A MEDICAL CURRICULUM ON COMMON MUSCULOSKELETAL DISORDERS

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ABSTRACT

Injuries and diseases of the musculoskeletal system account for more than 20% of patient visits to, and comprise one of the greatest competency needs among primary care medical practitioners. However, each phase of the medical education process typically fails to provide student physicians and interns with adequate knowledge and skill training in this area. Most primary care physicians receive no clinical undergraduate or postgraduate training in musculoskeletal disorders and, those that do, are commonly rated as possessing inadequate cognitive and manual skills by their program supervisors. Available elective training in musculoskeletal injuries and diseases is commonly taught by hospital-affiliated physicians and surgeons, but this teaching case-load is typically skewed toward serious and/or surgical problems.

The disparity between the clinical competence required for musculoskeletal problems in clinical practice and the content and format of medical education has not yet been addressed by changes in medical school curricula. One potential explanation for this is that the diagnostic coding systems commonly used in primary care medical practice are incomplete and imprecise with respect to musculoskeletal diagnoses. Morbidity statistics based on such codes can not be relied upon for an accurate needs assessment of the common disorders seen in clinical practice. As a result, data obtained using these codes cannot be used to define the competencies required by primary care physicians.

To address this disparity, the purpose of this thesis was to develop a new curriculum for musculoskeletal disorders. The curriculum's content was selected using a competency based curriculum planning technique. Physicians from the disciplines of sports medicine, family medicine, orthopedic surgery, physical medicine and rheumatology (n=20 in each group) were surveyed with respect to the most common musculoskeletal conditions they encountered in their clinical

practice.

The 20 most common musculoskeletal problems selected by the five groups of practitioners were used to develop two forms of learning objective curricula. The first curriculum included terminal and enabling learning objectives grouped around a particular clinical problem. The enabling objectives were subdivided into knowledge, skill and attitude sections. The second curriculum involved a more traditional content knowledge approach, with each disorder being presented as a clinical scenario followed by detailed learning objectives regarding essential anatomy of the region, regional physical examination, specific physical findings, diagnosis, treatment, associated disorders and a brief selection of references. Also, five musculoskeletal disorders which communicate important principles in musculoskeletal medicine were presented in a similar fashion.

The content of the curriculum was validated using an expert validity survey, and consensus outcome measures. Both documented that the curriculum content was valid, and a useful addition to the medical education process.

It is concluded that these curricula are a first step toward correcting the disparity between the burden of musculoskeletal problems seen in primary care medical practice, and the current competency requirements of the medical education process. Mastery of these learning objectives will enable the physician to competently deal with common musculoskeletal problems.

Key Words: Musculoskeletal disorders, medical education, curricula, competency

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Chapter 1
Review of the literature:

Musculoskeletal disorders comprise a significant portion of the patient case load seen in outpatient clinical practice, and have increased in frequency and importance in recent years with the emphasis on regular physical exercise. Despite this, undergraduate and graduate medical training typically dedicates little time to teaching clinical competence in this area. This review will: (i) consider the frequency of musculoskeletal disorders, (ii) examine existing trends in undergraduate and graduate curricula in this area, and (iii) summarize recommendations for curriculum development to correct the disparity which currently exists between the burden of musculoskeletal health care problems and the adequacy of training in musculoskeletal medicine.

MUSCULAR EXERCISE AND HEALTH

An important relationship between physical activity and health has been noted for thousands of years. Historically, physicians were staunch advocates of exercise in the prevention and treatment of disease. In the second century A.D., Galen, a Roman physician, used exercise extensively as a therapeutic tool for a variety of disease states (cited in Ryan and Allman, 1989). Avicenna, a Muslim physician who lived in the tenth century, wrote (cited in Kruger, 1962):

> "Among physical exercises there are some moderate ones; it is to them that one ought to devote himself. They balance the body by expelling residues and impurities and are factors of good nutrition for adults and of happy growth for the young. Exercise your limbs to help them repel bad humors by walking and struggling until panting".

Christobal Mendez, in 1551, summarized the role of exercise in the physicians' therapeutic and prophylactic armamentarium (cited in Ryan and Allman, 1989):

> "the easiest way of all to preserve and restore health without diverse peculiarities and with greater profit than all other measures put together is to exercise well".

This emphasis on exercise as a therapeutic tool was overshadowed by health care improvements brought about by the technologic advances of the nineteenth and twentieth centuries. The discovery of the general anaesthetic, Pasteur's formulation of the bacterial origin of infectious disease, the development of antisepsis, the discovery of insulin, and the invention of modern chemotherapy, permitted the cure and amelioration of illness and injury through the prescription of medicines. As a result, treatment emphasis shifted away from regular exercise (Ryan and Allman, 1989). Similarly, technological advances in the work place, industry, and farming diminished the requirement for daily exercise, with the result that many individuals became physically inactive in their occupations (Shephard, 1986). Over the past two decades, this sedentary lifestyle has been associated with greater morbidity and mortality from a number of disease states. As a result, both the medical community and governmental agencies have urged the public to engage in regular physical exercise in an effort to reduce the incidence and morbidity of these chronic disease states (Lalonde, 1974). In addition, over the past decade, exercise has been increasingly used as a therapeutic tool to treat general medical disorders (Fischer, 1992).

In Canada, the link between physical fitness and health was "rediscovered" by the Canadian Government in 1974, and described in the report titled "New Perspectives on the Health of Canadians". A few years later, the "Report of the Canada Health Survey of 1978" (The Health of Canadians, 1978) concluded that physical activity and physical fitness were related to good health status, and that physically active people were less likely to experience disability days or long-

term activity limitation, to take drugs, or to have recently consulted a doctor, and were also more likely to have positive emotional well being and lower blood pressure (Lalonde, 1974). Fitness Canada, a governmental agency within the department of Health and Welfare Canada, shortly thereafter developed "Participaction", a program designed to motivate Canadians to engage in physical activity. This program has been largely successful in increasing the physical activity rates of Canadians. Similar programs have been undertaken in the United States with similar results (Paffenbarger, Hyde, Wing, and Hsieh, 1986) and epidemiologic data continues to provide new evidence to support the role of regular exercise for health maintenance and disease prevention in conditions such as coronary artery disease, hypertension, hyperlipidemia, obesity, osteoporosis, type II diabetes mellitus, anxiety disorders and depression (Lalonde, 1974, Fischer, 1992).

One predictable, yet significant, sequela of these increased rates of physical activity has been an increase in the number of musculoskeletal injuries related to exercise, as well as a change in the frequency and complexity of certain musculoskeletal disorders (Stanish, 1984). Cumulative trauma disorders, stress fractures, refractory enthesopathies and many other ailments have resulted from the increased participation in, and dedication to regular physical exercise, as well as repetitive physical activities in the workplace. Garrick and Webb (1990) refer to overuse injuries of the musculoskeletal system as a pervasive problem, outnumbering instantaneous injuries in almost every activity. These musculoskeletal injuries are described as difficult to manage and physicians' readiness to manage them has been questioned. Stanish summarizes the problem: "Traditionally, these (musculoskeletal) problems have been managed with prolonged rest, abstinence from athletics and inadequate rehabilitation, which invariably have been followed by predictable soft tissue atrophy and patient

mental despondency" (cited in Ryan and Allman, 1989). While many activity-related musculoskeletal disorders have a relatively benign course compared with other health problems, they can prevent the patient from receiving the health benefits associated with regular physical exercise (LaLonde, 1974, McMahon and Palmer, 1985, Fischer, 1992). As such they do represent a significant health care burden.

MUSCULOSKELETAL MORBIDITY IN CLINICAL PRACTICE

Even before the resurgence of physical activity, various studies have shown that approximately 20% of patients seen by general and family practitioners suffer from musculoskeletal problems (Marshland 1976, Spitzer, 1976, McLemore and Koch, 1982, Rosenblatt et al 1982). Musculoskeletal diseases and injuries are classified as the second most common group of conditions seen in family practitioners' offices, outnumbered only by infectious diseases (Marshland 1976, Rosneblatt et al., 1982). In 1977, disorders of the musculoskeletal system accounted for approximately 55 million visits to office based physicians in the United States, a number exceeded only by disorders of the respiratory system (Kelsey, 1982). In a study of approximately 38,500 patient encounters in California in 1977, musculoskeletal conditions represented the third and fourth most common problems after general medical examinations and upper respiratory infections, and comprised seven of the top thirty diagnoses made by general and family practitioners (Rosenblatt et al. 1982). The National Ambulatory Medical Care Survey of 1977 examined approximately 32,000 patient encounters with family practitioners in the United States, and documented that musculoskeletal disorders represented approximately one quarter of the disorders seen (McLemore, 1982). Kahl (1987), investigating the frequency of musculoskeletal

problems in a Pittsburgh family health center which trained family practice residents, found over a 15 week period that 23% of patient visits to physicians were for musculoskeletal disorders. In females over 66 years of age, the figure was 51%. Spitzer (1976) retrospectively studied the frequency of presenting diagnoses in primary care medical practices in five southern Ontario communities with a combined patient population of over 85,000. They found that 37% of patients presented with at least one "arthritic complaint". The Marshland study of the rank order of diagnoses in general practice studied 526,196 patient problems presenting to family and general practitioners between 1973 and 1975 (Marshland, 1976). The study documented that conditions of the musculoskeletal system and appendicular trauma were the second most common diagnostic cluster seen by this group of practitioners. Based on this data, the investigators concluded that it was an "absolute necessity" for the clinician to have a working knowledge of common musculoskeletal disorders (Marshland, 1976).

Musculoskeletal injuries and disease are also one of the most common disorders encountered in the practice of Emergency Medicine. De Lorenzo et al. studied the experience of the Albany Medical Center, a Level I trauma center with more than 48,000 patient visits annually and two affiliated local emergency centers, with a combined total of more than 60,000 annual patient visits (DeLorenzo, Mayer and Geehr, 1990). Musculoskeletal injury and extremity trauma accounted for more than 20% of the patient problems seen at these centers.

Finally, musculoskeletal injuries and disorders represent the most significant cause of lost time from work in North America and are the most common cause of permanent disability in the United States (Haddad, 1987). Ten million people in the United States had limitation of activity due to musculoskeletal diosrders in 1982, a number greater than any other disease

category (Kelsey, 1982). In the United States, the majority of Workers' Compensation benefits (totalling more than 22 billion dollars in 1985) were for injuries and diseases of the musculoskeletal system, and 25% were due to low back pain alone (Tramposh, 1989). In 1982, the New York State Workers' Compensation Board paid 42 million dollars as compensation for back pain claims alone; 30 states in that year paid a combined 1.9 billion dollars for back injuries (Haddad, 1987). The Tennessee Workers' Compensation Board paid 160 million dollars in settled claims in 1986, 74% of which were due to musculoskeletal disorders, 40% of which were due to back injury claims (Federspiel, Guy, Kane, and Spengler, 1989).

MEDICAL TRAINING IN MUSCULOSKELETAL MEDICINE

The Association of American Medical Colleges annual curriculum directory compiles statistics on the time devoted to each aspect of medical education in the medical schools throughout North America. It obtains its information directly from the Dean's Office of each school based on data recorded by the local institution itself. An analysis of this data reveals that the medical schools in Canada offer an average of 1,500 hours of preclinical or basic science teaching per school (Association of American Medical Colleges Curriculum Directory, 1987). However, the average amount of time teaching locomotor and musculoskeletal disorders is 35 hours or only 2.4% of the total available pre-clinical curriculum hours.

A second opportunity for including curriculum on musculoskeletal medicine is in the later clinical years of medical education. In Canada, only 12% of medical schools require mandatory training in musculoskeletal disorders in the later, clinical years (Association of American Medical Colleges Curriculum Directory, 1987). In another study, Schumacher and Lockshin (1981) found that

30% of medical schools do not teach musculoskeletal examination in their undergraduate years.

Alternative methods for acquiring knowledge and skills in musculoskeletal disorders, available to both students and interns, are elective programs in orthopedic surgery, rheumatology, physical medicine and rehabilitation, and sports medicine. However, at the University of Manitoba Affiliated Teaching Hospitals, only 3.5% of a potential 116 rotating interns selected postgraduate electives in adult orthopedic surgery over the years of 1989-1991. Less than 8% selected training in pediatric orthopedics, and less than one per cent had postgraduate training in rheumatology, sports medicine and physical medicine combined (unpublished data, University of Manitoba Mixed/Rotating Internship Program). The most commonly selected training programs typically consist of inpatient experiences in orthopedic surgery, and these tend to emphasize cases pre-selected for surgical management. DiPaola, Bennet and Shearer (1986) analyzed the knowledge of medical students prior to taking such electives as well as the content of the elective training programs themselves. In the first instance, of 129 medical students from four different medical schools, only 41% could identify the scaphoid, capitate and trapezium bones of the wrist; 16% could not identify any carpal bones, and 63% could not identify the tarsal cuboid. In the second instance, DiPaola (1986) investigated the content and teaching methods of the elective orthopedic programs at twenty-nine medical schools. He found that 88% of the time spent by the student during the 4-6 week elective period involved hospital-based teaching of musculoskeletal problems requiring surgery, with an average of 18 hours spent in the operating theater. By comparison, only 13 hours were spent in outpatient clinics, with half of the teaching centers providing no outpatient teaching. DiPaola (1986) also surveyed 28 general practitioners by questionnaire and found that less than 30% of them had received any supervised

post-graduate training in the examination and diagnosis of musculoskeletal problems.

SUMMARY OF THE PROBLEM

Diagnostic profiles from primary care clinical practice indicate that approximately 1 in 5 outpatient cases are related to musculoskeletal injury and disease. Traditional medical school curricula have placed little emphasis on the teaching of musculoskeletal disorders at any of the three phases of medical education - preclinical, clinical, or post-graduate training. Even at the present time, medical teaching in musculoskeletal disorders is brief and not directly relevant to the knowledge and skills that are commonly required in outpatient settings. The preclinical curriculum devotes, on average, less than 3% of its time to the teaching of musculoskeletal injuries and diseases. The subsequent clinical undergraduate years typically have little training in this area, and the elective programs available to medical students and interns emphasize surgically managed musculoskeletal problems with a resultant bias. In addition, at some institutions, over 80% of physicians have no post-graduate training in this area (unpublished data, University of Manitoba Affiliated Teaching Hospitals). Even in the absence of further documentation, these comparisons demonstrate a significant disparity between the actual clinical case load of musculoskeletal disorders and the extent of medical education in musculoskeletal medicine.

One outcome of this disparity is the risk that the students' proficiency at physical examination will be unsatisfactory and the graduate physician may enter clinical practice with deficient knowledge and skills. For example, in a recent study, Fowler and Regan (1987) found that of 49 patients with chronic anterior cruciate ligament insufficiency, only three of the patients, received the

proper diagnosis by their primary care physician. Goldenberg et al. (1985) studied family practice residents in the United States by surveying residency program directors and found that 39% of their skills in performing musculoskeletal physical examination were inadequate, and more than half lacked the competence to perform a joint aspiration.

In an attempt to correct this problem, changes must be made to the existing medical curriculum. Kahl (1987) stated that a specific curriculum must be designed to instruct physicians in the area of musculoskeletal diseases. De Lorenzo et al. (1990) have planned changes in their Emergency Medicine clerkship training to account for the large proportion of musculoskeletal problems seen in outpatient departments. DiPaola (1986) has stated that: (i) undergraduate teaching should be based on the management of frequent orthopedic problems encountered in general practice, (ii) outpatient teaching of musculoskeletal disorders should receive greater emphasis, and (iii) musculoskeletal anatomy should be taught in conjunction with clinical orthopedics. Finally, the United States National Arthritis Act of 1974 (unanimously approved by the United States Congress), acknowledging the importance of common musculoskeletal problems in clinical practice, lead to the establishment of the "National Commission on Arthritis and Related Musculoskeletal Diseases" (cited in Schumacher and Lockshin, 1981) . This commission subsequently recommended that the primary care practitioner be specifically trained in the diagnosis and treatment of rheumatic and musculoskeletal conditions.

Documenting the disparity between clinical need and educational preparation is only the first step in educating physicians in the area of musculoskeletal medicine. The next steps involve: (i) quantifying the specific case load for which clinical competence is required (specific needs assessment),

(ii) developing and validating a suitable curriculum, (iii) testing the curriculum, and (iv) implementing the curriculum. In reality, a number of factors can limit the development and implementation of medical curricula in a given field. In the area of musculoskeletal medicine, at least one important obstacle exists at the very first step - the accurate quantification of case load data.

Several methods for obtaining case load data can be used, but invariably all of these depend upon morbidity statistics (Dunn, Hamilton and Harden, 1985, Harden, 1986), which in turn are related to the accuracy and completeness of diagnostic codes. In the case of musculoskeletal disorders, the diagnostic codes used to specify injury or disease are incomplete, and imprecise. Table 1 lists the diagnostic terms related to musculoskeletal disorders from the Royal College of General Practitioners coding system (cited in Marshland, 1976). Table 2 shows the diagnostic terms related to musculoskeletal disorders from a second classification system, namely, the International Classification of Health Problems in Primary Care (ICHPPC, 1979).

Table I The nine most commonly cited diagnostic codes listed in the Royal College of General Practitioners (RCGP) classification guide which are relevant to musculoskeletal medicine. The codes are listed in the rank order of frequency as measured in the Marshland study (1976). The numbers in parentheses indicate the frequency of the diagnosis (as a percentage of all patient problems, total 100%).

RCGP #	DIAGNOSIS
480	sprains and strains (2.4%)
409	other forms of arthritis and rheumatism(0.8%)
406	osteoarthritis (0.57%)
425	back pain alone (0.54%)
405	rheumatoid arthritis (0.38%)
420	bursitis (0.3%)
428	pain in joint (0.26%)
408	fibrositis and muscular rheumatism (0.25%)
495	fractures not included above (0.24%)

Table II Selected examples of musculoskeletal diagnostic codes from the International Classification of Health Problems in Primary Care (ICHPPC, 1979).

ICHPPC #	DIAGNOSIS
7150	osteoarthritis and allied conditions
7194	pain in joint, arthralgia, stiffness in joint
7260	the shoulder syndromes
7263	other bursitis and synovitis
7280	other nonarticular rheumatism
7295	pain and other limb syndromes
8390	all dislocations and subluxations other than meniscal damage to knee
8400	sprain or strain of shoulder, upper arm, elbow, forearm.

As can be seen from these two tables, both of the commonly used classification systems suffer serious deficiencies in diagnostic accuracy. These coding systems fail to identify anatomic site, specific tissue involvement, or the relative acuity of the diagnosis in question. The epidemiology and treatment implications of an anterior cruciate ligament sprain are substantially different compared to a quadricep strain. However, both would be included in the broad diagnostic code "sprains and strains". The breadth of these coding systems would preclude there use in the preparation of specific learning objectives for a musculoskeletal curriculum. The vague nature of these diagnostic coding systems is exemplified by such codes as "pain in joint" and "pain and other limb syndromes"

CURRICULUM CHOICES IN MUSCULOSKELETAL MEDICINE

Even without accurate diagnostic codes, curriculum development in musculoskeletal medicine can proceed using the approaches of face and content validity. In fact, most disciplines within medicine which have analyzed the effectiveness of their teaching methods and identified areas of deficiency have done so without relying on accurate diagnostic codes. The literature abounds with articles on developing modern medical curricula in generic terms (Harden, 1986), but is rather sparse with regard to the fields of musculoskeletal medicine, orthopedic medicine, and exercise medicine. Recognizing that the formulation of a curriculum for these areas would serve as an important step in correcting the education/competency disparity identified above, the remainder of this review will consider the choices available for developing such a curriculum.

Although several approaches to curriculum planning currently exist, one fact is certain: it is no longer appropriate to allow medical curricula to be based on tradition or personal bias (Bandarayanake, 1985). As community and social needs change, medical educators are increasingly accountable for ensuring that their courses and the content included therein are relevant. In addition, substantial increases in medical knowledge prohibit the physician from possessing sufficient knowledge and skill to be competent in each and every aspect of medical practice. This fact is appreciated by medical educators who are changing the emphasis and format of the medical education process (Lawrence et al. 1983). The Council of Deans and Council of Academic Societies in the United States as well as the Panel on the General Professional Education of the Physician have all recommended substantive changes to the content and organization of the medical education process (Muller, 1984).

CONTENT BASED CURRICULUM

Traditional medical school curricula have been theory dominated, with the expectation that the student physician will learn large volumes of factual information (Dunn et al., 1985). The specific material to be included in a given curriculum is typically selected by the educator based on his/her own previous teaching experience, the manner in which he/she was taught, existing traditional teaching methods at the same institution, and the teaching protocols used at other institutions (DeLorenzo et al., 1990). However, the substantial growth of factual information has exposed the limitations associated with this traditional "content knowledge" approach to curriculum planning. As a result, alternative methods are being used to develop and select the objectives for medical curricula.

DISCIPLINARY CURRICULUM PLANNING

The most common method for curriculum development in medicine has been the "disciplinary" approach. This educational philosophy divides subject matter along traditional disciplines within research or clinical practice, such as anatomy, physiology or biochemistry. This format often requires the student to memorize much of the subject matter for subsequent clinical courses (Fisher and Levene, 1989). The scope of the factual material included in the traditional curriculum is often based on the intuition of the educator, prior educational experience, or curricula from other institutions. Thus, the inclusion of specific fact-based objectives is not dependent on commonality or proven usefulness in clinical practice. In fact, the extensive theoretical knowledge is often gained at the expense of practical clinical experience (Dunn et al., 1985).

The primary advantage of the disciplinary pattern of curriculum organization is that it has the support of historical tradition. The disadvantage with organizing curriculum into separate disciplines is that learning is unnecessarily compartmentalized (Fisher, 1989). Logical sequencing may not be a major aid in memorization and comprehension if the logic is not appreciated by the student. In addition, this organization of content may not be easily incorporated into professional activity, where patient problems are not neatly confined to one discipline of the basic sciences. Orthopedic medicine and musculoskeletal medicine have poorly defined content boundaries and historically have not been part of the medical education process.

