THIRD 100 HOUR REHABILITATION COURSE TOPICS

Core material for the third 100 hours of rehab course work consists of the following topics. The American Chiropractic Rehab Board (ACRB) national certification examination consists of 3-5 questions from each topic area.

I) General

1) Case management: prioritization of treatment approaches

1) Case management (detailed integration & prioritization of treatment protocols involving muscle & joint dysfunction

Sub-acute, chronic, or recurrent pain patients who have no "red flags" of serious disease should be treated with the aim of reducing activity intolerance's (1,2). Manipulation of joints or self-generated end range joint mobilization procedures such as McKenzie methods may be appropriate in the acute syndrome to relieve pain, restore function, and reduce activity limitations (2). Starting as early as 2 weeks and certainly no later than 6 weeks active exercise to address specific muscular performance or motor control deficits is appropriate (14).

Chiropractors wanting to address muscle and joint dysfunction as part of a comprehensive approach to rehabilitation of the motor system should be aware of the proven relationship between dysfunctions of endurance or motor control and various pain syndromes. For instance, poor static endurance of the trunk extensors has been correlated with first time episodes of lower back pain as well as increased recurrence rates (5,6). Deep neck flexor weakness and forward head posture has been found to discriminate either chronic or post-concussion headache from individuals without headache (7,8). A faulty scapulohumeral rhythm has been found to correlate with shoulder pain (9). These are just a few proven examples of the relationship between muscular or motor control dysfunction and specific joint pain syndromes.

The three key methods of treatment are advice, manipulation and exercise (10). Advice is the basic starting point for reducing the strain modern society places on our musculoskeletal system. Manipulation is the treatment of choice for specific tissue dysfunction involving reduced mobility or adverse tension (i.e. joint blockage, trigger points). Remedial exercise is the treatment of choice for faulty movement patterns.

The goal of remedial exercise is to improve motor control in activities of daily living (ADL's) and demands of employment (DE). The problem is that it is time consuming. Therefore, the indication must be carefully determined or else both patient and therapist will be frustrated. Indications for exercise include prediction or history of relapses and the presence of faulty movement pattern related to symptoms.

When training a patient there are certain stages to keep in mind. First, teach the patient how to isolate their "functional training range". This is the painless movement they can produce & control with good coordination. The goal is to expand it to include their ADL's & DE.

Motor control starts with kinesthetic awareness on a conscious level, such as teaching a patient to maintain their lordosis when lifting & progresses to automatic or subcortical motor control. An example of the latter is improved posture during sitting, standing or walking. This subconscious improvement in motor function is important because injuries usually occur due to sudden, unexpected perturbations.

4 keys to Training

Postural advice to learn to produce & control simple movements within the functional range
Manipulation to expand the Functional Range
Sensory Motor training for reflex activation of improved motor programs
Stabilization training to learn to produce & control progressively more challenging movements within the functional range

Common errors that occur during many rehabilitation routines are easy to avoid. Strengthening exercises should be avoided until coordination and conscious control of the functional training range is demonstrated. Otherwise. Muscle imbalances will be exacerbated since overactive, shortened muscle will substitute for weakened muscle during strength training. Relaxation of muscle tension by adjustment or Post-isometric relaxation (PIR) procedures should generally precede any strength training. All activities should be evaluated for quality of movement pattern, in particular their proximal stability

Advice generally includes recommendations about sitting, bending, lifting and respiration.

Manipulation may include any manual intervention which addresses a specific tissues mobility restriction or adverse tension. Examples of such interventions might include thrust to a joint fixation, PIR to a muscle housing a trigger point, or fascial release to fascial restriction.

Sensory-motor training usually incorporates exercises on labile surfaces such as rocker or wobble boards. The patient is usually instructed to maintain their functional posture especially at the foot/ankle ("small foot" or gripping) and lumbopelvic regions. The addition of unexpected perturbations can facilitate neuromuscular reeducation.

Spinal stabilization training is the most challenging treatment for the patient. Progressively more difficult motor skills are attempted while coordination, strength and endurance are all trained. Manual resistance techniques incorporating PNF principles such as passive modeling; active assistance, concentric, isometric and eccentric resisted efforts are utilized. In addition, patient positioning, proprioceptive contacts, and verbal cues are all specifically used to help the patient to produce and control movements within their functional range. Stabilization exercises may begin in a comfortable, non-weight bearing position, but are progressed to functional, whole body activities which mimic ADL's and DE as closely as possible.

References:
1) Bigos S, Bowyer 0, Braen G et al. Acute low back problems in adults. Clinical Practice Guideline No.14. AHCPR Publication No.95-0642. Rockville, MD; Agency for Health Care Policy and Research, US Department of Health and Human Services. December 1994.
2) Waddell G Feder G, Mclntosh A, Lewis M, Hutchinson A (1996) Low Back Pain Evidence Review. London: Royal College of General Practitioners.
3) Haldeman S, Chapman-Smith D, Petersen DM. Frequency and duration of care. In Guidelines for chiropractic Quality Assurance and Practice Parameters. Aspen) 1993, Gaithersburg.
4) McGill SM. Low back exercises: prescription for the healthy back and when recovering from injury. ACSM Resource Manual. 3rd ed. Williams & Wilkins, Baltimore (sched 1997).
5) Biering-Sorensen F: Physical measurements as risk indicators for low-back trouble over a one-year period Spine 1984;9: 1 O6-119.
5) Luoto S, Heliovaara M, Hurri H, Alaranta H. Static back endurance and the risk of low-back pain. Curt Biomech 10:6;323-324, 1995.
7) Watson, DH, Trott PH. Cephalgia 1993:13;272-284.
8) Treleaven S, Jull G. Cephalgia 1994:14;273-279.
9) Babyar SR. Phys Ther 1996;76:226-238.
10)Liebenson C. Rehabilitation of the Spine: A Practitioner's Manual, Liebenson C (ed.). Williams and Wilkins, Baltimore, 1995.

A well- conceived rehabilitation management plan is the foundation of a rehabilitation program. The most successful assessment tool for designing a rehabilitation program is functional assessment which focuses on all phases of human movement. This should reflect the priorities expressed by the patient and family, should be based on the results of a baseline clinical assessment of medical conditions and neurological deficits, and should be consistent with the capabilities of the particular rehabilitation setting. The rehabilitation plan includes a clear description of the patients impairments, disabilities, and strength; explicit statements of short-term and long term functional goals; and specification of treatment strategies to achieve the goals. Priorities need to be clearly established among goals, especially in patients with multiple complex deficits. When developing an exercise program, three major goals should be included in the patients overall health. These goals include increased muscular strength, aerobic power, and flexibility. When dealing with static musculoskeletal dysfunction, the primary goal is to increase postural control and strength. Other factors that should be taken into account are what stage of healing is the patient in and is the condition acute, sub-acute or chronic. These factors will directly relate to what modalities and/or exercises the patient will be given.

