.g., Accolade, Tytron C-2000, VT 2000)

16.6.2. **Rating**: Established
Evidence: E, L

B. Multi(channel (e.g., Visitherm II)

16.7.1 **Rating**: Established
Evidence: E, L

C. Cryogenic-cooled detector thermal imaging cameras (Inframetrics, Agema, Mikron)

"A thermogram provides a graphic representation of neural fiber irritation by demonstrating a change in the thermal regions, innervated by that particular nerve."

16.8.1 **Rating**: Established
Evidence: E, L

D. Current Perception Threshold Devices (e.g., neurometer)

The current perception threshold device is a variable constant current sine wave stimulator proposed as a simple non-invasive and quantitative measure of peripheral nerve function. The neurometer has been shown to be appropriate for rapid screening for neural dysfunction.

16.9.1 **Rating**: Established
Evidence: E, L

E. Electroencephalography (EEG)

Standard EEG and computerized EEG, also known as brain mapping, have been shown to be useful in chiropractic patient management and document the effectiveness of chiropractic care..

16.10.1. **Rating**: Established
Evidence: E, L

F. Tissue compliance measurements

The tissue compliance instruments measure soft tissue consistency or compliance. Caution should be used in interpreting pre- and post-adjustment readings based on information which has shown that 26% of readings taken ten minutes following initial testing were significantly different without any intervention. A bilateral difference of greater than 2mm at 2 kg is significant and suggests pathological asymmetry.

16.11.1. **Rating**: Established
Evidence: E, L

2. Surface electromyography (EMG) is the technique of collecting and recording the electrical activity of the muscles.

Surface EMG, also known as "scanning" or "kinesiologic" EMG, employs a self-contained, hand-held electrode assembly connected to a computerized system that measures electrical potentials associated with the muscle in question. Electrodes are placed over the muscle in question. It enables scanning of paraspinal muscles over several vertebral levels. Very good test-retest reliability has been shown due to ease of duplicating protocols for longitudinal studies. Protocols and normative data for paraspinal EMG scanning in the chiropractic practice have been suggested by Kent & Gentempo. The same authors have found that Surface EMG potentials are substantially higher in children than in adults. Gentempo reported that "electromyographic findings were consistent with the clinical and radiographic manifestations of subluxation and myospasm." Significant changes in surface EMG potentials have been shown after a chiropractic adjustment.

16.11.2 **Rating**: Established
Evidence: E, L, C

H. Surface Electrodiagnostic procedures (NCV, F-Wave, H-Reflex, SSEP)

Surface electrodiagnostic procedures (NCV, F-wave, H-reflex, SSEP) are established procedures effective for examination of peripheral nerve disorders and are supported by Class I and Class II evidence. Somatosensory evoked potentials are established for limited applications to peripheral nerve disorders and lesions affecting the long sensory tracks of the spinal cord.

16.12.1. **Rating**: Established
Strength Type A

I. Other Instrument Measures

1. Spirometry

Pulmonary function testing is established as a method to assess effect of severe scoliosis and the differential diagnosis of lung disease. These uses are backed by Class I and Class II evidence. The procedures are safe and effective when performed by appropriately trained personnel.

16.13.1. **Rating**: Established
Strength Type A

V. COMMENTS

Instrumentation has been used in chiropractic nearly since its inception in 1895. Many advances in the accuracy and usefulness of the instruments have taken place. The use of instrumentation provides a scientific basis for analysis and outcome assessment in chiropractic practice. Due to advances that have been made in instrumentation germane to the analysis of vertebral subluxation the past decade, it is anticipated that the contents of this chapter will require periodic updating.

VI. REFERENCES

Adams A, Lopez D, Wild S, Lawless P, Loucks J: Intra- and Inter-examiner reliability of plumb line posture analysis measurements using a three dimensional electrogoniometer. *Res for* 1988, 4(3):60-72.

Agarwal A, Lloyd EN, Dovey P: Thermography of the spine and sacroiliac joints in spondylitis. *Rheum Phys Med* 1970, 10:349.

Ahern DK, Follick MJ, Council JR, Laser-Wolston N: Reliability of lumbar paravertebral EMG assessment in chronic low back pain. *Arch Phys Med Rehabil* 1986, 67:762.

Ahern DK, Follick MJ, Council JR, Laser-Wolston N, Litchman H: Comparison of lumbar paravertebral EMG patterns in chronic low back pain patients and non-patient controls. *Pain* 1988; 34:153.

Albanese AA: Calcium nutrition in the elderly: maintaining bone health to minimize fracture risk. *Postgrad Med* 1978, 63:167.

Andersson G, Jonsson B, Ortengren R: Myoelectric activity in individual lumbar erector spinae muscles in sitting. A study with surface and wire electrodes. *Scand J Rehab Med* 1974 Supl; 3:91.

Ayoub MA: Ergonomic deficiencies: I. Pin at work. *I Occup Med* 1990, 32:52.

Ayoub MA: *Design of a pre-employment screening program*, In: Kvalseth TO (ed). *Ergonomics of workstation design*, London: Butterworths, 1983. 152-8.

Ayres SM: *Pulmonary function studies*. In: Holman CW, Muschenheim C (eds): *Bronchopulmonary diseases and related disorders*, Hagerstown: Harper & Row, 1972.

Baillie AH, Biagioni PA, Forsyth A, Garioch JJ: Thermographic assessment of patch-test responses. *Br J Dermatol* 1990, 122:351.

Baltzopoulos V, Brodie DA: Isokinetic dynamometry applications and limitations. *Sports Med* 1989, 8:101.

Barbee, JA, Nron, BJ: *Reliability and validity of the metrecom for measuring inanimate objects.* Presented at the 1988 CPA/APTA Joint Annual Meeting, Las Vegas, NV June 1988.

Barlow DH, Hayes S, Nelson R: *The Scientist Practitioner: Research and Accountability in Clinical and Educational Settings*, New York: Pergamon Press, 1984, 112-124.

Basmajian JV: *Muscles alive*, Baltimore: Williams and Wilkins Co., 1979.

Beasley WC: Influence of method on estimates of normal knee extensor force among normal and postpolio children. *Phys Ther* 1956.

Beimborn DS, Morrissey MC: A review of the literature related to trunk muscle performance. *Spine* 1988, 13:655.

Bergofsky EH, Turino GM, Fishman AP: Cardiorespiratory failure in kyphoscoliosis. *Medicine* 1959, 38:263.

Bergstrom E, Courtis G: An inter- and intra-examiner reliability study of motion palpation in lateral flexion in the seated position. *Euro J Chiro* 1986, 34:121.

Bjure J, Grimby G, Kasalicky J, Lindh N, Nachemson A: Respiratory impairment and airway closure in patients with untreated idiopathic scoliosis. *Thorax* 1970, 25:451.

Bohannan RW: Hand-held dynamometry; stability of muscle strength over multiple measurements. *Clinical Biomech* 1986, 2:74.

Bolecek C, Steiner C, Guzelsu N: *Evaluation of conservative treatment of low-back pain via electromyography and pain quantification*. In: *Electromyographic Kinesiology Excerpta Medica*, New York: 1990, 191-194.

Boline P, Keating J, Brist J, Denver G: Inter-examiner reliability of palpatory evaluations of the lumbar spine. *Am J Chiro Med* 1988, 1(1):5.

Brand W, Gizoni C: Moire contouragraphy and infrared thermography: changes resulting from chiropractic adjustments. *J Manip Physio Ther* 1982, 113-116.

Braunwald E, Isselbacher KJ, Petersdorf RG, Wilson JD, Martin JB, Fauci AS (eds): *Harrison's principles of internal medicine*, New York: McGraw-Hill, 1987.

Brown WF: *The physiological and technical basis of electromyography*, Boston: Butterworth, 1984.

Brown WF RW: Hand-held dynamometry; stability of muscle strength over multiple measurements. *Clinical Biomech* 1986, 2:74.

Bullock-Saxton J, Janda V, Bullock M: Reflex activation of gluteal muscles in walking: an approach to restoration of muscle function patients with low back pain. *Spine* 1993, 18(6):704.

Busse EW: How mind, body, and environment influence nutrition in the elderly. *Postgrad Med* 1978, 63:118.

Byl NN, Richards S, Asturias J: Intrareter and interrater reliability of strength measurements of the biceps and deltoid using a hand held dynamometer. *J Orthop Sports Phys Ther* 1988, 9:399.

Caliendo MA, Sanjur D. Wright J, Cummings G: Nutritional status of preschool children. *J Am Diet Assoc* 1977, 71:20.

Calliet R: *Soft tissue pain and disability*, Philadelphia: F A Davis, 1977.

Calliet R: *Low back pain syndrome,* ed 3. Philadelphia: F A Davis, 1977.

Cassidy J, Potter G: Motion examination of the lumbar spine. 1979, 2 (3):151.

Chafetz N, Wexler CI, Kaiser JA: Neuromuscular thermography of the lumbar spine with CT correlation. *Spine* 1988, 13:922.

Chaffin D: Ergonomics guide for the assessment of human static strength. *AM Ind Hyg Assoc J* July 1975, 505-511.

Chaffin DB, Anderson GBJ: *Occupational 1987*, New York: Biomechanics, Wiley Interscience Publishers, 1988, 117-122.

Chang L, Abernathy N, O'Rourke D, Dittberner N, Robinson C: The evaluation of posterior thoracic temperatures by telethermography, thermoocouple, thermistor and liquid crystal thermography. *Therm* 1985, 1:95-101.
Christiansen J, Gerow G: *Thermography*, Baltimore: Williams & Wilkins, 1990.

Cobb CR, DeVries HA, Urban RT, Luekens CA, Bragg RJ: Electrical activity in muscle pain. *Am J Phys Med* 1975, 54(2):80

Coggins WN: *Basic Techniques and Systems of Body Mechanics*, Florrissant: Elco, 1975.

Cohen HL, Brumlik JD: *Manual of Electroneuromyography*, 2nd ed, Hagerstown: Harper & Row, 1976.

Collins GA, Cohen MJ, Neliboff BD, Shandler SL: Comparative analysis of paraspinal and frontalis EMG, heart rate and skin conductance in chronic low back pain. *Scand J Rehabil Med* 1982, 14:39.

Cooper P, Randall WC, Hartzman AB: Vascular convection of heat from active muscle to overlying skin. *J Appl Physiol* 1959, 14:207.

Cram J: *Clinical EMG: Muscle scanning for surface electrodes*, Seattle: Biofeedback Institute of Seattle, 1986.

Cram Jr, Lloyd J, Cahn TS: The reliability of EMG muscle scanning. *Int J Psychosomatics* 1994, 41:41.

Davis D: Respiratory manifestations of dorsal spine radiculitis stimulating cardiac arrythmia. *Ann Intern Med* 1950, 32:954.

DeBois EF: *The mechanism of heat loss and temperature regulation*, Stanford: Stanford University Press, 1937.

Desmedt J (ed): *New developments in electro-myography and clinical neurophysiology*, New York: S. Karger, 1973.

Deyo R: Measuring the functional status of patients with low-back pain. *Chiropractic Technique* 1990, 2930:127-136.

Diakow PR: Thermographic imaging of myofascial trigger points. *Manip Physiol Ther* 1988, 11:114.

Dolan P, Mannion AF, Adams MA: Fatigue of the erector spinae muscles. A quantitative assessment using frequency banding of the surface electromyography signal. *Spine* 1995; 20(2):149.

Donaldson S, Donaldson M: Multi-channel EMG assessment and treatment tecxhniques. In Cram J (ed) *Clinical EMG for Surface Recordings: Volume 2*. Clinical Resources. Nevada City, CA 1990.

Dotson, LR, Luithens CA: *A comparison between a standard manual goniometer and the metrecom skeletal analysis system*, Presented at the South Florida Physical Therapy Association Meeting, North Miami Beach, FL; April, 1988.

Dowling JJ, Kennedy SR: *The quantitative assessment of EMC cross talk in human soleus and gastrocnemius muscles*, Thirteenth annual meeting of the American Society of Biomechanics. Vermont, August, 1989.

Duensing F, Becker P, Rittmeyer K: Thermographic findings in lumba disc protrusions. *Arch Psychiatr Nervenkr* 1973, 217:53.

Dye AA: *The evolution of chiropractic*, Prentice Hall, 1939.

Ebrall, PS: A chiropractic screening health questionnaire: A pilot study concerned with quality standard of practice. *J Aust Chiropractor's Assoc* 1990; 20:122-8.

Ebrall PS, Iggo A, Hobson P, Farrant G: Preliminary report: the thermal characteristics of spinal levels identified as having differential temperature by contact thermocouple measurement (Nervo-scope). *Chiropractic Journal of Australia* 1994; 24(4):139.

Edwards R, Hyde S: Methods of measuring muscle strength and fatigue. *Physiotherapy* 1977, 63:51.

Eisen A, Schomer D, Melmed C: An electrophysiological method for examining lumbosacral root compression. *Can J Neurol Sci* 1977, 4:117.

Ellestad S, Nagle R, Boesler D, Kilmore M: Electromyographic and skin resistance responses to osteopathic manipulative treatment of low back pain. *JAOA* 1988, 88(8) 1991.

Feldman F, Nickoloff: Normal thermographic standards for the cervical spine and upper extremities. *Skeletal Radiol* 1984, 12:235-249.

Figar S, Krausova L: A plethysmographic study of the effects of chiropractic treatment in vertebrogenic syndromes. *ACTA Univ Caro Med (Suppl)* 1965, 21:84.

Figar S, Krausova L, Levit K: Plethysmographic examination following treatment of vertebrogenic disorders by manipulation. *ACTA Neurove* 1967, 29:618.

Fisher AA: Pressure algometry over normal muscles: Standard values, validity and reproducibility of pressure threshold. *Pain Vol* 1, 115-126, 1989.

Fisher AA: Pressure threshold meter: Its use for quantification of tenderspots. *Arch Pys Med Rehab*, Vol 67 #11, 836-838, 1986.

Fisher AA: Tissue compliance meter for objective documentation of soft tissue consistency and pathology. *Arch Phys Med Rehabil* 1987, 68:122-25.

Fisher AA: Clinical use of tissue compliance meter for documentation of soft tissue pathology. *Clin J Pain* 1987, 3:23-30.

Fisk JW: *A Practical Guide to Management of the Painful Neck and Back: Diagnosis, Manipulation, Exercises*, Prevention. Springfield: Charles C. Thomas, 1977, 10.

Frank GC, Voors AW, Schilling PE, Berenson GS: Dietary studies of rural school children in a cardiovascular survey. *J Am Diet Assoc* 1977, 71:31.

Freedman S: *Design of respiratory circuits and spirometry*. In: Laszk G, Sudlow MF (eds): *Measurement in clinical respiratory physiology,* London: Academic Press, 1983.

Freeman MO: *Rubbing Plate: Summary of Device and Mechanics of Use*, Portland, OR.

Frese E, Brown N, Norton B: Clinical reliability of manual muscle testing. Middle trapezius and gluteus medius muscles. *Phys Ther* 1987, 67(7): 1072-1076.

Fronk A, Coel N, Bernstein E: The importance of combined multisegmental pressure and doppler flow velocity studies in the diagnosis of peripheral arterial occlusive disease. *J Surg* 1978, 84: 840-847.

Fuhrer MJ: Effects of stimulus site on the pattern of skin conductance responses evoked from spinal manipulation. *J Neurol Neurosurg Psychiatr* 1975, 38:749.

Gemmell H, Jacobson B, Heng B: Effectiveness of toftness sacral apex adiustment in correcting fixation of the sacroiliac joint. A preliminary report. *Am J Chiro Med* 1990, 3(1):5-8.

Gemmell H, Jacobson B, Edwards S, Heng R: Interexaminer reliability of the electromagnetic radiation receiver for determining lumbar spinal joint dysfunction in subjects with low back pain. *J Manip Phys Ther* 1990, 13(3):134-37

Gentempo P, Kent C: Establishing medical necessity for paraspinal EMG scanning. *Journal of Chiropractic Research and Clinical Investigation* 1990; (3)1:22.

Gerow G, Callton N, Meyer JJ, Demchak JJ, Christiansen J: Thermographic evaluation of rats with complete sciatic nerve transection. *J Manip Physiol Ther* 1990, 13:257.

Gillette RG: A speculative arguement for the coactivation of diverse somatic receptor populations by forceful chiropractic adjustments. *Man Med* 1987, 3:1.

Giroux B, Lamontagne M: Comparisons between surface electrodes and intramuscular wire electrodes in isometric and dynamic conditions. *Electromyogr Clin Neurophysiol* 1990, 30:397.

Gleim GW, Nicholas JA, Webb JN: Isokinetic evaluation following leg injuries. *Phys Sportsmed* 1978, 68:74.

Goldman SR: A structural approach to bronchial asthma. *Bull Euro Chiropr Union* 1972, 21:66.

Gomez T, Beach G, Cooke C, Hrudey W, Goyert P: Normative database for trunk range of motion, strength, velocity, and endurance with the isostation B-200 lumbar dynamometer. *Spine* 1991, 16:15.

Gonella C, Paris S, Kutner M: Reliability in evaluating passive intervertebral motion. *Phys Ther* 1982, 62(4):436.

Goodman PH, Murphy MG, Siltanen GL, Kelley NP, Rucker L: Normal temperature asymmetry of the back and extremities by computer-assisted infrared imaging. *Therm* 1986, 1:195-202.

Green J, Coyle M, Becker C, Reilly A: Abnormal thermographic findings in asymptomatic volunteers. *Therm* 1986, 2:13-15.

Halberg F: Chronobiology. *Annu Rev Physiol* 1969, 31:675.

Haldeman S: The electrodiagnostic evaluation of nerve root function. *Spine* 1984, 9(1):42-48.

Hazard RG, Bendix A, Fenwick JW: Disability exaggeration as a predictor of functional restoration outcomes for patients with chronic low-back pain. *Spine* 1983, 8:141.

Hazard RG, Fenwick JW, Kalish SM, Redmond J, Reeves V, Reid S, Frymoyer JW: Functional restoration with behavioral support. A one-year prospective study of patients with chronic low-back pain. *Spine* 1989, 14:157.

Hazard RG, Reid S, Fenwick J, Reeves V: Isokinetic trunk and lifting strength measurements: Variability as an indicator of effort. *Spine* 1988, 13:54.

Head MK, Weeks RJ, Girbbs E: Major nutrients in the type A lunch. *J Am Diet Assoc* 1973, 63:620.

Herzog W, Bigg B, Real L, Olsson E: Asymmetries in ground reaction force patterns in normal human gait. *Med Sci Sports Exerc* 1989, 21(1):110-114.

Hildebrandt RW: *Chiropractic Spinography: a Manual of Technology and Interpretation*, Des Plaines: Hilmark Publication, 1977.

Hill FW: The phytogenesis and clinical import of the sacroiliac mechanism. *J Can Chiropr Assoc* 1965, 9:9.

Hoppenfeld S: *Scoliosis: A manual of concept and treatment*, Philadelphia: Lippincott, 1967.

Houdas Y, Guieu JD: Environmental factors affecting skin temperatures. *Bibl Radiol* 1974, 6:157.

Hoyt WH, Hunt HH, DePauw MA et al: Electromyographic assessment of low back pain syndrome. *JAOA* 1981, 80:728.

Hsieh CY, Phillips RB: Reliability of manual muscle testing with a computerized dynanometer. *Transactions of the PCCR*, June 1988.

Hubbard JE, Hoyt C: Pain evaluation by electronic infrared thermography: correlations with symptoms, EMG, Myelogram and CT scan. *Therm* 1985, 1:26-35.

Huskisson EC, Berry H, Browett J, Wykeham Balme H: Measurement of inflammation. *Ann Rheum Dis* 1973, 32:99.

Illi FW: The phylogenesis and clinical import of the sacroiliac mechanism. *J Can Chiropr Assoc* 1965, 9:9.

Jabre JF, Hackett ER: *EMG manual*, Springfield: Thomas, 1983.