BROAD FIELDS CURRICULUM PLANNING

A second method of organizing curriculum content is the "broad fields" format. This approach attempts to reduce some of the disadvantages of conventional disciplinary curricula. It involves concepts from differing disciplines being placed together based on common elements. The body systems method of curriculum planning, such as grouping together all relevant materials under a single system (eg. the cardiovascular system), is an example of a broad field curriculum. In this curriculum, students explore the entire field, irrespective of traditional disciplinary boundaries. This organizational format allows a natural extrapolation to professional practice since it continually relates the basic science concepts to clinical practice. The main disadvantage of this form of curriculum is that faculty members often feel that specific disciplines are being oversimplified. The broad field curriculum, however, is the approach most frequently adopted by professional schools undergoing curriculum revision (Fisher, 1989). It has the advantage of emphasizing common problems

encountered in practice with the resultant course being appropriate for preparation at a generalist level. For example, the "broad field" of musculoskeletal medicine could replace the traditional curriculum divisions of orthopedic surgery, rheumatology, and physical medicine.

PROBLEM ORIENTED CURRICULUM PLANNING

A third format for the organization of a curriculum is the "problem oriented" approach. Problems or clinical cases are presented so that a content area will be defined by the learning activities required to solve all or specific combinations of the selected problems. The advantage of a problem oriented approach is that students immediately perceive the relevance of the material. This allows the student to acquire knowledge and skills which are directly related to eventual professional practice, and minimizes the transition from their role as student to their role as clinician (Fisher, 1989). The primary disadvantage is that not all the subject matter in a professional curriculum is amenable to problem definition. In addition, a student may not be able to deal with a particular problem if they have not mastered the required disciplinary material.

COMPETENCY BASED CURRICLUM PLANNING

A fourth method of curriculum planning and one of the most commonly used approaches which has emerged in the past two decades is the "competency-based" method (Dunn, 1985, Harden, 1986). This type of curriculum organization is dependent on a determination of what a practicing physician should be able to competently do at the end of his/her training by first assessing the specific competency needs facing a physician in clinical practice. The analysis of the

duties performed by practicing physicians is dependent on the common health problems in the country or society to be served by the graduates of the school (Bandarayanake, 1985). The great advantage of this type of curriculum planning is that the identified competencies become immediately operable as objectives of the curriculum (Fisher, 1989) and the developed curriculum prepares the student physician to meet the precise demands identified in the initial needs assessment. It also permits the acquisition of skill and knowledge in a cumulative fashion. The disadvantages of this planning methodology are that student evaluation and program administration can be difficult.

The initial phase of needs assessment and competency analysis using this approach to curriculum planning frequently leads to the discovery of a disparity between the scope and depth of knowledge and skills taught in medical school, and the requirements of practicing physicians. It is not suprising that such a disparity has been identified in the area of musculoskeletal injuries and diseases.

Based on the preceding commentary, the objective of this study was to prepare a curriculum on common musculoskeletal disorders, using a competency-based curriculum planning format. The common musculoskeletal problems would be selected by the groups of physicians who deal with these problems on a frequent basis.

Chapter 2

Methods:

Of the many ways to approach the development of a curriculum, Harden's well established measures described in "Ten Questions to ask when planning a course or curriculum" (1986) were employed. The first four questions are directly relevent to the creation of a curriculum, and they were followed.

HARDEN QUESTION 1: What are the needs in relation to the training program?

The specific needs which were addressed by the development of the curriculum were:

1. The disparity between the burden of musculoskeletal problems seen in clinical practice, and the current, inadequate curricula used to educate physicians in this discipline.

2. The lack of data regarding the prevalence of specific musculoskeletal disorders seen in clinical practice.

HARDEN QUESTION 2: What are the aims and objectives?

The overall aim of this curriculum development was to help correct the disparity which currently exists between the burden of musculoskeletal healthcare problems and the adequacy of current curricula in this area in Canada. The specific goals were the following:

1. To collect data on the frequency of specific disorders of the musculoskeletal system (site and tissue specific) and determine the 20 most common problems seen in the clinical practice of primary medical care,

orthopedics, sports medicine, rheumatology and physical medicine and rehabilitation, that is those disciplines involved in musculoskeletal medicine.

2. To prepare cognitive, motor and attitudinal learning objectives related to the 20 identified disorders. These objectives used traditional disciplinary content organization, involving anatomy, regional examination, specific historical and physical factors, diagnosis, treatment and associated disorders.

3. In addition, a list of five disorders of the musculoskeletal system which communicate important principles involving the diagnosis and management of problems in this area, without regard to their frequency distribution, was developed. These would include problems which are frequently misdiagnosed, serious, or those highlighting management challenges.

4. A separate curriculum with terminal and enabling knowledge, skill and attitude objectives related to the identified musculoskeletal disorders was developed.

HARDEN QUESTION 3: What content should be included?

The 20 most common musculoskeletal disorders seen in practice were identified using a questionnaire. Sample questionnaires were mailed to 20 physicians in each of the disciplines of family practice/primary care, orthopedic surgery, sports medicine, rheumatology and physical medicine and rehabilitation (total number of 100 practitioners surveyed). The family practice physicians were selected based on their demonstrated knowledge and skills in the area of musculoskeletal disorders. Family practitioners with publications or research interest in the musculoskeletal area, and/or affiliation with the Canadian Academy of Sport Medicine, an organization whose members have special interest in this field, were selected. Orthopedic surgeons, rheumatologists and physiatrists

had met the necessary qualifications set by the Royal College of Physicians and Surgeons. Sports Medicine practitioners were selected from both academic and clinical centres throughout Canada.

The questionnaire used is included in Appendix I. The initial questions were aimed at defining the nature of the physician's clinical practice. The questionnaire also rated the perceived clinical importance of musculoskeletal problems, and the perceived adequacy of training the physician had received in this area. The subsequent question asked the practitioners to indicate the twenty most common musculoskeletal disorders they encountered in their practice. The physician was asked to circle twenty disorders on a list which had been provided to them in an alphabetized fashion and which had been arranged according to regional anatomic site. This diagnostic list had been prepared from existing curricula in musculoskeletal disorders, texts in musculoskeletal disorders and the most complete diagnostic classification systems (see Appendix I).

The final question asked the practitioner to specify up to ten additional diagnoses which they did not select as being common, but should be included in the curriculum due to their importance, severity, or ability to communicate valuable principles in the field of musculoskeletal disorders. A covering letter explaining the project was included (see Appendix I). The questionnaire was pilot tested on ten physicians prior to its use, and suggestions for improvement were incorporated.

Upon receipt of the completed questionnaires, the data was entered into a MacIntosh LC computer and recorded using Microsoft Excel. The responses obtained from each group of practitioners were pooled and the 20 most commonly selected musculoskeletal disorders formed the core content of the curriciulum.

The five most commonly selected "important" disorders were selected in an identical fashion and included in the core content of the curriculum.

HARDEN QUESTION 4: **How should the content be organized?**

The content of the curriculum was organized using the following techniques. First, the "broad field" pattern was used to form the framework of the curriculum, as the curriculum involved only the area of musculoskeletal disorders. Second, the content of the course was determined using the "competency based" model, as the common problems encountered by practicing physicians were selected. Third, the specific learning objectives were presented with "disciplinary objectives" as well as "terminal and enabling objectives" related to knowledge, skill and attitiude.

PREPARATION OF LEARNING OBJECTIVES:

1. Terminal and enabling objectives (Short curriculum)

This step in the planning of the curriculum involved preparing a list of specific behavioural objectives related to the identified content. Specific musculoskeletal disorders as identified by the physicians surveyed were grouped together according to anatomic regions, as in the broad field curriculum planning technique. For example, conditions affecting the shoulder were grouped together. Objectives were divided into terminal and enabling categories. The terminal objectives represented what a physician should be able to do after mastering the curriculum. The enabling objectives provide the student physician with guideposts, which "enable" him or her to learn and perform the terminal objectives. The enabling objectives were further subdivided into knowledge, skill and attitudinal components.

2. Content Knowledge objectives (Long Curriculum)

A more detailed curriculum was formulated to complement the terminal and enabling objectives. It was based on a more "disciplinary" model, also organized in a "broad field" fashion. Each of the musculoskeletal disorders selected as the 20 most common seen in clinical practice were included. The following outline was used to guide the formulation of the objectives, where appropriate:

a. Essential regional anatomy
b. Techniques of regional examination
c. Historical factors of the specific disorders in each region
d. Physical findings specific to the disorders in each region
e. Common diagnostic procedures
f. Common treatment protocols
g. Associated disorders.

The objectives encompassed three main categories:

i. Cognitive abilities (knowledge)
ii. Manual and technical abilities (skill)
iii. Interpersonal abilities (attitude)

A specific case presentation or problem was constructed to highlight salient features of each identified disorder. Current references regarding the specific problem were used in the preparation of the learning objectives, and were listed with each disorder.

CURRICULUM VALIDATION:

The curriculum was subjected to expert validity testing. It was submitted to ten experts, two in each of the fields of primary medical care, orthopedic surgery, sports medicine, rheumatology and physical medicine and rehabilitation. The experts were selected from University-based, academic centres throughout the country. The curriculum was also evaluated by two fourth year medical students. The reviewers were asked to complete a questionnaire evaluating the curriculum, and provide appropriate editorial comments (Appendix III). The questionnaire used an ordinal scale from 1-5 indicating strong disagreement to strong agreement with statements regarding the curriculum. The questionnaire used both positive and negative statements to prevent a "response set". The questionnaire was pilot tested on ten physicians and their suggestions for improvement were incorporated prior to its use.

Chapter 3:
Results

Questionnaire Results:

The response rate to the questionnaire was as follows:

Family Medicine	17/20 (85%)
Sports Medicine	18/20 (90%)
Orthopedic Surgeons	18/20 (90%)
Physical Medicine and Rehabilitation	16/20 (80%)
Rheumatology	16/20 (80%)
Overall	85/100 (85%)

This response rate was considered high enough to be representative of the true population surveyed.

Common musculoskeletal disorders:

The most common musculoskeletal disorders encountered in clinical practice as selected by the physicians surveyed are listed in Table III.

The number of times a specific musculoskeletal disorder was selected by each group of practitioner was recorded, then the total number of selections for each disorder amongst the groups of practitioners was combined. This formed the pooled database of most common musculoskeletal conditions. The selections of the

most common musculoskeletal conditions made by the sports medicine physicians were the most similar to the pooled data of all musculoskeletal practitioners. Seventeen out of 20 disorders selected by the sports medicine physicians were found on the pooled list (Table IV). Sixteen out of 20 disorders selected by the family medicine practitioners were found on the pooled list, while the orthopedic surgeons had 15 of their selections on the pooled list. The physical medicine and rehabilitation specialists had 12 of the 20 conditions they selected as most common found on the list of disorders pooled from all the musculoskeletal practitioners. The rheumatologists selected 10 musculoskeletal disorders which were found on the combined list of 20 most common musculoskeletal problems. Table IV lists the combined responses of the 5 groups of physicians (pooled data) for the most common musculoskeletal disorders seen in clinical practice.

Musculoskeletal disorders communicating valuable principles:

The musculoskeletal disorders selected as being clinically important, severe, or communicating valuable principles in the managment of musculoskeletal problems are listed in Table V. The clinical conditions of shoulder instability and degenerative disc disease of the lumbosacral spine were also selected as being common musculoskeletal problems, and therefore were included in that section of the curriculum (see Chapter 5).

Needs assessment results:

The results from the needs assessment survey are listed in Table VI. The sports medicine (2.72), family medicine (2.41), rheumatology (2.08) and physical medicine practitioners (2.00) rated their undergraduate training in

musculoskeletal disorders as below average, whereas the orthopedic surgeons (3.27) rated their undergraduate training slightly above average. Post-graduate training in musculoskeletal disorders was also rated as being below average by the family medicine group (2.53). The sport medicine practitioners (3.67) rated their post-graduate training between average and above average, whereas the orthopedic surgeons (4.72), rheumatologists (4.55), and physical medicine specialists (4.69) rated their post-graduate training as above average to excellent.

The importance of treating musculoskeletal disorders in clinical practice as rated by the physicians studied is listed in Table VII. All practitioners surveyed considered this an extremely important part of their clinical practice.

Table III: Musculoskeletal disorders selected as being the most commonly encountered in clinical practice. Numeral represents number of times selected by physicians responding to the survey. Numeral under area of practice represents number of practitioners who responded to the survey.

ORTHOPEDICS n=18	SPORTS MEDICINE n=18	FAMILY MEDICINE n=17
Anterior cruciate ligament tear (knee) 16	Subacromial impingement 18	Subacromial impingement 15
Subacromial impingement 16	Lateral epicondylitis 18	Lateral ankle ligament sprain 15
Meniscal tear (knee) 16	Lateral ankle ligament sprain 17	Patellofemoral pain syndrome (knee) 15
Osteoarthritis of the knee joint 15	Patellofemoral pain syndrome (knee) 17	Lateral epicondylitis 13
Patellofemoral pain syndrome (knee) 15	Meniscal tear (knee) 17	Degenerative disc disease of the lumbosacral spine 12
Multi-directional shoulder instability 13	Anterior cruciate ligament tear (knee) 15	Medial collateral ligament sprain (knee) 12
Colle's fracture (wrist) 12	Degenerative disc disease of the lumbosacral spine 14	Musculoligamentous sprain of the cervical spine 10
Medial collateral ligament sprain (knee) 12	Metatarsalgia 14	Tibial stress syndrome/stress fractures 10
Lateral epicondylitis 12	Tibial stress syndrome/stress fractures 12	Plantar fasciitis 10
Rotator cuff tear 10	Plantar fasciitis 12	Meniscal tear (knee) 10
Acute glenohumeral dislocation 10	Sacro-iliac joint dysfunction 11	Muscular strain of the lumbosacral spine 9
Chronic lateral ankle instability 10	Acromio-clavicular joint sprain 11	Osteoarthritis of the hip joint 9
Achilles tendinitis 10	Achilles tendinitis 10	Acromio-clavicular joint sprain 8
Acromio-clavicular joint sprain 10	Facet syndrome of the lumbosacral spine 9	Adhesive capsulitis (Frozen shoulder) 7
Lateral ankle ligament sprain 8	Multi-directional shoulder instability 9	Anterior cruciate ligament tear (knee) 7
Tibial/fibular fracture 8	Osteoarthritis of the knee joint 9	Degenerative disc disease of the cervical spine 7
Degenerative disc disease of the lumbosacral spine 8	Medial collateral ligament sprain (knee) 9	DeQuervain's tenosynovitis of the wrist 6
Femoral fracture 8	Musculoligamentous sprain of the cervical spine 8	Osteoarthritis of the knee joint 6
Adhesive capsulitis (Frozen shoulder) 7	Chronic lateral ankle instability 8	Ulnar collateral ligament sprain of the thumb MP 6
Plantar fasciitis 6	Patellar tendinitis 8	Metatarsalgia 6

Table III continued:

RHEUMATOLOGY n=16		PHYS MED & REHAB n=16	
Psoriatic arthritis	15	Degenerative disc disease of the lumbosacral spine	15
Ankylosing Spondylitis	15	Subacromial impingement	14
Rheumatoid arthritis	15	Fibromyalgia/myofascial pain	13
Degenerative disc disease of the lumbosacral spine	14	Facet syndrome of the lumbosacral spine	12
Subacromial impingement	14	Lateral epicondylitis	12
Gout	14	Adhesive capsulitis (Frozen shoulder)	12
Fibromyalgia/myofascial pain	14	Degenerative disc disease of the cervical spine	11
Osteoarthritis of the knee joint	14	Carpal tunnel syndrome	11
Lateral epicondylitis	13	Patellofemoral pain syndrome (knee)	11
Systemic Lupus Erythematosus	13	Osteoarthritis of the hip joint	11
Carpal tunnel syndrome	13	Metatarsalgia	11
Plantar fasciitis	13	Musculoligamentous sprain of the cervical spine	10
Adhesive capuslitis (Frozen shoulder)	12	Rotator cuff tear	8
DeQuervain's tenosynovitis	12	Muscular strain of the lumbosacral spine	7
Musculoligamentous sprain of the cervical spine	11	Plantar fasciitis	7
Metatarsalgia	11	Osteoarthritis of the knee joint	7
Reiter's Syndrome	11	Chronic lateral ankle instability	6
Septic arthritis	10	Reflex sympathetic dystrophy	6
Osteoarthritis of the hip joint	9	DeQuervain's tenosynovitis	6
Reflex sympathetic dystrophy	9	Rheumatoid arthritis	5

Table IV: 20 most common musculoskeletal conditions in clinical practice. Pooled selections of musculoskeletal conditions chosen by the five groups of physicians. The letter(s) in parentheses represents which group(s) of practitioners selected the disorder as one of their 20 most common musculoskeletal disorders. Total number of responses is 85. OS-Orthopedic surgery, SM-Sport Medicine, FM-Family Medicine, R-Rheumatology, P-Physiatry

MUSCULOSKELETAL CONDITION	TOTAL NUMBER OF SELECTIONS
1. Subacromial impingement	77 (OS, SM, FM, R, P)
2. Lateral epicondylitis	68 (OS, SM, FM, R, P)
3. Degenerative disc disease of the lumbosacral spine	63 (OS, SM, FM, R, P)
4. Patellofemoral pain syndrome	61 (OS, SM, FM, P)
5. Osteoarthritis of the knee joint	51 (OS, SM, FM, R, P)
6. Plantar fasciitis	48 (OS, SM, FM, R, P)
7. Meniscal tear (knee)	48 (OS, SM, FM)
8. Lateral ankle ligament sprain	43 (OS, SM, FM)
9. Anterior Cruciate ligament tear (ACL knee)	42 (OS, SM, FM)
10. Metatarsalgia	42 (SM, FM, R,P)
11. Musculoligamentous sprain of the cervical spine	42 (SM, FM, R, P)
12. Adhesive Capsulitis (Frozen Shoulder)	42 (OS, FM, R, P)
13. Osteoarthritis (OA) of the hip joint	38 (FM, R, P)
14. Fibromyalgia/myofascial pain syndromes	36 (R, P)
15. Medial collateral ligament sprain (knee)	34 (OS, SM, FM)
16. Acromio-clavicular (AC) joint sprain	29 (OS, SM, FM)
17. Achilles Tendinitis	29 (OS, SM)
18. Tibial stress syndrome/stress fractures	27 (SM, FM)
19. Multi-directional (MDI) instability of the shoulder	25 (OS, SM)
20. Chronic lateral ankle instability	25 (OS, SM, P)

Table V: Musculoskeletal conditions selected as clinically important, severe, or communicating valuable principles in the managment of musculoskeletal disorders.

MUSCULOSKELETAL DISORDER	NUMBER OF SELECTIONS
1. shoulder instability*	26
2. scaphoid fractures†	24
3. pars interarticularis stress fractures†	21
4. degenerative disc disease of the lumbosacral spine*	21
5. osteochondritis dissecans of the knee joint†	20
6. stress fractures†	19
7. ulnar collateral ligament sprains (thumb MP joint)†	19
8. reflex sympathetic dystrophy	18
9. myofascial pain syndromes	18
10. septic arthritis	16

* included in section of curriculum dealing with common disorders of the musculoskeletal system

† included in section of curriculum dealing with severe, important or problems which communicate valuable principles of musculoskeletal medicine.

Table VI: Needs assessment survey: Responses to questions by each group of practitioner surveyed. Responses scored as follows; 1-completely inadequate 2-below average, 3-average, 4-above average, 5-excellent. Responses reported are mean scores for each group.

1. With respect to musculoskeletal disorders, my undergraduate training was:

Family medicine:	2.41 +/- 1.00
Sport Medicine:	2.72 +/- 1.02
Orthopedic surgeons:	3.27 +/- 0.96
Rheumatology:	2.08 +/- 0.75
Physiatry:	2.00 +/- 0.60

2. With respect to musculoskeletal disorders, my post-graduate training was:

Family medicine:	2.53 +/- 1.41
Sport Medicine:	3.67 +/- 1.18
Orthopedic surgeons:	4.72 +/- 0.46
Rheumatology:	4.55 +/- 0.70
Physiatry:	4.69 +/- 0.59

Table VII: Importance of treating musculoskeletal disorders in clinical practice: Responses scored as follows; 1-extremely unimportant part, 2-relatively unimportant part, 3-average part, 4-important part, 5-extremely important part of clinical practice. Scores reported are the means from the groups surveyed.

Family medicine:	4.55 +/- 0.51
Sport Medicine:	5.00 +/- 0.00
Orthopedic surgery:	5.00 +/- 0.00
Rheumatology:	5.00 +/- 0.00
Physiatry:	4.73 +/- 0.35

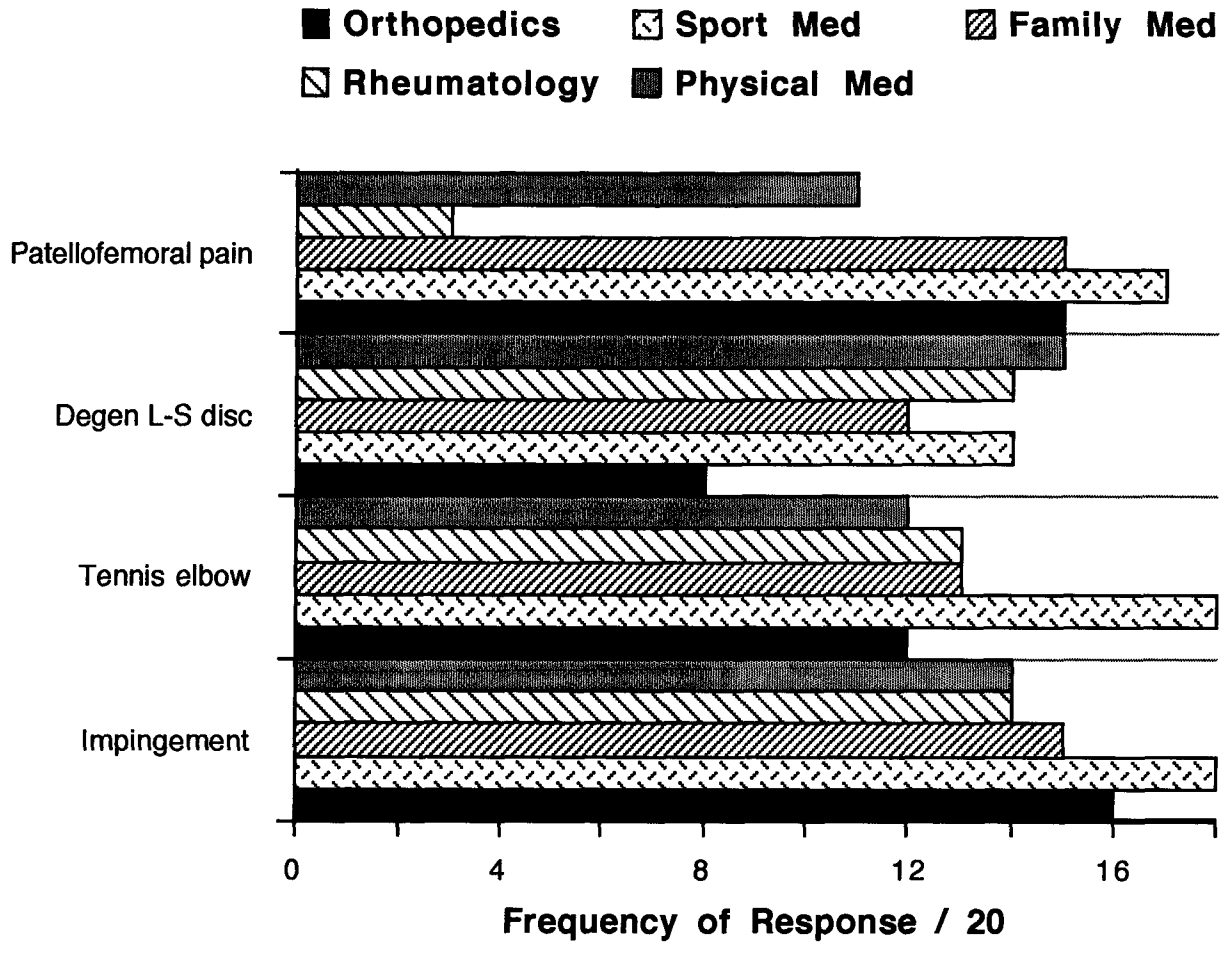

Figure Ia Bar graph demonstrating number of selections by each of the five groups of physicians comprising the twenty most common musculoskeletal conditions.