Liebenson, C. rehabilitation of the spine, Williams and Wilkins, 1996.
Acute Low Back Problems in Adults, AHCRP Guidelines No. 14, 1994
Baechle, T. Essentials of Strength and Conditioning Association, 1994

II) Basic Science

2) Clinical biomechanics of vehicle trauma and orofascial/TMJ

When assessing the injuries that may have been sustained in a vehicular accident, numerous mechanical and biomechanical features related to the vehicle and the occupants within the vehicle must be established as clearly as possible in order for the clinician to arrive at reasonable conclusions regarding the likelihood of injury. These factors include:

1. The effects of vehicular impact; When a pulse of impact energy is generated from one vehicle to another or from a vehicle to a solid object, the vehicle may undergo sudden acceleration and/or deceleration in various planes of motion. The speed at which the vehicle is accelerated and/or decelerated may have significant implications on ultimate bodily injury of the passenger(s) within the vehicle, and is often dependent upon factors of inertia.

2. The resultant body movements of the occupants within the vehicle; Based on the presumed effects of vehicular impact, reasonable conclusions can be drawn based on an understanding of biomechanics and studies on crash test results, of the likely movements of the occupant within the vehicle. Determination of whether various body parts underwent flexion, extension, compression, distension, bending, shearing, torsion, etc. can be reasonably ascertained.

3. The ultimate effects to specific body tissues and tissue damage; With the above two factors reasonably identified, and with an understanding of human anatomy and biomechanics, an astute clinician can draw reasonable conclusions of the effects the above factors may have had on specific body tissues. When attempting to arrive at a clinical determination of probable tissue damage, other mechanical and biomechanical factors must be considered, such as position of the occupant within the vehicle, the occupants awareness and preparedness at impact, application and position of seat belts, head restraints, shoulder harnesses, air bags and other vehicular protective devices, and pre-existing/pre-morbid physical, psychological, and social characteristics.

4. The patient's complaints and the providers physical findings; Several recent investigations have identified a significant increase in the number of claims for nonexistent and exaggerated injuries of motor vehicle accidents in recent years. Therefore, the veracity of patient complaints of pain and disability often comes under scrutiny. The above factors, can often identify whether the patient's complaints and physical signs are consistent with the presumed tissue damage that likely occurred as a result of the probable body movements of the occupants within the vehicle that occurred as a result of vehicular impact.

References

Severy DM, Mathewson JH, Bechtol CP. Controlled Automobile Rear End Collisions: An Investigation and Related Engineering and Mechanical Phenomenon. Can Services Medical Journal 11: 727, 1955.
Navin FPD, Romilly DP. An Investigation into Vehicle and Occupant Response Subjected to Low Speed Rear Impacts. Proceedings of the Multi-disciplinary Road Safety Conference IV, Fredericton, New Brunswick, June 5-7, 1989.
White AA, Panjabi MM: Clinical Biomechanics of the Spine. Philadelphia; JD Lipincott Company, 1978.
Foreman SM, Croft AC; Whiplash Injuries: The Cervical Acceleration/Deceleration Syndrome, 2nd Ed. Baltimore; Williams & Wilkins, 1995.

Carroll S, Abrahamse A, Vaiana M. from Rand-The Institute for Civil Justice. Cost of Excess Medical Claims for Automobile Personal Injuries. March 1995.
Derrig RA, Weisberg HI. A Report on the ABI Study of 1993 Personal Injury Protection and Bodily Injury Liability Claims; Coping with the Influx of Suspicious Strain and Sprain Claims from the Automobile Insurers Bureau of Mass. July 12,1996.

Clinical Biomechanics -orofascial System/TMJ - Mastication

The orofascial system has mechanical and central complexities that feedback and feed forward with problems of the locomotor system. It has significant influence on 3 of the 4 basic functional reflexes as described by Janda. Those are mastication, prehension and respiration. The masticatory muscles effect five bodily functions; mastication, swallowing, speech, respiration and emotional expression. The trigeminocervical nucleus is a key synapse for neurological information of the orofascial and neck regions.
Mandibular function requires muscle balance for the movements of elevation, depression and protrusion. Faulty movement is best observed during mandibular opening. The stabilizing role of the submandibular musculature and structures is vital for efficient function. The temporomandibular joint (TMJ) is a structural component which must be considered and whose function is greatly effected by locomotor function and postural presentation of the head, neck, upper torso and pelvis. Its anatomy consists of a two joint system where both a hinge and gliding motion are performed. There are three main ligaments and an articular disc. The teeth and their occlusion play a minute role in comparison to the contribution from the cervical spine, muscles, and myofascia and nervous system.

Janda1 V. Some aspects of extracranial causes of facial pain. Joum of Prosthetic Dentistry, Vol.56, No. 4, Oct.1986
Okeson, J. orofascial Pain: Guidelines for Assessment, Diagnosis and Management. Quintessence Books, 1996.
Kuwahara, T. Chewing pattern analysis in TMD patients with and without internal derangement: Part II. Journ of Craniomand Pract 1995; 13:2
Rocobado,M. Biomechanical relationship of the cranial, cervical and hyoid regions. Crania 1983; 1:3
McNamara JA. Journal of orofascial Pain, 1996; 9: 73-90.
Gonzalez, H. Forward head posture: Its structural and functional influence on the stomatognathic system, a conceptual study. 1996; 14:1

III Assessment

3) Work capacity

One's ability to work or perform specific job demands is defined as work capacity. This is typically measured through a functional capacity evaluation. An individuals work capacity can be limited following injury. One's capacity to perform specific or general tasks biopsychosocial elements.

Work capacity and its change following injury is best understood using a hierarchical view of function[1]. Injury and its effect on individuals work capacity and subsequent disability should be referenced in terms of disease, illness, disability, handicapped. Using this format not only is the work capacity quantified but also qualified. One would refer to appropriate measurement tools to assess strength, flexibility, coordination, aerobic, and/or biopsychosocial issues.

[1] Waddel, A New Clinical Model for Rx of LBP, Spine: 1987;12,632-644

4) Physical demands strength rating

RTW Outcomes for ef. To DOT items and usefulness

5) Return to work outcomes: assessment & integration of whole body functional capacity evaluations (i.e. lifting or carrying capacity) with return to work & ADL guidelines

The natural history of occupational disability acts as a benchmark for return to work outcomes.[2] Return to work outcomes can be affected by numerous variables, some of which are specific to occupational injuries[3]. These variables need to be accounted for in identifying high risk patients for ongoing occupational disability. Once these high risk patients are identified appropriate active care and work conditioning treatment modes should be sought.

Specific to measuring returned to work outcomes one should have a thorough understanding of DOT job classifications [4], traditional outcome-based questionnaires (see topic year one), and the use and interpretation of biopsychosocial questionnaire. (see topic year one and two).

Additionally, low technology lift assessment techniques may be beneficial in measuring and documenting functional improvement in occupationally disabled patients [5]. Examples of these techniques have been shown to be easy to administer and sensitive to functional improvements.

[2] Spitzer, WO, Scientific approach to the assessment and management of activity related spinal disorders. Spine 1987; 12:1-59
[3] Feurstein
[4] Fishbaine D, et al. Measuring residual functional capacity in chronic low back pain patients based on dictionary of occupational tides. Spine 1994;19:872-879.
[5] Cutis, et al. Physical progress and residual irnpairrnent quantification after functional restoration Spinel994;19:401-4O5.

6) Advanced FCE testing

Consideration of several issues should be evaluated before commencing a functional capacity evaluation. Patient selection criteria should be established particularly in regards to contradictions to performing such tests.[8] A clear rationale for understanding when to perform such testing should be outlined and consistent with the natural history of occupational disability. Specific test selection criteria should be thoroughly evaluated prior to test inclusion. Additionally, test selection should be sensitive to A.D.A. guidelines. [9] Due to the subjective nature of many of those tests, guidelines for evaluation of effort should be presented. [10] Finally, guidelines for test interpretation and data reporting should be presented.