Jacobs I, Bell DG, Pope J: Comparison of isokinetic and isomertial lifting tests as predictors of maximal lifting capacity. *Europ J Appl Physiol Occup Physiol* 1988, 57:146.

Jalovaara P, Niinimaki T, Vanharanta H: Pocket-size, portable surface EMG device in the differentiation of low back pain patients. *Eur Spine J* 1995, 4:(4):210.

Jamison JR: Dietary intervention in the clinical prevention of ischemic heart disease. *J Manip Physiol Ther* 1990, 31:247.

Jamison JR: Dietary control of mild essential hypertension. *J Manip Physiol Ther* 1987, 10:101.

Jansen R, Nansel D, Siosberg N: Normal paraspinal tissue compliance: the reliability of a new clinical and experimental instrument. *Manip Physiol Ther* 1990, (13)5:243-146.

Jiang BC, Smith JL, Ayoub MM: Psychophysical modelling of manual materials-handling capacities using isoinertial strength variables. *Hum Factors* 1986, 28:691.

Jiang BC, Smith JL, Ayoub NM: Psychophysical modelling for combined manual materials-handling activities. *Ergonomics* 1986, 29:1173.

Jones CH: Physical aspects of thermography in relation to clinical techniques. *Bible Radiol* 1974, 6:1.

Jones A, Wolf S: EMG Biofeedback training during movement. *Phys Ther* 1980, 60, 1:58.

Jowsey J: Osteoporosis. *Postgrad Med* 1976, 60:75.

Jull G, Bullock M: A motion profile of the lumbar spine in an aging population assessed by manual examination. *Physiotherapy Practice* 1987, 3:70.

Kannus P: Ratio of hamstring to quadriceps femoris muscles' strength in the anterior cruciate ligament insufficient knee. Relationship to long-term recovery. *Phys Ther* 1988, 68:961.

Karpman HL, Knebel A, Semel CJ, Cooper J: Clinical studies in thermography: II. Application of thermography in evaluating musculoligamentous injuries of the spine - a preliminary report. *Arch Environ Health* 1970, 20:412.

Katems JJ, et al: Constant current sine wave transcutaneous nerve stimulation for evaluation of peripheral neuropathy. *Arch Phys Med Rehabil* 1987, 68:210-213.

Katems JJ, et al: Current perception threshold: Repeatability and comparison with nerve conduction in evaluation of carpal tunnel syndrome. *Trans Am Soc Artif Int Organs* 1989, 35:280-284.

Keating J: *Inter-examiner reliability of motion palpation of the lumbar spine: a review of the quantitative literature*, Proceedings of the Scientific Symposium on Spinal Biomechanics. International Chiropractors Association. May 19-21, 1989.

Kent C, Gentempo P: Protocols and normative data for paraspinal EMG scanning in chriorpactic practice. *Journal of Chiropractic Research and Clinical Investigation* Oct 1990, 6(3):64.

Kent C, Gentempo P: Dynamic paraspinal surface EMG: a chiroprctic protocol. *Chiropractic Research Journal* 1993 2(4):40.

Kent C, Gentempo P: Normative data for paraspinal surface electromyographic scanning using a 25-500 Hz bandpass. *Journal of Vertebral Subluxation Research* 1996; 1(1):43.

Khalil TM, Goldberg XL, Asfour SS, Moty EA, Rosomoff RS, Rosomoff HL: Acceptable maximum effort (AME) a psychophysical measure of strength in back pain patients. *Spine* 1987, 12:372.

Kibler WB, Chandler TJ, Uhl T, Maddux RE: A musculoskeletal approach to the preparticipation physical examination. Preventing injury and improving performance, *Am J Sports Med* 1989, 17:525.

Kieffer JD: Laboratory procedures in the low-back syndrome. *ACA J Chiropr* 1965, 2:17.

Kimura J: *Electrodiagnosis in diseases of nerve and muscle*, Philadelphia: FA Davis, 1985.

Kohrs NB, O'Neil R, Preston A, Eklund D, Abrahams O: Nutritional status of elderly residents in Missouri. *Am J Clin*

Nutri 1978, 31:2186.

Komi P, Buskirk E: Reproducibility of electromyographic measurements with inserted wire electrodes and surface electrodes. *Electromyography* 1970, 10:357.

Kravitz E, Moore ME, Glaros A: Paralumbar muscle activity in chronic low back pain. *Arch Phys Med Rehabil* 1981, 62:172.

Kritchevsky D: How aging affects cholesterol metabolism. *Postgrad Med* 1978, 63:133.

Kroemer K: Testing individual capability to lift materials. Repeatability of a dynamic test compared with static testing. *J Safety Res* 1985, 16:1.

Kroemer KHE: An isoinertial technique to assess individual capacity. *Hum Factors* 1983, 25:493.

Kvalseth TO (ed.): *Ergonomics of Workstation Design,* London: Butterworths, 1983.

Kyneur JS, Bolton SP: Chiropractic instrumenttion: an update for the >90s. *Chiropractic Journal of Australia* (Sept 1991) 21(3):82.
Lakomy HKA, Williams C: Measurement of isokinetic concentric and eccentric muscle imbalance. *Int J Sports Med (Suppl)* 1984, 5:40.

Langrana NA, Lee CK, Alexander H, Mayott CW: Quantitative assessment of back strength using isokinetic testing. *Spine* 1984, 9:287.

Lilienfeld A, Jacob M, Willis M: Study of the reproducibility of muscle testing and certain other aspects of muscle scoring.

Lofland KR, Mumby PB, Cassisi JE, et al: Assessment of lumbar EMG during static and dynamic activity in pain-free normals: implications for muscle scanning protocols. *Biofeedback and Self-Regulation* 1995; 20(1):3.

Love R, Brodeur R: Inter-and intra-examiner of reliability of motion palpation for the thoracolumbar spine. *JMPT* 1987; 10(1)1.

Ludin HP: *Electromyography in practice*, Stuttgart: George Thieme Veriag, 1980.

Masson EA, VBeves A, Fernando D, Boulton AJM: Current perception threshold: a new quick and reproducible method for the assessment of peripheral neuropathy in diabetes mellitus. *Diabetologia* 1989, 32:724-728.

Mayer TG, Smit SS, Keeley J, Hooney V: Quantification of Lumbar function. Part 2: Sagittal plane trunk strength in chronic low-back pain patient. *Spine* 1985, 10:765.

Mayer TG, Gatchel RJ, Kishino N, Keeley J, Mayer H, Capra P, Mooney V: A prospective short-term study of chronic low-back pain patients utilizing novel objective functional measurement. *Pain* 1986, 25:53.

McNeil T, Warwick D, Anderson G, Schultz A: Trunk strengths in attempted flexion, extension, and lateral bending in healthy subjects and patients with low-back disorders. *Spine* 1980, 5:529.

Meyer JJ, Anderson AV, Berk RJ: The flexion-rexlaxation phenomenon: does it exist in the cervical spine? *Proceedings of the 1990 International Conference on Spinal Manipulation.* FCER, Arlinton VA.

Miller-Brown H, Mellenthin N, Miller R: Quantifying human muscle strength, endurance, and fatigue. *Arch Phys Med Rehab* 1986, 76:530.

Miller D: Comparison of electromyographic activity in the lumbar paraspinal muscles of subjects with and without chronic back pain. *Phys Ther* 1985, 65, 9:1357.

Mills GH, Davies GX, Getty CJ, Conway J: The evaluation of liquid crystal thermography in the investigation of nerve root compression due to lumbosacral lateral spinal stenosis. *Spine* 1986, 11:427.

Mira AJ, Markely K, Greer RB III: A critical analysis of quadriceps function after femoral shaft fracture in adults. *J Bone Joint* Surg 1980, 62A:61.

Mitchell FL, Pruzzo NL: Investigation of voluntary and primary respiratory mechanism. *J Am Osteopath Assoc* 1971, 70:1109.

Munroe HN, Young VR: Protein metabolism in the elderly: observations relating to dietary needs. *Postgrad Med* 1978, 63:143.

Niebuhr BR, Marion R: Detecting sincerity of efforts when measuring grip strength. *Am J Phys Med* 1987, 66:16.

Nunn KD, Mayhew JL: Comparison of three methods of assessing strength imbalances at the knee. *J Orthop Sports Phys Ther* 1988, 10:134.

O'Donovan D: The possible significance of scoliosis of the spine in the causation of asthma and allied allergic conditions. *Am Allergy* 1951, 9:184.

Palmer DD: *The Science, Art, and Philosophy of Chiropractic*, 1910.

Palmer BJ: *Precise posture spinograph comparative graphs*, Davenport, IA: Palmer School of Chiropractic Press, 1938.

Parnianpour M, Li F, Mordin M, Kahanovitz N: A database of isoinertia strength test against three resistance levels in sagittal, frontal, and transverse planes in normal male subjects. *Spine* 1989, 14:409.

Peneff AL, Nansel DD, Jansen RD, Cooperstein R: Inter and intra-examiner reliability with respect to the detection of right left joint play asymmetries in the cervical spine. *Transactions of the PCCR* June 1988.

Perelman RB, Adler D, Humphreys N: *Reflex sympathetic dystrophy. A thermographic evaluation*, Acad. Neuromuscular Therm Clin Proceedings. Orlando, FL, Sept 1986.

Plaugher G, Lopes N, Melch P, Cremats E: The Inter- and intra-examiner reliability of a paraspinal skin temperature differential instrument. *J Manip Physiol Ther* 14(6)361-367.

Pochaczevsky R: Thermography in posttraumatic pain. *Am J Sport Med* 1987, 15:243.

Pollock ML, Leggett SH, Graves JE, Jones A, Fulton M, Cirulli J: Effect of resistance training on lumbar extension strength. *Am J Sports Med* 1989, 17:624.

Price JP, Clare MH, Ewerhardt RH: Studies in low backache with persistent muscle spasm. *Arch Phys Med Rehabil* 1948; 19:703.

Prodromas C, Andriacohi T, Galante J: A relationship between gait and clinical changes following high tibial Osteotomy. *JBJS* 1985, 657(8):1188-1196.

Purse FN: Manipulative therapy of upper respiratory infections in children. *J Am Osteopath Assoc* 1966, 65:964.

Quigley F, Paris L, Duncan H: A comparison of doppler ankle pressure and skin perfusion pressure in subjects with and without diabetes. *Clin Physiology* 1991, 11:21-25.

Raskin N: *Thermography in low-back diseases. Medical thermography: theory and clinical applications,* Los Angeles: Brentwood, 1976.

Reeves J, Jaeger B, Graff-Radford S: Reliability of the pressure algometer as a measure of myofascial trigger point sensitivity. *Pain* 1986, 24:313-21.

Reinberg: Circadian changes in the temperature of human beings. *Bibl Radiol* 1975, 6:128.

Rendell MS, et al: A comparison of nerve conduction velocities and current perception thresholds as correlates of clinical severity of diabetic sensory neuropathy. *J Neural Neurosurg Psychiatry* 1989, 52:502-511.

Roaf R: *Scoliosis*, Baltimore: Williams & Wilkins, 1966.

Roland M, Morris R: A study of the natural history of back pain. Part I, development of a reliable and sensitive measure of disability in low-back pain. *Spine* 1983, 8:141.

Ruch TC, Patton HD, Woodbury JW, Towe AL: *Neurophysiology*, Philadelphia: Saunders, 1965.

Sapega AA: Muscle performance evaluation in orthopaedic practice. *J Bone Joint Surg* 1990, 72A:1562.

Saraniti AJ, Gleim GW, Melvin N, Nicholas JA: The relationship between subjective and objective measurements of strength. *J Orthop Sports Phys Ther* 1980, 2:15.

Sawyer CE: *Nutritional disorders*. In: Lawrence D (ed): *Fundamentals of chiropractic diagnosis and management*, Baltimore: Williams & Wilkins, 1991.

Schafer RE (ed): *Basic Chiropractic Procedural Manual*, Des Moines: American Chiropractic Association, 1977.

Scneider HA, Anderson CE, Coursin DB: *Nutritional support of medical practice*, Hagerstown: Harper & Row, 1977.

Seeds RH, Levene JA, Goldberg HM: Abnormal patient data for the isostation B100. *J Orthop Sports Phys Ther* 1988, 10:121.

Shambaugh P: Changes in electrical activity in muscles resulting from chiropractic adjustment: a pilot study. *JMPT* Dec 1987, 10 (6):300.

Sherman RA, Barja RH, Bruno GM: Thermographic correlates of chronic pain: analysis of 125 patients incorporating evaluations by a blind panel. *Arch Phys Med Rehabil* 1987, 68:273.

Silverman JL, Rodriguez AA, Agre JC: Reliability of hand-held dynamometer in neck strength testing. *Arch Phys Med Rehabil (Suppl)* 1989, 70-94.

Sims LS, Morris PM: Nutritional status of preschoolers. *J Am Diet Assoc* 1974, 64:492.

Sisson JA: *Handbook of clinical pathology*, Philadelphia: JB Lippincott, 1976.

Smith GA, Nelson RC, Sadoff SJ, Dadoff AM: Assessing sincerity of effort in maximal grip strength tests. *Am J Phys Med Rehabil* 1989, 68:73.

So YT, Aminoff NJ, Olney RK: The role of thermography in the evaluation of lumbosacral radiculopathy. *Neurology* 1989, 39:1154.

Spector B, Eilbert L, Finando S, Fukuda F: Video Integrated Measurement System. *J Manip Physiol Ther* 5(2):55-61, 1982.

Spector B: Surface electromyography as a model for the development of standardized procedures and reliability testing. *JMPT* 1979, 2(4):214.

Stephenson RW: *Chiropractic Textbook*, Davenport, IA: Palmer School of Chiropractic, 1927.

Stewart MS, Riffle DW, Boone WR: Computer-aided pattern analysis of temperature differentials. *JMPT* 1989; 12(5):345.

Stoddard A: *Manual of Osteopathic practice*, New York: Harper & Row, 1969.

Suter E, Herzog W, Conway PJ, Zhang YT: Reflex response associated with manipulative treatment of the thoracic spine. *JNMSS* 1994; 2(3):124.

Thompson J, Erickson R, Offord K: EMG muscle scanning: stability of hand-held electrodes. *Biofeedback Self Regul* 1979, 14(1):55.
Thorstensson A, Arvidson A: Trunk muscle strength and low back pain. *Scand J Rehabil Med* 1982, 14:69.

Triano J, Baker J, McGregor M, Torres B: Optimizing measures on maximum voluntary contraction. *Spine Rehab* (Submitted 1991).

Triano J, Skogsbergh D, Kowalski N: *The use of instrumentation by chiropractors*. In: Haldeman, S (ed) *Modern Developments in the Principles and Practice of Chiropractic*, Appleton-Lange, 1992.

Triano JJ, Luttges M: Myoelectric paraspinal response to spinal loads: potential for monitoring low back pain. *JMPT* 1985, 8, 3:137.

Triano JJ, Schultz AB: Correlation of objective measure of trunk motion and muscle function with low-back disability ratings. *Spine* 1987, 12:561.

Triano JJ, Humphreys CR: Patient monitoring in the conservative management of cervical radiculopathy. *J Manip Physiol Ther* 1987, 10:94.

Trott PH, Maitand GD, Gerrard B: The neurocalometer: a survey to assess its value as a diagnostic instrument. *Med J Aus* 1972, 1:464.

Uematsu, S, Hendler U, Hungerford, et al: Thermography and electromyography in the differential diagnosis of chronic pain syndromes and reflex sympathetic dystrophy. *Electro Clin Neurophysiol* 1981, 21:165-182.

Uematsu S: Quantification of thermal asymmetry. Part 1: Normal values and reproducibility. *J Neurosurg* 1988, 69, 552-555.

Vallfors B: Acute, subacute and chronic low-back pain. Clinical symptoms, absenteeism and working environment. *Scand J Rehabil Med (suppl)* 1985, 185:1.

Vernon H: Applying research-based assessments of pain and loss of function to the issue of developing standards of care in chiropractic. *Chiropractic Technique* 1990, 2(3): 121-126.

Vernon H, Aker P, Burns S, Viljakanen S, Short L: Pressure pain threshold evaluation of the effect of a spinal manipulation in the treatment of chronic neck pain. *J Manip Physiol Ther* 1990, 13(1):13.

Vernon H, Gitelman R: Pressure algometry and tissue compliance measures in the treatment of chronic headache by spinal manipulation: a single case/single treatment report. *J Canad Chiro Assoc* 1990, 34(3):141-144.

Vernon H, Grice A: The four quadrant weight scale: a technical and procedural review. *J Manip Physiol Ther* 1984, 3:165.

Wallace H, Wallace J, Resh R: Advances in paraspinal thermographic analysis. *Chiropractic Research Journal* 1993; 2(3):39.

Walshe FMR: *Diseases of the nervous system described for practitioners and students*, 10th ed. Baltimore: Williams and Wilkins, 1963.

Walther DS: *Applied kinesiology - the advanced approach in chiropractic*, Pueblo Systems, D.D., 1976.

Watkins MP, Harris BA, Kozlowski BA: Isokinetic testing in patients with herniparesis. A pilot study. *Phys Ther* 1984, 64:184.

Weber B, Smith JP, Briscoe WA, Friedman SA, King TX: Pulmonary function in asymptomatic adolescents with idiopathic scoliosis. *Am Rev Respir Dis* 1975, 111:389.

Whatmore GB, Kohi DR: Dysponesis: a neurophysiologic factor in functional disorders. *Behav Sci* 1968;13(2):102.

Wickes DJ: *Cardiovascular disorder in ambulatory patients*, In: Lawrence D (ed): *Fundamentals of chiropractic diagnosis and management*, Baltimore: Williams & Wilkins, 1991.

Wickes D: *Laboratory evaluation*. In: Cox JM: *Low-back pain mechanism, diagnosis and treatment*, 5th ed. Baltimore: Williams & Wilkins, 1990.

Wilbourn A, Aminoff N: AAEE minimomograph #32: The electrophysiologic examination in patients with radiculophathies.

Williams M, Stutzman L: Strength variation through the range of joint motion. *Phys Ther Rev* 1959, 39:145.

Wolf SL, Nacht M, Kelly JL: EMG feedback training during dynamic movement for low back pain patients. *Behavior Therapy* 1982, 13:395.

Work Practices Guide for Manual Lifting. Niosh technical report; USDHHS 1981, #81-122.

Wright J, Cruickshank J, Kontis S, et al.: Aortic compliance measured by non-invasive doppler ultrasound: description of a method and its reproducibility. *Clin Sci* 1990, 78:463-468.

Wyatt MP, Edwards AM: Comparison of quadriceps and hamstring torque values during isokinetic exercise. *J Orthop Sports Phys Ther* 3:48.

Ziegler EE, O'Donnel AM, Stearns G, Nelson SE, Burmeister LF, Formon SJ: Nitrogen balance studies with normal children. *Am J Clin Nurm* 1977, 30-939.

Zusman M: Spinal manipulative therapy: review of some proposed mechanism, and a new hypothesis. *Aust J Physiother* 1986, 32:89.

CHAPTER 17

Contraindications and Complications

Chapter Outline

I. Overview

II. List of Subtopics

III. Literature Review

IV. Recommendations

V. Comments

VI. References

I. OVERVIEW

While chiropractic procedures have been demonstrated to be comparatively safe, special caution is warranted with certain conditions. Prevention of complications from chiropractic care is facilitated when good professional judgment is exercised and quality care is provided. Elements common to all primary care practitioners include sufficient history taking and record keeping, thorough examination, timely re-evaluation procedures throughout the course of case management, good communication with the patient and appropriate response in the event that an unexpected incident does occur. If a significant adverse result from a procedure is apparent, it is of critical importance that the intervention or procedure associated with the onset of the complication not be repeated.