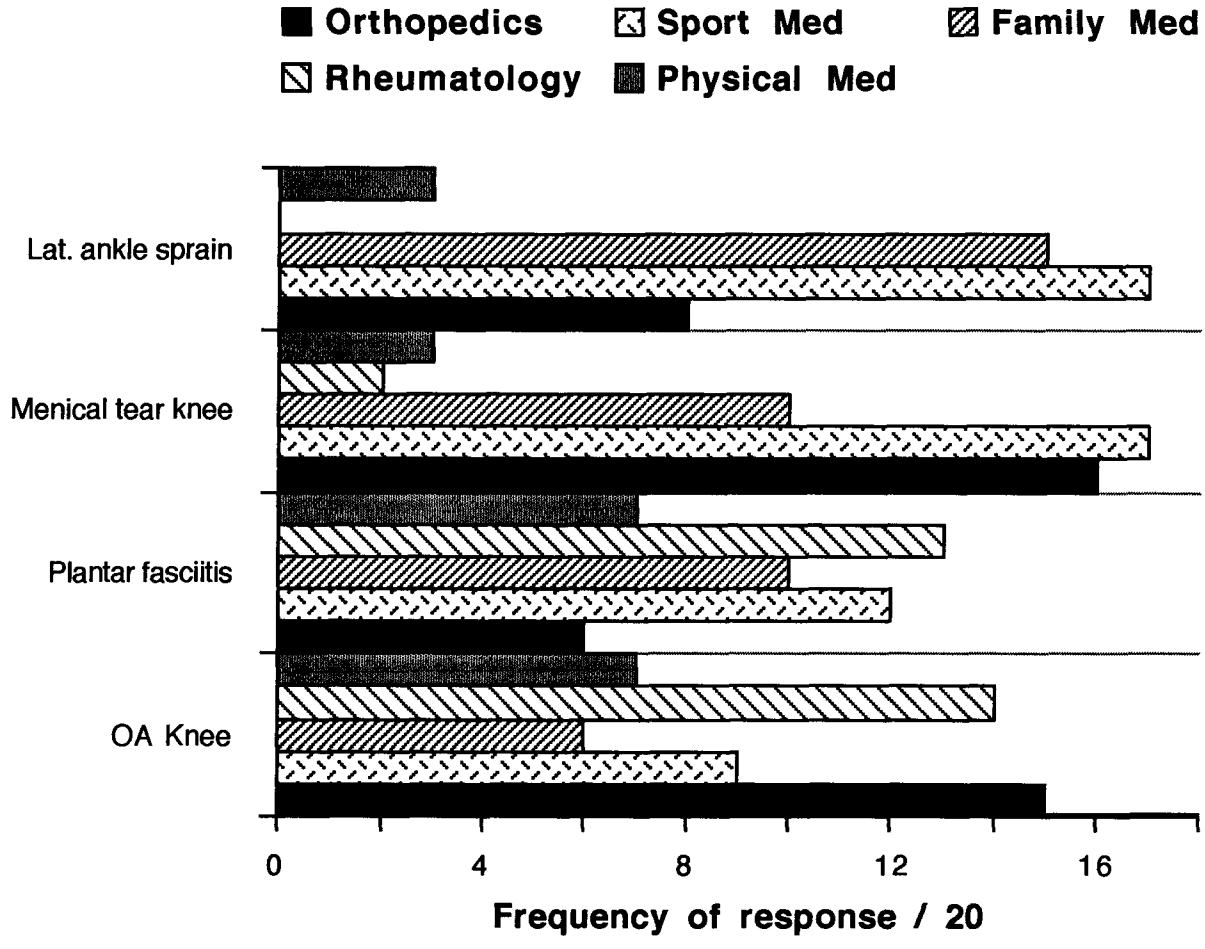

Figure Ib continued: Number of selections by each of the five groups of physicians comprising the twenty most common musculoskeletal conditions.

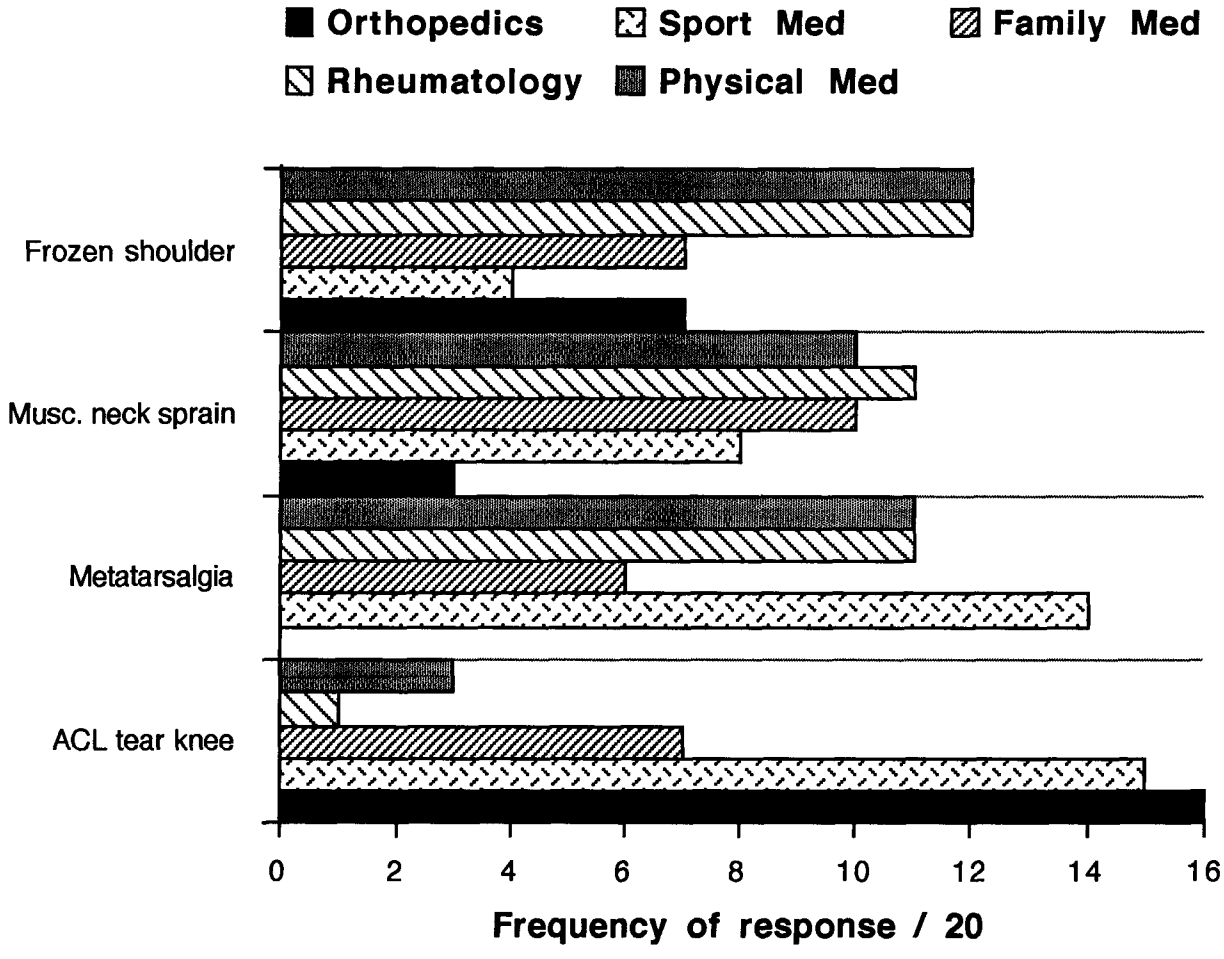

Figure Ic continued: Number of selections by each of the five groups of physicians comprising the twenty most common musculoskeletal conditions.

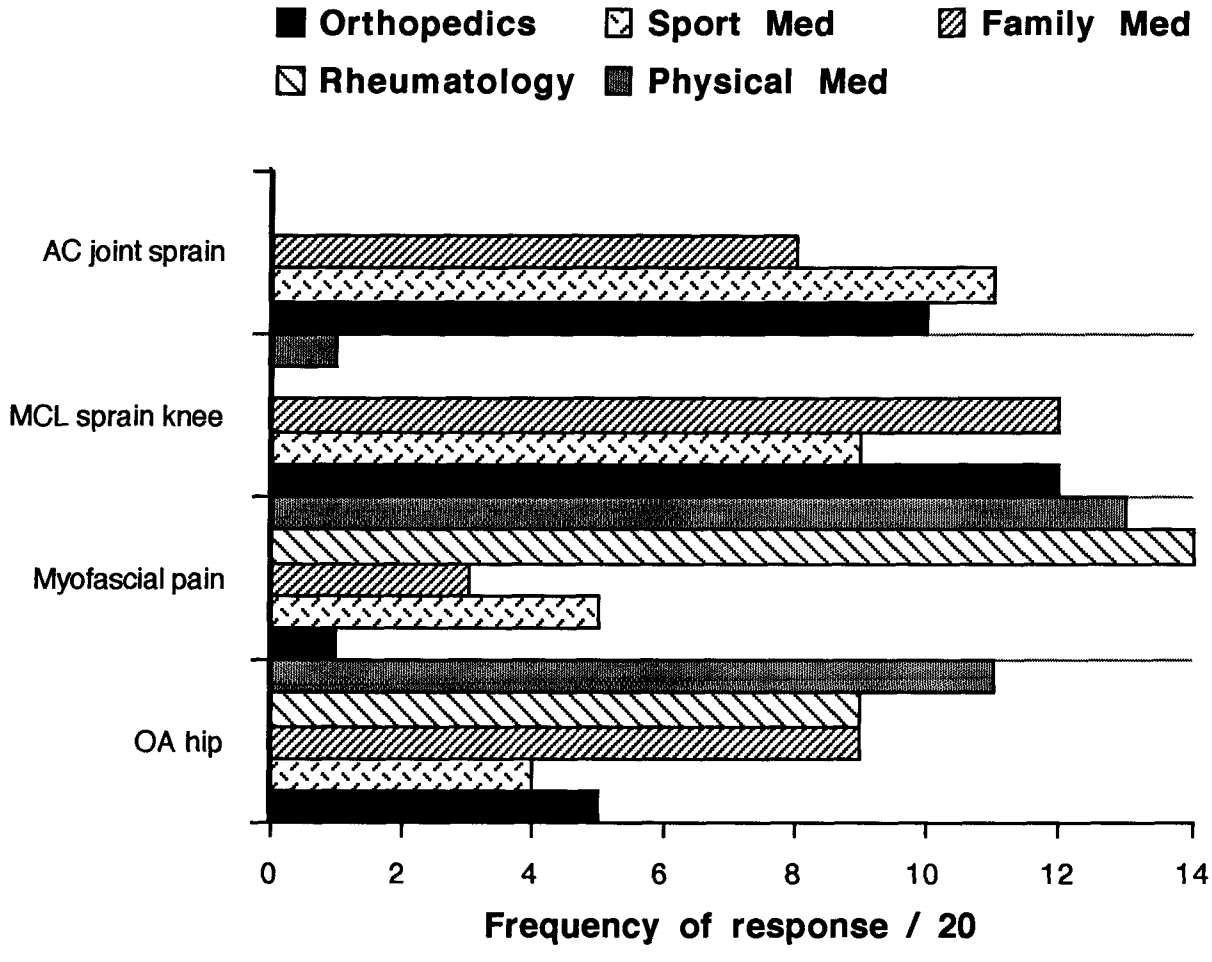

Figure Id continued: Number of selections by each of the five groups of physicians comprising the twenty most common musculoskeletal conditions.

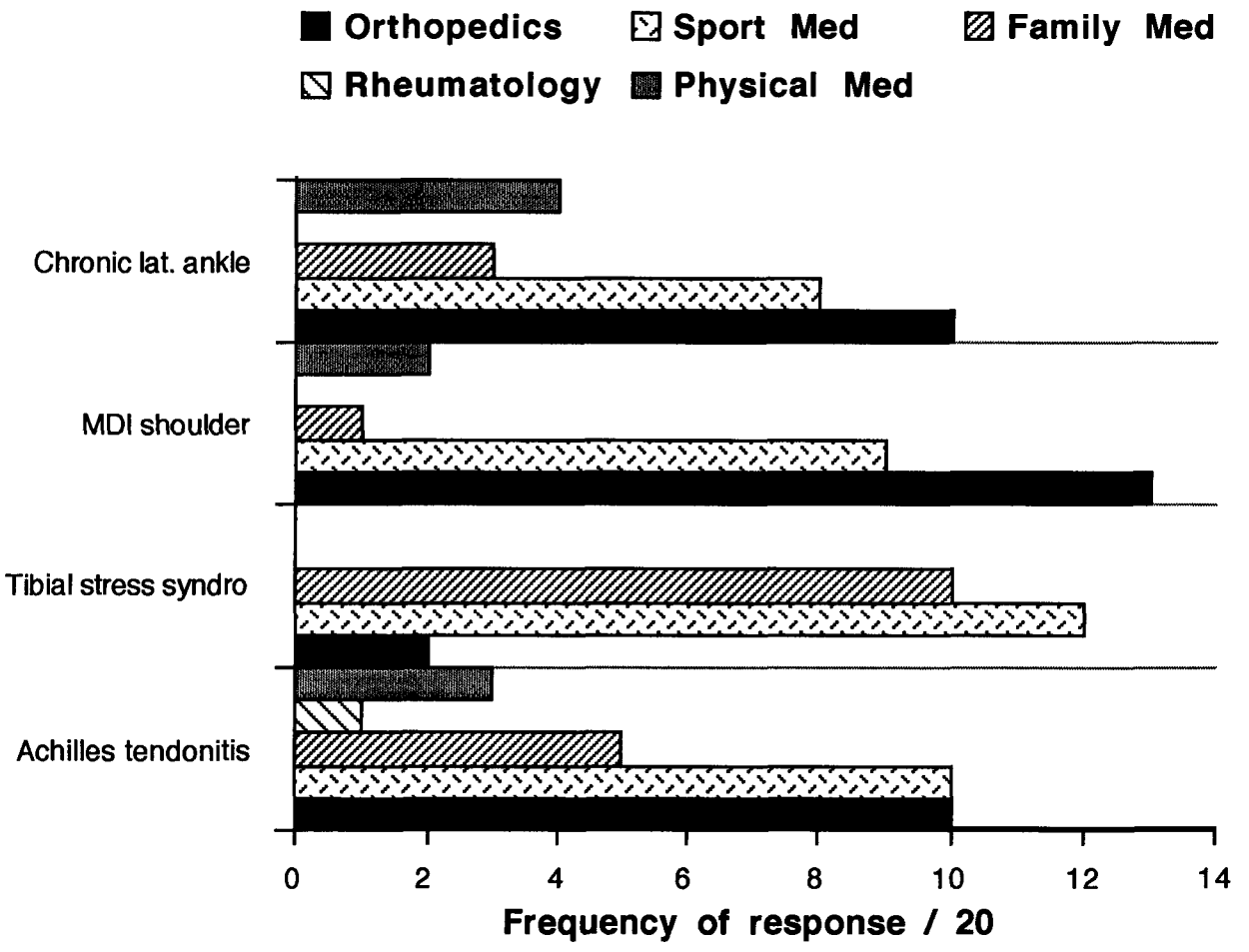

Figure Ie continued: Number of selections by each of the five groups of physicians comprising the twenty most common musculoskeletal conditions.

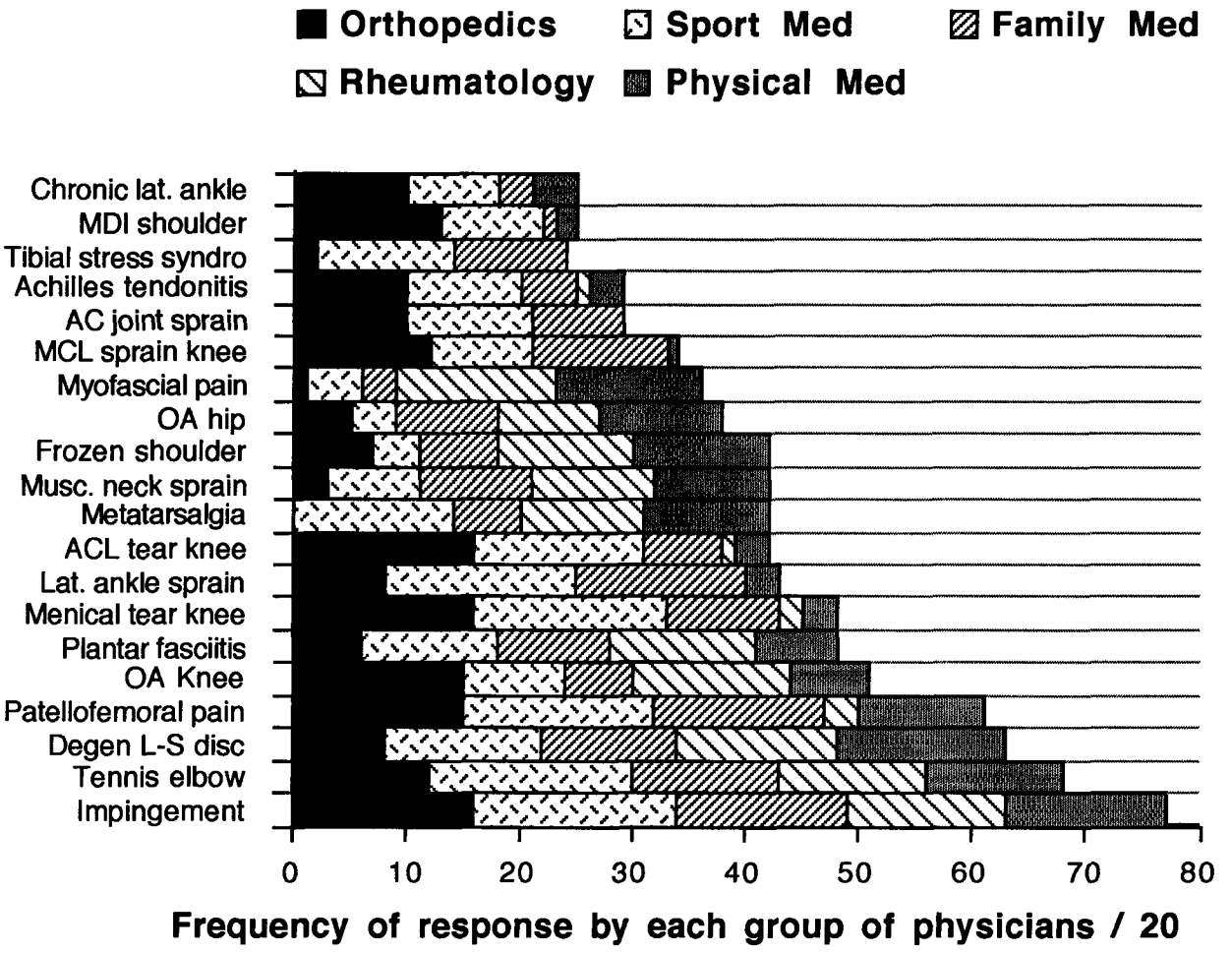

Figure II: Stack graph comparison of the relative number of selections of the twenty most common musculoskeletal conditions chosen by the five groups of physicians.