[8] Hart D, et al. Guidelines for functional capacity evaluation for people with medical condition, JOSPT 1995; 18.
[9] U.S. gov publication
[10] Hoffmann

7) Biomechanical evaluation and kinesiopathology of extremity joints

The diagnosis is on assessment of function. The assumption is that developing tissue tension will provoke pain when a lesion exists somewhere within that tissue. Tissue tension is developed by either performing resisted tests, thus producing tension In "contractile elements", or by carrying out passive movements which stretches "inert elements". Attempts are made to selectively produce tension in specific tissues through the skillful application of passive and resisted tests. Knowing which structures are being stressed with a particular test maneuver assists in identifying the location of the lesion. The goal of the exam is to reproduce the patient's complaint, not to prove a movement painful. The examination must be carried out in the same order being careful to stick with a standard sequence. All attempts are made to perform the tests with the same variables (i.e. starting position of the joint, build up to resistance, etc). The Dr arrives at a diagnosis not from the evidence furnished by one painful movement but by careful detection of a consistent pattern.

The following functional tests are evaluated. Active movements in both standard movements and combined movements test both joint and muscle function, paying attention for quantity, mechanics (alteration of movement pattern). and symptoms. Passive movements in both standard and combined movements, as well as translation (joint play)-traction, compression, gliding, paying close attention to the end-feel. Resisted tests lock at neuromuscular integrity and "contractile" elements. Differential diagnosis for pain in a muscle synergy can be evaluated in three methods, testing a muscle's secondary function in the same joint, testing a muscle's secondary function at an adjacent joint, or testing using reciprocal inhibition. Muscle length (flexibility) and neural tension and mobility is also evaluated.

Differentiation between contractile vs inert lesion is evaluated. Contractile involvement: active and passive movements painful and/or restricted in opposite direction, and resisted movements painful. Inert (non-contractile): active and passive movements painful and/or restricted in same direction, resisted movements painless, and passive accessory movements (joint play) painful and or restricted. The clinician must be able to perform a functional evaluation of the extremity joint and the treatment will focus on restoring normal mechanics and function with respect to the stage of pathology the disorder presents.

Cyriax, James, Textbook of Orthopaedic Medicine. Volume One: Diagnosis of Soft Tissue Lesions. 8th edition Bailliere Tindall, London 1982.
Evjenth 0, Hamberg J. Muscle Strengthening in Manual Therapy. The Extremities. Alfta. Alfta Rehab Forlag, 1914.
Kaltenborin, F. Manual Mobilization of the Extremity Joints. 4th ed. Oslo: Olaf Norlis Bokhandel, 1989
Maitland GD, Peripheral Manipulation Butterworth-Heinemann Ltd., 1991.

8) High-tech iso machine assessment: advantages and limitations of common systems (e.g. Cybex, MedX, etc); interpretation of data

There has been a focused interest to develop objective instrumentation for evaluating human performance, most particularly, spinal functional performance. This is in part because back pain is an epidemic in American society and because there is a tendency for approximately 20% of back pain sufferers to become chronic, recurrent and therefore, costly. As a result, there has been an interest in attempting to use computer-aided instrumentation for helping to access a patients candidacy for more specific interventions, improving outcomes and predicting and reducing the likelihood for back pain chronicity.
Specialized, computer-aided assessment protocols may provide utility for the practicing clinician, by providing objective data that can assist in establishing rehabilitation target goals, and help to measure subsequent program outcomes. These testing instruments, however, may be best integrated with other reliable and functional testing protocols in order to adequately address the entire kinetic claim.

9) Electromyography: fundamentals and clinical indications

10) McKenzie assessment of the cervical spine

McKenzie assessment of the cervical spine is based upon the history and clinical testing of provocative and palliative responses to spinal loading during lumbar motion and at end range. The assessment determines whether spinal complaints are amenable to mechanical therapy. Those amenable to mechanical therapy are classified as one of three syndromes: Postural, Dysfunction or Derangement. This classification is based upon subjective and objective findings that occur during motion and end-range loading.
The behavior of spinal complaints amenable to mechanical therapy is distinguished from other causes.

Butler, D. Mobilization of the Nervous system. Churchill Livingstone, Melbourne, 1991
Cyriax J. Cyriax P. Illustrated manual of orthopedic medicine. London: Butterworths, 1993
Jacob G. McKenzie R "Spinal Therapeutics Based on Responses to Loading, in Rehabilitation of the Spine, Craig Leibensen, ed., Williams & Wilkens, 1996
McKenzie RA, The Cervical and Thoracic Mechanical Diagnosis and Therapy, Spinal Publications, Wailanae, New Zealand, 1990

McKenzie RA, Treat Your Own Neck, Spinal Publications, Waikonac, New Zealand, 1997

IV Rehabilitation Treatment

11) Cervical McKenzie protocols

McKenzie Management of Cervical Pain

If spinal complaints are assessed as being amendable to mechanical therapy, they are classified as one of three syndrome patterns, each of which is managed according to an individual specific exercise (preferred loading strategy"):

1. Postural syndrome –requires postural re-education
2. Dysfunction syndrome – requires remodeling of adaptively shortened tissue
3. Derangement syndrome – requires reduction of deranged disc material

Recommendation for management for complaints not amenable to mechanical therapy is also considered. The employment of Cyriax (for shoulder), Butler (for adherent nerve root), and strength conditioning principles to McKenzie management of low back is considered. The psychosocial impact of spinal treatment style is stressed. Includes demonstration and practical participation to develop treatment management skills.

Butler, D. Mobilization of the Nervous system. Churchill Livingstone, Melbourne, 1991
Cyriax J. Cyriax P. Illustrated manual of orthopedic medicine. London: Butterworths, 1993
Jacob G. McKenzie R "Spinal Therapeutics Based on Responses to Loading, in Rehabilitation of the Spine, Craig Leibensen, ed., Williams & Wilkens, 1996
McKenzie RA, The Cervical and Thoracic Mechanical Diagnosis and Therapy, Spinal Publications, Wailanae, New Zealand, 1990
McKenzie RA, Treat Your Own Neck, Spinal Publications, Waikonac, New Zealand, 1997

12) PNF: clinical integration of PNF skills for muscle dysfunction with joint dysfunction treatment in the management of specific clinical conditions

Proprioceptive Neuromuscular Facilitation is a philosophy of total patient treatment based on neurophysiological principles. The goal of treatment is optimum function of the individual in an approach that is always positive, reinforcing and utilizing that what the person can do. Various proprioceptive
inputs are used to make a desired neuromuscular response easier for the patient to perform. As the patient and dysfunction changes overtime so must the facilitation and technique selection change. Treatment can be both direct and indirect.

The basic procedures are the foundation of PNF. Since they are based on neuro-reflexive responses they do not depend on patient cooperation to be effective. The basic procedures include: manual contact, body position and body mechanics, verbal stimulation, visual clues, appropriate resistance, irradiation, traction and approximation, stretch. and timing.