The evidence of low incidence of injury or complications from adjustments is promoted by quality care which follows professional judgment consistent with the objectives of chiropractic care. Chiropractic professional judgment includes, without limitation, appropriate response to unexpected findings and reevaluation of the suitability of a particular technique or procedure associated with the discovery of a complication. The chiropractor should be alert to the possibility of encountering unusual findings in any phase of care.

Patient safety can be further enhanced by the chiropractic profession's commitment to quality assurance.

When assessing the safety and efficacy of chiropractic care, two factors should always be considered: the type of technique being utilized and the integrity of the area of the spinal column/or articulation being addressed. These two factors assist in evaluating any risk that may be associated with the application of chiropractic care.

The primary focus of the chiropractic management of complications is the recognition of unusual findings that may require modification of the plan of care when the unusual finding is observed.

II. LIST OF SUBTOPICS

To assist in understanding the patient evaluation process in the context of possible complications or special circumstances where procedures may need to be modified to meet the needs of a particular patient, the following list of conditions is provided. This list is not a list of conditions for which chiropractic procedures are contraindicated. Conditions selected have come from a review of the chiropractic, scientific and medical/legal literature as well as insurance claim information. The appropriate chiropractic management of patients with these and related conditions is described in this chapter.

A. Articular Derangements
   1. Arthritides
      a. Acute arthropathies
      b. Subacute and chronic ankylosing spondylitis
      c. Degenerative joint disease
      d. Spondylolysis and spondylolisthesis

   2. Dislocation, fractures, instability
   3. Os Odontoideum
   4. Articular hypermobility

5. Postsurgical joint
6. Acute joint injury
7. Scoliosis

B. Bone Weakening and Destructive Disorders
1. Juvenile osteochondroses
2. Osteoporosis, osteomalacia
3. Bone tumors
4. Malignancy
5. Infection of bone and joint

C. Circulatory and Cardiovascular Disorders
1. Vertebrobasilar, etc.
2. Aneurysm
3. Bleeding disorders

D. Neurological Disorders
1. Myelopathy, cauda equina syndrome

III. LITERATURE REVIEW

The literature on chiropractic safety is perhaps the single most impressive component of the outcomes record of the profession. Since its inception as a separate and distinct health care profession, chiropractic has established itself as the safest primary care profession by far. Despite the high volume of patients and the great diversity of conditions with which they present, chiropractic can claim the lowest complication rate, the lowest malpractice insurance rates and the highest rates of patient satisfaction of any doctor level provider.

The Government of New Zealand, while studying the possibility of inclusion of chiropractic services in that nation's public health care programs, conducted one of the most exhaustive studies of chiropractic safety ever conducted. Their findings were emphatic:

> *The conspicuous lack of evidence that chiropractors cause harm or allow harm to occur through neglect of medical referral can be taken to mean only one thing: that chiropractors have on the whole an impressive safety record.*

Over the past two decades there has been an interesting growth of literature on general manipulation-induced accidents or injuries. This body of information clearly distinguishes the safety record of chiropractic because the vast majority of recorded injuries are found to be at the hands of non-chiropractic providers attempting to apply chiropractic like procedures, without the highly developed skill and experience of the doctor of chiropractic. (Dvorak, 1991; Patjin, 1991; Schmitt, 1991; Terrett, 1990, 1987; Grieve, 1986; Gotlib and Thiel, 1985; Schmidely and Koch, 1984; Gutmann, 1983; Dvorak and Orelli, 1982; Ladermann, 1981; Gatterman, 1981; Jaskoviak, 1980; Kleynhans, 1980; Livingston, 1974, 1971).

There can be little doubt that the elevated level of reporting arises from a general increase in awareness of complications by all professionals interested in spinal manipulative therapy, and an increased incidence of the use of manual procedures by professionals not thoroughly trained in the arts of manipulation or adjustment. As well, since many alleged "consequences" are consistent with the natural history of a condition, anecdotal or polemic reports must be distinguished from those that provide objective evidence of true manipulation-induced injuries. Many case reports of injury have proven to be unfounded upon further unbiased inquiry.

With respect to the frequency of possibly genuine complications, Ladermann (1980) identified 135 case reports of serious complications over a 30 year period from 1950-1980, a time period during which tens of millions of adjustments were administered by a variety of practitioners. Kleynhans (1980), analyzing some of these case studies, outlined a number of likely practitioner-related causes of adverse reactions and suggested three main factors: lack of knowledge or diagnostic error; lack of technique skill; and lack of rational clinical attitude in case management. These causes could well account for a number of iatrogenic injuries reported in the literature, e.g., pathological fractures (Austin, 1985; Holta, 1942), ruptured abdominal aneurysms (Kornberge, 1988), electrotherapy burns and injuries, etc.

Jasoviak (1981) and Terrett (1987) specifically dealt with case reviews on the adverse effect of cervical adjustment where vertebrobasilar insufficiency was evident. Gutmann (1984), Terrett (1987), Theil (1991) and Schmitt (1991) have recently described or studied the biomechanical effects of head and neck movement and cervical adjustment in association with vertebral artery injury. Adjustment has been identified as only one of many activities or health care procedures that may result in damage to the vertebral artery. However, it has been the one most extensively reviewed and discussed. (Pratt-Thomas and Berger, 1947; Gutmann 1957, 1962, 1971, 1984; Smith and Estridge, 1962; Maigne, 1969; Houle, 1972; Lewit, 1972; Giles, 1977; Henderson, 1979, 1991; George et al., 1981; Terrett, 1982, 1983, 1987; Hulse, 1983; Gast et al., 1987; Henderson and Cassidy, 1988; Martienssen and Nilsoon, 1989; Raskind and North, 1990).

Rare case reports of adverse events following spinal adjustment exist in the literature. In the case of strokes purportedly associated with adjustment, significant shortcomings in the literature were noted.

In a letter to the editor of *JMPT*, Myler wrote: “I was curious how the risk of fatal stroke after cervical adjustment, placed at 0.00025% compared with the risk of (fatal) stroke in the general population of the United States. According to data obtained from the National Center for Health Statistics, the mortality rate from stroke was calculated to be 0.00057%. If this data was accurate, the risk of death from stroke after cervical adjustment is less than half the risk of fatal stroke in the general population!”

Jaskoviak reported that not a single case of vertebral artery stroke occurred in approximately 5 million cervical adjustments at The National College of Chiropractic Clinic from 1965 to 1980.

LeBoeuf-Yde et al suggested that there may be an over-reporting of spinal adjustive related injuries. The authors reported cases involving two fatal strokes, a heart attack, a bleeding basilar aneurysm, paresis of an arm and a leg, and cauda equina syndrome which occurred in individuals who were considering chiropractic care, yet because of chance, did not receive it. Had these events been temporally related to a chiropractic office visit, it is likely that they would have been inappropriately attributed to the chiropractic care.

In many cases of strokes attributed to chiropractic care where the operator was not a chiropractor at all. Terrett observed that manipulations administered by a Kung Fu practitioner, GPs, osteopaths, physiotherapists, a wife, a blind masseur, and an Indian barber were incorrectly attributed to chiropractors. As Terrett wrote, “The words chiropractic and chiropractor have been incorrectly used in numerous publications dealing with SMT injury by medical authors, respected medical journals and medical organizations. In many cases, this is not accidental; the authors had access to original reports that identified the practitioner involved as a non-chiropractor. The true incidence of such reporting cannot be determined. Such reporting adversely affects the reader’s opinion of chiropractic and chiropractors.”

No reliable screening tests were identified which enable a chiropractor to predict patients at risk for stroke. After examining twelve patients with dizziness reproduced by extension-rotation and twenty healthy controls with Doppler ultrasound of the vertebral arteries, Cote et al concluded,” We were unable to demonstrate that the extension-rotation test is a valid clinical screening procedure to detect decreased blood flow in the vertebral artery. The value of this test for screening patients at risk of stroke after cervical adjustment is questionable.” Terrett noted, There is also no evidence which suggests that positive tests have any correlation to future VBS (vertebrobasilar stroke) and SMT (spinal manipulative therapy).

It is thought that cervical rotation combined with extension and traction may have some obstructive effect on perfusion of the vertebral artery on the contralateral side of rotation. If the ipsilateral artery is diseased or hypoplastic, symptoms of hind brain ischemia may occur because the dominant healthy artery is under partial physiological compression, resulting in a loss of sufficient or compensatory blood flow. If trauma to the arterial wall does occur, thrombus formation may be the result. Further, this may lead to stroke or stroke-like complications in susceptible patients. While incidence figures vary, it is generally agreed that the risk of serious neurological complications is extremely low, and is approximately one or two per million cervical adjustments. Structural abnormalities, particularly where mechanical instability pathological bone disorders, dislocations and fractures of the cervical spine are present may also lead to mechanical strain of the vertebral arteries (Terrett, 1987; Jaskoviak, 1981; Ladermann, 1981).

Other cervical complications, which are rare but have either been reported or described in the literature, include Horner's syndrome, diaphragmatic paralysis, cervical myelopathy secondary to meningeal hemorrhage, pathological fracture of a cervical vertebra and cervical disc protrusions (Dabert et al., 1970; Rinsky et al., 1976; Krewalramani, 1982; Hefner, 1985; Grayson, 1987; Gatterman, 1991). Dislocation in the upper cervical spine due to inflammatory or traumatic rupture of the transverse atlantal or alar ligaments warrants particular caution (Yochum and Rowe, 1980, 1987; Jeffreys, 1980; Sandman, 1981; Redlund-Johnell, 1984).

Though rarely reported in literature, empirically the most common complaint of adjustment of the thoracic region occurs when forceful or poorly applied manipulations cause costovertebral strains, rib fractures and costochondral separations (Grieve, 1986). Excessive thoracolumbar torque in the side posture position as well as inappropriately applied posterior to anterior techniques may cause thoracic cage injuries particularly in the elderly.

Lower back injury alleged to have occurred following spinal adjustment therapy has been reported in patients with pre-existing disc herniation or prolapse (CCPA Claim Review, 1990; Bromley, 1989; Gallinaro and Cartesgna, 1983). While it is suggested that the forces required to cause a disruption of the annular fibers of the healthy intervertebral disc well exceed that of a rotational adjustive thrust (Adams and Hutton, 1981, 1983; Farfan, 1983; Gilmore, 1986; Triano, 1991), some disc herniation/protrusion may certainly be aggravated by an inappropriately applied adjustive maneuver, as it may be by the other simple activities of daily living such as bending, sneezing, lifting. The most frequently described severe complication is compression of the cauda equina by massive midline nuclear herniation at the level of third, fourth or fifth intervertebral disc (Lehmann et al., 1991; Malmivivaara and Pohjola, 1982; Kleynhans, 1980; Hooper, 1973).

Of the thirty cauda equina complications associated with adjustment reported in the French, German and English literature over an 80 year period, only eight were allegedly related to chiropractic care (Ladermann, 1980). Had these patients not been manipulated, the outcome may have been the same with menial effort or impulsive strain replacing the rupturing effect alleged to arise from the adjustment. However, this clinical outcome does stress the need for particular care in this susceptible subgroup of patients. However, given the frequency of lumbar adjustment and the few reported complications over a long period of time, it does not appear that there is any risk associated with appropriately applied adjustment techniques including those utilizing high velocity thrust. To sum it up, it appears that lumbar roll type techniques, whether done with (Christman etal. Groh), or without (Ewer, Mensor) narcosis and hyperextension techniques without narcosis are safe compared to the lumbar hyperextension (Durchang of the German authors) under narcosis.

Psychological factors including pain intolerance, hysteria conversion reactions, hypochondriasis, malingering, etc., require special consideration, since the presence of spine related symptoms may be of secondary importance. Aside from the risk of creating a dependency for care that may or may not be indicated, chiropractic care itself may aggravate or contribute to real or imagined harm.

It is important to note that the scientific literature as well as the judicial record clearly illustrates that most serious adverse effects with manual or "spinal manipulative therapy (SMT) have not been the result of procedures performed by doctors of chiropractic. It is important, therefore, to protect the public and insure quality and safety of care, that throughout all the professions a standard minimum training greater than or equal to that of a doctor of chiropractic in adjustive/manual procedures be required prior to performance of manual procedures to the human spine.

IV. ASSESSMENT CRITERIA

The main focus for the prevention of complications is the recognition of well known and established indicators or "red flag" signs and symptoms, which may require careful assessment and reassessment, changes in chiropractic care plan, or other appropriate action such as emergency care or referral to another health care specialist. Ignoring these "red flag" indicators increases the likelihood of patient harm.

The literature and clinical experience show that the most common therapeutic procedure in chiropractic practice, and the one most likely to result in complications, is the adjustment or high-velocity manipulative thrust. The following assessment criteria and recommendations relate to this procedure applied to, or adjacent to, the anatomical site of pathology.

Assessment criteria developed and used in this chapter relate to:

A) Rating of conditions

B) Severity of complication

C) Quality of evidence

D) Level of identifiable contraindication: based on the above factors and the probability of complication

A. Rating of Conditions:

Type I: A condition for which high-velocity thrust procedures have been shown to be comparatively safe and effective so long as an adequate patient assessment has been made and an intervention trial is rationally applied (e.g., upper cervical dysfunction/subluxation associated with tension headaches).

Type II: A Type I condition is present but may be coincident with another related or unrelated condition requiring modification of procedures and/or further diagnostic assessment (e.g., upper cervical joint dysfunction/subluxation accompanied by widening of the atlantodental interval or inflammatory causes affecting the area). Careful clinical judgment is required as high-velocity thrust procedures may require modification or be inappropriate.

Type III: Type I or II conditions are present but considered negligible compared with clinical evidence of another pathological problem requiring further patient assessment and referral to another health care professional.

B. Severity of Complications:

Minimal Level:

Any complications of high-velocity thrust procedures may be considered minimal, with slight objective evidence of worsened signs usually lasting a maximum of several days. (Reactions such as short term pain and stiffness or, infrequently, a mild chronic pain disorder alleged to arise from aggravation of a pre-existing problem). These reactions are rarely reported in the literature/claim reviews, given the brief duration of mild symptoms experienced by patients and the superimposed natural history of the presenting complaint. High-velocity thrust procedures are not generally contraindicated. Chiropractic care modifications may have to be anticipated in exceptional cases.

Moderate Level:

Level of harm is generally moderate, characterized by more-or-less serious but usually reversible harm lasting weeks to months. Effects are temporary and/or residual in nature (e.g., broken rib, uncomplicated disc herniation, radiculopathy, foot drop). Depending on all factors (e.g., frequency of complications, benefits) high-velocity thrust procedures may require modification or be inappropriate.

High Level:

Evidence suggests possible risk and the need for a high level of clinical caution. The complication or accident may be serious and/or permanent, particularly in susceptible patients (e.g., stroke, cauda equina syndrome). High-velocity thrust procedures may require careful modification or be inappropriate, or be identifiably inappropriate, given patient history, diagnostic tests and/or other information obtained during a trial of therapy.

C. Quality of Evidence:

Evidence on the risk of complication arising from chiropractic chiropractic care and particularly high-velocity thrust procedures comes from case reports, surveys, literature reviews, and insurance and legal claims records. There needs to be further systematic study of the incidence, severity and management of complications. Present classification of quality of evidence is:

Class I:

Evidence provided by surveys, systematic studies, literature reviews, and detailed clinical case reports published in refereed journals.

Class II:

Evidence provided by other case studies or reviews, or consensus expert opinion from legitimate consensus-building efforts.

Class III:

Evidence provided by expert opinion and one or more case reports.

D. Level of Contraindication:

Having regard to all the individual assessment criteria already discussed, the following overall ratings are used:

No Identifiable Contraindication: No known clinical rational can be identified which would preclude the application of chiropractic adjustments or require the adaptation or modification of adjusting techniques

Special Circumstances: Situations in which clinical findings indicate the need for additional examination procedures to determine the best course of care and/or in which high-velocity thrust procedures may be used but with appropriate care and/or modification.

Special Circumstances to Identifiable Contraindication: Careful clinical judgment dictates whether any identifiable contraindication is present or special care is needed with each specific patient.

Identifiable Contraindication: Situations in which clinical indicators identify anatomical sites where certain adjusting procedures should be restricted or modified.

The diversity and sophistication of chiropractic adjusting techniques provides the doctor of chiropractic with an impressive array of approaches to patient care. This body of techniques means that no absolute contraindication exists to the adjustment process.

Example: As an example of the complete rating system:

Non-complicated Low-Back Pain:
No identifiable contraindication to high-velocity thrust procedures.

Risk-of-Complication Rating:

Severity (if harm did occur):	Minimal
Rating of Condition:	Type I
Quality of Evidence:	Class I

This rating system assumes no negligence or error on the part of the practitioner. Tolerance to chiropractic care may sometimes, but not always, be estimated by provocative or pre-adjustment testing.

RATING SYSTEM

A. Types:

1. Strong positive recommendation. The chiropractor under <u>most</u> circumstances would employ the procedure.

2. Positive recommendation. The chiropractor under <u>many</u> circumstances would employ the procedure.

3. Discretionary. The chiropractor under <u>some</u> circumstances would employ the procedure.

4. No recommendation. The circumstance within which this procedure would be appropriate have not been determined.

B. Support Categories:

1. E: Based on available expert opinion, clinical experience or effectiveness.

2. L: Based on available refereed literature or published monographs, legal decisions and/or authority.

3. C: Based on available controlled clinical studies.

V. RECOMMENDATIONS

A.1. Upon discovery of an unusual finding, the chiropractor should disclose the finding to the patient, note the finding in the record and reassess the plan of care.

17.1.1 **Rating**: Strong Positive Recommendation
Evidence: E, L

2. The modified plan of care should be reassessed when the unusual finding is no longer observed.

17.1.2 **Rating**: Strong Positive Recommendation
Evidence: E, L

Note: General health problems which have been described in the literature as either contraindications to or complications of high-velocity thrust procedures include the following conditions. It should be understood that the listed conditions are not necessarily those for which high-velocity thrust procedures are intended. Rather they may be coincidentally present in a patient undergoing chiropractic care. The fundamental object of chiropractic care is a subluxation (joint lesion, dysfunction, blockage).

B. Articular Derangements:

1. Acute rheumatoid, rheumatoidlike and nonspecific arthropathies including acute ankylosing spondylitis characterized by episodes of acute inflammation, demineralization, ligamentous laxity with anatomic subluxation or dislocation, represent a **special circumstances situation** in which additional examination procedures (such as videofleuroscopy or computerized x-ray digital analysis) may be necessary to determine the best course of care and/or modifications may be required to high-velocity thrust procedures in anatomical regions of involvement.

17.2.1 **Risk-of-Complication Rating**:
Severity: Moderate to High
Condition Rating: Type III
Quality of Evidence: Class II, III

2. Sub-acute and/or chronic ankylosing spondylitis and other chronic arthropathies in which there are no signs of ligamentous laxity, anatomic subluxation or ankylosis are **not contraindications** to high-velocity thrust procedures applied to the area of pathology.

17.2.2 **Risk-of-Complication Rating**:
Severity: Minimal
Condition Rating: Type I, II
Quality of Evidence: Class II, III

3. Degenerative joint disease, osteoarthritis, degenerative discopathy and spondyloarthrosis are **not contraindications** to high-velocity thrust procedures to the area of pathology but chiropractic care modification may be warranted during active inflammatory phases.

17.2.3 **Risk-of-Complication Rating**:
Severity: Minimal
Condition Rating: Type I, II
Quality of Evidence: Class II

4. In patients with spondylolysis and spondylolisthesis caution is warranted when high-velocity thrust procedures are used. These conditions are **not contraindications**, but with progressive slippage they may represent a special circumstances situation in which additional examination may be necessary and/or modifications to high-veloicity thrust procedures may be indicated.

17.2.4 **Risk-of-Complication Rating:**
Severity: Minimal to Moderate
Condition Rating: Type I, II
Quality of Evidence: Class II

5. Acute fractures and dislocations with signs of ligamentous rupture other than the disc represent a **contraindication** to high-velocity thrust procedures applied to the anatomical site or region.