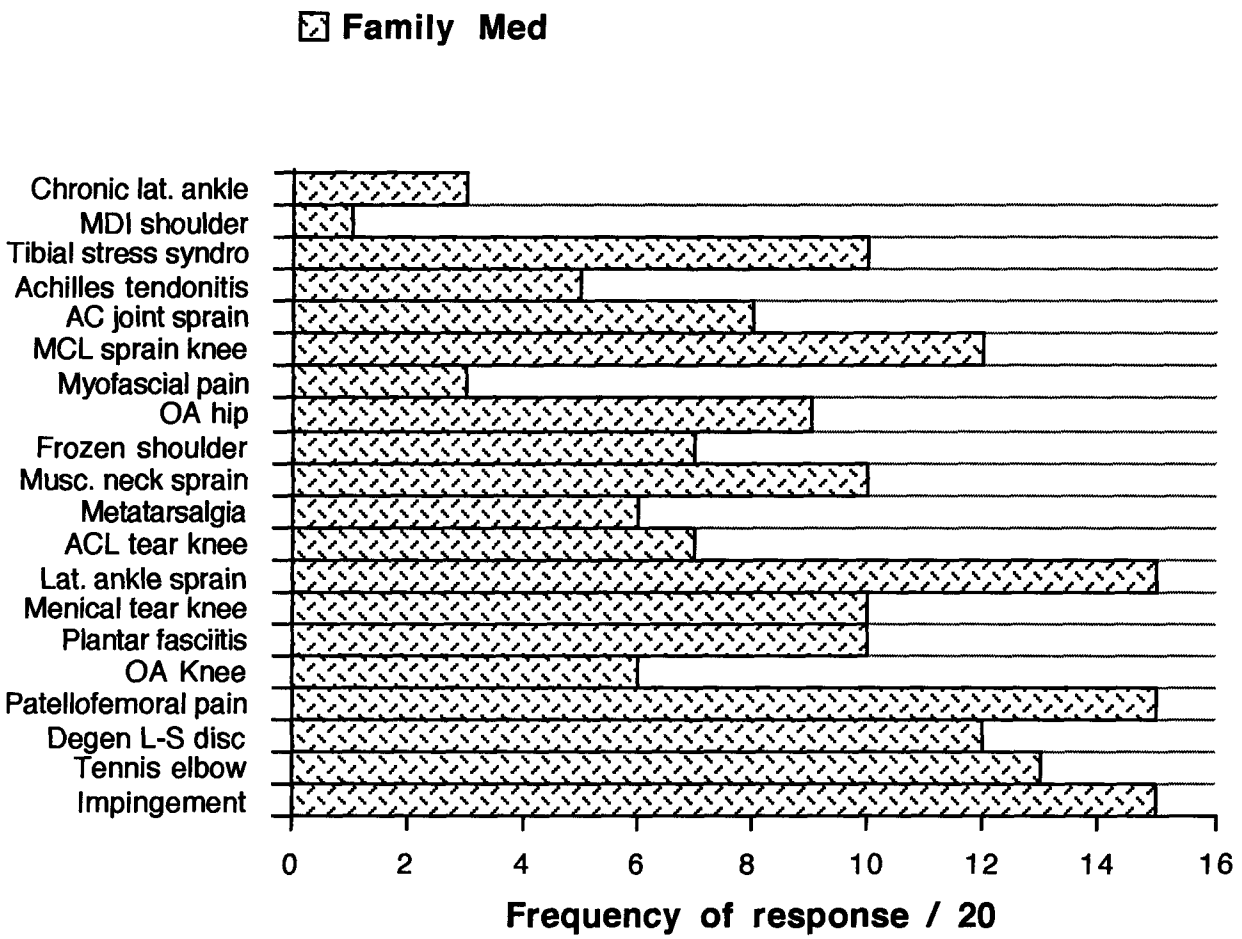

Figure III: Bar graph demonstrating the Family Physicians frequency of selection of the 20 most common musculoskeletal disorders

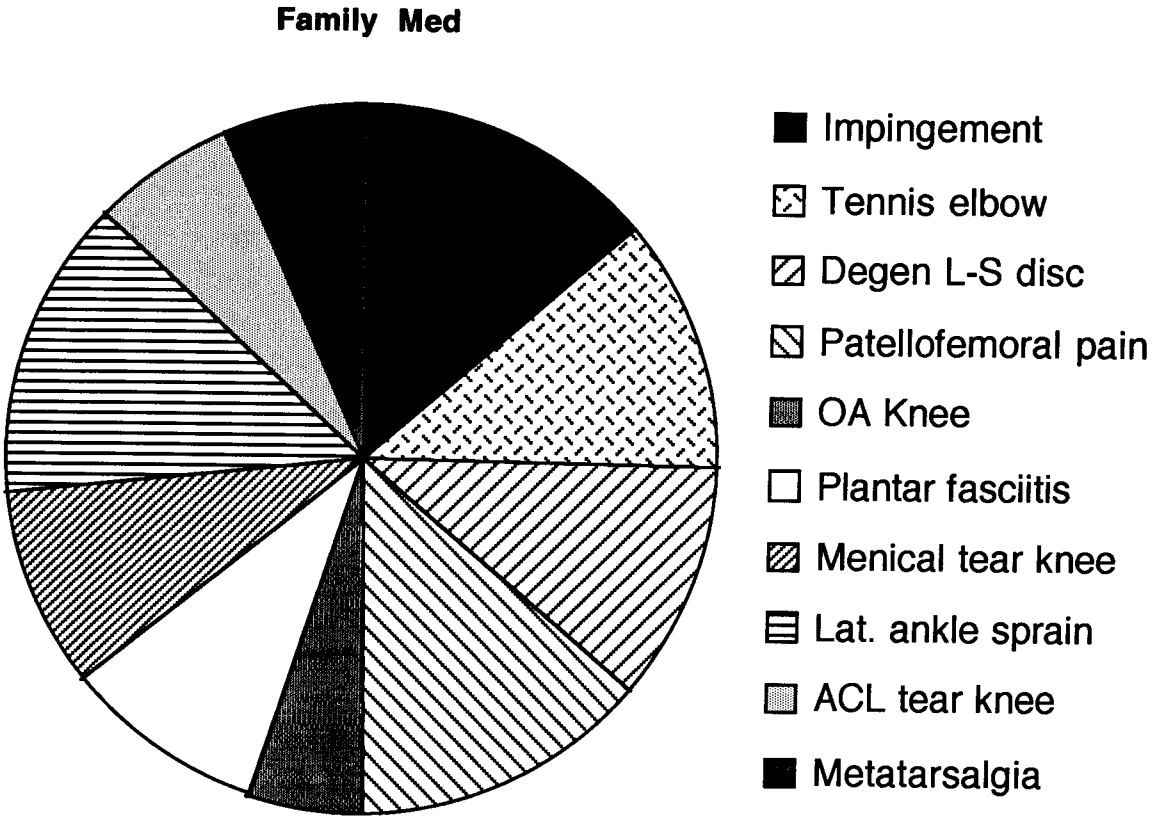

Figure IV: Pie graph demonstrating the Family Physicians relative frequency of selection of the 10 most common musculoskeletal disorders.

Chapter 4
Curriculum 1: Common Problems affecting the Musculoskeletal System

COURSE GOALS:

1. To become competent in history taking, physical examination and patient management skills with regard to the following common musculoskeletal problems*:

1. subacromial impingement
2. multidirectional shoulder instability
3. adhesive capsulitis of the glenohumeral joint
4. acromioclavicular joint ligament injury
5. anterior cruciate ligament injury
6. meniscal injury of the knee joint
7. patellofemoral pain syndrome
8. medial collateral ligament injury of the knee joint
9. degenerative osteoarthrosis of the knee joint
10. lateral epicondylitis
11. acute lateral ankle ligament sprain
12. chronic ankle instability
13. plantar fasciitis
14. achilles tendinitis
15. tibial stress syndrome
16. metatarsalgia
17. degenerative osteoarthrosis of the hip joint
18. musculoligamentous sprain of the neck
19. degenerative intervertebral disc disease.
20. fibromyalgia/myofascial pain syndromes

*This list is not intended to be an all inclusive or exhaustive list. It merely represents the 20 most common musculoskeletal disorders selected by the 85 clinicians surveyed in the preparation of this curriculum. Many musculoskeletal conditions not listed here are obviously important, and knowledge and skill in such conditions are often required clinically.

2. To use the etiology of common musculoskeletal problems, including direct trauma, overuse and repetitive strain (cumulative trauma) in the clinical diagnosis and treatment of patients with musculoskeletal disorders.

3. To use the important relationship between recreational and occupational activities and disorders of the musculoskeletal system, in the diagnosis and management of these patients.

4. To identifiy patients who do not improve with initial conservative management and/or that have problems which require specialist intervention.

I. CHRONIC SHOULDER PAIN:

A. TERMINAL OBJECTIVES:

1.0 When presented with a patient with shoulder pain that is not related to an episode of recent trauma, the physician shall:

1.1. Make the correct clinical diagnosis.

1.1.1. Identify occupational and/or recreational factors which may be involved in the etiology of the shoulder problem.
1.1.2. Select imaging studies to confirm the clinical diagnosis, as required, which are sensitive, specific and cost effective.
1.1.3. Rule out referred causes of shoulder pain.

1.2. Prescribe an appropriate initial treatment protocol.

1.3. Monitor the clinical progress of the patient.

1.4. Prescribe a regime to allow the patient who is recovering from a chronic shoulder problem to safely return to occupational and/or recreational activities, as the clinical condition permits.

1.5. Identify patients who fail to respond to conservative mangement, and refer these patients to appropriate specialists.

B. ENABLING KNOWLEDGE OBJECTIVES:

1. List five common causes of chronic shoulder pain.
2. Describe the clinical findings in the following problems which can present with chronic shoulder pain;
    a. the impingement syndrome (subacromial bursitis, rotator cuff tendonitis)
    b. tear of the rotator cuff
    c. adhesive capsulitis
    d. multidirectional and post-traumatic shoulder instability
    e. cervical radiculopathy
    f. acromioclavicular joint separation/arthrosis/osteolysis
    g. myofascial pain of the cervical and shoulder girdle musculature
    h. glenoid labrum tear
3. Describe the significance of the following shoulder injuries in the etiology of chronic shoulder pain;
    a. glenohumeral dislocation/subluxation
    b. acromioclavicular separation
    c. rotator cuff tear
    d. multidirectional shoulder instability
4. Identify plain radiographic abnormalities which may be contributing to the patient's painful shoulder (including the cervical spine).
5. List the indications for alternate imaging techniques such as CT scanning, diagnostic ultrasound, arthrography and MRI, in the investigation of the patient with chronic shoulder pain.
6. Prescribe a treatment plan for each of the above disorders including;
    a. modified activity
    b. analgesic/anti-inflammatory therapy
    c. ice/heat application as needed
    d. specific flexibility exercises to correct identified areas of decreased range of motion and/or contracture (rotator cuff, capsular stretching)

e. specific strengthening exercises to correct identified areas of musculotendinous weakness (external rotation, internal rotation, scapular stabilizers).

7. List the indications for the impingment ablation test (subacromial local anaesthetic injection) and its usefulness in the diagnosis of chronic shoulder joint problems.
8. List the indications and potential complications of subacromial and acromioclavicular joint corticosteroid injections.
9. Prescribe a regime to allow the patient who is recovering from a chronic shoulder condition to safely return to occupational and/or recreational activities.
10. Identify patients who fail to improve with conservative treatment and refer these patients to appropriate specialists.

ENABLING SKILL OBJECTIVES:

1. Perform a physical examination of the shoulder joint complex including the following:
   a. inspection for bony, muscular or postural asymmetry.
   b. active and passive glenohumeral range of motion (in degrees).
   c. impingement signs
   d. the apprehension sign
   e. the supraspinatus sign
   f. scapulothoracic rhythym
   g. rotator cuff muscle strength expressed out of five, based on manual muscle
   strength tests
   h. bicipital tendon testing
   i. acromioclavicular joint stress test
   j. glenohumeral translation/sulcus/dislocation, relocation signs
2. Examine upper extremity neurologic function.
3. Examine upper extremity vascular function.
4. Perform the "impingement ablation test" with subacromial anaesthetic injection.
5. Perform a subacromial bursal injection with corticosteroid/local anaesthetic.
6. Demonstrate a rotator cuff stretching exercise protocol.
7. Demonstrate a rotator cuff strengthening protocol.

8. Interpret plain radiographs of the shoulder joint complex.

ENABLING ATTITUDE OBJECTIVES:*

The physician will:
1. demonstrate a caring attitude toward the patient.
2. acknowledge the patient's concerns regarding the problem.
3. stress the importance of compliance with the prescribed treatment regimen.
4. demonstrate confidence and thoroughness in the history and physical examination of the patient.
5. give a realistic prognosis to the patient.

***These apply to each of the conditions listed in this curriculum.**

II. ACUTE SHOULDER INJURIES (POST TRAUMATIC):

A. TERMINAL OBJECTIVES:

2.0 When presented with a patient with shoulder pain that is related to a specific accident or episode of trauma, the physician shall;

2.1.1 Assess the patient's airway, breathing and circulation (ABC's from ATLS protocol)

2.1.2. Assess the neurovascular status of the involved extremity.

2.2 Make the correct clinical diagnosis.

2.3 Select appropriate imaging studies which are sensitive, specific and cost effective.

2.4 Document the presence or absence of complications frequently associated with the specific acute shoulder joint injury in question.

2.5 Demonstrate and discuss 2 techniques to reduce anterior glenohumeral dislocation.

2.6 Prescribe an appropriate immediate treatment protocol, including measures for analgesia, limb protection/immobilization and activitiy modification.

2.7 Prescribe an appropriate rehabilitation protocol, including duration and position of shoulder immobilization, if required.

2.8 Monitor the patient's progress through the rehabilitation protocol, examining for complications of the injury and deviations from the normal recovery period.

2.9 Prescribe a regime to allow the patient with an acute shoulder injury to safely return to occupational and recreational activities.

2.10 Advise the patient regarding the potential longterm complications of the injury they have sustained.

2.11 Identify acute shoulder joint problems which require emergent specialist intervention.

2.12 Identify patients who fail to improve with conservative treatment and/or whom exceed recovery norms, and refer these patients to appropriate specialists.

B ENABLING KNOWLEDGE OBJECTIVES:

1. List 4 common acute shoulder joint injuries.
2. Describe the clinical findings associated with the following acute shoulder joint injuries:
    a. glenohumeral subluxation/dislocation (anterior and posterior).
    b. acromioclavicular joint separation (grades I-III).
    c. rotator cuff tear.
    d. fracture of the surgical neck of the humerus.
    e. fracture of the clavicle.
3. Describe 2 potential complications of each of the above injuries.

4. Describe and identify the plain radiograpic abnormalities associated with each of the above acute shoulder joint injuries.
5. List the indications for alternate imaging techniques such as CT scanning, arthrography, and MRI in the patient with an acute shoulder injury.
6. List the indications for reduction of a glenohumeral dislocation under anaesthesia.
7. Prescribe a treatment plan for each of the disorders identified in number 2 above, including;

a. activity modification, with education of the patient regarding positions of the shoulder joint which might jeopardize the healing process (position of risk) and the normal duration of these modifications.

b. analgesic therapy.

c. active and passive range of motion exercises to maximize joint flexibility without putting the shoulder into a position of risk, or unduly stressing healing structures.

d. exercises to strengthen damaged periarticular tissues and/or stabilize the joint.

e. a duration of expected disability.

f. a regime to allow the patient to safely return to occupational and recreational function as the clinical condition permits.

g. criteria for a return to athletic involvement

8. Identify patients with complications and/or whom are deviating from the expected recovery norms, and refer these patients to a specialist.
9. List the indications for surgical therapy for the disorders in number 2 above.
10. List the common longterm complications of the shoulder joint injuries outlined in number 2 above, and communicate these to the patient in an understandable fashion.

ENABLING SKILL OBJECTIVES:

1. Conduct an examination of the patient with an acutely injured shoulder, including;

a. assessment of patient's ABC's

b. inspection for areas of asymmetry, contusion, swelling, potential open fracture.

c. palpation for areas of bony or soft tissue tenderness or disruption.

d. active and passive glenohumeral range of motion (in degrees).
e. impingement signs
f. the apprehension sign
g. the supraspinatus sign
h. scapulothoracic rhythym
i. rotator cuff strength expressed out of five, based on manual muscle strength tests.
j. bicipital tendon testing
k. acromioclavicular joint stress test
l. glenohumeral translation/sulcus signs

2. Examine upper extremity neurologic function.
3. Examine upper extremity vascular function.
4. Demonstrate 2 methods to reduce an anterior glenohumeral dislocation, and comment on the advantages and disadvantages of each.
5. Administer pharmacologic agents to relax the patients skeletal muscle so as to expedite relocation of the joint.
6. List the indications for, and demonstrate the application of the following devices used in the treatment of acute shoulder joint injuries.

a. a shoulder sling
b. a collar and cuff bandage
c. a "figure of eight" bandage
d. an upper extremity plaster of Paris backslab
e. a dislocation brace
f. the Velpeau immobilizer

III ACUTE KNEE INJURIES:

A. TERMINAL OBJECTIVES:

3.0 When presented with a patient with an acute knee injury, the physician will:

3.1 Protect the injured extremity from further injury.

3.2 Make the correct clinical diagnosis.

3.3 List 2 causes of non-traumatic acute knee pain and swelling.

3.4 Select appropriate imaging studies to confirm the clinical diagnosis, as required, which are sensitive, specific and cost effective.

3.5 Document the presence or absence of complications frequently associated with the acute knee injury in question.

3.6 Prescribe an appropriate initial treatment protocol, including measures for analgesia, limb protection/immobilization and activity modification.

3.7 List indications for referral to an orthopedic surgeon in the patient with an acute knee injury.

3.8 Prescribe an appropriate rehabilitation protocol, for those patients not requiring specialist intervention.

3.9 Monitor the patient's progress through the rehabilitation protocol, examining for complications of the injury and deviations from the normal recovery period.

3.10 Prescribe a regime to allow the patient with an acute knee injury to safely return to occupational and recreational activities, as the clinical condition permits.

B. ENABLING KNOWLEDGE OBJECTIVES:

1. List 4 common acute knee joint injuries.
2. Describe the clinical findings associated with the following acute knee joint injuries, and the common mechanisms leading to injury:
    a. anterior cruciate ligament tear
    b. medial/lateral collateral ligament injury
    c. meniscal injury
    d. patellar subluxation/dislocation
    e. osteochondral fracture of the femoral condyle or tibial plateau
    f. posterior cruciate ligament tear
    g. acute patellar tendon rupture
3. List the indications for obtaining plain radiographs in the patient with an acute knee joint injury.
4. List the indications for immediate or urgent orthopedic surgical referral in a patient with an acutely injured knee.
5. Prescribe a treatment plan for each of the disorders identified in number 2 above including;
    a. activity modification (non-weight bearing/crutch walking) as required
    b. analgesic therapy
    c. active and passive range of motion exercises to maximize joint mobility, prevent joint contracture and maintain quadriceps and hamstring strength, without endangering damaged intra-articular structures.
    d. the duration of expected disability and the course of rehabilitation
    e. a regime to allow the patient to safely return to occupational and recreational function, as well as the criteria for return to sport.
6. Advise the patient regarding the prognosis of their knee joint injury, expected complications and potential future functional difficulties.
7. List the indications for the following types of knee braces, and prescribe them as necessary:
    a. derotational braces
    b. hinge braces
    c. neoprene patellar stabilization braces
    d. medial or lateral support braces

8. Identify patients with complications and/or whom are deviating from the expected recovery norms, and refer these patients to appropriate specialists.
9. List the common longterm complications of the knee joint injuries outlined in number 2 above, and communicate these to the patient in an understandable fashion.

ENABLING SKILL OBJECTIVES:

1. Perform a physical examination of the lower extremity, including the following:
    a. inspection of standing lower extremity alignment, if possible.
    b. inspection of gait, if possible.
    c. inspection of quadricep tone and girth.
    d. active and passive knee joint range of motion in degrees.
    e. detection and demonstration of knee joint effusion.
    f. collateral ligament stress testing at 0 and 30 degrees of flexion.
    g. cruciate ligament testing (Lachman, anterior and posterior drawer, and pivot shift tests), if possible.
    h. provocative tests for meniscal tears (McMurray, Apley), if possible.
    i. patellar apprehension and compression tests.
    j. palpation of patellar facets and poles for tenderness.
    k. palpation of joint lines for meniscal tenderness.
2. Examine lower extremity neurologic function.
3. Examine lower extremity vascular function.
4. Demonstrate the technique for knee joint aspiration, and describe the significance of a hemarthrosis, and/or of fat globules in the aspirate.
5. List the indications for, and demonstrate the application of the following devices used in the treatment of acute knee joint injuries:
    a. Jones bandage
    b. posterior plaster of Paris knee splint ("backslab")
    c. Zimmer knee immobilizer (with and without range of motion restrictions)
    d. cylinder casting
    e. hinge casting
    f. post-operative hinge braces with controlled range of motion

6. List the indications for urgent/emergent arthroscopy/examination under anaesthesia.

IV CHRONIC KNEE PAIN:

A. TERMINAL OBJECTIVES:

4.0 When presented with a patient with knee pain that is not related to an episode of recent trauma, the physician will:

4.1. Make the correct clinical diagnosis.

4.1.1. Identify occupational and/or recreational factors involved in the etiology of the knee problem.
4.1.2. Identify biomechanical factors which may contribute to a repetitive strain/overuse knee problem.
4.1.3. Select appropriate investigations to confirm the clinical diagnosis, as required.

4.2. Select and prescribe an appropriate treatment protocol.

4.3. Monitor the clinical progress of the paitient.

4.4. Prescribe a regime to allow the patient recovering from a chronic knee problem to safely return to occupational and/or recreational activities.

4.5. Identify patients who require surgical consultation, and/or whom fail to respond to conservative management, and refer these patients to appropriate specialists.

B. ENABLING KNOWLEDGE OBJECTIVES:

1. List four common causes of chronic knee pain.
2. Describe the clinical findings in the following problems which can present with chronic knee pain:

a. patellofemoral pain syndrome (chondromalacia patella, anterior knee pain)

b. degenerative knee joint osteoarthrosis/arthritis)

c. meniscal tears/degeneration/cysts

d. patellar tendonitis/quadriceps tendonitis/biceps femoris tendonitis/semimembranosus tendonitis/pes anserinus tendonitis.

e. osteochondritis dissecans

f. Osgood-Schlatter's disease.

g. ilio-tibial band friction syndrome

3. Identify plain radiographic abnormalities which may be contributring to the patients knee pain.

4. List the indications for alternate imaging techniques such as CT scanning, arthrography and MRI, in the patient with chronic knee pain.

5. Prescribe a treatment plan for the disorders identified in number 2 above including:

a. modified activity

b. analgesic/anti-inflammatory therapy.

c. ice/heat application as needed.

d. flexibility exercises to correct identified areas of decreased range of motion and/or joint contracture (hamstrings, quadriceps, ilio-tibial band).

e. strengthening exercises to correct identified areas of musculotendinous weakness or atrophy (quadriceps VMO, hip abductors), and the relative importance of isometric, concentric, eccentric and isokinetic protocols.

f. correction of biomechanical factors which may be contributing to the patients pain (forefoot overpronation, rigid, cavus feet)

6. List the indications of the following biomechanical devices in the treatment of the patient with chronic knee pain:

a. motion control shoes/shock absorbing shoes

b. foot orthotics (soft/shock absorbing, semi-rigid/rigid/motion controlling)

c. patellar stabilization devices

d. derotational braces

e. compartmental "unloading" braces

7. Discuss the indications, contraindications and effectiveness of viscoelastic supplementation injections in osteoarthritis of the knee joint.

8. Identify patients who fail to improve with conservative treament, and refer these patients to appropriate specialists.