PNF techniques are tools used to treat specific problems in clinical conditions. They are dependent upon the patient's cooperation and voluntary effort. They may be combined in sequences to promote the desired effects. The techniques and their indication for usage include: rhythmic initiation (difficulties in initiating motion, movement too fast or too slow, uncoordinated motion, general tension), combination of isotonics (decreased eccentric control, lack of coordination or ability to move in desired direction, decreased AROM, lack of active motion in the middle of range), reversal of antagonists or slow reversals (weakness of the agonistic muscles, decreased ability to change direction of motion, exercised muscles begin to fatigue), rhythmic stabilization (limited ROM, particularly when motion is attempted, joint instability, weakness in antagonistic muscle group, and decreased balance), repeated stretch, contract-relax (facilitate relaxation, increase passive range of motion), and hold relax (pain, decreased ROM, patients isotonic contraction an too strong for clinician to control).

PNF patterns of facilitation were developed while watching motion under stress(i.e. athletes). Normal coordinated activities were accomplished by the extremities and trunk moving in diagonal directions with spiral components. Proprioceptive facilitation spreads within the synergistic patterns, both distally and proximally. Treatment makes

use of irradiation from those synergistic combinations or muscles (patterns) to strengthen the desired muscle groups or reinforce the desired functional motions.

Adler S, Beckers, and Buck. PNF in Practice; An Illustrated Guide. Springer-Verlag, 1993.
Knott M, Voss D. Proprioceptive Neuromuscular Facilitation. Harper & Row, 1968

13) Aquatic

Aquatic therapy has shown tremendous success in the rehabilitation of various neuromuscular conditions. Due to the unique qualities of water, it provides flexible options in the resistance of motions, speed of activities, and irradiation of neuromuscular responses of non-involved structures. Hydrostatic pressures, viscosity, buoyancy, and temperature are all qualities of water that adds to its flexibility in a rehabilitative setting. By varying the depth of the pool or positioning the patient at various levels within a pool the buoyancy property of water varies the weight of gravity allowing for early entry into rehabilitation by reduction of joint stress for lower extremities. For various hand and feet devices along with torso supports can be utilized to increase the drag of the extremities through the water adding variability of resistance. The viscosity property of water allows for maintenance of constant resistance against active motion. It has also been theorized that hydrostatic pressure is useful in patients when venous return can be a complicating factor. Variations of water temperature can be useful in either increasing tissue extensibility at one extreme or addressing inflammation reduction at the other. The Arthritis Foundation has issued specific guidelines in the sue of water exercise which can be utilized for consistent administration and parameters for the specific population.

Pappas-Gianes, M., Fantastic Water Workouts, Human Kinetics, 1993, p. 142
Michard, T; Zayas-Rodriques, J, Andres, F, Journal of Strength and Conditioning Research, 1995 Vol. 9(2) p. 107
Catarino, C; Training and Conditioning Vol. 5, Aug. 1995, p. 36

14) Nutrition

Nutrition for chiropractic rehabilitation should build upon concepts of healthy eating for the general public. An optimum diet should be recommended which is consistent with minimizing the risks of both nutritional deficiency and excess. The rehabilitation physician must be able to inspect the patient's diet for nutritional adequacy and make appropriate recommendations.

The rehabilitation patient may have special nutrition needs due to current injury, exercise demands and/or coexisting disorders. Nutrition intervention may help ameliorate the effects of traumatic inflammation and provide for optimum tissue repair. Rehabilitation exercise may increase nutritional needs, which must be anticipated and provided for. The rehabilitation patient may suffer from coexisting conditions that my impair recovery. These conditions, which may include rheumatic disorders (arthritis, fibromyalgia), depression, and sleep disorders, may respond to nutrition intervention.

Bucci, L. Nutrition applied to injury rehabilitation and sports medicine. Boca Raton: CRC Press, 1995.
Committee on Diet and Health, Food and Nutrition Board, National Research Council, National Academy of Sciences, Diet and Health: implications for reducing chronic disease risk. Washington, DC: National Academy Press, 1989.
Gerber, J. Handbook of preventive and therapeutic nutrition, Gaithersburg, MD: Aspen Pubs., 1993.
Gerber, J. Sports nutrition, In Hyde T, Geigenbach M, eds. Conservation management of sports injuries. Baltimore: Williams & Wilkins, 1997:681-710.

Nutrition includes the relationship between diet, wellness and body composition. The percentages of macro nutrients, the glycernic index of meals, the types and ratios of fatty acids, the quality and quantity of protein, all are important concepts concerning wellness and body composition. The concept

of positive and negative nitrogen balance must be understood and applied to athletes and individuals undergoing a rehabilitation program. Varying the types of fatty acids has been shown to have an effect upon inflammatory mediators. Glycosaminoglycans have shown a beneficial effect in the healing of connective tissues. Various vitamin and mineral combinations have been shown to accelerate the healing of wounds, aid in the maintenance of bone density and alter the patients outcome assessments. Often patients will be taking NSAIDs along with a rehabilitation program and the clinician should be aware of common interactions of food and medications. Many recreational athletes currently consume various supplements for functional gains and their validity through peer reviewed research should known by the rehabilitation clinician.

Bucci, L. Nutrition Applied to Injury Rehabilitation and Sports Medicine. Copyright 1995 CRC Press, Inc.
Erasmus, U. Fats that Heal, Fats that Kill, Copyright 1993. Alive Books
Brooks, G, Etal. Exercise Physiology/Human Bioenergetics and its Applications 2nd ed. Copyright 1996 by Mayfield Publishing Company.

15) Post-surgical extremity

There is a great variance in post-surgical rehabilitation protocols. One must have direct communication with the orthopedic surgeon as to his direction. The following are **only** general considerations.

Total Hip Replacement: the following positions must be avoided: hip flexion greater than 90, Hip adduction past midline, and hip internal rotation. This is the positioning used to dislocate the hip during surgery.

ACL Reconstruction: The graft will get weaker before it gets stronger. The avascuity phase varies from 6 to 10 weeks. Emphasis must be placed on patella and soft tissue mobilization, hamstring strengthening, closed chain quadricep training with proprioceptive training. If meniscal repair occurred, the patient will be NWBing for 4-5 weeks.

Arthroscopic Bankhardt Repair for anterior instability of the shoulder. Begin six-direction isometrics, pendulum, and elbow AROM in the first two weeks. Emphasis on restoring active and passive ROM in weeks 2-4. Progressive strengthening exercises after the 4th week. Full resistive exercises at the 8th week.

Acromioplasty with and without rotator cuff repair: varies with the surgeon as to when begin isometrics due to tissue quality. Should have full AROM by week 6. Scapular functioning is addressed early on as well as range of motion exercises. Once strengthening is allowed, it should focus on rotator cuff and scapulothoracic muscles. Must assure the rotator cuff is capable to maintaining the humeral head in a depressed position within the glenoid fossa so as to minimize upward shear stresses of the anterior-middle deltoid when performing forward flexion and abduction strengthening.

References

Colby LA, Kisner C. Therapeutic Exercise, Foundations and Techniques. F.A. Davis, Philadelphia, 1990.
Gill TJ et al. Bankart Repair for Anterior Instability of the Shoulder. Journal of Bone and Joint Surgery, Vol 79A, No 6, June 1997.
Mangine R, Wilk K, Paine R, Home Study Guide to Anterior Cruciate Ligament Rehabilitation. Sports Physical Therapy Section Home Study Course, 1994.