17.2.5 **Risk-of-Complication Rating:**
Severity: High
Condition Rating: Type III
Quality of Evidence: Class III

6. Healed fractures and dislocations with signs of ligamentous rupture other than the disc represent a special circumstances situation in which additional examination is necessary to determine the best course of care and/or if modifications are necessary to high-velocity thrust procedures applied to the anatomical site or region.

17.2.6 Risk-of-Complication Rating:
Severity: Minimal to Moderate
Condition Rating: Type III
Quality of Evidence: Class III

7. Articular hypermobility, and circumstances where the stability of a joint is uncertain, do not represent a **contraindication**, but may represent **a special circumstances situation in which additional examination is necessary to determine the best course of care and/or if modification is necessary** to high-velocity thrust procedures to the area of pathology.

17.2.7 **Risk-of-Complication Rating:**
Severity: Minimal
Condition Rating: Type I, II
Quality of Evidence: Class II, III

8. Post-surgical joints or segments with no evidence of instability are **not a contraindication** to high-velocity thrust procedures but may represent **a special circumstances situation in which additional examination is necessary to determine the best course of care, or if a contraindication present,** depending on clinical signs (e.g., response, pretest tolerance or degree of healing).

17.2.8 **Risk-of-Complication Rating:**
Severity: Minimal
Condition Rating: Type II
Quality of Evidence: Class III

9. Acute injuries of osseous and soft tissues may require modification of chiropractic care. In most cases, high-velocity thrust procedures to the area of pathology are **not contraindicated.**

17.2.9 **Risk-of-Complication Rating:**
Severity: Minimal to moderate
Condition Rating: Type I, II
Quality of Evidence: Class I, II

10. The presence of scoliosis is **not a contraindication** to high-velocity thrust procedure.

17.2.10 **Risk-of-Complication Rating:**
Severity: Minimal
Condition Rating: Type I, II
Quality of Evidence: Class II, III

C. Bone Weakening and Destructive Disorders

1. Active juvenile avascular necrosis, specifically of the weight bearing joints (e.g., Perthes' disease) represents **a contraindication** to high-velocity thrust procedures to the area of pathology.

17.3.1 **Risk-of-Complication Rating:**
Severity: High
Condition Rating: Type III
Quality of Evidence: Class III

2. Demineralization of bone warrants caution with the use of high-velocity thrust procedures. This represents **a special circumstances situation in which additional examination may be necessary to determine the best course of care and/or**

modifications may be necessary to high-velocity thrust procedures to the area of pathology.

17.2.1 **Risk-of-Complication Rating:**
Severity: Minimal to Moderate
Condition Rating: Type II
Quality of Evidence: Class II, III

3. Benign bone tumors may result in pathological fractures and therefore represent **a special circumstances situation in which additional examination may be necessary to determine the best course of care and/or modification** to high-velocity thrust procedures to the area of pathology.

17.3.3 **Risk-of-Complication Rating:**
Severity: Low to moderate
Condition Rating: Type II, III
Quality of Evidence: Class III

4. Malignancies represent conditions for which high-velocity thrust procedures to the area of pathology are special circumstance situations and/or situations in which additional examination will reveal that high velocity thrust procedures are **contraindicated.**

17.3.4 **Risk-of-Complication Rating:**
Severity: Minimal to High
Condition Rating: Type III
Quality of Evidence: Class II, III

5. Infection of bone and joint represents a special circumstances situation **to contraindication** to high-velocity thrust procedures to the area of pathology.

17.3.5 **Risk-of-Complication Rating:**
Severity: Minimal to high
Condition Rating: Type III
Quality of Evidence: Class II

D. Circulatory and Cardiovascular Disorders

1. Clinical manifestations of vertebrobasilar insufficiency syndrome are not a **contraindication** but may represent a **special circumstances situation in which additional examination may be necessary to determine the best course of care and/or modifications may be necessary** to cervical high-velocity thrust procedures to the region of pathology based on degree of insufficiency.

17.4.1 **Risk-of-Complication Rating:**
Severity: Minimal to high
Condition Rating: Type II, III
Quality of Evidence: Class I, II, III

2. When a diagnosis of a dissecting aneurysm involving a major blood vessel has been made, a **contraindication** may exist for high-velocity thrust procedures within the area of pathology.

17.4.2 **Risk-of-Complication Rating:**

Severity: High
Condition Rating: Type III
Quality of Evidence: Class III

3. Bleeding is a potential complication of anticoagulant therapy or certain blood dyscrasias. Patients with these disorders represent a **special circumstances situation to contraindication** to high-velocity thrust procedure, and require additional evaluation to determine the best course of care.

17.4.3 **Risk-of-Complication Rating:**
Severity: Minimal
Condition Rating: Type II
Quality of Evidence: Class III

E. Neurological Disorders

1. Signs and symptoms of acute myelopathy or acute cauda equina syndrome represent a **special circumstances situation in which additional examination may be necessary to determine the best course of care and/or modifications may be required, to strong contraindication** to high-velocity thrust procedures applied to the anatomic site of involvement.

17.5.1 **Risk-of-Complication Rating:**
Severity: Minimal to High
Condition Rating: Type II, III
Quality of Evidence: Class I, II

*Most dysfunctions or disease processes have variations or phases. Levels of severity and probability have been assigned on the basis that the condition displays usual and classical signs and symptoms. The difficulty in precisely detailing the degree or severity and probability of an individual patient's overall physical and psychological response both to the condition and any specific manual procedure (subtleties of force, amplitude, direction, patient positioning, etc.) is acknowledged. Nevertheless, ratings have been assigned based on the literature and the current state of clinical experience. These provide a starting point which will require ongoing review and refinement.

2. Discogenic lesions that have been clinically established (intact or fragmented) do not represent a **contraindication** to adjustive procedures to the area of involvement.

17.6.1. **Risk of Complication Rating**
Severity: Minimal
Condition Rating: Type I
Quality of Evidence: II, III

VI. COMMENTS

This chapter provides a general framework and interim guideline recommendations with respect to complications of and contraindications to chiropractic thrust procedures. At present, detailed systematic studies on this subject are lacking and the recommendations made are based on information from clinical reviews and case reports, as well as from expert opinion and consensus methods.

The recommendations made must be continuously re-evaluated in light of ongoing research and clinical experience. Cooperative intradisciplinary and interdisciplinary research will be necessary to determine the true extent of the nature and occurrence of iatrogenic complications in chiropractic practice. The development of a central registry system capable of generating comprehensive research data would be valuable, and would facilitate the establishment of more detailed and refined guideline recommendations in the future. As well, the establishment of bodies of data that would allow consumers, policy-makers and other professionals to compare the relative safety of the various approaches to patient care, such as the chiropractic versus the standard medical management of a range of conditions, would be an invaluable asset in the pursuit of optimal health care strategies on all levels.

VII. REFERENCES

Adams MA, Hutton WC: The mechanical function of the lumbar apophyseal joints. *Spine* 1983, 8(3):327-30.

Adams MA, Hutton WC: The relevance of torsion to the mechanical derangement of the lumbar spine. *Spine* 1981, 6:241-8.

Austin RT: Pathological vertebral fractures after spinal adjustment. *Br Med J 1985*, 291: 1114-1115.

Bromley W: The National Chiropractic Mutual Insurance Company: stronger than ever. *ACA J Chirop* 1989, 26:52.

Campbell LK, Ladenheim CJ, Sherman RP, Sportelli L: *Risk management in chiropractic*, Fincastle, VA: Health Services Publication, 1990.

Canadian Chiropractic Protective Association: Data from claim reviews, Canadian Chiropractic Association. 1978-85, 1986-90.

Cote P, Kreitz B, Cassidy J, Thiel H: The validity of the extension-rotation test as a clinical screening procedure before neck adjustment: a secondary analysis. *JMPT* 1996, 19:159.

Dabbs V, Lauretti WJ: A risk assessment of cervical adjustment vs. NSAIDS for the treatment of neck pain. *JMPT* 1995; 18:530.

Dabert O, Freeman, DG, Weis AJ: Spinal meningeal hematoma, warfarin therapy and chiropractic adjustment. *JAMA* 1970, 214(11):2058.

Dvorak J, Orelli F: How dangerous is manipulation of the cervical spine? *J Manual Medicine*. 1982, 20:44-8.

Dvorak J: Inappropriate indications and contraindications for manual therapy. *J Manual Medicine*. 1991, 6(3):85-88.

Dvorak J, Baumgertner H, Burn L, Dalgaard JB, et al.: Consensus and recommendations as to the side effects and complications of manual therapy of the cervical spine. *J Manual Medicine*, 1991, 6(3):117-8.

Farfan HF: Biomechanics of the lumbar spine. In: Kirdaldy-Willis WH (ed.) Managing low back pain. New York: Churchill-Livingstone. 198:109-127.

Fast A, Zincola DF, Marin EL: Vertebral artery damage complicating cervical manipulation. *Spine* 1987, 12:840-1.

Gallinaro P, Cartesegna M: Three cases of lumbar disc rupture and one of cauda equina associated with spinal manipulation (chiropraxis). *Lancet* 1983, Feb 19:411.

Gatterman MI: Contraindications and complications of spinal manipulative therapy. *ACA J Chiro* 1981, 15:75-86.

Gatterman MI: Contraindications and complications of spinal manipulative therapy. In: Gatterman MI, (ed.):

Chiropractic Management of Spine Related Disorders, Baltimore: Williams and Wilkins, 1990, pp. 231-232.

George PE, Silverstein HT, Wallace H, Marshall M: Identification of the high risk prestroke patient. *ACA J Chiro* 1981, 15:26-8.

Giles LGF: Vertebrobasilar artery insufficiency. *J Can Chiro Assoc* 1977, 21:112-7.

Gilmore KL: Biomechanics of the lumbar motion segment. In: Grieve GP, (ed.): *Modern manual therapy of the vertebral column*, New York: Churchill-Livingstone, 1986, 103-11.

Gotlib A, Thiel H: A selected annotated bibliography of the core biomechanical literature pertaining to stroke, cervical spine, manipulation and head/neck movement. *J Can Chiro Assoc* 1985, 29:80-9.

Grayson MF: Horner's syndrome after manipulation of the neck. *Br Med J* 1987, 295:1382.

Grieve GP: Incidents and accidents of manipulation. In: Grieve GP (ed.): *Modern Manual Therapy*, New York: Churchill Livingstone, 1986, pp 873-889.

Gutmann G, Tiwisina T: *Zum problem der irritation der arteria vertebralis*, Stuttgart: Hippokrates-Verlag GmgH 1957, 15.

Gutmann G *Halswirlebsaule und durchbu-lutungsstorrungen in der vertebralis-basilaris-strombahn. In...Die wirbelsaule in forschung und praxis*, Stuttgart: Hippokrates 1962, 25:138-55.

Gutmann G: Durchbluntungsstorungen der arteria vertebrails im zusammenhang mit Halswirbel-sauleenverietzungan. *Manuelle Medizin* 1971, 5:112-6.

Gutmann G, ed: *Arteria vertebralis - traumatologie und funtionelle pathologie*, Berlin/Heidelberg: Springer-Veriag, 1984.

Gutmann G: Injuries to the vertebral artery caused by manual therapy. *Manuelle Medizin* 1983, 21:2-14.

Hefner JE: Diaphragmatic paralysis following chiropractic manipulation of the cervical spine. *Arch Intern Med* 1985, 145:562-563.

Henderson DJ: Significance of vertebral dyskinesia in relation to the cervical syndrome. *J Manip Physiol Ther* 1979, 2:3-15.

Henderson DJ, Cassidy JD: Vertebrobasilar vascular accidents associated with cervical manipulation. In:...Vernon H, (ed.): *Upper cervical syndrome - chiropractic diagnosis and treatment*, Baltimore: Williams & Wilkins, 1988, 194-206.

Henderson DJ: Vertebral artery syndrome. In: Vear HJ, (ed.): *Chiropractic standards for practice and quality of care*, Gaithersburg, MD: Aspen Publishers, Inc. 1992:115-143.

Holta O: Hemangioma of the cervical vertebra with fracture and compression myelomalacia. *Acta Radiol* 1942, 23:423.

Hooper J: Low-back pain and manipulation: paraparesis after treatment of low-back pain by physical methods. *Med J Australia* 1973, Mar 17:549-551.

Houle JOE: Assessing hemodynamics of the vertebrobasilar complex through angiothlipsis. *J Can Chiro Assoc* 1972, 41:35-6, 41.

Hulse M: *Die zervikalen gleichgewichtsstorungen*, Berlin: Sprinder-Verlag, 1983:4-9.

Jaskoviac PA: Complications arising from manipulation of the cervical spine. *J Manip Physio Ther* 1980, 3:213-9.

Jaskoviac PA: Complications arising from manipulation of the cervical spine. *J Manip Physio Ther* 1980, 3:213.

Jeffreys E: Disorders of the cervical spine. London, Butterworths, 1980:106-118.

Kewalramani LS, Kewalramani DL, Krebs M, Saleem A: Myelopathy following cervical spine manipulation. *Am J Physical Med* 1982, 61:165-175.

Kleynhans AM: The prevention of complications from spinal manipulative therapy. In: Indezak RM, (ed.): *Aspects of manipulative therapy*, Melbourne, Lincoln Institute of Health Sciences - Conference Proceedings. 1980, 133-141.

Kleynhans AM: Complication and contraindications to spinal manipulative therapy. In: Haldeman S, (ed.): *Modern developments in the principles and practice of chiropractic*, New York: Appleton-Century-Crofts, 1980, 133-41.

Klougart N, Leboeuf-Yde C, Rasmussen LR: Safety in Chiropractic Practice, Part I; The occurrence of cerebrovascular accidents after manipultaion to the neck in Denmark from 1978-1988. *JMPT* 1996; 19:371.

Kornberge E: Lumbar artery aneurysms with acute aortic occlusion resulting from chiropractic manipulation: a case report. *Surgery* 1988: 103(1): 122-124.

Ladermann JP: Accidents of spinal manipulation. *Ann Swiss Chiro Assoc* 1981, 7:162-208.

LeBoeuf-Yde C, Rasmussen LR, Klougart N: The risk of over-reporting spinal manipulative therapy-induced injuries: a description of some cases that failed to burden the statistics. *JMPT* 1996, 19:536.

Lee, K: Neurologic complications following chiropractic manipulation: a survey of California neurologists. *Neurology* 1995, 45:1213.

Lehmann OH, Mendoza ND, Bradford R: Beware the prolapsed disc. *Br J Hosp Med* 1991, 46-52.

Lewit K: Komplikationen nach chiropraktischen manipulationen. *Disch Med Wschr* 1972, 97:784.

Livinston CP: Spinal manipulation causing injury. A three-year study. *Clin Ortho Rel Res* 1971, 81:82-86.

Maigne R: Manipulations vertebralis et les thromboses vertebro basilares. *Angeoiologie* 1969, 21:287.

Malmivivaara A, Pohjola R: Cauda equina syndrome caused by chiropraxis on a patient previously free of lumbar spine symptoms. *Lancet* 1982, Oct 30:986-987.

Martienssen J, Nillson N: Cerebrovascular accidents following upper cervical manipulation: the importance of age, gender and technique. *Amer J Chiro Med* 1989, 2(1):10-3.

Myler L: Letter to the editor. *JMPT* 1996, 19:357.

National Chiropractic Mutual Insurance Company: Claim Information, 1990.

Patjin J: Complications in manual medicine: a review of the literature. *J Manual Medicine* 1991, 6(3), 89-92.

Pratt-Thomas HR, Berger KE: Cerebellar and spinal injuries after chiropractic manipulation. *JAMA* 1947, 133:600-3.

Quon JA, Cassidy JD, O'Conner SM, Kirkaldy-Willis. Lumbar intervertebral disk herniation, treatment by rotational manipulation. *J Manip Physio Ther* 1989, 12:220-227.

Raskind R, North CM: Vertebral artery injuries following chiropractic manipulation. *Angiology* 1990, 41(6):445-52.
Redlund-Johnell I: Atlanto-occipital dislocation in rheumatoid arthritis. *Acta Radiol Diagn* 1984, 25:165-168.

Rinsky LA, Reynolds GG, Jameson RM, Hamilton RD: A cervical spinal cord injury following chiropractic manipulation. *Paraplegia* 1976, 13:223-227.

Sandman TD, Sandman KB: Rheumatoid arthritis of the cervical spine, examination prior to chiropractic manipulative therapy. *J Manip Physiol Ther* 1981, 4(1)19-20.

Sandoz R: The nature of a spinal degenerative lesion. *Ann Swiss Chiro Assoc* 1989, 9:149-192.

Schmidley JW, Koch T: The non-cerebrovascular complications of chiropractic manipulation. *Neurology* 1984, 34:684-685.

Schmitt HP: Anatomical structure of the cervical spine with reference to pathology of manipulation complications. *J Manual Medicine* 1991, 6(3): 93-101.

Shekelle P, Adams A, Chassin M, Hurwitz E, Phillips R, Brook R, eds., *The Appropriateness of Spinal Manipulation for Low Back Pain: Project Overview and Literature Review*. RAND, 1991, page 4.

Smith RA, Estridge MN: Neurological complications of head and neck manipulations. *JAMA* 1962, 182:528.

Terrett AGJ: Importance and interpretation of tests designed to predict suspectibility to neurocirculatory accidents from manipulation. *J Aust Chiro Assoc* 1983, 13:29-34.

Terrett AGJ: It is more important to know when not to adjust. *Chiro Tech* 1990, 2:1-9.

Terrett AGJ: Vascular accidents from cervical spine manipulation. *J Aust Chiro Assoc* 1987, 17:131-44.

Terrett AGJ, Webb M: Vertebrobasilar accidents following cervical spine adjustment manipulation. *J Aust Chiro Assoc* 1982, 12:24-7.

Terrett AGJ: Misuse of the literature by medical authors in discussing spinal manipulative therapy injury. *JMPT* 1995, 18:203.

Terrett AGJ: Vertebrobasilar stroke following manipulation. *NCMIC* Des Moines, 1996, page 32.

Thiel HW: Gross morphology and pathoanatomy of the vertebral arteries. *J Manip Physio Ther* 1991, 14(2): 133-141.

Vick D, McKay C, Zengerle C: The safety of manipulative treatment: review of the literature from 1925 to 1993. *JAOA* 1996:96:113.

What about serious complications of cervical manipulation? *The Back Letter* 1996, 11:115.

Yochum TR, Roe LJ: Arthritides of the upper cervical complex. In: Idozak RM, (ed.): *Aspects of manipulative therapy*, Victoria: Lincoln Institute of Health Sciences, 1980:22-32.

Yochum TR, Rowe LJ: *Essentials of skeletal radiology*, Baltimore: Williams & Wilkins, 1987.

GLOSSARY

Accuracy: The property of a measurement which determines how closely the result will approximate the true value.

Active Care: Modes of treatment/care requiring "active" involvement, participation, and responsibility on the part of the patient.

Active Rest: The resting of a tissue or body part only to the point of restriction of deforming and pathological forces during the healing period, while at the same time allowing normal physiological stresses. Also called relative rest.

Adjustment: A specific directional thrust maneuver or application of forces applied to a subluxated vertebra that sets the vertebra into motion with the intent to reduce and/or correct the vertebral misalignment, thus improving the neurological component of the vertebral subluxation complex along with vivification of the affected tissues and body functions.

AHARA: As high as reasonably achievable. The current doctrine that recognizes the risk of ionizing radiation exposure, and therefore requires that all imaging yield the maximum analytical benefit to justify the risk.

ALARA: As low as reasonably attainable. The current doctrine that recognizes that there is no safe level of exposure to ionizing radiation, and therefore requires that all exposures are made at minimum levels.