ENABLING SKILL OBJECTIVES:

1. Perform a physical examination of the lower extremity, including the following:
    a. inspection of standing lower extremity alignment (genu varum,valgum, foot alignment, Q angle).
    b. inspection of gait.
    c. inspection of quadricep tone and girth.
    d. active and passive knee joint range of motion in degrees.
    e. detection of and demonstration of knee joint effusion.
    f. collateral ligament stress testing at 0 and 30 degrees.
    g. cruciate ligament testing (Lachman, anterior and posterior drawer, and pivot shift tests).
    h. provocative tests for meniscal tears (McMurray, Apley).
    i. patellar apprehension and compression tests.
    j. palpation of patellar facets, poles and tendon for tenderness.
    k. palpation of the tibial apophysis for tenderness and swelling
2. Examine lower extremity neurologic function.
3. Examine lower extremity vascular function.
4. Demonstrate isometric, concentric and eccentric quadricep and hamstring strengthening exercises.
5. Demonstrate stretching exercises for the quadriceps, hamstrings and ilio-tibial band.
6. Inject/aspirate bursae around the knee joint.

V. NON-TRAUMATIC PROBLEMS OF THE FOOT:

A. TERMINAL OBJECTIVES:

5.0 When presented with a patient with pain in the foot that is not related to a specific episode of recent trauma, the physician shall:

5.1.0 Make the correct clinical diagnosis.

5.1.1 Identify occupational and/or recreational factors which may be involved in the etiology of the foot problem.
5.1.2 Identify biomechanical factors which may be involved in the etiology of the problem.
5.1.3 Select appropriate investigations to confirm the clinical diagnosis as required (eg. CBC, ESR, and serum uric acid levels in suspected gout).
5.1.4 Select appropriate imaging studies, to confirm the clinical diagnosis, as required which are sensitive, specific and cost effective.
5.1.5 Rule out historical or physical evidence of a seronegative spondyloarthropathy.

5.2 Prescribe an appropriate initial treatment protocol.

5.3 Monitor the clinical progress of the patient.

5.4 Identify patients who fail to respond to conservative mangement and refer them to appropriate specialists.

5.5 Prescribe a regime to allow the patient who has had a disorder in the foot to safely return to occupational and/or recreational function.

B. ENABLING KNOWLEDGE OBJECTIVES:

1. List 4 common causes of non-traumatic foot pain.
2. Describe the clinical findings associated with the following non-traumatic foot disorders:
    a. Morton's neuroma
    b. plantar fasciitis
    c. metatarsalgia/metatarsal stress fractures
    d. hallux valgus (bunions)
    e. hallux rigidus (turf toe)
    f. sesamoiditis
    g. tarsal coalition
    h. Severs disease
    i. Frieberg's infraction
3. Identify plain radiographic abnormalities in the foot which may be involved in the patient's foot pain.
4. List the indications for alternative imaging techniques in the evaluation of the patient with chronic foot pain.
5. Prescribe a treatment plan for the disorders identified in number 2 above, including:
    a. modified activity
    b. analgesic/anti-inflammatory therapy
    c. ice/heat application as needed
    d. flexibility exercises to correct identified areas of decreased range of motion and/or joint contracture (gastrocnemius-soleus contracture).
    e. strengthening exercises to correct identified areas of musculotendinous weakness or atrophy (gastrocnemius-soleus weakness, intrinsic foot muscular weakness).
    f. correction of biomechanical factors which may be contributing to the patients problem (forefoot overpronation, cavus/rigid feet).
6. List the indications for the following devices in the treatment of the patient with chronic foot pain:
    a. motion control shoes
    b. soft orthotics
    c. semi rigid/rigid orthotics
    d. metatarsal pad

e. shock absorption insoles and shoes
f. rocker bottom shoes
g. heel lifts
h. steel soled shoes
i. night splint

7. List the indications and complications of local corticosteroid injection in the management of common problems of the foot.
8. Identify patients who fail to improve with conservative treatment, and refer these patients to appropriate specialists.

ENABLING SKILL OBJECTIVES:

1. Perform a physical examination of the foot and lower extremity including:
   a. inspection of lower extremity standing alignment
   b. inspection of foot morphology (cavus, planus, transverse arch)
   c. palpation of the plantar fascia, the medial calcaneal tuberosity and the achilles tendon
   d. palpation of the tarsal and metatarsal bones
   e. identification of patterns of increased stress, such as callosities, and corns
   f. palpation of dorsalis pedis and posterior tibial pulses
   g. perform a Mulder's click maneuvre and describe its significance
   h. identify the foot position of subtalar joint neutral and describe its significance
2. Examine lower extremity neurologic function.
3. Perform a corticosteroid injection into the plantar fascia near its attachment at the medial calcaneal tubersotiy.
4. Perform a corticosteroid injection into a Morton's neuroma.
5. Measure the rearfoot and forefoot alignment in degrees.
6. Demonstrate stretching exercises for the gastrocnemius-soleus complex, and the plantar fascia.
7. Demonstrate strengthening exercises for the gastrocnemius-soleus complex, and the intrinsic muscles of the foot.

VI. NON TRAUMATIC PROBLEMS OF THE LOWER LEG:

A. TERMINAL OBJECTIVES:

6.0 When presented with a patient with lower leg pain that is not related to an episode of recent trauma, the physician shall:

6.1 Make the correct clinical diagnosis.

6.1.1 Identify occupational or recreational factors which may be involved in the etiology of the leg problem.
6.1.2 Select appropriate imaging studies to confirm the diagnosis, as required, which are sensitive, specific and cost effective.

6.2 Prescribe an appropriate initial treatment protocol.

6.3 Monitor the clinical progress of the patient.

6.4 Prescribe a regime to allow the patient who is recovering from a lower leg disorder to safely return to occupational and/or recreational function.

6.5 Identify patients who fail to respond to conservative management, and refer them to a specialist.

B. ENABLING KNOWLEDGE OBJECTIVES:

1. List 4 common causes of chronic lower leg pain:
2. Describe the clinical findings in the following problems which can present with chronic lower leg pain:
    a. achilles tendonitis
    b. tibial stress syndrome/stress fractures, fibular stress syndrome/fractures
    c. chronic ankle instability
    d. posterior tibial tendonitis
    e. peroneal tendonitis/subluxation
    f. chronic exertional compartment syndromes

g. intermittent vascular and neurogenic claudication

3. Identify plain rediographic abnormalities in the lower extremity which may be involved in the patient's problem.

4. List the indications for alternative imaging techniques in the evaluation of the patient with chronic (non-traumatic) lower leg pain.

5. List the indications for intracompartmental pressure measurement in patients with suspected chronic exertional compartment syndromes.

6. Prescribe a treatment plan for the disorders identified in number 2 above, including:

a. modified activity

b. analgesic/anti-inflammatory therapy

c. ice/heat application

d. flexibility exercises to correct identified areas of decreased range of motion and/or joint contracture (gastrocnemius-soleus).

e. strengthening exercises to correct identified areas of musculotendinous weakness or atrophy (indications for isometric, concentric, and eccentric training of gastocnemius/soleus and peronei).

f. correction of biomechanical factors which may be contributing to the patient's problem (forefoot overpronation, cavus/rigid feet).

7. List the indications for the following devices in the treatment of the patient with chronic lower leg pain:

a. motion control shoes/shock absorbing shoes

b. soft orthotic devices/semi rigid/rigid orthotic devices

c. shock absorption insoles

d. heel lifts

e. ankle stabilization devices (aircasts, subtalar stabilization devices, elastic and lace-up braces).

8. Identify patients who fail to improve with conservative treatment, and refer these patients to appropriate specialists.

ENABLING SKILL OBJECTIVES:

1. Perform a physical examination of the foot and lower extremity including:
    a. inspection of lower extremity standing alignment
    b. inspection of foot morphology (cavus, planus, transverse arch)
    c. inspection of the leg musculature for areas of muscular wasting or asymmetry, color change, muscular or fascial defect or hernia
    d. palpation of the tibia and fibula for areas of tenderness or inflammation
    e. testing of tendinous integrity and strength (eg. Thompson test, manual muscle testing)
    f. testing for musculotendinous irritation by resisted muscle activation
    g. palpation of dorsalis pedis and posterior tibial pulses
    h. identify the position of subtalar neutral and describe its significance to the patient with lower leg pain.
    i. perform provocative tests for chronic exertional compartment syndromes.
2. Examine lower extremity neurologic function.
3. Measure rearfoot and forefoot alignment in degrees.
4. Examine lower extremity vascular function.

VII. ACUTE ANKLE INJURIES:

TERMINAL OBJECTIVES:

7.0 When presented with a patient with an acute ankle injury the physician will:

7.1 Protect the injured extremity from further injury.

7.2 Make the correct clinical diagnosis

7.3 Select appropriate imaging studies to confirm the diagnosis, as required, which are sensitive, specific and cost effective.

7.4 Prescribe an appropriate initial treatment protocol.

7.5 Monitor the clinical progress of the patient.

7.6 Prescribe a rehabilitation protocol to allow the patient who is recovering from an acute injury to the ankle joint to return to occupational and/or recreational function.

7.7 Identify patients who fail to follow recovery norms and/or who fail to improve with conservative therapy and refer these patients to appropriate specialists.

ENABLING KNOWLEDGE OBJECTIVES:

1. List 3 common acute ankle joint injuries.
2. Describe the clinical findings associated with the following acute ankle joint injuries:
    a. lateral ankle ligament sprain
    b. distal tibial and/or fibular fracture
    c. deltoid ligament injury
    d. tibiofibular diastasis (distal tib-fib ligament injury, syndesmosis injury)
    e. avulsion fracture of the tuberosity of the fifth metatarsal.
    f. peroneal tendon subluxation/dislocation
    g. osteochondral fracture/lesion of the talus
3. List the indications for obtaining plain radiographs in the patient with an acutely injured ankle joint.
4. List the indications for urgent or emergent referral to an orthopedic surgeon in a patient with an acutely injured ankle joint.
5. Prescribe an initial treatment protocol for each of the disorders identified in number 2 above including:
    a. activity modification (non-weight bearing, crutch walking as indicated)
    b. analgesic therapy
    c. P.R.I.C.E. therapy (Protection of the injured ankle, Rest, Ice, Compression, and Elevation).
    d. ankle immobilization as required (see skills objectives)

6. Prescribe a rehabilitative protocol to allow the patient to return to occupational and/or recreational function at the appropriate time, including:
    a. ankle flexibility exercises
    b. exercises to strengthen the dynamic stalibizers of the ankle joint (ankle inverters and everters).
    c. proprioception exercises
    d. agility drills
7. Identify patients who fail to respond to conservative management and refer them to appropriate specialists.
8. List 2 reasons for failure to improve with conservative treatment.

ENABLING SKILL OBJECTIVES:

1. Perform a physical examination of the patient with an acute ankle injury including:
    a. inspection for deformity, redness, contusion, edema or evidence of open fracture.
    b. rule out limb threatening neurovascular damage.
    c. palpation of the bony elements of the ankle joint and foot for tenderness, crepitus, or displacement.
    d. palpation of the ligamentous supports of the ankle joint for tenderness, crepitus and edema formation.
    e. palpation of the musculo-tendinous supports of the ankle joint for tenderness and pain with muscle activation on manual muscle tests.
    f. stress the ligamentous supports of the ankle joint (Drawer test, inversion stress test) after ruling out bony injury.
2. Demonstrate the application of the following devices to protect the patient with an acutely injured ankle joint:
    a. Plaster of Paris/fibreglass backslabs
    b. Plaster of Paris/fibreglass below knee cylinder and walking casts
    c. commercially available ankle foot orthoses.
3. Demonstrate:
    a. proprioception exercises
    b. dynamic ankle joint stabilization exercises
    c. flexibility exercises

VIII. LOWER BACK PAIN:

A. TERMINAL OBJECTIVES:

8.0 When presented with a patient with back pain, the physician shall:

8.1.0 Make the correct clinical diagnosis (site and tissue specific).
8.1.1 Identify occupational and/or recreational factors involved in the etiology of the problem.
8.1.2 Rule out viscerogenic, vasculogenic and other urgent/emergent causes of low back pain.
8.1.3 Select appropriate imaging studies to confirm the clinical diagnosis, as required, which are sensititve, specific and cost effective, and list the indications for these imaging studies.

8.2 Prescribe an appropriate initial treatment protocol.

8.3 Monitor the clinical progress of the patient.

8.4 Identify patients who fail to respond to conservative management and refer them to appropriate specialists.

8.5 Prescribe a regime to allow the patient who is recovering from a back problem to safely return to occupational and/or recreational function.

B. ENABLING KNOWLEDGE OBJECTIVES:

1. List 4 common causes of low back pain.
2. List 4 local or referred causes of low back pain which require urgent/emergent diagnosis and treatment.
3. Describe the clinical findings associated with the following causes of low back pain.
    a. herniated nucleus pulposis with nerve root compression
    b. degenerative disc disease (spondylosis)
    c. facet syndrome
    d. spinal stenosis

e. spondylolisthesis
f. myofascial pain syndrome in the following muscle groups
    i. quadratus lumborum
    ii. piriformis
    iii. gluteal muscles
g. sacro-iliac joint dysfunction
h. pars interarticularis stress fracture

4. Identify plain radiographic abnormalities which may be involved in the etiology of the patient's low back discomfort.
5. List the indications for alternative imaging techniques in the evaluation of the patient with back pain.
6. Prescribe a treatment plan for the disorders identified in number 3 above, including;
    a. modified activity
    b. analgesic/anti-inflammatory therapy
    c. ice/heat application as indicated
    d. flexibility exercises to correct areas of decreased range of motion and/or joint contracture/hypomobility (hamstrings, psoas, lumbodorsal fascia)
    e. strengthening exercises to correct areas of musculotendinous weakness (abdominal muscles, back extensor muscles, hip abductor muscles)
    f. activities to maintain cardiovascular function without stressing the injured tissues.
7. Describe the indications, contraindications and effectiveness of epidural corticosteroid injections.
8. Discuss the role of proliferant therapy in the patient with chronic back pain and dysfunction
9. Discuss the role of chemonucleolysis in the patient with lumbar disc prolapse.
10. Identify patients who fail to improve with conservative treatment, and refer these patients to appropriate specialists.

<u>ENABLING SKILL OBJECTIVES:</u>

1. Perform a physical examination of the patient with lower back pain including:
    a. inspection of vertebral alignment (note deviation form normal pattern of vertebral curvature).

b. documentation of active vertebral range of motion in degrees

c. palpation of local muscular tissue for tenderness, spasm, trigger points, taut bands.

d. palpation of the bony elements of the lumbosacral spine and pelvis for areas of tenderness.

e. assess sacro-iliac joint movement and perform sacro-iliac joint stress tests

f. assess leg length both supine and seated

g. assess myotome strength

h. assess dermatome sensation

i. assess deep tendon reflexes

j. perform nerve root stretching maneuvres (straight leg raise, LaSague's test, Slump test, femoral stretch test)

k. hip joint stress test.

l. assess for pelvic height and symmetry

m.. assess the plantar reflexes

n. assess abdominal and lower limb vascular function

2. Demonstrate the following exercises used in the treatment of low back disorders;

a. hamstring stretching

b. abdominal wall strengthening exercises (crunches)

c. McKenzie back extension exercises

d. Williams lumbodorsal stretching exercises

e. "pelvic tilt" isometric exercises

f. bridging exercises

g. quadruped exercises

IX. CHRONIC ELBOW PAIN

A. TERMINAL OBJECTIVES:

When presented with a patient with shoulder pain that is not related to an episode of recent trauma, the physician shall:

9.1 Make the correct clinical diagnosis

9.1.1. Identify occupational and/or recreational factors which may be involved in the etiology of the elbow problem.
9.1.2. Select imaging studies to confirm the clinical diagnosis, as required, which are sensitive, specific and cost effective.
9.1.3. Rule out referred causes of elbow pain.

9.2. Prescribe an appropriate initial treatment protocol.

9.3. Monitor the clinical progress of the patient.

9.4. Prescribe a regime to allow the patient with elbow pain to safely return to occupational and/or recreational activities, as the clinical condition permits.

9.5. Identify patients who fail to respond to conservative mangement, and refer these patients to appropriate specialists.

B. ENABLING KNOWLEDGE OBJECTIVES:

1. List 3 common causes of chronic elbow pain
2. Describe the clinical findings in the following problems which can present with chronic elbow pain:
    a. lateral epicondylitis
    b. medial epicondylitis
    c. radial tunnel syndrome
    d. posterior interosseous nerve entrapment
    e. osteochondritis dissecans
    f. cervical radiculopathy

g. lateral ulno-humeral impingement

i. ulnar nerve subluxation

3. Identify plain radiographic abnormalitites which may be contributing to the patient's elbow pain.

4. Prescribe a treatment plan for the disorders identified in number 2 above including:

a. modified activity

b. analgesic/anti-inflammatory therapy

c. ice/heat application as needed.

d. flexibility exercises to correct identified areas of decreased range of motion and/or joint contracture (eg. wrist extensor stretching in lateral epicondylitis).

e. strengthening exercises to correct identified areas of musculotendinous weakness or atrophy (eg. concentric and eccentric wrist extensor strength in lateral epicondylitis).

f. correction of biomechanical factors which may be contributing to the patients pain (poor ergonomic profile at work, poor technique in recreational activities).

5. List the indications of the following biomechanical devices in the patient with chronic elbow pain:

a. "tennis elbow" forearm braces

6. List the indications, contraindications and complications of local corticosteroid injection in the treatment of a patient with chronic elbow pain.

7. Identify patients who fail to improve with conservative treatment and refer these patients to appropriate specialists.

8. List 2 reasons patients fail to improve with conservative therapy.

B. ENABLING SKILL OBJECTIVES:

1. Perform a physical examination of the patient with elbow pain including:

a. inspection of cervical spine range of motion

b. inspection of shoulder range of motion

c. inspection of elbow range of motion in degrees

d. inspection of the upper extremity for areas of muscular asymmetry, wasting and/or hypertrophy

e. palpation of the bony elements of the elbow for tenderness

f. resisted wrist extension/flexion/supination/pronation
g. resisted long finger extension
h. upper extremity neurovascular assessment
i. ulnar nerve stability (ulnar nerve Tinel sign)

2. Perform a corticosteroid injection into the lateral and medial epicondylar areas.
3. Demonstrate to the patient stretching exercises for the forearm musculature useful in the treatment of lateral and medial epicondylitis.
4. Demonstrate concentric and eccentric strengthening exercises for the forearm musculature useful in the treatment of lateral and medial epicondylitis.

XI. CHRONIC HIP PAIN:

A. TERMINAL OBJECTIVES:

10.0 When presented with a patient with hip pain that is not related to an acute episode of trauma, the physician shall:

10.1 Make the correct clinical diagnosis

10.1.1. Identify occupational and/or recreational factors which may be involved in the etiology of the hip problem.
10.1.2. Select imaging studies to confirm the clinical diagnosis, as required, which are sensitive, specific and cost effective.
10.1.3. Rule out referred causes of hip pain.

10.2. Prescribe an appropriate initial treatment protocol.

10.3. Monitor the clinical progress of the patient.

10.4. Prescribe a regime to allow the patient with hip pain to safely return to occupational and/or recreational activities, as the clinical condition permits.

10.5. Identify patients who fail to respond to conservative mangement, and refer these patients to appropriate specialists.

B. ENABLING KNOWLEDGE OBJECTIVES:

1. List 2 common causes of hip pain.
2. Describe the clinical findings associated with the following causes of hip pain:
    a. degenerative osteoarthritis/osteoarthrosis of the hip
    b. trochanteric bursitis
    c. sacro-iliac joint dysfunction
    d. myofascial pain of the buttock musculature (piriformis, tensor fascia lata, gluteus medius)
    e. lumbosacral referred pain.
    f. stress fracture of the femur or pelvic ring
    g. osteitis pubis
3. Identify plain radiographic abnormalities of the hip, pelvis or lumbosacral spine which may be involved in the patient's hip pain.
4. List the indications for alternative imaging techniques in the evaluation of the patient with hip pain.
5. Prescribe a treatment plan for the disorders identified in number 2 above including:
    a. modified activity
    b. analgesic/anti-inflammatory therapy
    c. ice/heat application as needed.
    d. flexibility exercises to correct identified areas of decreased range of motion and/or joint contracture (eg. hip adductor contracture).
    e. strengthening exercises to correct identified areas of musculotendinous weakness or atrophy (eg. hip abductor weakness).
    f. correction of biomechanical factors which may be contributing to the patient's pain (eg. forefoot overpronation).
6. List the specific indications for the use of anti-inflammatory therapy in the patient with degenerative osteoarthrosis/osteoarthritis of the hip.
7. List 3 serious complications of NSAID use in the patient with osteoarthrosis/osteoarthritis of the hip.
8. List 3 medicines used in the treatment/prevention of NSAID induced gastropathy, and compare and contrast their mechanism of action and efficacy.
9. List the indications, contraindications and efficacy of corticosteroid injection of the hip joint and trochanteric bursa.

C. ENABLING SKILL OBJECTIVES:

1. Perform a physical examination of the patient with hip pain including:
    a. inspection of lower extremity standing alignment and gait.
    b. inspection of lumbosacral and pelvic alignment
    c. documentation of hip range of motion in degrees (capsular vs. non-capsular pattern).
    d. palpation of buttock and lumbosacral muscles for areas of tenderness, spasm, taut band formation, and trigger points.
    e. palpation of the bony landmarks of the lumbosacral area, pelvis and hip for areas of tenderness and asymmetry.
    f. assess sacro-iliac joint movement and perform sacro-iliac joint stress tests
    g. assess leg length both supine and seated
    h. assess myotome strength
    i. assess dermatome sensation
    j. assess deep tendon reflexes
    k. perform nerve root stretching maneuvres (straight leg raise, LaSague's test, Slump test, femoral stretch test)
    l. perform the FABER test and describe its significance
    m. assess pelvic height, alignment, and symmetry
2. Demonstrate injection of the trochanteric bursa with corticosteroid.
3. Demonstrate injection of myofascial trigger points in the buttock musculature.
4. Demonstrate stretching exercises for the psoas, hip adductors, hip rotators.
5. Demonstrate strengthening exercises for the hip abductors, hip adductors and hip rotators.

XI. ACUTE NECK PAIN:

A. TERMINAL OBJECTIVES:

11.0 When presented with a patient with acute neck pain related to a recent episode of trauma the physician will:

11.1. Protect the patient's cervical spine from further injury while assessing the patient's ABC's.

11.2 Make the correct clinical diagnosis.

11.2.1 Rule out an unstable cervical spine fracture.
11.2.2 Select appropriate imaging studies to confirm the clinical diagnosis, as required, which are sensitive, specific and cost-effective.

11.3 Presribe an appropriate initial treatment protocol.

11.4 Monitor the clinical progress of the patient.

11.5 Identify patients who fail to respond to conservative management and refer them to appropriate specialists.

11.6 Prescribe a regime to allow the patient who is recovering from a neck injury to safely return to occupational and/or recreational function.