16) Introduction to work hardening

Work Hardening

Work hardening is the process by which individuals current work capacity is measured and any limited factors, compared to current occupational demands, followed by specific training for poorly tolerated tasks. Traditionally work hardening consists of training in whole person dynamic tasks that are job related (i.e. lifting). This was initially provided in multidisciplinary tertiary care centers. Recent literature supports the use of such techniques in loss intensive environments and can easily be incorporated into the chiropractic setting. [6] General treatment concepts in work conditioning programs are goals oriented operant conditioning and addressing patient perceptions/self efficiency.[7]

[6] Sachs et al. Spinal rehabilitation by work tolerance based on objective physical capacity. Spine 1990,15:1325.1332
[7] Matheson L Work hardening for patients with back pain J Musc Med 1993;10:53-63

Work hardening programs are designed to return injured employees to work or to maximize their employability. Work hardening provides a transition from the acute injury to daily working after an employee is able to perform work tasks for a few hours but are unable to tolerate a full work day. For a patient who normally works an eight-hour day, the therapy beings with low-impact conditioning followed by simulated work.

Individual, goal-oriented and structured programs provide job simulation of the work environment with a clinical setting, education on body mechanics, spinal anatomy, posture, stress management, general exercise and relaxation.

In addition to the physical problems, psychosocial issues emerge which confound conventional treatment and prolong resolution. Work hardening programs develop to address the many issues of the occupationally injured chronic patient.

Peterson, M. Nonphysical factors that affect work hardening success: a retrospective study. J Orthop Sports Phys Ther, 1995, 22:6, 238-46
Beissner KL; Saunders RL; McManis BG. Factors related to successful work hardening outcomes. Phys Ther, 1996 Nov, 76:11, 1188-201
Greenberg SN; Bello RP. The work hardening program and subsequent return to work of a client with low back pain J Orthop Sports Phys Ther, 1996, Jul, 24:1, 37-45

V) Management Topics

17) Spinal soft tissue rehabilitation concepts & psycho-motor skills review with application to specific conditions including post-surgical rehab.

The aim of manipulation is to restore mobility and normalize tone. This requires palpatory literacy to feel resistance and to feel release. Any tissue with restricted mobility can be manipulated.
According to Panjabi movements within the neutral zone can only be stabilized by active muscle contractions while those at the periphery are stabilized by osteoligamentous structures. Therefore, active muscle contractions limit the physiological - neutral range and passive osteoligamentous elements limit the anatomical range.
Two dysfunctions can occur with respect to the physiological range:

Decreased neutral range due to a pathological barrier
Increased neutral range due to poor agonist/antagonist co-contraction function

A decreased physiologic range due to a pathologic barrier is typical when there is joint restriction or fixation. This will shift the neutral position of the joint and alter biomechanics. Instability occurs when the normal physiological limit extends due to inadequate agonist/antagonist co-contraction ability, thus placing the passive structures at risk during movements. To mobilize or release a pathological barrier in the physiologic range, manipulation is needed. To stabilize the neutral range sensory motor and stabilization training is needed.
The barrier should be palpated slowly and with little force. Or else you will miss it or it will defend itself. Once we learn to palpate it, it is best to wait and feel for release after a latency. To treat a barrier dysfunction never let go of the barrier, if you feet a release take up the slack, don't let go of the slack! Breathing, eye movements,

springing, isometric contractions away from the barrier and thrusting may all be used to release a barrier. The disadvantage with thrusting is that palpation of release is impossible - the only sense we use is our ears not our hands!
To stabilize the neutral range sensory motor and stabilization training is needed. It is the manipulation of some "key link" which is related to the activity intolerance that is the most economical and often efficacious treatment. Obviously, if abnormal movement patterns are "programmed" relapse may occur and remedial exercise aimed at restoring muscle balance and healthy movement patterns in one's ADL's and DE will be necessary.

18) Advanced upper extremity soft tissue rehabilitation concepts & psycho-motor skills with application to specific

There are numerous soft tissue mobilization techniques. These techniques can be analyzed by looking at how the following nine technique variables are applied: location, area, direction, depth, force, time, amplitude, rhythm and rate. Sot tissue techniques can be classified into two main groups. Accessory soft tissue movements or "muscle play" cannot be performed actively (i.e. friction massage). Physiological soft tissue movements can be performed actively or passively. Depending upon the stage of pathology and treatment goals, one can look at lengthening techniques and shortening techniques. There are different types of patient participation: completely passive; contract-relax, then stretch ; contract-relax, then soft tissue manipulation; contract with simultaneous soft tissue manipulation of antagonist

Soft tissue healing is a complex interaction between the injured tissues, the vascular system and chemical mediators. There are three overlapping phases, inflammatory phase, fibroblastic phase and remodeling phase. During the inflammatory phase, the treatment goals are to decrease swelling, promote venous and lymphatic drainage and prevent unwanted adhesions without disrupting the repair process. During this phase one would use RICE, shortening-broadening soft tissue techniques in a shortened position. During the fibroblastic phase, immobilization or insufficient activity produces an immobile scar which inhibits normal tissue mobility and promotes further muscle atrophy. However excessive activity may delay the normal healing. One may begin gentle lengthening techniques with care. The remodeling phase is responsible for the final aggregation. orientation and arrangement of collagen fibers. The scar must have sufficient tensile strength and mimic the alignment, length and mobility of the tissue it is replacing. Increase vigor of accessory mobilization through propositioning structure in a more lengthen position is appropriate, begin muscle stretching and increase vigor of training to restore normal strength, endurance and coordination.

For example. your patient is a fast-pitch softball pitcher. The evaluation reveals a biceps strain at midbelly. Besides RICE initially, shortening ST techniques are used in a shortened position, pumping into elbow flexion with supination. As healing progresses gradually place the muscle into a more lengthened position of shoulder extension and pump into elbow extension and pronation

References

Kloth, LC. McCullouch JM. Feedar JA. 1990. Wound Healing: Alternatives in Management 1 ed. F.A. Davis Company. Philadelphia.

McGonigle T, Matley K. Soft Tissue Treatment and Muscle Stretching. 3oumal of Manual and Manipulative Therapy, Vol 2, No. 2, 55-2, 1994

Morgan D. Principles of Soft Tissue Treatment, Journal of Manual and Manipulative Therapy, Vol 2, No 2, 63-65.1994.

Morgan D, Moore MJ, Course Notes-Long Term Manual Therapy Course. Folsom Physical Therapy, Folsom CA, 1986.

The rehabilitation clinician should be familiar with upper extremity traumatic lesions, the stages of healing and the progression of rehabilitation from passive to active care. Rehabilitation of the upper extremity should focus on the upper kinetic chain, focusing first on proximal stability of the scapulothoracic articulation then progressing to the more distal portions of the upper kinetic chain. Scapulohumeral rhythm along with tone and coordination of the scapular stabilizers are crucial components when rehabilitating the upper extremity. Functional assessment techniques by Janda and Levvit provide better understanding of the scapulohumeral and upper extremity rehabilitation. Glenhumeral motion and the stabilizing effect of the rotator musculature is vital in minimizing superior migration of the humeral head during shoulder abduction. Exercises focusing solely on abduction without considering strengthening of the glenhumeral depressors can lead to impingement syndromes. Varying acromium morphology may also play a role in impingement syndromes. Proper biomechanics of the throwing motion, especially proper deceleration can aid in reducing the stress on the shoulder contractile tissue.