Amplitude: Amplitude refers to the depth of, or distance traveled by, the practitioner's thrust. Most adjustment is of low amplitude, minimizing total force applied to the patient. When placing a joint in position prior to treatment/care the practitioner pre-stresses the joint in the appropriate direction to take up soft-tissue slack (joint play). When joints are less accessible and/or involve a longer level contact, or when inadequate pre-stress is obtained, amplitude will necessarily increase.

Analysis: The act of separating into component parts the clinical evaluation of a condition in order to identify the clinical impression or determine the chiropractic diagnosis.

Anthropometry: The study of proportional relationship between the shape, weight and size of body segments.

Applicability/clinical relevance: This term refers to the relevance of an outcome procedure, in other words, how it may impact upon case-management decisions. It answers the question: Is this outcome important to measure in clinical practice? Relevance also varies with health condition. Different types of patients require different types of outcome assessments. Scientific experimentation is important in determining this characteristic.

Assessment: An examination performed with the intent of arriving at a qualitative or quantitative description of a patient's condition. The term suggests any evaluation procedure performed for the purpose of obtaining information regarding the patient's state or condition.

Assessment Outcomes: Assessment of the impact of a continuing education or postgraduate program on a practitioner's knowledge, attributes, practice performance and patient care.

Baseline: The temporal course of a patient's condition prior to the initiation of care, determined by a series of clinical evaluations performed during separate sessions over a period of time.

Blocking Technique: The use of a static device to position the spine or related structures in such a manner as to facilitate the correction of subluxation through mechanical leverage.

Calibration: Periodic adjustment/maintenance of instrument components to yield minimum variation of measurements in contrast to a "Gold Standard" over a specified range of measurement.

Case Management: The process of evaluating patient needs or indicated care so as to provide service at the optimum level. All providers make case management decisions for each patient using a variety of variables and indicators.

Chart Notes: General term indicating notes made on the patient's work chart.

Chiropractic: A science and form of health care practice which deals with the relationship between the articulations
of the skeleton and the nervous system, and the role of this relationship in the restoration and maintenance of health. Of primary concern to chiropractic are abnormalities of structure or function of the vertebral column known clinically as the vertebral subluxation complex. The subluxation complex includes any alteration of the biomechanical and physiological dynamics of contiguous spinal structures which can cause neuronal disturbances.

Chiropractic Adjustment: This term refers to a wide variety of manual and mechanical interventions that may be high or low velocity; short or long lever; high or low amplitude; with or without recoil. Procedures are usually directed at specific joints or anatomic regions. An adjustment may or may not involve the cavitation or gapping of a joint (opening of a joint within its paraphysiologic zone usually producing a characteristic audible "click" or "pop"). The common denominator for the various adjustive interventions is the concept of removing structural dysfunctions of joints and muscles that are associated with neurologic alterations. The chiropractic profession refers to this concept as a "subluxation." This use of the word subluxation should not be confused with the term's precise anatomic usage which considers only the anatomical relationships.

Chiropractic Analysis: A chiropractic analysis is performed on a routine basis to determine the patient's need for spinal adjustments. A chiropractic analysis may include (but certainly is not limited to) two or more of the following procedures: instrumentation (skin temperature differential analysis), chiropractic x-ray analysis, spinal static and motion palpation, postural analysis, leg-length comparison tests, muscle strength measures, and other chiropractic analysis procedures.

Chiropractic Assessment: The process of integrating the clinical analysis to determine the best mode to address and monitor the correction of vertebral subluxation and other malpositioned articulations and structures. Specifically it is the integrating of history with physical, imaging and instrumentation examinations.

Chiropractic Care: This term refers to the behaviors, methods, procedures, etc., that chiropractic practitioners employ in the case-management of patients.

Chiropractic Consultation: This process includes the initial interview. The initial consultation is done in an effort to determine if chiropractic care can benefit the patient.

Chiropractic Diagnosis: Such clinical processes as are necessary in the professional judgment of the attending doctor to determine the need for care and, in particular, to detect the presence, location and nature of chiropractic lesions (subluxation and attendant biomechanical, biochemical, structural and neurophysiological problems, etc.) and prepare and administer an appropriate course of care within the realm of chiropractic.

Chiropractic Examination: Testing procedures ordered or performed by a doctor of chiropractic to assess the condition of a patient leading to an analysis, impression or diagnosis.

Chiropractic History: Patient information may include a family health history, previous and present social and occupational environment, and experiences, including any "abnormal" sensations, moods or acts observed by the patient or others, with the dates of their appearance and duration, as well as any results of non-chiropractic intervention or previous chiropractic care.

Chiropractic Practice Objective: The primary professional practice objective of chiropractic is to reduce or correct vertebral subluxations and other malpositioned articulations and structures in a safe and effective manner.

Chronicity: Stages of progress of a disorder that are related both to severity and duration: acute, subacute, chronic, and recurrent.

Clinical Impression: A working hypothesis formulated from significant items in the history and the physical findings; a tentative diagnosis; or a working diagnosis.

Clinical Necessity: The presence of a clinical condition requiring professional intervention to resolve, alleviate, stabilize or retard it. This term is preferable to "medical necessity" in chiropractic reportage, in that it does not imply a judgement that pertains to the practice of allopathic medicine.

Collaborative Care: The reciprocal interprofessional interaction of two or more health care providers in the management of the patient's current health status.

Combination: The potentiation or competition of response by simultaneous care applications.

Complicated Case: A case where the patient, because of one or more identifiable factors, exhibits regression or retarded recovery in comparison with expectations from the natural history.

Complication: The unexpected aggravation of an existing disorder or the onset of an unexpected new disorder while under chiropractic care.

Classification of Complications.

a) **Adverse Effect:** Any detrimental result of an action.

b) **Reaction:** A slight or benign adverse effect of short duration usually lasting no more than a few days.

c) **Idiosyncractic Reaction:** Resulting from an idiosyncracy, that is: a special characteristic(s) by which persons differ from each other. That which makes one react differently from others. A peculiar or individual reaction to an idea, an action, a drug, a food, or some other substance through unusual susceptibility. These reactions are not predictable.

d) **Indirect Complication:** Delay of diagnosis and appropriate chiropractic care as a consequence of using a procedure that, in retrospect, has proven to be of no benefit for the condition.

Computed tomography: A variation on traditional radiographic technology that provides for imaging in multiple planes.

Condition Specific Assessments: Procedures designed to elicit information about the specific signs and symptoms and other clinical characteristics of diseases or conditions. Condition specific assessments are usually more limited in scope than general health assessments. These outcome procedures can run the gamut from physiological tests to questionnaires.

Consent to Participate in Research: The subject has adequate information regarding the research and the power of free choice to participate in the research or decline participation.

Consent to Care: Permission from the patient or, where the patient is a minor or otherwise without legal capacity to consent, from the patient's guardian. Valid consent must be voluntary. It may be oral or written if expressly given, or may be implied.

Consultation: Any combination of history taking, physical examination, and explanation and discussion of the clinical findings and prognosis. A consultation can also be the service provided by a practitioner whose opinion, or advice, regarding evaluation and/or management of a specific problem is requested by another practitioner or other appropriate source.

Continuing Education: Voluntary and/or mandatory ongoing instruction for facilitation of clinical performance.

Contract-Relax: Application of a combination of active and passive muscle tightening and stretching.

Contraindication -- Absolute: Any circumstance which renders a form of care or clinical intervention inappropriate because it places the patient at undue risk.

Contraindication -- Relative: Circumstance which may place the patient at undue risk unless chiropractic care approach is modified.
Contraindications: Historical and clinical findings and evaluation procedures which would lead the chiropractor to modify his/her usual clinical regime to ensure patient safety.

Contrast studies: The injection or ingestion of radiopaque dyes to allow for the visualization of structures not normally seen on radiographic examination.

Cost Effective: A result of managed expenditure in which a cost/value evaluation has been determined to be optimally efficient.

Credentialing: A formal means by which the capabilities of the individual practitioner to perform duties at an acceptable level are certified.
Differential Diagnosis: The determination of which one of two or more complaints or conditions a patient is suffering from by systematically comparing and contrasting their clinical findings.

Discriminability: The property of information derived from a test or a measurement that allows the practitioner to discern between groups of subjects: for example, healthy from unhealthy.

Dosage: The frequency of care including ancillary procedures necessary and sufficient to maintain effects while healing occurs.

Duration: The time or interval needed to obtain a stable response.

Dynamic Thrust: The determined force or maneuver delivered by the practitioner during manual and most adjustment techniques. It is typically a high-velocity, low-amplitude movement applied to a joint when all joint play has been passively removed. It may be applied with follow through, which means that the end amplitude of the thrust is immediately withdrawn. There are low-velocity thrust techniques, but all thrusts involve some element of rapid acceleration.

Effectiveness: Effectiveness refers to the potential any given procedure or group of procedures has to produce a desired effect under actual conditions of use.

Elective Care: Care requested by the patient in their desire to promote optimum function to alleviate subjective symptomatology.

Emergency: Onset of a condition manifesting itself by acute symptoms of sufficient severity that the absence of immediate attention could reasonably result in:

1. permanently placing the patient's health in jeopardy;
2. causing other serious health consequences;
3. causing serious impairment to bodily functions; or
4. causing serious and permanent dysfunction of any bodily organ or part.

Evaluation: Synonymous with assessment.

Examination: Those varied procedures performed by the practitioner necessary to determine a working diagnosis.

False-Negative Rate (FNR): The likelihood of a negative test in a patient with a disorder.

$$\text{False-Negative rate} = \frac{\text{number of patients with a disorder with negative test}}{\text{number of patients with a disorder}}$$

False-Negative Result: A negative result in a patient with a disorder.

False-Positive Rate (FPR): The likelihood of a positive test in a patient without a disorder.

$$\text{False-Positive rate} = \frac{\text{number of patients without a disorder with positive test}}{\text{number of patients without disorder}}$$

False-Positive Result: A positive result in a person who does not have the disorder.

FFD/SID: Focal film distance/source image distance. The FFD/SID setting governs the distance that the source of radiation is placed from the patient and the image recording device. Proper placement enhances image quality.

Filtration: The placement of devices (usually aluminum) between the source of radiation and the patient to eliminate radiation exposure to a particular area.

Flexibility and Stability: The long term goal of care is to restore the patient to pre-injury function and reduce the chances of recurrent episodes. Repetitive microtrauma superimposed on previous injury can lead to advanced degeneration. Spinal stabilization is designed to teach trunk muscle recruitment as an effort to control and reduce flexion and torsional stresses on the joint segments. Through the use of voluntary muscles, pain-free regional postures can be maintained while the patient carries out normal daily activities. The necessary posture and combination of muscle actions determined experimentally are specific for each case. Once the comforting position is found, the patient is assisted while rehearsing progressively more complex tasks, keeping the body part in its neutral, pain-free position.

Follow-up Reassessment: Evaluation of a patient during or at the end of a course of care or management program for the purpose of assessing the status of the patient at maximal clinical improvement.

Force: The product of the amplitude and velocity applied during a thrust. An adjustment or manual procedure may be very fast (high velocity) but of extremely low-amplitude, and in these circumstances the force will be relatively low.

Gatekeeper: Health care professional designated to exercise responsibility for, and control of, the utilization of health care services.

General Health Assessments: These are usually questionnaires completed by patients and scored for a number of attributes deemed important to the overall concept of health.

Gold Standard Test: An accepted reference test or procedure used to define the true state of the patient's health.

Gold Standard: A known value or attribute used to test veracity of instrumented measures to define the true state of the patient.

Grids: Devices placed between the patient and the image recording device to reduce the amount of non-informative secondary radiation reaching the image recording device. The use of grids improves image quality.

Health Record: Documents and recorded information relating to the clinical management of a patient.

Health: This is a state of optimal physical, mental and social well-being, not merely the absence of disease or infirmity.

High Velocity Thrust with Recoil: A measured depth thrust delivered in such a way that at the time of contact with the vertebra the Chiropractor's thrusting motion recoils setting the segment being contacted in motion directionally.

High Velocity Thrust without Recoil: A measured depth thrust delivered quickly with a sustained contact with the segment being adjusted directionally.

History: The patient's account of health information including past and present clinical problem(s) given in response to questions from the practitioner, staff and or written forms.

Homeostasis: This is the tendency to maintain, or the maintenance of, normal, internal stability in an organism by coordinated responses of the organ systems that automatically compensate for changes in the organism.

Iatrogenesis: Disorders or complications caused by health care providers.

Image recording device: Usually photographic film, but newer technologies provide for the image to be recorded on video tape or directly digitized into computer memory.

Imaging analysis: Those procedures utilized to qualify and quantify components of the vertebral subluxation and other malpositioned articulations and structures that are visualized by an imaging modality.

Imaging Modalities: Those technologies used to obtain a visual record of internal anatomical structure.

Indications: Clinical findings which may indicate the presence of vertebral subluxation and other malpositioned articulations and structures.

Initial intensive care: Initial care and/or ancillary intervention to assist and promote anatomical rest, reduce muscle spasm and inflammatory reaction, and alleviate pain.

Initial Intensive Care#2: is that care which is instituted to stabilize the condition. This care is clinically necessary.

Initial Patient Evaluation: Represents the assessment procedures that are performed on a patient upon initial contact, and are used to arrive at a clinical impression and a plan for patient management. (Also: preliminary assessment, preliminary evaluation, clinical workup.) Initial evaluation may include a series of diagnostic or evaluative sessions separated by days or weeks when the express purpose of these sessions is to evaluate the patient's state prior to the initiation of care (i.e., obtain a baseline).

Instability: 1. Quality or condition of being unstable; not firm, fixed or constant. 2. In reference to ligamentous and articular structures, joint hypermobility due to connective tissue derangement. 3. In reference to the spine, joint hypermobility due to connective tissue derangement of such a degree that the spinal cord and/or nerve roots are endangered.

Instrument: A specific tool or measuring device.

Instrumentation: The use of any mechanical tool or device used to ascertain objective data, which can be recorded in a reproducible manner. In chiropractic, instrumentation provides information above the condition of the patient relative to the vertebral subluxtion.

Interactive Reassessment: Evaluation of a patient by procedures utilized on each visit to assess the immediate need for manual intervention.

Intervention/Care Goals: Written short term and long range expectations of patient response to the care plan.

Intervention/Care Plan: A written description of intended clinical actions divided according to relevant care goals and prognosis.

Ionizing radiation: A portion of the electromagnetic spectrum that can alter the electron component of atomic structure.

Ischemic Compression: Application of a progressively increasing pressure on a pressure point, trigger point, or tight muscle. This typically reduces the point's tenderness and produces a flushing and a relaxation of tightness.

Joint Play (Accessory Movement): The small, precise joint movements, not under the control of the voluntary muscles or patient, that are necessary to permit normal voluntary joint movement. Joint play may include spin, glide and roll of articulation. The full range of active movement of a joint without practitioner assistance is a combination of voluntary movement (voluntary muscles) and joint play.

KVP: Kilovoltage potential. The KVP setting governs the quality of the x-ray beam produced.

Levels of Care: Differentiations between indicated courses of care based on the nature of the presenting complaint, clinical findings and the attending doctor=s objectives.

LEVEL I Care is characterized by a patient-specific program of care the goal of which is to begin the reduction of clinical indicators of subluxation. Level I care is sometimes referred to as acute , relief, urgent or intensive care.

LEVEL II Care is characterized by a program of chiropractic intervention that has as its objective the reduction of subluxation indicators to a minimal or non-present level. This level of care is sometimes referred to as intermediate care and can include rehabilitative care.

LEVEL III is characterized by episodic care of chronic condition which helps to prevent the condition from further deterioration. The level of care is referred to as supportive care.

LEVEL IV Care consists of on-going adjustive care, which may extend to the lifetime of the patient, the objective of which is the sustaining of the optimal state of the patient. This level of care is sometimes referred to as prevention or wellness.

Determinations as to the appropriateness of any of these levels of care are based on objective indications of the presence of subluxation and the clinical status of the patient. Duration of care should be determined by the practitioner based on the individual needs of the patient.

Life Style Modification: Adaptations of life style necessary to modify social and recreational activity, diminish work environment risk factors, and adapt to psychological elements affecting, or altered by, the disorder.

Likelihood Ratio: A measure of discrimination by a test result. A test result with a likelihood ration of greater than 1.0 raises the probability of a disorder and is often referred to as a "positive" test result. A test result with a likelihood ratio of less than 1.0 lowers the probability of a disorder and is often called a "negative" test result.

$$\text{Likelihood ratio} = \frac{\text{probability of result in person with disorder}}{\text{probability of result in person without disorder}}$$

LIKELIHOOD RATIO FOR
A POSITIVE TEST RESULT:

$$\text{Likelihood ratio (+)} = \frac{\text{sensitivity}}{1 - \text{specificity}}$$

LIKELIHOOD RATIO FOR
A NEGATIVE TEST RESULT:

$$\text{Likelihood ratio (-)} = \frac{1\text{-sensitivity}}{\text{specificity}}$$

Line of Drive (Vector): The direction of thrust, usually described in terms of the three cardinal planes of skeletal motion: 1. Flexion/Extension, 2. Right/Left Rotation, 3. Right/Left Lateral Flexion.

Long-lever Contacts: Contacts in which joints and structures are positioned between the practitioner's contact point and the adjusted joint. For example, an adjustment of the right sacroiliac (SI) joint with a contact on the ischium is considered short-lever because there are no articulations between the contact point and the SI joint. However, an adjustment of the L5/SI facet using the same contact is long-lever because the SI joint is located between the contact and the L5/SI facet joint.

Low Velocity Thrust with Recoil: A controlled depth thrust delivered at low speed with a sudden pull-off by the chiropractor setting the segment in motion.

Low Velocity Controlled Vectored Force without Recoil: A sustained contact, with force building until resistance of the misalignment factors of subluxation are overcome.

Low Velocity Thrust without Recoil: A controlled depth thrust delivered at low speed using a sustained contact with the segment being adjusted.

Magnetic resonance imaging: Imaging modality that uses magnetic fields and radio frequencies to produce an image of both hard and soft tissue structures.

Management: A plan of action for chiropractic care of the patient in accordance with diagnosis, progress, and expectations of outcome.

Manipulation: A manual procedure that involves a directed thrust to move a joint past the physiological range of motion, without exceeding the anatomical limit.

Manipulations and Mobilization: During joint motion, three barriers or end ranges to movement can be identified. The first is the active end range which occurs when the patient has maximally contracted muscles controlling a joint in a particular directional vector. At this point, the clinician can passively move the joint toward a second barrier called the passive end range. Movement up to this barrier is termed physiologic joint space. Beyond this point, the practitioner can move the joint into its paraphysiologic space. The third barrier encountered is the anatomic end range. Movement beyond this will result in rupture of the joint's ligaments.

Manual Procedures: Adjustive or manipulative procedures, and other manual techniques.

Manual Therapy: Procedures by which the hands directly contact the body to treat the articulations and/or soft tissues.

Manually Assisted Mechanical Thrusts: Specific directional thrusts delivered by a mechanical device but manually set up and positioned.

MAS: Milliampere (seconds). The MAS setting governs the quantity of the x-ray beam produced.

Maximum Clinical Benefit (Maximum Chiropractic Improvement): Return to pre-injury/illness status or point at which a patient=s progress plateaus.

Mechanically Assisted Manual Thrust: Thrusts which are manually delivered but enhanced by moving mechanism built into the adjusting equipment, such as a drop table.

Meta-analysis: This refers to a type of study that statistically pools the data from many relevant single studies in order to make summary conclusions about a topic.

MHCO (Managed Health Care Organization): An organized system for providing health care in a geographic area, accepting the responsibility to provide or otherwise assure the delivery of set of services as deemed necessary by the organization.

Mobilization: Movement applied singularly or repetitively within or at the physiological range of joint motion, without imparting a thrust or impulse, with the goal of restoring joint mobility.

Motion Segment: The smallest functional unit, made up of two adjacent articulating surfaces and contiguous and intervening soft tissues.

Motivation: Conscious or subliminal factors of attitude and belief which contribute to the rationale for a person to choose between self-reliance (coping), patient and claimant behaviors in contending with health related predicaments.