B. ENABLING KNOWLEDGE OBJECTIVES:

1. List 2 common acute neck injuries.
2. List 2 neck injuries which require emergent C-spine immobilization and orthopedic or neurosurgical consultation.
3. Describe the clinical findings associated with the following causes of neck pain:
    a. Cervical spine fracture/dislocation

b. acute musculoligamentous sprain/strain of the cervical spine (Whiplash syndrome)

c. torticollis

d. herniated nucleus pulposis of the cervical disc with radiculopathy

e. acute brachial plexopathy (burner, stinger)

4. Identify plain radiographic abnormalities which may be contributing to the patients pain.

5. List the indications for alternative imaging techniques or EMG/NCS in the patient with an acute neck injury.

6. List the indications and usefulness of plain radiographic flexion, extension and oblique views in the evaluation of the patient with an acute neck injury.

7. Prescribe a treatment plan for the disorders outlined in number 3 above including:

a. cervical spine immobilization as required (hard Philadelphia-style collar)

b. immediate consultation in cases with suspected fracture/dislocation and/or neurologic deficit

c. analgesic/anti-inflammatory therapy

d. pharmacologic agents as indicated

e. ice/heat application as needed.

f. flexibility exercises to correct identified areas of decreased range of motion and/or joint contracture (overpressure exercises).

g. strengthening exercises to correct identified areas of musculotendinous weakness or atrophy.

8. Identify patients who fail to respond to conservative treatment and refer these patients to appropriate specialists.

9. List 2 reasons for failure to improve with conservative treatment.

10. Describe regional myofascial pain syndromes and their relationship to traumatic injuries to the cervical spine.

11. List the potential contribution of medico-legal issues to the patient and their rate of recovery from neck injuries associated with motor vehicle accidents.

12. List the contra-indications for return to activity in an athlete who has sustained an acute brachial plexopathy.

B. ENABLING SKILL OBJECTIVES:

1. Perform a physical examination of the patient with neck pain including:
    a. inspection of vertebral alignment.
    b. documentation of cervical range of motion in degrees (if such testing is not contra-indicated).
    c. palpation of local muscular tissues for tenderness, spasm, trigger points and taut bands.
    d. palpation of the bony elements of the cervical spine for areas of tenderness.
    e. assess upper extremity myotome strength.
    f. assess upper extremity dermatome sensation.
    g. assess deep tendon reflexes.
    h. Adson's sign
2. Demonstrate how to apply a hard cervical collar to a patient with a neck injury in whom a cervical fracture dislocation is suspected.
3. Demonstrate how to remove a hard cervical collar from a patient in whom a lateral radiograph has been performed and found negative.
4. Demonstrate cervical in line traction.
5. Demonstrate the correct technique to "log roll" a patient with a suspected cervical spine injury.

XII. CHRONIC MUSCULAR PAIN SYNDROMES:

A. TERMINAL OBJECTIVES:

1.0 When presented with a patient with chronic muscular pain, the physician shall:

1.1 Make the correct clinical diagnosis.

12.1.1 Identify occupational and/or recreational factors which may be involved in the etiology of the chronic muscular pain.
12.1.2 Identify biomechanical factors which may be involved in the etiology of the problem.
12.1.3 Identify systemic factors which may be involved in the etiology of the pain.
12.1.4 Identify psychiatric and psycho-social factors which may be conntributing to the patient's pain complex.
12.1.4 Select appropriate investigations to confirm the clinical diagnosis as required.
12.1.5 Select appropriate imaging studies, to confirm the clinical diagnosis, as required which are sensitive, specific and cost effective.

12.2 Prescribe an appropriate initial treatment protocol.

12.3 Monitor the clinical progress of the patient.

12.4 Identify patients who fail to respond to conservative management and refer them to appropriate specialists.

12.5 Prescribe a regime to allow the patient who has had chronic muscular pain to safely return to occupational and/or recreational function.

B. ENABLING KNOWLEDGE OBJECTIVES:

1. List 3 causes of chronic muscular pain.
2. Describe the clinical characteristics of myofascial pain syndromes including:
    a. trigger points
    b. taut bands
    c. twitch response
    d. zone of reference
3. List 3 factors which are thought to contribute to the etiology of myofascial trigger points.
4. Describe the clinical findings characteristic of fibromyalgia including:
    a. tender points
    b. sleep disturbance
    c. affective disturbance
    d. fatigue
5. Describe the clinical findings characteristic of dermatomyositis and polymyositis.
6. Prescribe a treatment plan for myofascial pain syndromes and be able to discuss the following treatment options:
    a. vapocoolant spray and stretch
    b. home stretching programs
    c. ischemic compression and stretch
    d. trigger point injection and stretch
    e. anti-depressant chemotherapy
    f. graduated exercise programs
7. Identify patients who fail to improve with stretching therapy and refer them to appropriate specialists for trigger point injection and/or more aggressive therapy.
8. Identify patients with fibromyalgia and refer them to appropriate specialists.
9. Identify patients with dermatomyositis or polymyositis and refer them to appropriate specialists.

ENABLING SKILL OBJECTIVES:

1. Perform a physical examination of the patient with a chronic muscular pain syndrome including:
    a. inspection for postural and biomechanical abnormalities
    b. demonstratrion of muscular weakness (on the 0-5 scale of manual muscle testing)
    c. demonstration of restricted range of motion of the involved muscle group and/or joint
    d. palpation of an involved muscle for the presence of a taut band, trigger point, twitch response and zone of reference
    e. palpation for tender points in the accepted usual locations

XIII INFLAMMATORY ARTHRITIDES AND OSTEOARTHRITIS

A. TERMINAL OBJECTIVES:

When presented with a patient with an inflamed joint that is not obviously related to recent trauma, the physician shall:

13.1.0 Make the correct clinical diagnosis.

13.1.1 Inquire regarding systemic symptoms which may be associated with the patient's inflammatory arthropathy.
13.1.2 Examine for physical signs which may be associated with the patient's inflammatory arthropathy.
13.1.3 Perform appropriate investigations to confirm the clinical diagnosis as required (eg. CBC, ESR, serum uric acid, rheumatoid factor, anti-nuclear antibody, C-reactive protein)
13.1.4 Select appropriate imaging studies to confirm the clinical diagnosis as required which are sensitive, specific and cost effective.

13.2 Prescribe an appropriate initial treatment protocol.

13.3 Monitor the clinical progress of the patient.

13.4 Identify patients who fail to respond to conservative management and refer them to appropriate specialists.

B. ENABLING KNOWLEDGE OBJECTIVES:

1. List 2 common causes of an acute inflammatory arthropathy.
2. List 3 causes of chronic inflammatory arthropathy.
3. Describe the key clinical findings and natural history associated with the following inflammatory arthropathies:
    a. rheumatoid arthritis
    b. osteoarthritis
    c. gout
    d. pseudogout
    e. septic arthritis
    f. ankylosing spondylitis
    g. systemic lupus erythematosus
4. Discuss the indications for and significance of the following serologic investigations in the evaluation of a patient with an inflammatory arthropathy:
    a. CBC
    b. ESR
    c. Rheumatoid factor
    d. anti-nuclear antibody
    e. C-reactive protein
    f. uric acid
5. Identify plain radiographic abnormalities associated with the inflammatory arthropathies listed above.
6. List the indications for alternative imaging techniques such as CT scanning, diagnostic ultrasound, arthrography and MRI in the investigation of the patient with an inflammatory arhtropathy.
7. List the indications for joint aspiration in the patient with an inflammatory arthropathy.
8. Prescribe a treatment plan for the patient with an inflammatory arthropathy including the general concepts of:
    a. relief of pain
    b. reduction or suppression of inflammation

c. preservation of muscle and joint function

d. return to occupational and recreational function.

9. Discuss the indications and contraindications of non-steroidal anti-inflammatory therapy in a patient with an inflammatory arthropathy.

10. Discuss the risks and benefits of long-term anti-inflammatory therapy.

11. List 3 common side effects of NSAID therapy.

12. List the indications for gastric cytoprotective agents in patients on long-term NSAID therapy.

13. List the indications for oral steroids in a patient with an inflammatory arthropathy.

14. List the indications for the so-called slow acting drugs such as gold, antimalarials, penicillamine and methotrexate, and refer a patient to an appropriate specialist if these medications are indicated.

15. Prescribe physical therapy for the patient with an inflammatory arthropathy as indicated.

16. List the indications for intra-articular corticosteroid and viscoelastic supplementation injections.

17. Presribe an exercise regimen which can maintain muscle strength, flexibility and cardiovasciular endurance without unduly stressing compromised or inflamed joints.

B ENABLING SKILL OBJECTIVES:

1. Perform a physical examination of the patient with an inflammatory arthropathy including.

a. a thorough history for evidence of systemic complications.

b. a complete general physical examination for evidence of systemic complications.

2. Perform a detailed joint examination for all potentially involved joints including:

a. inspection for erythema, swelling and deformity

b. palpation of heat, range of motion, synovial hypertropy (pannus) and tenderness.

c. musculotendinous weakness or contracture

d. surrounding ligamentous integrity

3. Demonstrate aspiration techniques of the knee and first metatarsophalangeal joints.
4. Demontrate corticosteroid injection techniques of the knee joint.

Chapter 5
Curriculum number 2
A Study Guide for the Most Common Musculoskeletal Disorders Encountered in Clinical Practice

TABLE OF CONTENTS

All references to "Netter" in the anatomy sections are to:
Netter FH. (1989) Atlas of Human Anatomy Sharon Colacino, consulting editor, Ciba-Geigy, New Jersey: West Caldwell.

OBJECTIVES

I. COMMON PROBLEMS INVOLVING THE SHOULDER JOINT

PROBLEM 1: SUBACROMIAL IMPINGEMENT SYNDROME :

Case presentation: A 35 year old male patient presents to your office with a five week history of right shoulder discomfort. The pain began after the patient painted the ceiling in his house over a weekend. The pain felt "like a toothache" in the shoulder, and was particularly bothersome at night, occassionally waking him from his sleep. The pain was worse with activities of daily living such as undressing. There had been no acute injury or traumatic event associated with the onset of the discomfort. The patient experienced similar pain two years previously, after a weekend long tennis tournament, and had obtained relief with a "cortisone shot" into the shoulder administered by his family physician. The man also related being unable to swim freestyle 12 months previously, because of shoulder discomfort. His family doctor had given him a second cortisone shot one week prior to his seeing you. This did not lead to significant relief of the pain. He has not had other opinions or investigations regarding his shoulder pain. Your examination revealed a positive impingement sign, a positive supraspinatus test and relative weakness of the right shoulder external rotator musculature. The apprehension sign was negative. Plain radiographs of the shoulder were normal. Your diagnosis was grade II impingement syndrome, and you prescribed modified activity, ice, and specific strengthening and stretching exercises.

A. ESSENTIAL ANATOMY OF THE SHOULDER: Netter 395-409

The physician will be able to:

1. list and diagram the following anatomic structures of the shoulder joint:
   i. the humerus, scapula and clavicle
   ii the acromioclavicular joint, sternoclavicular joint, glenohumeral joint, and scapulothoracic joint.
   iii. the muscles which comprise the rotator cuff and their innervation.
2. describe the dynamic and static stabilizing structures of the shoulder joint, including;
   i. the shoulder joint caspule

ii. the glenohumeral ligaments
iii. the glenoid labrum
iv. the rotator cuff musculotendinous unit
3. describe the anatomic arrangement of the coracoacromial arch (bony and ligamentous).
4. diagram the area of "impingement" between the rotator cuff, subacromial bursa, coracoacromial arch, acromion and the proximal humerus.

B. REGIONAL EXAMINATION OF THE SHOULDER:

The physician will be able to:

1. Perform a complete physical examination of the shoulder joint including;
i. observation of cervical spine movement/ROM
ii. inspection for bony or muscular abnormalities around the shoulder joint including:
a. wasting of the rotator cuff musculature
b. acromioclavicular joint separation
c. deltoid wasting
d. clavicular hypertrophy
iii. active and passive range of motion assessment, including;
a. internal rotation at 0 and 90 degrees abduction
b. external rotation at 0 and 90 degrees abduction
c. elevation in the plane of the scapula
d. abduction
e. adduction
f. forward flexion
g. extension
h. scapulohumeral motion/scapulothoracic rhythm
iv. regional palpation of each of the four shoulder joints
v. regional palpation of each of the bones of the shoulder joint
vi. upper extremity neurologic assessment
vii. upper extremity vascular assessment
viii. assess the strength of the glenohumeral internal and external rotators
ix. assess the strength of the supraspinatus muscle

x. assess the strength of the deltoid muscle

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. recite 4 historical factors which are characteristic of the impingement syndrome.
2. list 3 activities or positions of the upper extremity which cause or exacerbate the symptoms of the impingement syndrome.
3. specify the symptoms and signs characteristic of grades 1-4 of the impingement process.
4. recite 4 potential causes of referred shoulder pain

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. demonstrate and recite the significance of the following specific diagnostic maneuvres:

i. rotator cuff muscle strength testing
ii. the supraspinatus test
iii. impingement signs
iv. the apprehension sign
v. the bicipital tendon sign (Speed's and Yergason's signs)
vi. gleno-humeral translation
vii. acromio-clavicluar joint stress test
viii. the relocation sign

E. DIAGNOSIS:

The physician will be able to:

1. describe the normal plain radiographic appearance of the shoulder joint, identifying the following structures;

i. acromion process of the scapula (including abnormalities of acromial morphology which will exacerbate subacromial impingement)
ii. acromioclavicular joint
iii. coracoid process of the scapula
iv. clavicle
v. sternoclavicular joint
vi. head and articular surface of the humerus

vii. lesser and greater tuberosities of the humerus
viii. anatomic and surgical necks of the humerus
ix. glenoid fossa of the scapula
2. recite the plain radiographic signs of impingement.
3. recite the indications for, and limitations of arthrography, CT, MRI and diagnostic ultrasound of the shoulder joint in detecting abnormalities in the impingement syndrome.
4. compare and contrast the investigative procedures listed above, with specific reference to their sensitivity and specificity in the four grades of the impingement process.

F. TREATMENT:

The physician will be able to:

1. prescribe appropriate activity modification to prevent further exacerbation of the impingement process (including postural correction).
2. recite appropriate modalities of anti-inflammatory therapy including:
i. ice application
ii. oral non steroidal antiinflammatory medications (NSAID's)
iii. physiotherapeutic modalities
3. list the usefulness and indications of heat to increase shoulder joint flexibility.
4. list specific stretching exercises for identified areas of shoulder muscle inflexibility.
5. list specific strengthening exercises for each of the supraspinatus, internal and external rotator muscles of the shoulder joint, and describe their importance in the management of the impingement process.
6. describe the indications, contraindications, efficacy and side effects of subacromial bursa corticosteroid injection.
7. describe a protocol of graded return to activity and sport.
8. list the indications for surgical treatment in patients with the impingement syndrome and recite 2 surgical procedures used.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. Compare and constrast the following disorders which are included in the diagnostic entity of the "impingement syndrome";
   i. bicipital tendonitis
   ii. supraspinatus tendonitis
   iii. rotator cuff tendonitis
   vi. painful arc syndrome
   v. subacromial bursitis
   vii. subdeltoid bursitis
   viii. calcific tendonitis
2. describe the contribution of glenohumeral instability to the etiology of the impingement syndrome (AMBRI, TUBS).
3. list 3 other disorders which can present as referred shoulder pain.

References:

1. Neer GS. (1983). Impingement lesions. Clinical Orthopedics and Related Research 173, 70-77.

2. Jobe FN. and Jobe CM. (1987) Painful athletic injuries of the shoulder. Clinical Orthopedics and Related Research 173, 117.

3. Nicholson GG. (1989). Rehabilitation of common shoulder injuries. Clinics in Sports Medicine 8, 633-655.

4. Miniaci A., Fowler PJ. (1993). Impingement in the athlete. Clinics in Sports Medicine 12, 91-110.

5. Townsend H., Jobe FW., Pink M., Perry J. (1991). Electromyographic analysis of the glenohumeral muscles during a baseball rehabilitative program. American Journal of Sports Medicine 19, 264-272.

PROBLEM 2: CHRONIC SHOULDER INSTABILITY: (MULTIDIRECTIONAL SHOULDER INSTABILITY)

Case presentation: A nineteen year old right hand dominant baseball pitcher presents to your office with problems concerning his right shoulder. He complains of episodes of his shoulder "popping out of joint". These episodes are usually followed by a sensation of his arm going "dead". Initially, these episodes would only occur with substantial forces such as falling or colliding with another player. However, they now occur with trivial events such as rolling over in his sleep. He is also experiencing increasingly severe nocturnal pain in the shoulder. He denies any major injuries to his shoulder joint, and has never dislocated his shoulder. On examination, the patient has normal range of cervical spine movement and no tenderness to palpation. There is no obvious muscle wasting of the shoulder girdle. Shoulder range of motion is full, but there is pain with abduction above 100 degrees and with forward flexion. There is a positive apprehension sign, a positive impingement sign, an inferior sulcus sign, and relative weakness of the external and internal rotators of the shoulder compared to the opposite side. The dislocation, relocation test is positive. There is grade two anterior translation of the humerus in the glenoid fossa. There is no winging of the scapula. The upper extremity neurovascular examination is normal. The patient can hyperextend both elbows, and can easily touch his thumb to the ipsilateral forearm. Plain radiographs are normal. You diagnose multidirectional shoulder instability, with recurrent glenohumeral subluxation. You prescribe a graduated program of strengthening the rotator cuff musculature, concentrating on internal and external rotation of the shoulder. The patient is advised to stop pitching for 4 weeks, and use an oral anti-inflammatory and ice. The patient notices some improvement with therapy, but is apprehensive about continuing to pitch, and decides to stop playing baseball. Activities of daily living are not problematic for this patient.

A. ESSENTIAL REGIONAL ANATOMY: SEE PROBLEM 1A. Netter 395-409

B. REGIONAL EXAMINATION: SEE PROBLEM 1B.

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. list 2 symptoms suggestive of glenohumeral subluxation and dislocation.
2. recite the symptoms associated with the "dead arm syndrome".

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. demonstrate the following signs indicative of glenohumeral instability;
   i. the apprehension sign
   ii. the dislocation-relocation test
   iii. excessive glenohumeral translation
   iv. the inferior sulcus sign
2. demonstrate evidence of generalized ligamentous laxity
3. assess rotator cuff muscle strength
4. assess scapulothoracic movement

E. DIAGNOSIS:

The physician will be able to:

1. identify normal plain radiographic anatomy of the shoulder (Problem 1E1)
2. identify and describe the following signs of recurrent glenohumeral subluxation;
   i. the Bankart lesion
   ii. the Hill-Sachs deformity
3. list the advantages and disadvantages of the use of diagnostic ultrasound, computed tomography, arthrography and MRI in the evaluation of shoulder instability.

F. TREATMENT:

The physician will be able to:

1. list and demonstrate the exercises that strengthen the muscles that provide dynamic shoulder stabilization to the glenohumeral joint.
2. prescribe a program of scapular stabhilization exercises
3. advise a patient regarding the role of surgical procedures to stabilize multidirectional instability of the shoulder.

4. list the indications for shoulder stabilizing braces as and discuss their efficacy with patients.
5. discuss the criteria for return to sport.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. differentiate between the anterior ("TUBS", traumatic, unidirectional, Bankart, surgical) and multidirectional ("AMBRI", atraumatic, multidirectional bilateral, rehabilitation) forms of glenohumeral instability (1).

References:

1. Hawkins RJ., Mohtadi NGH. (1991). Clinical evaluation of shoulder instability. Clinical Journal of Sport Medicine 1 59-64.

2. Rowe CR. (1987). Recurrent transient anterior subluxation of the shoulder: The "Dead Arm" syndrome. Clinical Orthopedics and Related Research 223 11-19.

3. Jobe FW., Moynes DR., Brewster CE. (1987). Rehabilitation of shoulder joint instabilities. Orthopedic Clinics of North America 18 475-482.

4. Nicholson GG. (1989). Rehabilitation of common shoulder injuries. Clinics in Sports Medicine 8 633-655.

5. Townsend H., Jobe FW., Pink M., Perry J. (1991). Electromyographic analysis of the glenohumeral muscles during a baseball rehabilitative program. American Journal of Sports Medicine 19, 264-272.

PROBLEM 3 ADHESIVE CAPULITITS OF THE SHOULDER (FROZEN SHOULDER):

Case presentation: A 45 year old woman was travelling home to England. As she was disembarking from the plane in Heathrow airport, she stumbled and fell on her outstretched left hand. She felt immediate pain and noticed a deformity in her wrist. She was taken to hospital, where she was diagnosed as suffering from a fractured radius. This was reduced and casted, and the woman was advised to use a sling to support the injured arm. The woman then continued on her way to the north of England, without medical follow-up. She wore her sling until she returned home to Canada to have her cast removed, six weeks after the initial injury. Upon arrival in Canada, she felt her radius had healed well, but she noticed difficulty performing activities of daily living because of stiffness in her shoulder. This problem became progressively worse during the next few months, and began to be associated with shoulder pain. She was unable to sleep due to shoulder pain, and could not lift her arm over her head. She did not recall any trauma to her shoulder joint, aside from the recent fall. Your examination revealed passive and active external rotation at the shoulder of 30 degrees, abduction of 50 degrees and internal rotation of 40 degrees. You detected an "end feel" with range of motion testing. Plain radiographs were normal. A shoulder arthrogram was performed to differentiate a rotator cuff tear with a stiff and painful shoulder from adhesive capsulitis, and revealed a significant decrease in the volume of the shoulder capsule, with loss of the axillary capsular fold. The patient was diagnosed as suffering from adhesive capsulitis, and was prescribed a program of gentle passive stretching of the shoulder. Despite therapy, she remained symptomatic for 18 months, then her symptoms gradually abated.

A. ESSENTIAL REGIONAL ANATOMY: SEE PROBLEM 1 A. Netter 395-409

B. REGIONAL EXAMINATION OF THE SHOULDER JOINT COMPLEX: SEE PROBLEM 1 B

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. describe 3 symptoms suggestive of adhesive capsulitis.
2. describe the predisposing factors to adhesive capsulitis including;

i. calcific rotator cuff tendonitis

ii. subacromial impingement/bicipital tenosynovitis
iii. cervical radiculopathy
iv. prolonged shoulder or upper extremity immobilization
v. coronary artery disease
vi. subphrenic mass, infection, or inflammation
vii. mastectomy
viii. diabetes mellitus

3. differentiate between the historical factors associated with adhesive capsulitis and other causes of the stiff and painful shoulder.
4. describe the natural course of adhesive capsulitis.