Kamkar, A. et al, Nonoperative Management of Secondary Shoulder Impingement Syndrome, JOSPT, Volume 17, #5, May 1993
Davies, G. JOSTPT, Volume 18, #2, August 1993
Liebenson, C., Janda, V. Evaluation of Muscular Imbalance, Rehabilitation of the Spine. Copyright 1996 by Williams and Wilkins
Magee, D. Orthopedic Physical Assessment 3rd ed. Copyright 1997 by Saunders Company.

19) Advanced lower extremity soft tissue rehabilitation concepts & psychomotor skills with application to specific conditions

There are numerous soft tissue mobilization techniques. These techniques can be analyzed by looking at how the following nine technique variable are applied: location, area, direction, depth, force, time, amplitude, rhythm and rate. Sot tissue techniques can be classified into two main groups. Accessory soft tissue movements or "muscle play" cannot be performed actively (i.e. friction massage). Physiological soft tissue movements can be performed actively or passively. Depending upon the stage of pathology and treatment goals, one can look at lengthening techniques and shortening techniques. There are different types of patient participation: completely passive; contract-relax, then stretch ; contract-relax, then soft tissue manipulation; contract with simultaneous soft tissue manipulation of antagonist

Soft tissue healing is a complex interaction between the injured tissues, the vascular system and chemical mediators. There are three overlapping phases, inflammatory phase, fibroblastic phase and remodeling phase. During the inflammatory phase, the treatment goals are to decrease swelling, promote venous and lymphatic drainage and prevent unwanted adhesions without disrupting the repair process. During this phase one would use RICE, shortening-broadening soft tissue techniques in a shortened position. During the fibroblastic phase, immobilization or insufficient activity produces an immobile scar which inhibits normal tissue mobility and promotes further muscle atrophy. However excessive activity may delay the normal healing. One may begin gentle lengthening techniques with care. The remodeling phase is responsible for the final aggregation. orientation and arrangement of collagen fibers. The scar must have sufficient tensile strength and mimic the alignment, length and mobility of the tissue it is replacing. Increase vigor of accessory mobilization through propositioning structure in a more lengthen position is appropriate, begin muscle stretching and increase vigor of training to restore normal strength, endurance and coordination.

Patient presents with achilles tendonitis. Place the muscle in a shortening position of knee flexion and plantar flexion. Begin with shortening and accessory techniques. Gradually progress into more knee extension and dorsiflexion using lengthening techniques.

References

Kloth, LC. McCullouch JM. Feedar JA. 1990. Wound Healing: Alternatives in Management 1 ed. F.A. Davis Company. Philadelphia.

McGonigle T, Matley K. Soft Tissue Treatment and Muscle Stretching. 3oumal of Manual and Manipulative Therapy, Vol 2, No. 2, 55-2, 1994

Morgan D. Principles of Soft Tissue Treatment, Journal of Manual and Manipulative Therapy, Vol 2, No 2, 63-65.1994.

Morgan D, Moore MJ, Course Notes-Long Term Manual Therapy Course. Folsom Physical Therapy, Folsom CA, 1986.

Various studies have addressed concerns focused to the lower extremities. Muscular asymmetries including flexibility and strength have been reported in numerous studies as a source of potential neuromuscular traumas. Bilateral comparison of one lower extremity to another has shown that range of motions that exceed the opposite lower extremity by approximately 15% or more consistently have a higher injury rate. It has also been shown that athletes with one lower extremity stronger than the other by approximately 15% or more had a 2.6 times greater possibility for injury than athletes with lesser strength imbalances. Various studies and research projects have consistently shown that proprioceptive deficits measured by various tools (i.e. stabilometry, rhombergs test, patient reports, etc.) can be consistent barometers for increased injury rate within ankles by approximately four fold. It has also been shown that a patients ability to detect small static changes within the ankle joint not only increases the changes of injury rate, but is relatively consistent finding to post injury ankle patients.
Close chain activities have consistently been utilized in the rehabilitation of lower extremities. Close chain activities stress co-contraction of muscles which are vital in joint stability during gait activities. The compressive forces of close chain activities minimize joint sheer force thus reducing static structural stress to lower extremity joints during rehabilitative phases when joint sheer should be minimized. By definition close chain activities apply force to joints and long bones longitudinally as compared to the perpendicular forces of open chain activities. Although open chain activities may be utilized during a rehabilitative program, movement towards close chain activities should occur during terminal stages of rehabilitation.

Knapik, J; Bauman, C; Jones, B; The American Journal of Sports Medicine, Vol. 19, 1991
Tropp, H; Ekstrand, J; Gillquist, J; Medicine and Science in Sports and Exercise, Vol. 16, No. 1, p 66, 1984
Galick, C; Training and Conditioning, Vol. 3, No. 2, p. 5, June, 1993

20) Industry: relations, cost containment, disability management

The rapid growth of the chiropractic rehabilitation model in industry is based on a common foundation of function and practicality. That is, industry strives to function effectively to manufacture goods and services for profit. Success depends heavily on the level of workers' production. Decreased production, or function, results in lower profits and reduces profitability. Therefore, practically speaking, the functional levels of the workers are important to an industry's competitiveness and very survival.
Key tools that are utilized in chiropractic rehabilitation include:

(1) Psychosocial assessment to determine factors of chronicity or abnormal illness behavior. When significantly positive, appropriate follow-up (counseling) may be necessary for optimal improvement.
(2) Functional capacity evaluation to objectively determine patient performance levels to measure improvement, establish work capacity, set work and activity restrictions and determine maximum medical improvement for impairment disability rating purposes.
(3) Assessment of posture, gait & other movement patterns. This assists the Dr. to prescribe proper stabilization program of remedial exercise to stabilize locomotor (neuromusculoskeletal) system, improving function and reducing risk of recurrences.
(4) Proper utilization of assessment for "Red Flag" conditions which require outside referral to the appropriate specialist.
(5) Literature based implementation of proven manual techniques including manipulation and exercise to restore function. A continuum from more passive care to active care occurs as the condition transitions from the acute stage. Because the injured employee is viewed as an industrial athlete, active (exercise) measures are customized with the patient's physical demands of employment in mind.
(6) Use of literature based outcomes measures such as ADL's, pain drawings, visual analog scales. Such tools are used to document presence or absence of clinical progress, vital information used to determine the clinical course of each case.
(7) Ergonomic assessment of the work place to reduce risk of injury/re-injury.

(8) Reduced risk of abnormal illness behavior because of active care protocol.

Impairment reduction and functional restoration practically translates to increased production and increase profitability for an employer. This logical and documentable approach to active patient care make for positive industrial relations and places the chiropractic rehabilitation specialist in growing demand.