Multiple Provider Facility: A facility in which two or more health care providers practice either in association or separately.

Natural History: The anticipated clinical course of recovery for uncomplicated disorders without care.

Negative Test Result: A test result that occurs more frequently in patients who do not have a disorder than in patients who do have the disorder.

Negligence: Breach of the duty of care placed on all practitioners to exercise reasonable care and skill in the circumstances.

Neurologic Examination: Most commonly refers to evaluating deep tendon reflexes, sensation and muscle strength.

Neurological Reflex Techniques: Techniques that attempt to stimulate proprioceptive and other sensory nerve endings by application of light touch or sustained pressure on various soft tissue structures.

OFD/PFD: Object film distance/part film distance. The OFD/PFD setting governs the distance that the anatomic part of interest is placed from the image recording device. Proper placement enhances image quality.

Outcomes Assessment: This term refers to a procedure or method of objectively measuring a change in patient status over time, primarily to evaluate the effectiveness of fulfilling the objectives of the chiropractor's care.

Passive Care: Application of clinical procedures by the care giver to the patient who "passively" submits to and receives care.

Passive Stretch (Spray and Stretch): Application of a lengthening force along a muscle by passive movement of the associated joint(s). Sometimes used with a distractor such as a coolant spray or ice prior to applying the stretch.

Patient Education: Sharing information with the patient individually or in a group concerning their continued or pending care in your office. The intent is to bring the patient to a basic understanding of chiropractic care and how it relates to their particular condition. Educating the patient allows them to know what to expect with care and conversely what to expect if they choose not to start/continue or discontinue care. Patient education allows the patient to make a decision in regards to their health based on facts and not misunderstanding.

Patient Satisfaction: Degree of confidence and gratification accompanying the delivery of health care services. Patient satisfaction relates to perceptions on the part of the patient that his/her wishes are being carried out, that care is being delivered, and that patient sensitivities are being respected. These perceptions are based on subjective patient feelings, and may or may not deal with issues of technical appropriateness of care or outcomes.

Peer Review: Evaluation by peers or colleagues of the quality, quantity, and efficiency of services ordered or performed by a practitioner.

Periodic Reassessment: Evaluation of a patient at intervals of weeks or months for the purpose of assessing the need for continued care, modified care, cessation of care or referral.

Physician Dependence: Patient behavior which transfers responsibility for health status to the care-giver.

Plain film radiography: That branch of radiography that produces a single 2D image of internal anatomic structure. It is the most common type of imaging modality utilized.

POMR: Problem Oriented Medical Records.

Positive Test Result: A test result that occurs more frequently in patients with a disorder than in patients without the disorder.

Practicality: This refers to the feasibility issues related to an outcome procedure, in clinical practice.

Pre-Stress: The process in which, prior to intervention, a joint is moved passively to its end range, controlling joint play. The joint is near the limit of its passive end range.

Precision: The ability to obtain the same measurement of a function or structure repeatedly within a set margin of error across the possible range of test applications.

Predictive Value Negative: Probability of a disorder being absent if a test is negative.

Pretest Probability: The probability of disorder before a test is done (also prior probability or pretest risk).

Prevalence: The total number of cases of a disorder in existence at a certain time in a designated area.

Preventive/Maintenance Care: Any management plan that seeks to prevent disease, prolong life, promote health and enhance the quality of life. A specific regimen is designed to provide for the patient's well-being for maintaining the optimum state of health.

Primary Health Care Profession: Primary providers which by law, expertise and professional ethics, may accept patients without referral.

Primary Care Provider: Any health care provider capable of providing first level contact and intake into the health delivery system, any health care provider licensed to receive patient contact in the absence of physician referral.

Probability: An expression of opinion, on a scale of 0 to 1.0, about the likelihood that an event will occur.

Processing: The technique of developing an image recorded on photographic film.

Profession Classification: Professions are classified according to level of training, authority to accept patients with or without referral, and responsibility and authority to care for the patient with regard to the domains of anatomy, conditions addressed and scope of practice.

Professional Referral: Professional referral requires authority and competence to acquire accurate information concerning matters within the scope and practice of the profession for which a referral is made. There are two types of professional referrals made by chiropractors:

(A) <u>Intraprofessional Referral</u>: Chiropractors, by virtue of their professional objective, education and experience, have authority and competence to make direct referral within the scope and practice of Chiropractic. Such a referral may be made when the attending chiropractor is not able to address the specific chiropractic needs of a particular patient. Under these circumstances, the chiropractor may refer the patient directly to or consult with another chiropractor better suited by skill, experience or training to address the patient's chiropractic needs.

(B) <u>Interprofessional Referral:</u> In the delivery of chiropractic care a practitioner may encounter conditions or findings that deviate from those normally encountered. The chiropractor has a responsibility to recognize such findings, report their existence to the patient and record their existence.

Progress: Any change in the patient's condition. It does not necessarily mean improvement, or symptomatic relief.

Progress Notes: Generally brief notations recorded in the patient's file for each office visit once management has commenced.

Provocative Testing: Those tests or procedures that are performed to elicit physical or physiological expressions of a given disorder.

Quality of Care: The degree to which effective, timely care is provided in an appropriate manner.

Radiation/radioisotopic therapy: A medical treatment/care wherein the patient receives high dosages of ionizing radiation either by exposure (radiation therapy) or by ingestion (radioisotopic therapy).

Radioisotopic scanning (nuclear medicine): The injection or ingestion of radioactive organ specific chemicals to provide visualization of the functional aspects of that organ.

Radiology/radiography/radiographic image: An imaging modality that employs x-radiation to produce a visual record of internal anatomic structures.

Reactivity: A test interaction effect causing an unintentional change in a patient's response when exposed to the repeated application of a test.

Reassessment: Evaluation for the purpose of following the progress of a patient under clinical management. The term does not include multiple assessment sessions employed for baseline evaluation and carries the express connotation of assessment performed after the initiation of patient care.

Reconstructive: is that care that is provided to rehabilitate the condition to its maximum potential correction. **(After meeting)**

Referral: The direction of a patient to another health care professional or institution for evaluation, consultation or care. Referral may be made or received for purposes of consultation, concurrent care, post-chiropractic care, the administration of diagnostic procedures, the evaluation of diagnostic findings, emergency care or because a clear determination has been made on the part of the practitioner that a patient condition is outside his/her scope of professional experience.

Reliability: The ability of a clinical test or instrument to produce the same or similar result when examining a stable function or structure on several different occasions. This ability can be discussed in terms of a single examiner (intraexaminer or intratester reliability) or in terms of more than one examiner using the same procedure (interexaminer or intertester reliability).

Responsiveness: This term refers to the ability of an outcome assessment to detect clinically important changes over time. Sometimes this is referred to as the sensitivity of an outcome assessment to care. Responsiveness is a particularly important attribute of an outcome assessment because subtle beneficial clinical effects of care should be able to be detected. Scientific experimentation, especially randomized controlled clinical trials, provide the best evidence for the responsiveness of an outcome assessment.

Risk Factor: A behavior, environmental agent, inherited trait, or any other factor which increases the probability of the development of a particular health problem.

Risk Management: A systematic preventative strategy to minimize patient harm and practitioner liability through education and the development of guidelines for practice.

Rule of Confidentiality: A rule which requires that all information about a patient that is gathered by a practitioner as part of the provider/patient relationship be kept confidential unless its release is authorized by the patient or, in exceptional circumstances, serves some other overriding purpose.

Safety: The degree of health risk clinical procedure may present; especially to patients, but also to doctors and their staff.

Screening: The application of a test to detect a potential illness or condition in a person who has no known signs or symptoms of that illness or condition. Screening is performed on "at risk" populations in order to determine appropriate intervention(s).

Sensitivity: In clinical testing, the ability to detect the presence of (that is, to not Amiss@) a relevant condition. Mathematically, this is expressed as the number of true positive test results divided by the sum of true positive plus false negative test results.

Series: The number of images usually required to obtain a complete analysis of the area of interest.

Shared Resources: Centralizing facilities and/or equipment and/or personnel in a manner that diminishes duplication.

Shielding: The placement of devices (usually lead) between the source of radiation and the patient to eliminate radiation exposure to a particular area.

Short-lever Contacts: Those which involve contacts and stabilization on osseous structures directly involved in the joint being adjusted.

SOAP: Acronym for Subjective symptoms, Objective signs, Assessment and Plan.

Somatization: 1. Conversion of mental experiences into physical sensations or symptoms.
2. Somatic symptoms without identifiable pathophysiology or in excess of identified pathophysiology. The diagnosis is by exclusion of pathophysiology or the identification of psychological amplifiers or drivers. Symptoms associated with subluxation in general and the vertebral subluxation complex in particular often are erroneously relegated to this category.

SORE: Acronym for Subjective, Objective, Rx (treatment/care) and Exercise (ergonomics).

Specialist: A health care provider who has obtained a professionally accepted or recognized level of additional training and competence with respect to specific procedures or disorders.

Specificity: In clinical testing, the ability to detect the absence of a relevant condition. Mathematically, this is expressed as the number of true negatives divided by the sum of the true negatives and false positives.

Spinal Analysis: The comprehensive process of evaluating the spinal column and its immediate articulations for vertebral subluxations and contraindications to any or all chiropractic procedures.

Spinograph: A general term for a spinal image produced by an imaging modality.

Stress study: Any image taken when the anatomic part of interest is in anything other than a neutral position.

Subluxation: A complex of functional and/or structural and/or pathological articular changes that compromise neutral integrity and may influence organ system function and general health. A subluxation is evaluated, diagnosed, and managed through the use of chiropractic procedures based on the best available rational and empirical evidence.

Subluxation Complex: See subluxation.

Subluxation Syndrome: See subluxation.

Substantive: Pertaining to decisions based on mainly objective or "hard" information (such as x-ray, MRI, precise ROM, SEMG, motion studies, thermography, etc.).

Supportive Care: Care for patients who have reached maximum clinical benefit, but who fail to sustain this benefit and progressively deteriorate when there are periodic trials of withdrawal of care. Supportive care follows appropriate application of active and passive care including rehabilitation and life style modifications. It is appropriate when alternative care options, including home-based self-care, have been considered and attempted. Supported care may be inappropriate when it interferes with other appropriate primary care, or when the risk of supportive care outweighs its benefits, i.e., intervention dependence, somatization, illness behavior, or secondary gain.

Sustained Force: Holding a contact with a vertebral segment without a thrust.

Terms of Acceptance: The acknowledgment between a health care provider and a patient which defines for the patient the objectives, responsibilities and limitations of professional care and the terms within which such care will be provided. The patient's acknowledgment of the terms allows the provider the ability to accept the patient for care and the patient the ability to make an informed choice to accept the care.

Threshold: The minimum rate and magnitude of joint load needed to bring about a change.

True-Negative Rate: See specificity.

True Positive Rate: See sensitivity.

True-Negative Result: A negative test result in a patient who does not have a disease.

Ultrasonography: An imaging modality that uses sound waves to produce images of internal anatomic structure. It is especially well suited to soft tissue fluid body imaging.

Uncomplicated Case: A case where the patient exhibits progressive recovery from an illness or injury at a rate greater than, or equal to, the expectation from the natural history.

Underutilization: The provision of less than an appropriate or adequate amount of care in a given case.

Utility: Significant benefit to both the patient and clinician resulting from a reduction in uncertainty pertaining to the case.

Validity: The property of information derived from a test or a measurement that assures that it represents the function or structure that is intended.

Velocity: The speed with which a thrust is delivered.

Vertebral Subluxation Complex (VSC): See subluxation

Videofluoroscopy: A radiographic technique that produces a motion picture image. It is usually recorded on video tape.

Vitalism: The doctrine that the life in living organisms is caused and sustained by a vital principle that is distinct from all physical and chemical forces and that life is, in part, self-determining and self-evolving.

Work Chart: The form that the practitioner and/or staff uses to record a patient's data.

APPENDIX

The following listing of abbreviations are some of the ones that are commonly used for chart notations. The list is not intended to be all encompassing and is not complete by any means.

GENERAL ALPHABETIC LISTING

A	assessment; artery; abortion or miscarriage; anterior; Achilles
a	ante; before; prior
a,aa	artery
AAA	abdominal aortic aneurysm
AAL	anterior axillary line (an imaginary line drawn down from the front of the armpit)
Ab	abortion or miscarriage; antibody
AB	antibiotics
abd	abduction
ABD	abdomen
abn	abnormal
abs	absent
ac	before meals
AC	acromioclavicular
ACE	axial compression in extension
ACELR	axial compression in extension with left rotation (maximum cervical compression)
ACERR	axial compression in extension with right rotation (maximum cervical compression)
acid phos	acid phosphatase
ACJ	AC joint; acromioclavicular joint
ACLF	axial compression in left lateral flexion (foramina compression)
ACLR	axial compression in left rotation (Jackson test)
ACN	axial compression neutral (foramina compression)
ACRF	axial compression in right lateral flexion (foramina compression)
ACRR	axial compression in right rotation (Jackson test)
act	active, activator, activator adjustment
act adj	activator adjustment
ACTH	adrenocorticotropic hormone
AD	antidepressant (medication); anterior deltoid
add	adduction
ad feb	fever present
ADH	anti-diuretic hormone
Adj(adj)	adjustment; Specified Chiropractic Adjustment
ADL	activities of daily living
ad lib	as desired
ADP	adenosine diphosphate
AF	atrial fibrillation (an irregular heart rhythm)
AFB	acid fast bacilli (tuberculosis bacteria)
Ag	antigen
A/G (A:G)	albumin/globulin ratio
agg	aggravated
AI	anti-inflammatory (medication)
AIDS	acquired immunodeficiency syndrome
AKA	also known as
alk phos	alkaline phosphatase
ALL	anterior longitudinal ligament
ALS	amyotrophic lateral sclerosis
Alt	alternate

ALT	alanine aminotransferase (formerly SGPT)
am	morning
AMA	against medical advice
amb	ambulatory
AMPLE	allergies, medications, PMH, LMP, events of illness
ANA	anti-nuclear antibodies
anat.	anatomical
ANS	anterior
ant	anterior
Antcx	anterior cruciate
A&Ox4	alert and oriented to person, place, time and situation
AP	anterior-posterior
APGAR	appearance, pulse, grimace, activity, respirations
apr	apprehension
ARC	AIDS related complex
AROM	active range of motion
AS	ankylosing spondylitis
ASA	acetylsalicylic acid; aspirin
ASAP	as soon as possible
ASCVD	atherosclerotic cardiovascular disease
ASD	atrial septal defect
ASHD	arteriosclerotic heart disease (heart disease due to "hardening of the arteries")
ASIS	anterior-superior iliac spine
ASO	antistreptolysin O
AST	aspartate aminotransferase (formerly SGOT)
ASVD	arteriosclerotic vascular disease
asym	asymmetrical
ATP	adenosine triphosphate
atr	atrophy
AV	atrioventricular, atriovenous
ax	axilla
AXR	abdomen X-ray

B	brisk; burning (pain)
B,	bilateral
BBB	bundle branch block
BBT	basal body temperature (body temperature taken first thing in the morning- usually recorded to determine fertile times of the month)
BCP	birth control pills
B4	before
BE	backward elevation; barium enema
BEF	bony end feel
BID,bid.	twice daily
bili	bilirubin
BKA	below knee amputation
Bkwd	backward
BM	bowel movement; bone marrow; black male
bmk	birthmark
BMR	basal metabolic rate
bog	bogginess of tissue
BP	blood pressure
BPH	benign prostatic hypertrophy (enlarged prostate-common in older men)
BPM	beats per minute
BR	bathroom

Brag	Braggard's test
BRBPR	bright red blood per rectum (hematochezia)
BRP	bathroom privileges
BS	bone scan; blood sugar; breath sounds; bowel sounds
BSE	bilateraly symmetrical and equal (DTRs)
BSN	bowel sounds normal
BT	bitemporal
BTR,btr	better
B/T	between
BTWN,btwn	between
BUN	blood urea nitrogen (a measure of kidney function)
Bx	biopsy
B9	benign

C	cervical spine; celsius, centigrade
c,c, w/	(cum) with (s or w/o without)
C1-C7	first through seventh cervical vertebrae
CA	cancer
Ca	carcinoma (cancer); calcium
ca	about (circa)
CABG	coronary artery bypass graft
CAD	coronary artery disease
CADS	cervical accerleration/deceleration syndrome
cap	capsule
CAT	computerized axial tomography
CBC	complete blood count
CBR	complete bed rest
CC,C/C	chief complaint
CC8	chief complaint improved
CC6	chief complaint static or unchanged
CC9	chief complaint worse
CC-	chief complaint inconsistent
C-D	cervicodorsal
CDA	crystal deposition arthropathy
CF	cystic fibrosis
CFM	cross friction massage
CHD	coronary heart disease
CHF	congestive heart failure
CHO	carbohydrate
chr	chronic
CI	contraindication
CIB	call in basis
Cl	chloride
cm	costal margin
cm.	centimeter(s)
CMC	carpometacarpal joint
cmp	chiropractic manipulative treatment; technique
CN	cancel(-ation); cranial nerve
CNI-CNXII	cranial nerves 1 through 12
CNP	cannot perform
CNS	central nervous system
CO,co	complains of
C/O,c/o	complains of
CO2	carbon dioxide
coc	coccyx

cons	consult
const	constant
cont	continue
Contra	contraindication
Contralat	contralateral
CPOD	chronic obstructive plumonary disease
Cor	heart
CP	cervical pillow; cold pack; cerebral palsy
CPK	creatine phosphokinase
CPPD	calcium pyrophosphate arthropathy
CPR	cardiopulmonary resuscitation
CPSM	cervical paraspinal musculature
cr	cranial
crep	crepitation(s)
CRF	chronic renal (kidney) failure
CRP	C-reactive protein
Cryo	cryotherapy...time & area
CSF	cerebrospinal fluid
Csp	cervical spine
CSPT	cervical support
C&S	culture and sensitivity (culture to look for bacteria causing an infection and find out what antibiotics can treat it)
C sect.	Cesarean section
CT	cervical-thoracic; carpal tunnel; computer tomography; cervical towel
CTA	connective tissue arthropathies
CTjct	cervical-thoracic junction/region
CTS	carpal tunnel syndrome
CV	cardiovascular
CVA	cerebrovascular accident (stroke); costovertebral angle (mid back area overlying the kidneys)
CVAT	costovertebral angle tenderness
CVJ	costovertebral joint
c/w	consistent with
Cx	cervix; culture
cx	coccyx
CXR	chest X-ray

D	dorsal; the right
Dsp,D sp	dorsal spine (thoracic spine)
D1-D12	dorsal spine segments 1 through 12 (thoracic spine)
d	dull
/d	per day
D/A	date of accident
DAC	discharge as cured
DAMA	discharged against medical advice
dbl	double
d/c	discontinued
D&C	dilatation and curettage
DD	differential diagnosis
DDD	degenerative disc disease
DDx	differential diagnosis (a list of possible causes for symptoms)
def	deficiency
deg	degenerate(-tion); degree(s)

delt	deltoid
dev	deviation(-ate)
DF	dorsiflex(-ion)
DI	drop-in
D/I	date of illness; date of injury
Dia	diathermy
DIFF	differential blood count (a test of numbers and types of white blood cells in the blood)
dim	diminished
DIP	distal interphalangeal (finger or toe joint farthest from the hand or foot)
DISH	diffuse idiopathic skeletal hyperostosis
distrx	distraction
div	diversified
DJD	degenerative joint disease
DJD-O	degenerative joint disease - osteo type
DJD-R	degenerative joint disease - rheumatoid type
DKA	diabetic kettoacidosis
D-L	dorsolumbar
DLMP	date of last menstrual period
DM	diabetes mellitus
DOB	date of birth
DOE	dyspnea on exertion (shortness of breath on walking or going up stairs)
DOI	date of injury
DP	drop pelvic (technique); dorsalis pedis
DPAT	decreased pain after treatment
Dperc	digital percussion
DPSM	dorsal paraspinal musculature
DPT	diphtheria, pertussis, tetanus
DT	diathermy
d.t.	due to
DTR	deep tendon reflexes
DVT	deep vein thrombosis
DX,dx	diagnosis