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. with the use of a goniometer, demonstrate the limitations in active and passive range of motion of the shoulder joint in adhesive capsulitis .
2. differentiate between the typical limitations in movement caused by adhesive capsulitis and other causes of the stiff and painful shoulder.
3. describe and demonstrate the concept of a "mechanical end-point" or "end feel"in shoulder range of motion testing.

E. DIAGNOSIS:

The physician will be able to:

1. describe the normal plain radiographic anatomy of the shoulder joint
2. recite the limitations with plain radiography in the diagnosis of adhesive capsulitis.
3. list the indications for arthrography of the shoulder joint with a suspected diagnosis of adhesive capsulitis, and list the findings indicative of this disorder.
4. list the indications for, and limitations of arthroscopy in the diagnosis of adhesive capsulitis of the shoulder.
5. list the indications for and limitations of diagnostic ultrasound, CT and MRI in the investigation of adhesive capsulitis.

F. TREATMENT:

The physician will be able to:

1. describe the natural history of adhesive capsulitis of the shoulder ("freezing", "frozen", "thawing").
2. list preventative strategies in patients "at risk" for the development of adhesive capsulitis of the shoulder.
3. prescribe passive stretching exercises for the shoulder (initially in conjunction with a physical therapist).
4. describe the risks and benefits associated with manipulation of the shoulder joint under anaesthesia. (M.U.A.)
5. discuss the indications, risks, benefits and efficacy of shoulder joint corticosteroid injection.
6. describe the indications, risks, benefits, and efficacy of surgical procedures for correction of adhesive capsulitis.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. list other causes of the stiff and painful shoulder, including;

i. acute and chronic calcific tendonitis
ii. non-calcific rotator cuff tendonitis
iii. glenohumeral arthrosis
iv. acromioclavicular arthrosis
v. incomplete and complete rotator cuff tears
vi. shoulder synovitis
vii. bicipital tenosynovitis

References:

1. Nevasier RJ., Nevasier TJ. (1987). The frozen shoulder. Diagnosis and management. Clinical Orthopedics and Related Research 223, 59-64.

2. Nicholson GG. (1989). Rehabilitation of common shoulder injuries. Clinics in Sports Medicine 8, 633-655.

3. Nevasier TJ. (1987). Adhesive capsulitis. Orthopedic Clinics of North America 18, 439-444.

4. Bulgen DY., Binder AI., and Hazleman BL.(1984). Frozen shoulder: prospective study with an evaluation of three treatment regimens. Annals of the Rheumatic diseases. 43, 353-360.

PROBLEM 4: ACUTE ANTERIOR DISLOCATION OF THE SHOULDER JOINT:

Case presentation: An 18 year old male construction worker was atop of a 10 foot scaffold when he lost his balance, and fell to the ground. He felt his right arm strike the ground in a position extreme external rotation and abduction. His main complaint was of right shoulder discomfort, and an inability to move his right arm. The industrial first aid worker at the construction site documented normal sensation in the right hand and normal grip strength, placed the patient's injured arm in a sling, and escorted him to a local emergency room. The patient denied any previous injury to his right shoulder, and his past medical history was unremarkable. The patient was in mild distress, and held his right arm at his side in internal rotation. There was a prominence of the acromion of the right shoulder. The upper extremity neurologic examination was normal with specific reference to axillary nerve motor and sensory function. Plain radiographs revealed an anterior subcoracoid glenohumeral dislocation. The patient had an intravenous inserted into his right hand and was administered Midazolam. The physician then applied gentle traction to the right arm in a position of forward flexion, with external rotation, while the intern applied countertraction through a bed sheet passed around the axilla. The patient was recumbent. A "clunk" was felt, and the shoulder appeared to return to a normal appearance. Post reduction films revealed a normal glenohumeral joint. The patient was discharged from the emergency room with a sling and urged to follow-up with his family doctor. The patient did not have a doctor and decided to look after the shoulder himself. No supervised rehabilitaion was conducted. Three weeks later while back on the job site, the patient was reaching for an overhead support and felt his arm "pop" out of place. As a result he missed the support, fell thirty feet and fractured his right tibia and fibula, and had a concommittant recurrent right shoulder dislocation.

A. ESSENTIAL REGIONAL ANATOMY OF THE SHOULDER: SEE PROBLEM 1 A 1 Netter 395-409

B. REGIONAL EXAMINATION OF THE SHOULDER: SEE PROBLEM 1 B

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. recite 2 mechanisms of acute anterior glenohumeral dislocation.
2. list 3 symptoms suggestive of acute glenohumeral dislocation.
3. list the 3"E's" of posterior glenohumeral dislocation
4. differentiate between "TUBS" vs."AMBRI" classifications of shoulder instability.

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. describe the common position in which a patient holds the injured arm with a glenohumeral dislocation.
2. describe the findings on inspection and palpation in the classical appearance of anterior glenohumeral dislocation
3. identify the sensory zone of the axillary nerve and recite its significance in anterior glenohumeral dislocation.
4. assess isometric strength of the deltoid muscle and detail why this is important in anterior glenohumeral dislocation.
5. perform a complete upper extremity neurologic exam to rule out other nerve injuries

E. DIAGNOSIS:

The physician will be able to:

1. describe the normal plain radiographic anatomy of the shoulder joint (See Problem 1 E 1)
2. describe the characteristic radiographic appearance and three possible positions of anterior glenohumeral dislocation.
3. define and recite the significance of the following plain radiographic signs:

i. Hill-Sachs deformity

ii. Bankart lesion

4. list special plain radiographic views useful in the identification of shoulder dislocation.

F. TREATMENT:

The physician will be able to:

1. advise the patient regarding the natural history of glenohumeral dislocation, including the rate of recurrence (with respect to the patient's age).
2. list and perform 3 methods to reduce acute anterior glenohumeral dislocation.
3. compare and contrast 3 pharmacologic methods to maximize muscle relaxation to facilitate shoulder joint reduction.
4. list the indications for reduction under general anaesthesia.
5. describe the immediate post reduction management of a patient with acute anterior glenohumeral dislocation.
6. describe the early rehabilitative course (1-3 weeks post-injury) for patients and specify shoulder movements which are contraindicated.
7. list and demonstrate exercises to stabilize the glenohumeral joint (See Problem 1 F)
8. prescribe a protocol to allow the graded resumption of recreational and occupational activities and return to sport.
9. recite the role of surgery in the management of glenohumeral dislocation.
10. describe 2 surgical procedures used to limit anterior glenohumeral dislocation.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. identify the following disorders which can complicate anterior glenohumeral dislocation;

i. axillary nerve palsy
ii. brachial plexus injury
iii. avulsions of the greater tuberosity of the humerus
iv. proximal humeral fractures
v. glenoid labrum avulsion/glenoid rim fracture
vi. rotator cuff tear
vii. acromioclavicular joint injuries
viii. clavicular fractures
ix. posterior glenohumeral dislocations

x. adhesive capsulitis

References:

1. O'Brien SJ., Warren RF., Schwartz E. (1987). Anterior Shoulder Instability. Orthopedic Clinics of North America 18, 395-408.

2. Simon RR., Koenigsknecht SJ. (1987). Emergency Orthopedics: The extremities. Norwalk Connecticut: Appleton and Lange.

3. Nicholas JA., Hershman EB. (1990). The Upper Extremity in Sports Medicine. St. Louis, MO: C.V. Mosby.

4. Jobe FW., Moynes DR., Brewster CE. (1987). Rehabilitation of shoulder joint instabilities. Orthopedic Clinics of North America 18, 475-482.

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6. Townsend H., Jobe FW., Pink M., Perry J. (1991). Electromyographic analysis of the glenohumeral muscles during a baseball rehabilitative program. American Journal of Sports Medicine 19, 264-272.

PROBLEM 5 ACROMIOCLAVICULAR LIGAMENT INJURY (SHOULDER SEPARATION)

Case presentation: A thirty year old male was playing softball at an office picnic. He was running at full speed, chasing an outfield fly ball, when he stumbled and fell, landing directly on the "point" of his right shoulder. He felt immediate pain over his shoulder, and noticed an area of swelling. He was taken to a local emergency room, holding his right arm at his side. He had suffered no previous shoulder injuries. He had no numbness and no weakness of the upper extremity. Examination revealed slight prominence of the distal right clavicle with tenderness over the acromioclavicular joint and coracoclavicular ligaments. There was decreased active and passive range of motion of the right shoulder in all planes due to pain. Plain radiographs were normal, but stress radiographs with 10 lb weights strapped to the patients wrists revealed slight widening of the acromioclavicular joint, and the coracoclavicular interval. A grade 2 acromioclavicular sprain was diagnosed and the patient was prescribed a sling and analgesics. One week after the injury, the patient was still experiencing pain, but had increased range of motion of the shoulder joint. The patient was referred to a physical therapist who used passive and active shoulder range of motion exercises and other modalities to decreases the patient's pain. Eight weeks after the injury, the patient had normal use of his shoulder, and was not concerned by the cosmetic deformity over his AC joint.

A. ESSENTIAL REGIONAL ANATOMY OF THE SHOULDER: SEE PROBLEM 1 A

The physician will be able to:

1. identify and diagram the acromioclavicular and coracoclavicular ligaments.

B. REGIONAL EXAMINATION OF THE SHOULDER: SEE PROBLEM 1 B

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. describe the common mechanism of injury to the acromioclavicular joint.
2. describe 2 symptoms suggestive of acromioclavicular joint injury.

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. differentiate among grades 1, 2, and 3 acromioclavicular separation.
2. describe the clinical appearance of each grade of AC joint sprain.
3. palpate the acromioclavicular and coracoclavicular ligament areas for tenderness.

E. DIAGNOSIS:

The physician will be able to:

1. define the normal plain radiographic anatomy of the shoulder (See Problem 1 E 1) with specific reference to the AC joint.
2. describe the radiographic appearance of grades 1, 2, and 3 AC joint separation.
3. describe the use and limitations of stress views of the AC joint.

F. TREATMENT:

The physician will be able to:

1. describe the initial symptomatic treatment for AC joint separation including;

i. analgesia

ii. ice application

iii. arm immobilization (sling, collar-cuff)

2. prescribe an approptiate early rehabilitation protocol including;

i. range of motion exercises

ii. strength training

3. discuss the relative merits of conservative versus surgical management of AC joint separation and acromioclavicular arthrosis and distal clavicular osteolysis.
4. discuss the potential complications of surgical management of AC joint separation.
5. list the role of corticosteroid injection in the management of chronic AC joint degenerative disease and compare this to its role in management of the impingment syndrome.

6. discuss the potential longterm complications of AC joint arthritis and osteolysis of the distal clavicle.

7. advise the patient regarding the natural history of AC joint separation with respect to cosmetic and functional outcome.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. differentiate between the following disorders;

i. complicated acromioclavicular separation (Grades III-VI on the Rockwood scale)

ii. distal clavicular fracture

iii. acromial contusion ("shoulder pointer")

iv. osteolysis of the distal clavicle

v. thoracic outlet syndrome as a compliction of an AC separation

References:

1. Nevasier RJ. (1987). Injuries to the clavicle and acromioclavicular joint. Orthopedic Clinics of North America 18, 433-438.

2. Garrick JG., Webb DR. (1990) Sports Injuries: Diagnosis and Management. Philadelphia, PA.: W.B. Saunders pp. 74-75.

3. Dias JJ., Steingold RF., and Richardson J. (1987). The conservative treatment of acromioclavicular dislocation. Journal of Bone and Joint Surgery 69B 719-722.

II. COMMON PROBLEMS INVOLVING THE KNEE JOINT

PROBLEM 6 ANTERIOR CRUCIATE LIGAMENT DEFICIENCY IN THE KNEE:

Case presentation: A 22 year old female was downhill skiing when she caught the inside edge of her ski on a patch of soft, wet snow and fell. As she fell, her ski did not release. She felt her right knee buckle in a position of flexion and valgus loading. She heard a "pop", and noticed swelling of the knee almost immediately. She attempted to stand so she could ski down to medical attention, but the knee was painful and did not feel stable. She had to be taken down the hill by toboggan with the help of the ski patrol. Four hours later, at the local medical facility an examination of the knee and plain radiographs were performed. The knee joint exam revealed only an effusion and decreased range of active and passive motion. A Lachman test and anterior drawer sign were inconclusive because of hamstring spasm and swelling of the knee joint. The radiographs were interpreted as showing only a knee joint effusion. She was diagnosed as having a "strained knee", and given crutches and a tensor bandage. Two weeks after the injury while turning to go to her refridgerator with the right foot planted, the knee buckled and began to swell. She sought an opinion from her family doctor, who diagnosed an anterior cruciate ligment tear on the basis of the history of injury, hemarthrosis and subsequent instability, as well as a positive Lachman test and a positive pivot shift test. The patient was scheduled for ligament reconstruction surgery.

A. ESSENTIAL REGIONAL ANATOMY OF THE KNEE: Netter 476-483

The physician will be able to:

1. list and diagram the following knee joint anatomic structures;
   i. the femur, tibia and patella
   ii. the medial and lateral collateral ligaments
   iii the anterior and posteror cruciate ligaments
   iv. the medial and lateral menisci
2. recite the functional significance of the above detailed structures
3. list the four components of the quadriceps musculature and describe their independent and corporate actions on the knee joint, and their innervation.

4. list the three major components of the hamstring muscle group, and describe their independent and corporate action on the knee joint, and their innervation.
5. list the 3 components of the pes anserinus muscle-tendon group, and describe their function on the knee joint.
6. describe the location of the following bursae:
i. prepatellar
ii. infrapatellar
iii. semimembranosus
iv. pes anserinus
7. describe the anatomic and functional significance of the iliotibial band in relation to the knee joint.
8. describe the anatomic arrangement of the quadriceps/patellar tendon extensor mechanism.
9. describe the patellar ligaments and retinacula.
10. diagram the location of the following neurovascular structures in relation to the knee joint;
i. sciatic nerve
ii. common peroneal nerve
iii. tibial nerve
iv. popliteal artery
v. profunda femoris artery
vi. saphenous nerve
vii. obturator nerve

B. REGIONAL EXAMINATION OF THE KNEE JOINT:

The physician will be able to:

1. conduct an examination of the knee joint:
a. in the standing position including;
i. assessment of standing lower limb alignment
ii. gait assessment, squat, duck walk, and hop
b. in the recumbent position
iii. inspection for signs of muscle wasting, joint effusion, heat, redness bony abnormalities including posterior tibial sag.
iv. assess and measure both active and passive range of motion in degrees

v. demonstrate fluid in the knee joint

vi. palpate joint lines for evidence of meniscal tears or bony tenderness

vii. perform valgus and varus stress tests at 0 and 30 degrees of flexion to demonstrate the integrity of the medial and lateral collateral ligaments respectively.

viii. perform the following tests to demonstrate anterior cruciate ligament integrity;

a. Lachman test

b. anterior drawer test

c. pivot shift test

ix. perform McMurray's test to demonstrate meniscal tears

x. perform patellar compression tests and palpate the patellar facets to demonstrate patellofemoral pain and/or chondromalacia patella

xi. perform the patellar apprehension test

xii. demonstrate a posterior drawer sign to show posterior cruciate ligament laxity

xiii. demonstrate the palpation of the anterior tibial condyles or the "thumb sign" to show posterior cruciate deficiency

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. list historical clues to the diagnosis of an ACL tear including mechanism of injury, popping/snapping, inability to continue the activity, early hemarthosis, sensation of instability

2. recite 2 common mechanisms leading to anterior cruciate ligament injury.

2. list 3 historical factors which suggest a diagnosis of chronic anterior cruciate ligament deficiency

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. recite the limitations involved with the examination of the acutely injured knee joint

2. describe the significance of a hemarthrosis in the acutely injured knee, and list four common injuries associated with it

E. DIAGNOSIS:

The physician will be able to:

1. list the indications to perform radiographs of the acutely injured knee, and specific views required depending on the pathology suspected.
2. describe the normal plain radiographic appearance of the knee joint and identify the following structures:

i. femoral condyles
ii. tibial plateaus
iii. patella
iv. patellofemoral joint
v. tibial spines
vi. tibial tubercle
vii. femoral epicondyles
viii. fibular head

3. perform aspiration of knee joint fluid for diagnostic and therapeutic reasons, and inspect the fluid for blood and/or fat globules.
4. recite the indications for arthrography, MRI, and CT in the evaluation of suspected anterior cruciate ligament injury.
5. recite the indications for arthroscopy in the evaluation of acute and chronic knee injury.
6. recite the indications for examination under anaesthesia in the evaluation of the acutely injured knee.

F. TREATMENT:

The physician will be able to:

1. prescribe appropriate treatment measures for the patient with an acutely injured knee, including:

i. Protect the extremity
ii. Rest of the extremity
iii. Ice application
iv. Compressive dressings/braces
v. Elevation of the extremity {the "P.R.I.C.E". mnemonic}.
vi. anti-inflammatory/analgesic medications.

2. describe the following ways to protect an acutely injured knee, and be familiar with their application and indications for their use:

i. plaster backslab
ii. hinge cast
iii. cylinder cast
iv. Zimmer knee immobilizer (commercial range of motion braces)
v. Jone's bandage
3. demonstrate the use of crutches to facilitate non-weight bearing
4. prescribe an appropriate early rehabilitative program in conjuction with a physical therapist, including:
i. local analgesic modalities
ii. range of motion exercises
iii. cryotherapy and thermal therapy
iv. quadricep and hamstring strengthening (isometric, concentric, eccentric)
v. baseline isokinetic muscle testing
5. describe the natural history of anterior cruciate ligament injury.
6. recite the indications for referral to an orthopedic surgeon for surgical management.
7. describe how the following factors influence the choice of conservative versus surgical management:
i. patient age
ii. associated intra-articular pathology
iii. physical demands patient will place on the knee.
iv. duration of the injury
8. prescribe a task specific regimen for the patient's return to physical activity.
9. discuss the risks and benefits of conservative and surgical management.
10. discuss the role of proprioception and closed kinetic chain eccentric rehabilitation principles in the ACL deficient knee
11 differentiate between the rehabilitative problems associated with acute and chronic anterior cruciate ligament injury.
12. list the indications for and types of derotational bracing.
13. list the longterm complications associated with the anterior cruciate deficient knee.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. list the associated intra-articular structures frequently injured with acute anterior cruciate ligament injuries (the "unhappy triad of acute knee joint injury").
2. identify the relationship between chronic anterior cruciate ligament deficiency, degenerative meniscal tears and degenerative osteoarthritis of the knee joint.

References:

1. King JB., Aitken M. (1988). Treatment of the torn anterior cruciate ligament. Sports Medicine 5, 203-208.

2. Ray JM. (1988). A proposed natural history of symptomatic anterior cruciate ligament injuries of the knee. Clinics in Sports Medicine 7, 697-713.

3. Gersoff WK., Clancy WG. (1988). Diagnosis of acute and chronic anterior cruciate ligament tears. Clinics in Sports Medicine 7, 727-738.

4. Antich TJ., Brewster CE. (1988). Rehabilitation of the nonreconstructed anterior cruciate ligament deficient knee. Clinics in Sports Medicine 7, 813-826.

5. Palmitier RA., An KN., Scott SG., Chao. (1991). Kinetic chain exercise in knee rehabilitation. Sports Medicine 11, 402-413

6. Stanish WD., Lai A. (1993). New concepts of rehabilitation following anterior cruciate reconstruction. Clinics in Sports Medicine 12, 25-58.

7. Caborn DNM., Johnson BM. (1993). The natural history of the anterior cruciate ligament deficient knee. A review. Clinics in Sports Medicine 12, 625-637

8. Vailas JC., Pink M. (1993). Biomechanical effects of functional knee bracing: Practical implications. Sports Medicine 15, 210-218.

PROBLEM 7 MENISCAL INJURIES TO THE KNEE JOINT:

Case presentation: A 45 year old female was squatting down to pet her cat when she felt a sharp pain in her right knee. She thinks that she may have lost her balance while in the squatted position and suffered some rotational movement in her knee joint. Since the injury, which occured 2 months ago, the woman has experienced pain with any excessive weight bearing, along with swelling in her knee. She occasionally feels that her knee "catches", and once she was unable to fully extend her knee, until she moved it, felt a crack, then noticed her range of motion was again full. Her family physician performed plain radiographs which were interpreted as normal. Upon examination in your office, the patient had an antalgic gait, obvious right quadriceps wasting, a small knee joint effusion, a tender anterior medial joint line and pain with forced full flexion of the knee joint. Her range of motion was full. McMurray's test was negative. You diagnosed a tear of the right medial meniscus, and prescribed a regimen of icing, low resistance stationary cycling, decreased weight bearing activities, and a progressive quadriceps and hamstring rehabilitation program. Two months later, the woman is significantly improved and able to carry out all activities of daily living. However, she still experiences occasional pain and swelling in the knee joint. You then refer her to an orthopedic surgeon for arthoscopy and potential partial meniscectomy.

A. ESSENTIAL REGIONAL ANATOMY: SEE PROBLEM 6A. Netter 476-483

B. REGIONAL EXAMINATION: SEE PROBLEM 6B

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. list four functions of the menisci.
2. list two common mechanisms of injury to the menisci.
3. differentiate between traumatic and degenerative meniscal lesions.
4. recite 4 symptoms which are suggestive of meniscal pathology.
5. list the potential causes of a locked knee joint, and identify the potential contribution of a meniscal injury to this condition.
6. define "pseudolocking" of the knee joint, and list 2 causes of this condition.

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. demonstrate the following tests;
   i. McMurray's test
   ii. joint line palpation
   iii. squatting test
   iv. duck walking
2. demonstrate a block to full flexion and extension of the knee joint.

E. DIAGNOSIS:

The physician will be able to:

1. describe the normal plain radiographic anatomy of the knee (See Problem 6E1)
2. list the indications for arthrography, MRI scanning and CT scanning in patients with a suspected meniscal lesion. (See Problem 6E 1-8)
3. describe the role for diagnostic arthroscopy in patients with suspected meniscal tears

F. TREATMENT:

The physician will be able to:

1. advise the patient regarding the natural history of meniscal lesions
2. demonstrate the technique to mobilize an acutely locked knee.
3. prescribe initial protective and analgesic therapy (See Problem 6 F 1-5)
4. organize orthopedic referral if unable to mobilize a locked knee.
5. differentiate between the treatment needs of acute and chronic meniscal injuries.
6. list the indications for therapeutic arthroscopy in patients with a suspected meniscal lesion.
7. describe partial meniscectomy, meniscal repair.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. list the intra-articular structures which are frequently injured at the same time as the menisci.
2. list the structures which may be injured with prolonged meniscal dysfunction.
3. list the potential consequences of complete meniscectomy.
4. discuss the natural history of meniscal cysts and knee joint loose bodies.