21) Chronic Pain syndromes

It is generally believed that most back pain patients will recover from acute episodes and that only a minority become chronic. Since it is considered very difficult to treat the chronic patient emphasis has been placed on prevention and prediction of who will become chronic. Bolton asks, "can an accurate prediction be made of a patient's prognosis early enough to take preventive action." (1). The chronic or chronic bound patient requires a far more complex biopsychosocial approach than the simple acute patient. The biopsychosocial model recognizes that lbp symptoms are influenced by factors other than anatomical or physiological parameters. LBP has biological, psychological & social aspects (2)

Patients prone to chronicity can be identified by the presence of the following features (3):
-Past history of >4 episodes - history
-Longer than 1 week of symptoms before Dr. visit - history
-Severe pain intensity - >50% on VAS
-Pre-existing strux path rel. to symptoms - history, imaging

RCGP (4):
-Work loss in last year - history
-Radiating leg pain - history, pain diagram
-+SLR - ortho/neuro exam
-Signs of n. root involvement - ortho/neuro
-Reduced tr st/end - Alaranta tests
-Poor physical fitness - aerobic capacity test
-Self-rated health poor - SF-36
-Heavy smoking history
-Psychologic distress/depression - SF-36, SCL-90
-Illness behavior - Waddell's signs
-Low job satisfaction - APGAR
-Heavy occupation - JDQ
-Alcohol, marital, financial prob's -history
-Adversarial med-legal - history

In a recent study Cherkin found that only 46% of patients presenting to a primary care clinic were symptom-free after 7 weeks (5). 29% had a poor outcome even 1 year later. Indeed, the chronic or at least the recurrent pain patient may be far bigger a problem than previously believed. Cherkin summarized the following predictors of a poor outcome - sciatica, depression, and job dissatisfaction.

In an exhaustive review of the literature Frank, et al. concluded that the following factors were most significant in predicting outcome - previous history of low back problems, severe acute pain, and sciatica (6).

According to North American Spine Society (7),"Many pts who do not respond to non-op tx w/in 4-6 mos have a history of sig. psychosocial disorders, limited compliance, and inhibition physical function as evidenced by pain sensitivity, nonorganic signs, and demonstrated deficiencies in physical and functional capacity testing."
AHCP - P91(B) concluded, "In a Pt w/acute low back symptoms and no evidence of serious underlying spinal pathology, the inability to regain tolerance of required activities may indicate that unrealistic expectations or psychosocial factors need to be explored before considering referral for a more extensive evaluation or tx program."

A number of factors can be summarized as being predictive of a disability prone patient (9). These include:
symptom magnification
pain avoidance behavior
psychological distress
job dissatisfaction
anxiety
Tx dependency
catastrophizing as a coping strategy
pending litigation

To identify abnormal illness behavior consider the following instruments:
SF-36
SCL-90 (appendix)
Beck Depression inventory
Hamilton Rating Scale for Depression
Zung Self-Rating Depression Scale
Waddell's Non-Organic Signs
Fear Avoidance Beliefs Questionnaire

1)Bolton, JE. Eur J of Chir 1994;42:29-40
2)Fordyce WE, Back pain in the workplace, IASP press 1995
3)Haldeman S, Chapman-Smith D, Petersen DM. Frequency and duration of care. In Guidelines for chiropractic Quality Assurance and Practice Parameters. Aspen 1993, Gaithersburg
4)Waddell G, Feder G. McIntosh A, Lewis M, Hutchinson A (1996) Low back pain evidence review. London: Royal College of General Practitioners
5)Cherkin, DC. Spine 1996:21:2900-2907
6)Frank JW, et al. Spine 1996; 21(24) 2918-2929
7)Mayer TG, Polatin P, Smith B, Smith C, Gatchel R, Herring SA, Hall H et al. Contemporary concepts in spine care; spine rehabilitation - secondary and tertiary nonoperative care. Spine 8;2060-2066, 1995.
8) Bigos S, Bowyer 0, Braen 0, et al. Acute low back problems in adults. Clinical Practice Guideline. Rockville, MC: US Department of Health and Human Services, Public Health Service, Agency for Health Care Policy and Research, 1994
9) Liebenson, C. Rehabilitation of the Spine: A Practitioner's Manual, Liebenson C. (ed.)) Williams and Wilkins, Baltimore, 1995

22) Orofascial & TMJ

Management of orofascial pain and TMJ Disorders requires thorough diagnosis as many conditions can manifest as face, head and. jaw pain. A high percentage of these disorders are muscular in etiology. Although muscle imbalance may be the primacy cause or initiating factor; abnormal joint loading and CNS involvement are common contributing factors. Cephalad compensation and/or the association of basic reflexes (mastication, prehension, respiration) result in complicated and multi-dimensional problems with a high potential for illness behavior and neuropathic presentation. Assessment must include knowledge or assistance in dental orthopedic medicine, locomotor function and biopsychosocial measures.
Treatment should begin with the most appropriate and conservative(reversible) choices. Relaxation and stretching of the muscles responsible for elevation and protrusion should be coordinated with facilitation and training of the proximal stabilizers of the mandible. Functional restoration must include activation of mandibular depressor function. Mobilization and/or stabilization of the temporomandibular joint is sometimes necessary. Cervical spine dysfunction is commonly found associated with temporomandibular disorders and should be manually treated. Posture education, reduction of parafunctional habits (lip biting, clenching, grinding, etc.) and modifications to activities of daily living are essential to long term success. Early aggressive active rehabilitation is vital to diminish likelihood of chronicity and disability.
Traumatically-induced temporomandibular disorders have been shown to have increased signs, symptoms and chronicity. The mechanisms proposed for injury or condition development include two theories. The direct theory postulates that during an acceleration/deceleration process of a collision the temporomandibular complex is

directly stretched beyond its physiologic means resulting in damage to soft tissue elements. This would necessitate initial pain and inflammatory signs. The indirect theory postulates that imbalance resulting from the injury the head and neck causes muscular overactivity and abnormal joint loading in the orofascial region. This would more likely surface as a delayed presentation of signs and symptoms. This patient population may require earlier consideration of supportive measures (splints, surgery) to fully resolve their disorder.

Lewit, K. Manipulative Therapy in Rehabilitation of the Locomotor System.
2nd edition Butterworth-Seinemann, 1991
Fricton, J. Recent advances In orofascial pain and temporornandibular
disorders, Journal of Back and Musculoskeletal Rehabilitation. 1996; 6:2.
Steenks, MH. Orthopedic diagnostic tests for temporomandibular and cervical spine disorders. Journal of Back and Musculoskeletal Rehabilitation, 1996;6:2

23) Vehicle Trauma

When an individual sustains bodily injury as a result of vehicular trauma, the care giver must identify location, nature and extent of injury, and consider numerous physical, psychological and social variables such as the physical injury itself, the person's physical capacity, job/personal requirements, personality, basic emotional status, coping skills, psychological and social stress factors and patient motivation.
The provider must then develop a rational, progressive, flexible, multi-phase program incorporating appropriate treatment and management procedures for the acute injury and as it progresses through the sub-acute, chronic and rehabilitative phases of recovery. At each level the provider must consider range of active motion, strength of related musculature, posture control and balance, general muscular power, general aerobic fitness, emotional state, impairment factors and level of activities of daily living.
In the United States and other developed countries it has been identified that the reimbursement system within any given state, region, or country could effect expectations of pain and disability following injury from motor vehicle accidents. For this reason it is recommended that patients should be provided honest, rational explanations of their injury, recovery rate and prognosis. For soft tissue injury, they should be reassured that with proper treatment and management and patient cooperation, the conditions are usually self limiting. The provider should help the patient adapt to an active and positive attitude at all stages after an injury, emphasize an early return to usual activities, encourage the patient to remain functional in spite of pain, discourage passive behavior and prolonged manipulative and physical therapy procedures.