E,Ex	examination
EAM	external auditory meatus
EBL	estimated blood loss
EBV	Epstein-Barr virus
Ecare	emergency care
ECT	electroconvulsvie therapy
E/D	extension-distraction
EDC	estimated date of confinement
EEG	electroencephalogram
EENT	eyes, ears, nose, throat
EHL	extensor hallicus longus
EKG,ECG	electrocardiogram
EM	extremity manipulation
E&M	evaluation and management
EMG	electromyography
EMS,ems	electrical muscle stimulation
EMT	emergency medical technician
ENT	ear, nose, throat
EOA	erosive osteoarthritis
EOM	extraocular movement (eye movement)

EOMI	external ocular muscles intact
EORP	end of range pressurer
EP	end play
ER	extension restriction; emergency room
ES	electrical stimulation
esp	especially
ESR	erythrocyte sedimentation rate (a test that gives a rough measure of inflammation or infection)
ess	essentially
et.	and
etiol	etiology
ETOH	alcohol; alcholic (sometimes written "EtOH"); ethanol (intoxication)
ETT	exercise tolerance test
EUA	examine under anesthesia
ev	eversion
eval	evaluation(-ed)
eve	evening
exac	exacerbation(ed)
exam	examination
exp	expiration
Ext,ext	extension; external; exterior; extensor
exs ,exer	exercise(s)

F	Fahrenheit; female; forward; flexion
FA	first aid
FANA	Fluorescent antinuclear antibody (a test for lupus)
FBS/FBG	fasting blood sugar/glucose
FC	foraminal compression
FCNS	fever, chills, night sweats
FD	fibrous dysplasia
F/D	flexion distraction
FE	forward elevation
Fe	iron
FEV1	forced expiratory volume in one second
FF	forward flexion
FFR	forward flexion restriction
FH,FHx	family history
FIX,fix	fixation
flac	flaccid
Flx	flexion
FM	friction massage
FM/S	friction massage with stretching
F-N	finger to nose test
FR	flexion restriction
freq	frequency(-ent)
FROM	full range of movement
FS	full spine
FTA-ABS	fluorescent treponemal antibody-absorbed (a test for syphilis)
F/U,FU	follow-up
f/up	follow-up
FUO	fever of undetermined origin
Fx	fracture
FXN,fxn	fixation

g	gram
G	gravida (number of pregnancies)
G5	vibratory-oscillating-percussive
Galv	galvanic current (positive or negative)
GC	gonorrhea
GGT	gamma-glutamyl transpeptidase
GHJ	glenohumeral joint
GI	gastrointestinal
GM	gram
gmax	gluteus maximus
gmed	gluteus medius
gmin	gluteus minimus
G/P/A	gravida/para/aborta
GPF	gross physical findings
gr	grain
grad	gradually(-ated)
GSW	gunshot wound
gt,gtt	gutta (drop, drops)
GTT	glucose tolerance test
GU	genitourinary
GYN	gynecologist

h,hr,HR	hour
H2CO3	carbonic acid
HA	headache
HADD	hydroxyapatite deposition disease
Ham	hamstring
Hb,hgb	hemoglobin
HBAg	hepatitis B antigen (also HAA, HBg, Ag)
HBP	high blood pressure
HC1	hydrochloric acid
HC	house call; handicapped
HCG	human chorionic gonadotropin (a test for pregnancy)
HCO	bicarbonate
Hct	hematocrit (blood count)
HDL	high density lipoprotein
H&E,H/E	history and examination
HEENT	head, eyes, ears, nose, throat
HEP	hard end play
hern	herniation
Hg	mercury
Hgb	hemoglobin
HH	hiatal hernia
H/H,H&H	hemoglobin and hematocrit
HIV	human immunodeficiency virus (human T-lymphocyte virus)
HLA	histocompatibility locus antigen
HMP	hot moist (heat) packs
HNP	herniated nucleus pulposus
H/O	history of
HP	hot pack
H&P	history and physical
Hperc	hammer percussion
HPI	history of present illness (injury)
HR	heart rate

/hr.	per hour
HS,h.s.	hora somni (hour of sleep-at bedtime)
H-S	heel to shin test
HSM	hepatosplenomegaly
HSV	herpes simplex virus
HT	hypertonus(-ic); hypertension; heel/toe walk test
ht.	height
HTLV-III	human lymphotropic virus-type III
HTN	hypertension (high blood pressure)
HV	high volt
HVG	high volt galvanic (positive or negative)
H/W	height/weight
Hx,HX	history
hyst	hysterectomy; hysterical

IC	intercostal; intermittent claudication
ICS	intercostal space
ICU	intensive care unit
I&D	incision and drainage
IDDM	insulin dependent diabetes mellitus
IDS	intervertebral disc syndrome
IF,IFC	interferential therapy
Ig	immunoglobulin
IgA	albumin
IgD	beta
Ige	gamma
IgG	alpha-1
IgM	alpha-2
IM	intramuscular (injection)
imm	immediate
imp	improved; impression
INB	if not better/improved
Incid	incidence
inf	inferior
INH	isoniazid (a medication for tuberculosis)
insp	intermittent; intermediate; internal; interior
inv	inversion; involuntary
I&O	intake and output
IPJ	interphalangeal joint
ipsi	ipsilateral
ISI	inferior sacroiliac
ISL	interspinous ligament
I/Trx	intersegmental traction
IU	international unit
IUD	intrauterine device
IV	intravenous
IVC	inferior vena cava
IVD	intervertebral disc
IVF	intervertebral foramen
IVP	intravenous pyelogram (kidney X-ray)
IVU	intravenous urogram

J,jt,jt.	joint
JCA	juvenile chronic arthritis

JCT,jct	junction
JODM	juvenile onset diabetes mellitus
JRA	juvenile rheumatoid arthritis
JVD	jugular venous distension
JVP	jugular venous pulse (visible pulsation in the jugular vein in the neck)
K+	potassium
KC	knee-chest
Kg,Kgm	kilogram
KI	potassium iodide
KUB	kidney, ureter, bladder (abdomen X-ray)
kVp	kilovotage potential
L,	left
L	lumbar; lumbar spine; low, lower
L1-L5	first through fifth lumbar vertebrae
L+A	light and accommodation (pupil reflexes)
Lab	laboratory
LAE	left atrial enlargement
LAM	laminectomy
LAO	left anterior oblique
Lat	lateral
lat flex	lateral flexion
LB	low back
lb	pound
LBp,LBP	low back pain
LC	lower cervical
lc	longus colli
LCUD	lower cervical-upper dorsal
LD	lower dorsal
LDH	lactic dehydrogenase
LDL	low density lipoprotein
LE	lower extremity; lupus erythematosus
LE prep	lupus erythematosus cell preparation
LEF	ligamentous end feel
LF	ligamentum flavum
LFT	low force technique
Lib	Libman's test
Lig	ligament
LJA	Luschka joint arthrosis
LLE	left lower extremity (left leg)
LLF	left lateral flexion
LLFR	left lateral flexion restriction
LLL	left lower lobe of the lung
LLQ	left lower quadrant of the abdomen
LMNL	lower motor neuron lesion
LMP	last menstrual period
LMT	licensed massage therapist
LNMP	last normal menstrual period
LOC	loss of consciousness
LOD	line of drive
LOM	limitation of motion
LP	lumbar puncture
LPO	left posterior oblique

LPSM	lumbar paraspinal musculature
LR,LROT	left rotation
L-R	left to right
LRR	left rotation restriction
LS,L/S,L-S	lumbosacral; lumbar sacral
L1-5	lumbar segments one through five
L5-S1	lumbar segment five and sacral segment 1; lumbosacral
LSB	left sternal border (lower edge of the rib cage on the left)
Lsp	lumbar spine
LSPT	lumbar support
LUE	left upper extremity (left arm)
LUL	left upper lobe of the lung
LUQ	left upper quadrant
LV	left ventricle (a chamber of the heart)
LVG	low volt galvanic (positive or negative)
LVH	left ventricular hypertrophy (thickening of the left ventricle)
LVSC	levator scapula
lytes	electrolytes (Na-sodium, K-potassium, Cl-chloride, CO2-carbon dioxide)
M	murmur
m,m.,mm	muscle
/m	per month
mA	milliampere
man	manipulate; manual
mAs	milliampere seconds
MC	mid cervical; metacarpal
MCjt	metacarpal joint
M/Cjt	metacarpal joint
MCH	mean corpuscular hemoglobin
MCHC	mean corpuscular hemoglobin concentration
MCJ	metacarpal joint
MCL	mid clavicular line (an imaginary line drawn from the middle of the collarbone)
MCP	metacarpophalangeal joint (the joints between hand and fingers and foot and toes)
MCV	mean cell volume; mean corpuscular volume
MD	middorsal; medical doctor
med	medial; median; medical; medication
MEF	muscular end feel
meq	milliequivalent (a unit of measurement)
mets	metastasis
MFTP	myofascial trigger point
Mg	magnesium
MG,mg	myasthenia gravis; milligram
mg%	milligrams percent (mg. per 100 ml.)
MgSO4	magnesium sulfate
m,g,r	murmurs, gallops, or rubs (abnormal heart sounds) (letters may be circled)
MH	moist heat
MI	myocardial infarction; mitral insufficiency
/min.	per minute
ml.	milliliter(s)
ML	mid lumbar
mo	month
mm	millimeters; muscle
MM	multiple myeloma
MMI	maximum (medical) improvement

MMR	measles, mumps, rubella
mob	mobilize
mod,2	moderate
MOM	milk of magnesia
MN	midnight
MP	motion palpation; mammillary process; metatarsophalangeal
MR	muscle relaxant (medication)
MRI	Magnetic resonance imaging
ms,m s	muscle spasm
MS	multiple sclerosis; mitral stenosis
mss	massage
M/Trx	manual traction
MT	metatarsal
MTJ	metatarsal joint
MTP	metatarsophalangeal joint
MUA	manipulation under anesthesia
MUS	manipulation under sedation
Musculocut	musculocutaneous
MVA	motor vehicle accident
Myo	muscle; electrical muscle stimulation
N	normal; negative
n/l	normal limits
NA,Na+	sodium
N/A	not applicable
Na	sodium
NAA	no apparent abnormalities
NAC	no appreciable change
NaCl	sodium chloride
NAD	no acute distress
NARE	no apparent residual effects
NB,n.b.	(nota bene) note well
NBM,NPO	nothing by mouth
NC	no change; noncontributory
N/C	no complaints
NCV	nerve conduction velocity
NE	not evaluated; not examined
Neg	negative
neuro	neurology
NF	not found; negro female
NG	nasogastric
NGU	nongonococcal urethritis
NIDDUM	non-insulin-dependent diabetes mellitus
NK	not known
NKA,NKDA	no known drug allergies
NKCTM	no known contraindications to manipulation
NM	negro male
NMR	neuro-muscular reflex
NMS	neuromusculoskeletal
noct	nocturnal, night
non rep.	don't repeat
NO Rad	no radicular symptoms
NO SDS	no sensory disturbances
NP	new patient; not performed
NPH	neutral protamine hagedorn (insulin)
NPO	nothing by mouth

NR	normal range; no radiation
NS	normal saline solution
NSA	no significant abnormality
NSAID	non-steroidal anti-inflammatory drugs
NSC	no significant change
NSO	Nonspecific onset
NS(V)D	normal spontaneous (vaginal) delivery
NSR	normal sinus rhythm
N/T	numbness and tingling
N&V,N/V	nausea and vomiting
Nyst	nystagmus
O	objective
o	no
O2, Ox	oxygen
OA	osteoarthritis
Ob	obstetrics
OB/GYN	obstetrics and gynecology
obl	oblique
OBS	organic brain syndrome
obs	obese
OC	oral contraceptive
OCA	oral contraceptive agent
OCC,occ	occasional; occiput
Occ	occasional
OCG	oral cholecystogram (gall bladder X-ray)
OD,od	right eye;overdose
OF	occipital-frontal
OIC	obtained informed consent
OMT	osteopathic manipulative treatment; osteopathic manipulative therapy
o/o	on and off, intermittent
OOB	out of bed
OOW	out of work
OP	over pressure (to pasive limits); opposite; osteopenia; osteoporosis
O&P	ova and parasites
OPLL	ossification of posterior longitudinal ligament
OR	operating room
ortho	orthopedic
OS,os	left eye; opening snap
OTC	over-the-counter (sold without a prescription)
OTJ	on the job injury
OU,ou	both eyes
OV	office visit
oz	ounce
P,	pain
P	Patella
P	pinch(-ing) pain; plan; procedure; number of childbirths; pulse; after; following
p	pain
p-	para
P&A	percussion and auscultation (tapping on the upper back and listening with a stethoscope to check the lungs)
PA	posterior-anterior
PAL	posterior axillary line
Pap	papanicolaou smear
PAPED	papilledema

par	parietal
Para.	parasympathetic
Pass	passive
PAT	paroxysmal atrial tachycardia (a rapid abnormal heart rhythm)
Path	pathology, pathogens, pathogeneels
PB	pelvic bench
PBI	protein bound iodine
PC	phone call
pc	after meal
P-C	paracervical (muscles)
PCE	physical capacity evaluation
PCN	penicillin
PCS	post-concussion syndrome
PD	pelvic deficiency (short leg)
PDPR-%	patient describes pain reduction as _%
PDR	Physicians Desk Reference
PDU	patient demonstrated understanding
PE,P.E.	physical examination; physical education; pulmonary embolism
Pec	Pectoralis
PecM	pectoralis major
pecm	pectoralis minor
PECO	patient entering complaining of
perc	percussion
PER-RLA	pupils, equal, round, react to light and accommodation
pert.	pertaining
PF,PFlx	plantar flexion
PFT	pulmonary function test
PG,Pg,preg	pregnant
PH,PHx	past history
pH	hydrogen ion concentration
PI	personal injury; personal illness
PID	prolapsed intervertebral disc; pelvic inflammatory disease
PIP	proximal interphalangeal joint (finger or toe joint closer to the hand or foot)
piri	piriformis
PIS	pre injury status
PJA	posterior joint arthrosis
PJP	Palpated joint prominence
PKU	phenylketonuria
PK-YRS	cigarettes smoked (in packs per day) x years smoking
PL	primary lesion; placebo
P-L	paralumbar (musculature)
PLL	posterior longitudinal ligament
plp,palp	palpation(-ate)(-atory)(-able)
plpn	palpatory pain
pm	afternoon; physical medicine
Pmaj	pectoralis major
PMD	private medical doctor
Pmeds,pnmeds	pain medication(s)
PMH	past medical history
PMI	point of maximal impulse (place where the heartbeat can be felt on the chest)
PMN	polymorphonuclear leukocyte (neutrophil)
PMS	premenstrual syndrome
Pn	pain
Pn-	pain, radiating
PND	paroxysmal nocturnal dyspnea (waking up at night short of breath)
PNF	proprioceptive neuromuscular facilitation

PO,po	parieto-occipital; postoperative; by mouth
P.O.	phone order
PO4	phosphorous
polys	neutrophils
PONS	physical, orthopedic, neurologic examination
POS	place of service
pos, +	positive
poss	possible
post	posterior
Postcx	posterior cruciate
postop	after surgery
Pov	past office visit
pp	post prandial
PPD	permanent partial disability; purified protein derivative (skin test for tuberculosis)
PR	pulse and respiration; public relations; partial remission
PRAE	patient responding as expected
preg	pregnant
preop	before surgery
PRN,prn	as needed; as occasion requires
prob	probable
prod	produced
prog	prognosis
prom	prominent
PROM	passive range of motion
pron	prone, pronation(-ated)
prox	proximal
PS	pubic symphysis
PSIS	posterior-superior iliac spine
PSS	progressive systemic sclerosis
PSVT	paroxysmal supraventricular tachycardia (a rapid abnormal heart rhythm)
Pt	patient
PT	physical therapy; posterior tibial; paroxysmal tachycardia; patient; prothrombin time (a test of blood clotting)
PTA	posttraumatic amnesia; prior to admission
Pt.ed	patient education
PTH	parathyroid hormone
PTPW	patient tolerated procedure well
PTT	partial thromboplastin time (a test of blood clotting)
PUD	peptic ulcer disease
PV	paravertebral
PVC	premature ventricular contraction
PVM	paravertebral muscles
PVOD	peripheral vascular occulsive disease
pw	paperwork
pwb	partial weight-bearing
Px	paresthesia(s); physical examination; prognosis
Px-	paresthesia(s), radiating
Q,q	(quoque) each, every; quart
QA	qualilty assurance; appropriateness
q.a.m.	every morning
qd	once a day
q.d.	every day
q.h.	every hour
q2h	every two hours
q4h	every four hours

qid	four times daily
QL	quadratus lumborum
qod	every other day
q.p.m.	every afternoon/evening
qs	quantity sufficient
quotid	every day
Q.V.	as much as you will
R,	right; resisted; reinforced (-ment); respiration; rectum
RA	rheumatoid arthritis; right atrium; right auricle; right arm
rad	radiating; radial
Rad	radiology
RAM	rapid alternating movements
RAO	right anterior oblique
RAP	profile
RBC	red blood cell
RDA	recommended daily allowance
REA	round equal and active pupils
Rec	recommend; recent; recurrent
ref	refer(-red)
rel	elief(-ieved)
REM	rapid eye movement
REP	reduced end play
rep	let it be repeated
resp	respiration
rev	reviewed
RF	rheumatoid factor/rectus femoris
RFF	rising from flexion
RFSS	rising from sitting to standing
RFT	reduced force technique
RHD	rheumatic heart disease
rhom(b)	rhomboid
RIA	radioimmunoassay
RICE	rest, ice, compression, elevation
R-L	right to left
RLE	right lower extremity (right leg)
RLF	right lateral flexion
RLFR	right lateral flexion restriction
RLL	right lower lobe of the lung
RLQ	right lower quadrant of the abdomen
RML	right middle lobe of the lung
R/O	rule out
ROF	report of findings
ROM	range of motion
ROS	review of systems
ROT	rotation
ROV	return to office
RPCC	replicates pain of chief complaint
RPMC	replicates pain of main complaint
RPO	right posterior oblique
RPR	rapid plasma reagin (test for syphilis)
RR	recovery room; right rotation
RR,RROT	right rotation
R&R	report and recommendation
R+R	rate and rhythm of the heartbeat
RRE	round regular equal (pupils)

RROM	restricted range of motion
RRR	right rotation restriction; regular rate and rhythm
RSR	regular sinus rhythm
Rt,R,	right
RTC	return to clinic
RTW	return to work
RUE	right upper extremity (right arm)
RUL	right upper lobe of the lung
RUQ	right upper quadrant of the abdomen
Rx,RX	recommended therapy; prescription; treatment
S	sharp (pain); stretch; subjective; sacrum
s	without (sine)
s, s	spasm
S1	first sacral segment; first heart sound
S2	second sacral segment; second heart sound
SA S/A	subjective assessment
SA 1-10	subjective assessment graded on a scale 1 through 10
S/A5	subjectively 50% improved
S/A6	subjectively 60% improved
S&A	sugar and acetone
SAB	same as before
sac	sacrum
sant	scalenus anticus
SB	side bending
SC	subluxation complex
SCJ	sternoclavicular joint
scl	subclavius(-ion)
SCM	sternocleidomastoideus
SCMT	specific chiropractic manipulative technique
sec	seconds
SED	sedimentation
seg	segment(-al)
sev	severe
sfc	surface
SGOT	serum glutamic-oxyloacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
Sgy	surgery
SH	social history
SHR	scapulohumeral rhythm
SI	sacroiliac
SIDS	sudden infant death syndrome
sig	significant; signa (write on label)
sl	slight
SL	spondylolisthesis
SLE	systemic lupus erythematosus
SLP	short leg, prone
SLR	straight leg raise
SLS	short leg, supine
SM	self massage
SMA	sequential multiple analyzer (blood chemistry screen)
SMAC	sequential multiple analysis chemistry (serum chemistry)
smed	scalenus medius
SMT	spinal manipulative treatment (therapy)
SNSA	seronegative spondyloarthropathies
SO	suboccipital