References

Ameis A. Cervical Whiplash: Considerations in the Rehabilitation of Cervical
Myofascial injury. Can Am Phys 1986: 32;1871-1876.
Tarola GA. Whiplash; Contemporary Considerations in Assessment, Management, Treatment, and Prognosis. JNMS 1993: (4)156-166.
Spitzer WO, Skovron ML, Salmi LR, Cassidy JD, et al. Scientific Monograph of the Quebec Task Force on Whiplash-Associated Disorders; Redefining "Whiplash" and its Management. Spine; 20(8s), 1995.
Carette, J. Whiplash Injury and Chronic Neck Pain. NEJM, April 14, 1994.

24) High risk/special populations (e.g. geriatric/pediatric)

The category of Special Populations includes many different groups. Of these groups, pediatrics, geriatrics, pregnancy and arthritic patients tend to be the primary focus. When assigning exercises to their groups, many underlying conditions must be taken into consideration that would otherwise not be considered in the general populations. In pregnant patients, factors such as trimester, eright and pre-existing health conditions all help to dictate which exercises can and can't be given to the patient some of the contra-indications of exercise for pregnant females is incompent cervix, pregnancy induced hypertension, second/third trimester bleeding and premature membrane rupture. When giving pregnant patients exercises after the first trimester, supine exercises are contra-indicated due to the Inferior Vena Cava being compressed and decreasing venous flow to the heart.

In children, acute renal disease, CHF, and systemic hypertension are all contra-indicated when prescribing an exercise program. In the elderly, exercises that stress concentric and eccentric movement should be stresses but

orthopedic joint stress should not be. Also in the geriatric population the primary insult to injury in from repetitive type trauma.

ACSM Guidelines for Exercise Testing and Prescription, 1995
Araujo, D., Expecting Questions about Exercise and Pregnancy, The Physician and Sports medicine Vol. 25, No. 4, April 1997 pp 85-93
Hyde and Gengenbach, Conservative Management of Sports Injuries, 1997 pp. 588

Special populations and topics encompass the geriatric patient, the pregnant patient and the podiatric patient. Within each of these patient categories, a rehabilitative approach is outlined for several common conditions. Under special topics, the field of aquatic therapy is reviewed.

A Geriatric Population - With an estimated 13% of individuals within the United States expected to be over the age of 65 by the year 2000, and 20% predicted by the year 2040, chiropractors will undoubtedly be faced with an increasingly aged patient population.[1] Geriatric rehabilitation refers to the approach utilized to attend to the particular needs of the older patient population (those over the ago of 65). It also addresses treatment approaches for the most common neuromusculoskeloal conditions to affect older individuals, including osteoarthritis of the spine and extremity joints, balance deficits, decreased strength and flexibility of the trunk and extremities, osteoporosis, ataxia and spinal stenosis.

B. Pregnant Population - For the pregnant patient population, mechanical low back pain is a common complaint for which chiropractic care is sought. It has been estimated that from 24 to 66 percent of all pregnant women experience low back pain.[2] In addition, other common musculoskeletal complaints associated with pregnancy include carpal tunnel syndrome and stenosing tonosynovitis, leg cramps, restless leg syndrome and edema, and weakening of the pelvic floor musculature leading to stress incontinence.[3 4 5] For all of these conditions, simple, cost-effective therapeutic measures can be employed by the chiropractic rehabilitation specialist to decrease symptoms, and enhance the experience of pregnancy, labor and delivery, and puerperium.

C. Pediatric Population - Pediatric rehabilitation refers to the rehabilitation approach utilized to address the particular needs of children and adolescents. It incorporates an understanding of the normal physiology of children and adolescents, and a review of the most common neuuromusculoskeletal pediatric and adolescent conditions presented to chiropractors, including scoliosis and overstress injuries. With tie growth of organized sports for American children, there has been an increase in the occurrence of overstress injuries. The most common injuries are muscle sprains, contusions, head and neck injuries, spondylolysis and spondylolisthesis, shoulder instability, clavicle injuries, elbow and wrist
injuries, osteochondritis dissecans, meniscus tears and ligamentous injuries, ankle and foot injuries.[6]

D. Aquatic Therapy - Aquatic therapy refers to the utilization of a body of water for patient activity and rehabilitation. The unique properties of water permit a variety of specialized therapeutic approaches to musculoskeletal conditions for rehabilitation. These properties include its ability to impart buoyancy, which can "assist, support or resist movement through the water." [7] The relatively greater density of water, as compared to air, imparts greater hydrostatic pressure upon the immersed body parts. In cases where edema is present, this increase in pressure aids in reducing edema. The quantity of hydrostatic pressure increases in direct proportion to the depth of immersion. In addition, the greater the degree of immersion, the less the effects of gravity upon the body. Another property of aquatic therapy is water's viscosity which generates resistance to flow, and can create increasing turbulence. The greater the speed with which the body part moves, the greater the turbulence and thus the greater the resistance. 3 Also, the less streamlined the shape of the body part, the greater the resistance.

Aspects of aquatic therapy include exercise selection, patient positioning, depth of immersion within the water, use of flotation and/or resistance devices in the water, speed of the patient movement, creating a current or flow of water (to produce streamlining or turbulence depending on goals), and use of the properties of buoyancy and surface tension to respectively decrease and increase resistance against motion.

Indications for aquatic therapy include: "inability to participate in a and-based exercise or functional mobility program, weight-bearing restrictions limiting ambulating, severe pain or weakness limiting ability to move, postural and proximal instability limiting extremity exercise, mobility restrictions unresponsive to conventional stretching, and inability to tolerate resisted exercise programs in which distally applied weights pose risk for the patient with joint laxity, subluxation and deformity, osteoporosis, and fragile skin."[4] Aquatic therapy can be a suitable alternative for pregnant women, who enjoy the sensation of weightlessness produced by the water's buoyancy.[8] Aquatic exercise has been shown to significantly decrease pain in patients with arthritis, and to provide gains in overall function and specific ranges of motion.[4]

1. Gucciotie AA. Implications of an aging population for rehabilitation: demography, mortality and morbidity in the elderly. In; Guccione AA, ed. Geriatric Physical Therapy. St. Louis, MO: CV Mosby Co; 1993-4.
2. Ostgaard HC, Andersson GBJ. Previous Back Pain and Risk of Developing Back Pain in a Future Pregnancy. Spine, Volume 16, Number 4, pp.432-436, 1991.
3. Heckman JD. Part 1: Managing Musculoskeletal problems in Pregnant Patients. Journal of Musculoskeletal Medicine. August 1990;7(8)29-41
4. Heckman JD. Part II: Managing Musculoskeletal Problems in Pregnant Patients. Journal of Musculoskeletal Medicine, September 1990;7(9) 17-24.
5. Black E, Anas task SC. Prcgnancy and the lower Extrenjitics. BiCinechaniCs, April l')95, pp. 22 ~ 9.
acider, B, cdiwr. Sports Mcdi ciric.' The School-Age Atlilcic. W.B. Saundors & Company, Philadelphia, 1991.
7 Strer-Acevedo J, Cinillo, JA. Integrating Land and Aquatic Approaches With A Fancticiwl Emphasis. In AqiwLic Pliysicil Thcrapy, Cirullo, S.k edilor. Onhopaedic Thysical Thcrapy Clinics or North Amcrica, Vol.3, Nwnber 2, Jtnc 1994. W.B. Saundcrs Company, Philadelphia.
• Touchet. at'. Floatitig tbrougi Pregnancy. Biotnochanics, September 1995, pp.117-89. Millcr Froeman, Inc., San Francisco.