S-O	salpingo-oophorectomy
SOAP	subjective, objective, assessment, plans
SOB	shortness of breath
SOL	space occupying lesion
SOS	step-off sign (spondylo)
s.o.s.	if occasion requires; if necessary
SP	spinous process; symphysis pubis; systolic pressure
S/P	status post (after or previous)
Sp, Spr	sprain
SPE	(serum) protein electrophoresis
SPF	standard procedure followed
spondy	spondylosis
spondylo	spondylolisthesis
sp/st	sprain/strain
SS	saline solution; sickle cell; half
S/S	signs and symptoms
SSI	superior sacroiliac
SSLR	sitting straight leg raise
ssp	supraspinatus
St,Str	strain
Stab	stable, stabilize(-ity)
Staph	staphylococcus
STAT	immediately
STD	sexually transmitted diseases
STH	somatotropic hormone
stim	stimulate(-tion)
STM	soft tissue massage
STS	serologic test for syphilis; soft tissue swelling
ST/sp	strain/sprain
subQ	subcutaneous
sup	supine, supination, superior
surf	surface
surg	surgery
SVC	superior vena cava
sw	swelling, swollen
SWD	shortwave diathermy
Sx,Sy	symptoms; subjective; surgery
sym	symmetrical
SZ	seizure
S1-S5	first through fifth sacral segments
T	thoracic; tender, transverse; temperature
T3	triiodothyronine
T4	thyroid hormone; thyroxin
T&A	tonsils and adenoids(-ectomy)
T&T	taut & tender
T.AB.	therapeutic abortion
tab	tablet
TAH	total abdominal hysterectomy
TAHBSO	TAH with bilateral salpingo-oophorectomy
TB	tuberculosis
TBR	total bed rest
tbsp	tablespoon
TCI	transient cerebral ischemia
TD	total disability; therapy discontinued
Tdx	tentative diagnosis

Temp	temperature
tend	tenderness
TENS	transcutaneous electrical nerve stimulation
TF	tuning fork
TFM	traction friction massage
TFT	transverse friction therapy
TGs	triglycerides
TH	thoracic or dorsal spine
THEREX	therapeutic exercise
TIA	transient ischemic attack (a stroke-like episode that resolves completely within less than a day)
TIBC	total iron-binding capacity
t.i.d.	three times a day
TJ	triceps jerk
T-L	thoracolumbar
TM	teres major; temporo mandibular, tympanic membrane
TMJ	temporomandibular joint (the joint between the skull and the jawbone)
TMT	tarsometatarsal joint
TNT	tight but non tender
TNTC	too numerous to count
T.O.	telephone order
TOD	time of day
TOS	thoracic outlet syndrome, type of service
TP	trigger point; transverse process
TPRBP	temperature, pulse, respiration, blood pressure
TPT	trigger point therapy
TPW	tolerated procedure well
tr	trace
Trac	traction (continuous or intermittent)
TRAM	treatment response assessment method
trans	transitional
trap	trapezius
TRIEOE	to return in event of exacerbation
TRINB	to return if not better
troch	trochanter(-ic)
Trx	traction
TSH	thyroid stimulating hormone
TPSM	thoracic paraspinal musculature
T&T	taut and tender
TTF	taut-tender fibers
TTT	tender to touch
TURP	transurethral resection of prostate
tw	twice a week
Tx	treatment
T*	tingle(-ing)
T1-T12	first through twelfth thoracic vertebrae
U	upper; urine
u	unilateral
u.	units
UA	urine analysis; uric acid
UC	upper cervical
ud	ut dictum (as directed)
UD	upper dorsal; ulnar deviation
UE	upper extremity
UGI	upper GI series

ULN	upper limits of normal
uln	ulnar
umb	umbilicus
UMN	upper motor neuron
UMNL	upper motor neuron lesion
UOV	unscheduled office visit
UOVDTP	unscheduled office visit due to pain
UR	utilization review
Ur	urine
URI	upper respiratory infection
US/ES	ultrasound/electrical stimulation
US,Us	ultrasound (combined, continuous pulsed)
UT	upper thoracic; ultratherm diathermy
UTI	urinary tract infection
UV	ultraviolet
V,vv	vein
VA	visual acuity; vertebral artery
vag	vagina(-al)
VAGHYST	vaginal hysterectomy
val	valgus
var	varus
VAS	vascular amplitude surge (Mannkpf's; vertebral artery syndrome)
vb	very brisk
VBI	vertebro-basilar insufficiency
VD	venereal disease
VDRL	Venereal Disease Research Laboratory (test for syphilis)
vert	vertebral; vertebrae; vertebra
VFI	visual fields intact
vis	visual, visible
VLDL	very low density lipoprotein
VM	vibratory massage
VMA	visible muscle asymmetry
v.o.	voice order
VS,v.s.	vital signs
vsc	vertebral subluxation complex
VSS	vital signs stable
vv	vein(s)
w	which; with
w,wk	week
WBC	white blood count
w/,c	with
w/cm2	walls per square centimeter
WD	well developed
W/D	withdraw
WDWN	well-developed, well-nourished WFwhite female
WH	wet heat
wk	week
WM	well musculed; white male
W/M	white male
WN	well nourished
WNL	within normal limits
w/o,s	without
WR:	work restrictions
/w	per week

wt	weight
W/U	work up
X,Xs	time; times
x	except
x	subluxation
x	vertex
XR	X-ray
yest	yesterday
YIF	yeast infection
YO	year old
YOF	year old female
YOM	year old male
YOBF	year old black female
YOBM	year old black male
YOWF	year old white female
YOWM	year old white male
y/o	year old
yr	year
2ya	2 years ago

SYMBOLS

<	less than; before; less to
>	greater than; after; more to causing
6	leading to, producing
8	increased(-ing)
88	much increased
9	decreased(-ing)
99	much decreased
+	positive, present
-	negative, normal, absent
-	approximately
$	related to
&	female
%	male
+/o	off and on, intermittent
?	question(s), questionable
|	yields
$	money; financial concerns
	Standing
	Sitting
	Recumbent; lying
	Lying with knees flexed
Î to	change to
1E	primary; first degree
2E	secondary; second degree
3E	tertiary; third degree
O,i	no change
2E	secondary (due to)
Bi	bilateral
Lt	left
Rt	right
Pn	pain

tn	tenderness

ANATOMY

Muscles and Ligaments

delt	deltoid
EHL	extensor hallicus longus
gmax	gluteus maximus
gmed	gluteus medius
gmin	gluteus minimus
Ham	hamstring
ISL	interspinous ligament
Lig	ligament
lc	longus colli
m,mm	muscle
P-C	paracervical (muscles)
P-D	pardorsal (muscles)
P-L	paralumbar (muscles)
P-T	parathoracic (muscles)
Pec	pectoralis
Pmaj	pectoralis major
piri	piriformis
rhom(b)	rhomboid
sant	scalenus anticus
scl	subclavius
SCM	sternocleidomastoid
smed	scalenus medius
SP	spinous process
sp	spine
ssp	supraspinatus
TFL	Tensor fascia lata
tm,tmaj	teres major
trap	trapezius

Joints

AC	acromioclavicular joint
CJ	coxal joint
CS	chondrosternal joint
CVJ	costovertebral joint
GHJ	glenohumeral joint
IVD	intervertebral disc
J	joint
Jt,jt	joint
L-S,L/S	lumbosacral
PS	pubic symphysis
SCJ	sternoclavicular joint
SI	sacroiliac joint
TMJ	temporomandibular joint

Bones/Regions/Relationships

AAL	anterior axillary line
ant	anterior

AP	anterior-posterior
ASIS	anterior-superior iliac spine
asym	asymmetrical
ax	axilla
B,	bilateral
BT	bitemporal
C	cervical
C1-7	cervical spinal segments 1-7
CC	costochondral
C-D	cervico-dorsal
CM	costal margin
Contralat	contralateral
cr	cranial
CS	costosternal
Csp	cervical spine
cx	coccyx
D	dorsal
D-L	dorsolumbar
Dsp	dorsal spine
D1-12	doral spinal segments 1-12
EAM	external auditory meatus
EENT	eyes, ears, nose, throat
ext	external
FS	full spine
GI	gastrointestinal
GU	genitourinary
Ipsi	ipsilateral
IS	iliac spine
L	left; lumbar
Lat	lateral
LB	low back
LC	lower cervical
LCUD	lower cervical-upper dorsal
LCUT	lower cervical-upper thoracic
LD	lower dorsal
LE	lower extremity
LL	lower lumbar
L/S,L-S	lumbosacral
Lsp	lumbar spine
LT	lower thoracic
L1-5	lumbar spinal segments 1-5
MC	mid cervical
MD	mid dorsal; medical doctor
med	medial; median
ML	mid lumbar
MT	mid thoracic; metatarsal

occ	occasional; occiput
OF	occipitofrontal
p-	para
PA,P-A	posterior-anterior
PAL	posterior axial line
PS,P/S	paraspinal
PSIS	posterior-superior iliac spine
R,	right
Rad	radial
S1-5	sacral segments 1-5
sac	sacrum
SC	sacrococcygeal; supraclavicular
seg	segment(-al)
SI	sacroiliac
SO	suboccipital
SS	supraspinatus
T1-12	thoracic segments 1-12
T	thoracic; tranverse
T-L	thoracolumbar
troch	trochanter(-ic)
Tsp	thoracic spine
UC	upper cervical
UD	upper dorsal
UE	upper extremity
uln	ulnar
Umb	umbilicus
Vag	vagina(-al)
Vert	vertebral
Vx	vertex

BODY (PART) MOTION/POSITION

abd	abduction
Act	active
add	adduction
amb	ambulatory
ant	anterior
AP	anterior-posterior
asym	asymmetrical
BE	backward elevation
cntl	contralateral
dev	deviation
DF	dorsiflex(-ion)
dist	distraction
E/D	extension-distraction
EP	end play

ev	eversion
exp	expiration
ext	extension
F/D	flexion-distraction
FE	forward elevation
Flex	flexion
Flx	flexion
insp	inspiration
inv	inversion; involuntary
I/Trx	intersegmental traction
KC	knee-chest
L,	left
L	lumbar
Lat	lateral
LLF	left lateral flexion
LR,LROT	left rotation
Lsp	lumbar spine
PA	posterior-anterior
Pass	passive
PF	plantar flexion
post	posterior
pron	prone(-ation)
prox	proximal
PWB	partial weight bearing
R,	right
RFF	rising from flexion
RFSS	rising from sitting to standing
RLF	right lateral flexion
ROM	range of motion
ROT	rotation
RR,RROT	right rotation
S	stretch
SB	side bending
SHR	scapulohumeral rhythm
SLP	short leg prone
SLS	short leg supine
stim	stimulate (-tion)
sup	supine, supination
UD	upper dorsal; ulnar deviation
val	valgus
var	varus

DIAGNOSTIC PROCEDURES/ORTHOPEDIC MANEUVERS

ACE	axial compression in extension
ACELR	axial compression in extension with left rotation (maximum cervical compression)
ACERR	axial compression in extension with right rotation (maximum cervical compression)
ACLF	axial compression in left lateral flexion (foramina compression)
ACLR	axial compression in left rotation (Jackson test)
ACN	axial compression (neutral) (foramina compression)
ACRF	axial compression in right lateral flexion (foramina compression)
ACRR	axial compression in right rotation (Jackson test)
BP,Bp	blood pressure
Brag	Braggard's test
BS	bone scan
cmp	compression
CT	computerized tomography
DDD	degenerative disc disease
distrx	distraction
DJD	degenerative joint disease
Dperc	digital percussion
DTR	deep tendon reflexes
E	examination
eval	evaluation
Ex	examination
Ext	extension
flex	flexion
flx	flexion
Hperc	hammer percussion
L+A	light and accommodation
Lab	laboratory
Lib	Libman's test
LLF	left lateral flexion
LRR	left rotation restriction
MP	motion palpation
MRI	magnetic resonance imaging
OP	over pressure (to passive limits)
Perc	percussion
plp,palp	palpation(-atory) (-able)
Px	physical examination
RAM	rapid alternating movements
RLF	right lateral flexion

ROM	range of motion
R/O	rule out
RR	rotation restriction
RRR	right rotation restriction
S	stretch
SB	side bending
SLP	short leg, prone
SLS	short leg, supine
SLR	straight leg raise
SOS	step-off sign (spondylo)
SSLR	sitting straight leg raise
TF	tuning fork
tj	triceps jerk
UA	urine analysis

FINDINGS

abn	abnormal
abs	absent
apr	apprehension
asym	asymmetrical
atr	atrophy
B	bilateral; burning (pain); brisk
B,	bilateral
BEF	bony end feel
bmk	birthmark
bog	bogginess of tissue
BSE	bilaterally symmetrical and equal
BSN	bowel sounds normal
Btr	better
CC	chief complaint
chr	chronic
c/o	complains of
crep	crepitation(s)
CVA	cerebrovascular accident
d	dull
DDD	degenerative disc disease
def	deficiency
deg	degenerate(-tion)
dev	deviate (-tion)
dim	diminished
DJD	degenerative joint disease
DLMP	date of last menstrual period
DTR	deep tendon reflexex
EP	end play
ER	extension restriction

ess	essentially
ev	eversion
exac	exacerbation
FH	family history
fix	fixation
flac	flaccid
FR	flexion restriction
Fx	fracture
HA	headache
HBP,HBp	high blood pressure
HEP	"hard" end play
HNP	herniated nucleus pulposus
HT	hypertonus(-ic); hypertension
IC	intercostal; intermittent claudication
imm	immediate
imp	improved; impression
int	intermittent
LBP	low back pain
LJA	Luschka joint arthrosis
LLFR	left lateral flexion restriction
LMP	last menstrual period
LRR	left rotation restriction
mal	malingering
mod,2	moderate
N	normal, negative
NAA	no apparent abnormalities
NB	nota bene (note well)
N/C	no complaints
NC	no change; non contributory
NE	not evaluated; not examined
neg	negative
NF	not found
NK	not known
NR	normal range
NSA	no significant abnormality
NSC	no significant change
NSO	nonspecific onset
N&V	nausea and vomiting
obs	obese
occ	occasional
o/o	on and off, intermittent
P,	pain
p	pinch (-ing)
PD	pelvic deficiency (short leg)
Perc	percussion
PERRLA	pupils equal round react to light and accommodation
Pg	pregnant
PID	prolapsed intervertebral disc

PIS	pre-injury status
PJA	posterior joint arthrosis
PJP	palpated joint prominence
plp	palpable (-atory) (-ation)
plpn	palpatory pain
PMS	premenstrual syndrome
Pn	pain
Pn-	pain, radiate(ing)
pos	positive
prod	produced
prog	prognosis
prom	prominent
PTA	posttraumatic amnesia
Px	paresthesia(s)
Px-	paresthesia(s), radiate(ing)
RA	rheumatoid arthritis
rad	radiating(-tion)
ref	refer (-red)
rel	relief
REP	reduced end play
RLFR	right lateral flexion restriction
ROM	range of motion
RPMC	replicated pain of main complaint
RRE	round regular equal (pupils)
RRR	right rotation restriction
S	sharp (pain); subjective
sev,3	severe
sl	slight
SLP	short leg, prone
SLS	short leg, supine
SOB	shortness of breath
SOL	space occupying lesion
SOS	step-off sign (palpation sign for spondylo)
S/P	spondylo spondylolisthesis
Spr	sprain
Str	strain
sw	swelling, swollen
Sx	symptoms; subjective
sym	symmetrical
T*	tingle
TNT	tight but non tender
TOS	thoracic outlet syndrome
TP	trigger point
TPR	temperature pulse respiration
tr	trace
trans	transitional
TTF	taut-tender fibers
Tx	tingling
ULN	upper limits of normal
val	valgus
var	varus
VAS	vascular amplitude surge (Mannkopf's)

vb	very brisk
vis	visual, visible
VMA	visible muscle asymmetry
VS	vital signs
WD	well developed
WM	well muscled
WN	well nourished
WNL	within normal limits

Type of Findings

A	assessment/impression
E	exercise; ergonomics
O	objective findings
P	plan (of treatment or referral)
R(T)	(short for Rx) treatment
S	subjective findings

Pain Findings

B	burning
D	dull
P,	pain
Pn	pain
S	sharp

Pain Grade Findings

1	mild
2	moderate
3	severe
4	very severe

TREATMENT/ RECOMMENDATIONS

adj	adjustment
CC	cervical chair
CFM	cross friction massage
CMT	chiropractic manipulative treatment
CP	cervical pillow
cp	cold pack
ct	cervical towel
cryo	cryotherapy
CSPT	cervical support
Cox	Cox manipulative technique
div	diversified
dp	drop pelvic
E/D	extension-distraction
exs	exercises
FA	first aid
F/D	flexion-distraction

FM	friction massage
FM/S	friction massage with stretching
fu	follow-up
grad	gradually (-ated)
HP	hot pack
IF	interferential
inv	inversion
ITrx	intersegmental traction
KC	knee-chest
LFT	low force technique
LMT	licensed massage therapist
LOD	line of drive
LSPT	lumbar support
man	manipulate; manipulation
meds	medication(s)
m,mm	muscles
mob	mobilize
mss	massage
M/Trx	manual traction
NC	no charge
PB	pelvic bench
PC	phone call
PNF	proprioceptive neuromuscular facilitation
PRN	as needed, as required
PT	physical therapy
rec	recommend
ref	refer (-red)
R/O	rule out
RTW	return to work
Rx	recommended therapy, prescription, treatment
S	stretch
SM	self-massage
SMT	spinal manipulative treatment
TENS	transcutaneous electrical nerve stimulation
TP	trigger point
TPT	trigger point therapy
Trx	traction
Tx	treatment
US	ultrasound
VL	very light
VM	vibratory massage, mechanical: G5, genie, thumper

WR	work restriction(s)

NOTES THAT SHOW ACTIONS OR INTERACTIONS

AMA	against medical advice
ASAP	as soon as possible
CNP	cannot perform
DPAT	decreased pain after treatment
PDPR_%	patient describes pain reduction as _%
PDU	patient demonstrates understanding
PTPW	patient tolerated procedure well
RFF	rising from flexion
RFSS	rising from sitting to standing
RPMC	replicated pain of main complaint
RTW	return to work
SPF	standard procedure followed
TRAM	treatment response assessment method
WR:	work restriction(s):

TIME/FREQUENCY

BID	twice daily (bis in diem)
freq	frequency
q	(quoque) each, every
qd	every day
qid	four times per day
qod	every other day
q2h	every 2 hours
OD	(omni die) every day
PRN	as needed, as indicated
TID	three times daily
x	times; multiplied by
/d	per day
/w (k)	per week
/m (o)	per month
1xw (k)	1 per week
2xw/3w(k)	2 times per week for 3 weeks
3xw (k)	3 times per week
2-4xm(o)	2-4 times per month
yest	yesterday
2da	2 days ago
2wa	2 weeks ago
2ma	2 months ago

WORDS

ax	axilla
cx	coccyx
Dx	diagnosis
Ex	examination
exs	exercise(s)
Fix	fixation

Fxn	fixation
flex	flexion
Flx	flexion
Fx	fracture; function
Hx	history
I/Trx	intersegmental traction
M/Trx	manual traction
PX	physical examination
Px	paresthesia(s)
Rx	(recommended) therapy; prescription
Sx	symptoms/subjective
Tdx	tentative diagnosis
Tx	treatment
Trx	traction
T*	tingle
vx	vertex