References:

1. Muckle DS. (1988). Meniscal repair in athletes. Sports Medicine 5, 1-5

2. Renstrom P., Johnson RJ. (1990). Anatomy and biomechanics of the menisci. Clinics in Sports Medicine 9, 523-538.

3. Cooper DE., Arnoczky SD., Warren RF. (1991). Meniscal Repair Clinics in Sports Medicine 10, 529-547.

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PROBLEM 8 PATELLOFEMORAL PAIN SYNDROME (PFPS):

Case presentation: A 22 year old female decided to "get fit" and embarked on a running program. She had been relatively sedentary during the preceding few years. She progressed until the third week of her program when she began to experience bilateral peripatellar discomfort. The discomfort was initially present only after hard runs, but then occured after easy workouts, and then even began at rest. The discomfort was more severe if she sat with her knee flexed for a prolonged period of time. She had pain climbing stairs. She had never experienced a severe knee injury in her past. She recalled having "chondromalacia" as a teenager. She had no swelling, locking or buckling of her knee joint. On examniation, she had significant forefoot overpronation in the standing position, genu valgum, and poor develpoment of her quadricep musculature, with significant wasting of the vastus medialis obliquus. She had medial patellar facet tenderness and a tight lateral patellar retinaculum. Testing of her collaterals, cruciates and menisci was normal. She was diagnosed as suffering from patellofemoral pain syndrome. She was prescribed semi-rigid orthotic devices to control her forefoot pronation, motion control shoes, an icing program, and a graduated program of strengthening exercises for her quadricep muscles involving straight leg raises and terminal knee extension, progressing to closed chain eccentric knee drops. She was much improved after 12 weeks of therapy.

A. ESSENTIAL REGIONAL ANATOMY: SEE PROBLEM 6A NETTER PAGES 476-483

B. REGIONAL EXAMINATION OF THE KNEE: SEE PROBLEM 6B

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. list 4 historical factors which suggest a diagnosis of patellofemoral pain syndrome.
2. recite 4 factors and/or training errors which cause or exacerbate the patellofemoral pain syndrome.
3. identify 5 anatomic factors which might predispose the patient to develop patellofemoral pain syndrome.

4. recite 3 factors which would predispose an adolescent to develop patellofemoral pain syndrome.

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. demonstrate or decribe the following physical findings;

i. Q angle

ii. patella alta

iii. patellar compression test

iv. patellar facet tenderness

v. vastus medialis obliqus atrophy

vi. patellar retinacular testing

vii. patellar apprehension sign

viii. patellar tracking

ix. forefoot overpronation (subtalar and forefoot varus)

x. genu varum/valgum

xi. pes planovalgus

xii. increased femoral anteversion

2. manual muscle testing of the quadriceps, hamstrings, hip abductors and hip adductors.

E. DIAGNOSIS:

The physician will be able to:

1. See Problem 6 E 2
2. list plain radiographic views to best evaluate the patellofemoral joint.
3. describe the radiographic signs of patellofemoral pain syndrome.
4. recite the limitations to the use of plain radiography in the diagnosis of patellofemoral pain syndrome.
5. list the indications and relative usefulness of arthrography, CT, MRI and arthroscopy in the diagnosis of PFPS.

F. TREATMENT:

The physician will be able to:

1. describe the etiology of PFPS to the patient.

2. prescribe modified activity to decrease the symptoms while allowing the maintenance of cardiovascular fitness.
3. list modalities to decrease acute inflammation in patellofemoral pain (See Problem 6 F 1).
4. identify modifiable intrinsic biomechanical factors which contribute to the development of patellofemoral pain, including:
i. use of motion control running shoes to control forefoot overpronation
ii. use of orthotics to control forefoot overpronation not amenable to running shoe correction.
iii. strengthening exercises to correct muscle strength imbalance in the lower extremity (eg. vastus medialis obliqus muscle, weak hip abductor musculature)
iv. stretching tight musculotendinous structures (eg. tight quadriceps and iliotibial band)
5. prescribe a graduated quadriceps strengthening protocol with particular attention to the vastus medialis obliquus, involving both isometric concentric and eccentric muscle strenghtening techniques.
6. describe the types of patellar stabilization sleeves, and their purported mechanism of action
7. describe the role of patellofemoral taping to improve patellar tracking
8. describe the role of surgical procedures in the treatment of patellofemoral pain, and outline two procedures currently used, and the outcomes expected.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. differentiate between the following conditions and their contribution to anterior knee pain and the patellofemoral pain syndrome:
i. synovial plica syndrome
ii. chondromalacia patella
iii. patellar tendonitis
iv. Sinding-Larssen-Johanssen syndrome
v. patellar subluxation/dislocation
vi. fat pad inflammation/impingement
vii. patellar osteochondritis dissecans

viii. patellofemoral osteoarthitis/osteoarthrosis

References:

1. Brunet ME., Stewart GW. (1989). Patellofemoral rehabilitation. Clinics in Sports Medicine 8, 319-330

2. Jacobson KE., Flandry FC. (1989). Diagnosis of anterior knee pain. Clinics in Sports Medicine 8, 179-196

3. Schmidt DR., Henry JH. (1989). Stress Injuries of the adolescent extensor mechanism. Clinics in Sports Medicine 8, 343-355.

4. Messier SP., Davis SE., Curl WW., Lowery RB., Pack RJ. (1991). Etiologic factors associated with patellofemoral pain in runners. Medicine and Science in Sport and Exercise 23, 1008-1015.

5. Labrier K., O'Neill DB. (1993). Patellofemoral stress syndrome: Current concepts. Sports Medicine 16, 449-459.

PROBLEM 9 MEDIAL COLLATERAL LIGAMENT INJURY OF THE KNEE JOINT:

Case presentation: A twenty year old male was playing football. He planted his right leg, preparing to tackle an approaching running back, when he was struck by an opposing blocker on the outside of his right knee. His knee was forced into a position of valgus at the knee joint and he felt immediate pain. He did not hear a pop. He was able to get up and was helped to the sidelines. He was examined by the team's trainer who noted only medial distal femoral tenderness. There was no apparent instability or swelling of the knee joint. The player was prohibited from returning to play, despite his demands to do so. Later that night, the patient began to experience more pain, had difficulty weight bearing and noticed swelling in the knee joint. You examined the patient two days after the injury and noted a moderate knee joint effusion but full active and passive range of motion with pain on full extension. There was tenderness over the medial epicondyle of the femur, and proximal medial tibia. Anterior drawer, Lachman and pivot shift tests were normal. There was slight opening of the medial joint line with valgus stressing 30 degrees of flexion, with a firm endpoint, and no opening at 0 degrees of extension. There was medial joint line tenderness, but McMurray's test was negative. Plain radiographs showed only a small knee joint effusion. You diagnosed a grade II medial collateral ligament sprain and prescribed a protective brace with a 10 degree extension stop and program of progressive quadriceps and hamstring strengthening exercises, as well as local icing and physical therapy. The patient improved consistently, and was able to return to football after 6 weeks of therapy. He wore a commercially available neoprene knee sleeve which had a medial stabilizing strut.

A. ESSENTIAL REGIONAL ANATOMY: SEE PROBLEM 6A Netter pages 476-483

B. REGIONAL EXAMINATION OF THE KNEE JOINT: SEE PROBLEM 6B

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. list the common mechanisms of acute injury to the MCL of the knee.
2. list 1 mechanism of overuse injury to the MCL.

3. list 3 common symptoms suggestive of a MCL injury.
4. describe the sequence of structures that fail with increasing valgus, varus, flexion and extension of the knee joint.

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. palpate the entire medial collateral ligament, with specific attention to its tibial, femoral, and meniscal attachments.
2. describe the rationale for testing collateral ligament integrity in both 0 and 30 degrees of flexion.
3. list and demonstrate the criteria for the each of first, second and third degree medial collateral ligament disruptions.
5. rule out associated intra-articular pathology such as:

i. meniscal injury (Problem 7D)
ii. anterior cruciate ligament injury (Problem 6D)
iii. patellar subluxation/dislocation.

E. DIAGNOSIS:

The physician will be able to:

1. describe the normal plain radiographic antomy of the knee (See problem 6E).
2. list the indications for and usefulness of radiographic valgus stress views of the knee joint.
3. list the indications for examination under anaesthesia in a patient with evidence of MCL injury.

F. TREATMENT:

The physician will be able to:

1. prescribe appropriate treatment measures to protect the patient with an acutely injured knee as well as maximize patient comfort (PRICE mnemonic/NSAIDS Problem 6 F 1-6)
2. advise the patient regarding the natural history of grades 1, 2, and 3 medial collateral ligament injuries.
3. recite the differences in treatment of grades 1, 2 and 3 medial collateral ligament injury.

4. list the indications for surgical consultation in an individual with a medial collateral ligament injury.
5. list the braces available to individuals with a medial collateral ligament injury, and their indications, both in the acute and subsequent return to activity phases.
6. describe the role of prophylactic knee bracing to protect the collateral ligaments

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. differentiate between the problems found in skeletally immature and skeletally mature patients.

References:

1. Baker BE. (1990). The effect of bracing on the collateral ligaments of the knee. Clinics in Sports Medicine 9, 843-852.

2. Indelicato PA. (1983). Non-operative treatment of complete tears of the medial collateral ligament. Journal of Bone and Joint Surgery 65A, 323.

3. Delitto A., Lehman RC. (1989). Rehabilitation of the athlete with a knee injury. Clinics in Sports Medicine 8, 805-840.

4. Kannus P., Jarvinen M. (1991). Thigh muscle function after partial tear of the medial ligament compartment of the knee. Medicine and Science in Sport and Exercise 23 4-9.

PROBLEM 10 OSTEOARTHRITIS OF THE KNEE JOINT (OSTEOARTHROSIS):

Case presentation: A forty-five year old female salesperson gradually began to notice left sided knee pain, at the end of her 8 hour shifts. The pain began insidiously, and was often worse at night while the patient was trying to sleep. She noticed swelling of the knee after walking for more than half an hour, and had began to feel "unstable" on that leg. The patient denied any recent injury or change in her pattern of physical activity. She related an injury to her right knee while skiing approximately ten years ago. She had been told at that time that she had a "cartilage tear", and claims that the injury caused her pain and swelling for about two months. The patient had a meniscectomy, then the symptoms began to subside. Your examination revealed a moderately obese woman (5'4" tall and 150 lbs) in no distress. Her standing alignment revealed genu varum bilaterally. Her left quadriceps musculature was wasted. She had a 5-10 degree flexion deformity of the left knee joint, with increased varus angulation. There was a moderate knee joint effusion. There was a boggy sensation on palpation of the left knee joint along with medial joint line tenderness. Ligament testing revealed anterior cruciate laxity. Standing plain radiographs revealed narrowing of the medial knee joint compartment with subchondral sclerosis and mild osteophyte formation of the distal femur. You diagnosed degenerative osteoarthritis of the medial compartment of the knee joint and prescribed weight loss, regular icing and NSAIDs, quadriceps and hamstring strengthening, decreased walking and a cycling program. You discussed an unloading medial compartment knee brace. The patient showed some improvement at the one month follow-up visit, but was still experiencing some discomfort. She was referred to an orthopedic surgeon who scheduled arthroscopy to attempt to debride any meniscal lesions contributing to her pain.

A. ESSENTIAL REGIONAL ANATOMY: SEE PROBLEM 6A

B. REGIONAL EXAMINATION OF THE KNEE JOINT: SEE PROBLEM 6B

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. describe 3 symptoms suggestive of a diagnosis of osteoarthritis of the knee joint.

2. describe how the following factors are related to the development of degenerative osteoarthritis of the knee joint:

i. sex of the patient

ii. angular knee deformity

iii. obesity

iv. joint instability (coronal, sagittal, rotational instability)

v. joint sepsis

vi. inflammatory diseases

vii. genetic predisposition to osteoarthritic changes in other joints

viii. previous meniscal or cruciate ligament injury

3. describe the pathophysiology of osteoarthritis as it applies to the knee joint.

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. describe the importance of the following physical findings:

i. bony and articular tenderness

ii. joint effusion

iii. bony hypertrophy

iv. synovial hypertrophy

v. varus deformity/valgus deformity

2. identify intra-articular pathology which predisposes to degenerative osteoarthritis of the knee joint including:

i. anterior and posterior cruciate ligament deficiency (Problem 6D)

ii. meniscal tears (Problem 7D)

iii. previous meniscectomy

E. DIAGNOSIS:

The physician will be able to:

1. describe the normal plain radiographic anatomy of the knee (See Problem 6 E 1-2).

2. describe the findings of degenerative arthritis of the knee joint seen on plain radiography, (normal and weight bearing views), including:

i. joint space narrowing

ii. subchondral sclerosis/cysts

iii. marginal osteophyte formation (squaring of femoral condyles)
iv. peaked intercondylar eminences
3. describe the role of synovial fluid analysis in the diagnosis of degenerative osteoarthirtis of the knee joint
4. describe the role of arthroscopy in the diagnosis of osteoarthritis of the knee joint.

F. TREATMENT:

The physician will be able to:

1. prescribe a modified activity regimen to accomplish the following goals;
i. maintain/improve muscle strength
ii. reduce loading on the involved knee
iii. maintain mobility of the involved knee
iv. maintain cardiovascular fitness
v. assist in weight loss
2. prescribe local modalities such as heat and ice to provide analgesia.
3. recite the indications and contraindications of oral NSAID use, their potential side effects, and the clinical criteria the physician must follow in a patient on long term oral NSAID's.
4. list the indications, contraindications, efficacy and complications of intra-articular corticosteroid and viscosupplementation injections.
5. describe factors to decrease load through the osteoarthritic knee joint including:
i. weight reduction
ii. increased muscular strength and endurance, with special emphasis on the quadriceps and hamstrings musculature
iii. use of a walking stick
iv. shock absorbing footwear
v. orthotic devices to decrease rotational and malalignment stress on the knee joint
vi. compartmental unloading braces
6. describe the indications, contraindications, efficacy and complications of braces to "unload" the affected athritic knee compartment.

7. list the indications and contraindications, efficacy and complications of the following surgical procedures:
   i. arthroscopic debridement
   ii. mechanical load altering procedures such as the high tibial osteotomy
   iii. total knee replacement

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. describe the following conditions which can be associated with osteoarthritis of the knee joint;
   i. patellofemoral osteoarthritis
   ii. calcium pyrophosphate deposition disease (pseudogout), gout, and all inflammatory arthritides.
   iii. rhematoid and seronegative arthritides

References:

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3. Hernborg JS., Nilson BC. (1977). The natural course of untreated osteoarthritis of the knee. Clinical Orthopedics 123, 130.

4. McCubbin JA. (1990). Resistance exercise training for persons with arthritis. Rheumatic Disease Clinics of North America 16, 931-943.

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6. Panush RS. (1990). Does exercise cause arthritis? Long-term consequences of exercise on the musculoskeletal system. Rheumatic Disease Clinics of North America 16, 827-836.

7. Horlick, SG., Loomer RL. (1993). Valgus Knee Bracing for Medial Gonarthrosis. Clinical Journal of Sport Medicine 3, 251-255.

III. COMMON PROBLEMS OF THE ELBOW:

PROBLEM 11 LATERAL EPICONDYLITIS OF THE ELBOW (TENNIS ELBOW):

Case presentation: A forty year old right handed male dentist spent the weekend working in his backyard building a fence. This required a great deal of hammering, using a screwdriver and sawing. During the next week he experienced lateral right elbow pain. He saw his family doctor who diagnosed "tennis elbow" and prescribed rest and ASA. Despite this treatment, the man's pain continued, and in fact worsened. He began to have difficulty doing his work, and soon could not even pick up a cup of coffee. He was unable to perform procedures at work which required right arm strength. Shaking hands lead to pain. The dentist was referred to an orthopedic surgeon who informed him that an operation was not necessary at that time. The surgeon prescribed local icing over the common forearm extensor origin, stretching of the extensor muscles, and began a program of strengthening of the forearm extensors, progressing from concentric to eccentric work with radial deviation of the hand at the wrist. After six weeks the dentist was much improved, and able to return to full work without pain.

A. ESSENTIAL REGIONAL ANATOMY: Netter: 411-425

The physician will be able to:

1. diagram the bony architecture of the elbow joint and identify the following structures:
   i. medial and lateral epicondyles of the humerus
   ii. radial head, neck, and tuberosity
   iii. olecranon process of the ulna, olecranon fossa of the humerus.
   iv. capitulum and trochlea of the humerus
   v. coronoid process of the ulna and coronoid fossa of the humerus.
2. describe the component parts, integrated function and innervation of the following muscle groups:
   i. forearm extensors and flexors
   ii. biceps brachii and triceps brachii
4. describe the position of the following neurovascular structures:
   i. ulnar, median, radial and posterior interosseous nerves
   ii. radial, ulnar, and brachial arteries

B. REGIONAL EXAMINATION OF THE ELBOW:

The physician will be able to:

1. perform a complete physical examination of the elbow joint involving:

i. inspection for any obvious bony or muscular abnormalities

ii. active and passive range of motion testing

iii. regional palpation of the following structures including:

a. the medial and lateral humeral epicondyles

b. the radial head

c. the radiocapitellar joint

d. the olecranon process

iv. upper extremity strength testing

v. medial and lateral collateral ligament testing

vi. neurovascular assessment of the upper extremity.

vii. identification of flexor or extensor muscular contractures.

viii. cervical spine movement

ix. shoulder joint range of motion

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. identify both traumatic and overuse factors in the etiology of lateral epicondylitis.

2. list 4 historical factors consistent with a diagnosis of lateral epicondylitis.

3. list 3 activities commonly involved in the etiology of lateral epicondylitis.

4. identify historical evidence of referred causes of elbow pain including:

i. cervical radiculopathy

ii. carpal tunnel syndrome

iii. brachial plexopathy

iv. myocardial ischemia

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able:

1. describe and perform the following tests to exacerbate lateral epicondylar pain:
   i. resisted wrist extension
   ii. resisted wrist radial deviation of wrist
   iii. resisted long finger extension

E. DIAGNOSIS:

The physician will be able to:

1. describe normal plain radiographic anatomy of the elbow (See Problem 11 A 1).
2. recite plain radiographic findings consistent with a diagnosis of lateral epicondylitis.
3. recite the indications for and limitations of CT, and MRI in the evaluation of lateral elbow pain.

F. TREATMENT:

The physician will be able to:

1. prescribe modified activity to decrease the stress on the injured area.
2. prescribe a comprehensive antiinflammatory regimen involving ice, anti-inflammatory medicines and physiotherapeutic modalities including:
   i. phonophoresis
   ii. ultrasound
   iii. electrotherapy
   iv. deep/transverse friction massage
3. prescribe a set of exercises to stretch the extensor musculature of the forearm.
4. prescribe a set of exercises to strengthen the extensor musculature of the forearm including concentric and eccentric work.
5. list the indications, contraindications, risks and benefits of local corticosteroid injection.
6. list the types of braces used in the treatment of lateral epicondylitis, and describe their method of action in the treatment protocol.
7. list ways to modify the technique of individuals involved in repetitive activities in order to decrease the stress on the lateral epiconylar area.

8. list ways to modify equipment to decrease the the stresses on the lateral epicondyle.

9. list the indications for surgery in lateral epicondylitis, and describe 2 common prodedures utilized.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. list and differentiate the following disorders which may mimic lateral epicondylitis:

i. posterior interosseous nerve compression (radial tunnel syndrome)

ii. radiocapitellar osteochondritis dissecans/degenerative arthrosis

iii. radial collateral ligament insufficiency/irritation

iv. osteochondritis dissecans of the capitulum

References:

1. Regan WD. (1991). Lateral elbow pain in the athlete: a clinical review. Clinical Journal of Sport Medicine 1, 53-58

2. Leach RE., Miller JK. (1987). Lateral and medial epicondylitis of the elbow. Clinics in Sports Medicine 6, 259-272

3. Watrous BG., Ho G. (1988). Elbow pain. Primary Care 15, 725-735.

4. Nirschl RP. (1992). Elbow Tendinosis/Tennis elbow. Clinics in Sports Medicine. 11, 851-871.

IV. COMMON PROBLEMS OF THE LOWER EXTREMITY:

PROBLEM 12 ACUTE LATERAL LIGAMENT SPRAIN OF THE ANKLE JOINT:

Case presentation: After jumping for a rebound, an 18 year old male basketball player lands on another players foot and feels his right ankle twist, and go into a position of inversion and plantar flexion. He experiences immediate pain, and cannot continue to play in the game. Within minutes he notices swelling of the ankle joint, and can no longer bear weight on the injured limb. He is taken to a local emergency department where plain radiographs are performed. These are interpreted as normal. He is told he has a sprained ankle, given crutches and a tensor bandage. Two weeks later he presents to your office with persistent lateral ankle pain. His ankle felt weak and unstable. He had an antalgic gait and mature contusion and swelling over the lateral aspect of his ankle joint. Proprioception of the lower extremity as assessed by a one legged balance test and was poor. He demonstrated tenderness to palpation over the lateral malleolus and lateral ligament complex, and a positive anterior drawer sign. There was weakness of the peroneal musculature, but no subluxation of the tendons. Repeat plain radiographs were normal. The patient was given an aircast and encouraged to begin weight bearing. He was advised to ice the area 15 minutes four times a day. He was instructed to perform active range of motion exercises of the ankle joint, and strengthen his peroneal musculature. He was given proprioception exercises to perform. A graduated program of agility drills and graded activites were prescribed to allow the patient to return to playing basketball. Four weeks after the injury he was playing again.

A. ESSENTIAL REGIONAL ANATOMY: Netter 492-499

The physician should be able to:

1. list and diagram the following anatomic structures:
   - i. distal fibula, tibia and talus, tarsal bones, metatarsal bones
   - ii. calcaneo-fibular, anterior and posterior talo-fibular ligaments
   - iii. deltoid ligament
   - iv. anterior and posterior inferior tibiofibular ligaments
   - v. plantar fascia

2. recite the anatomic structures which provide static and dynamic stability to the ankle joint.
3. list the function of the following muscle groups and their innervation:
i. achilles tendon/gastro-soleus complex
ii. peroneus brevis and longus muscles
iii. tibialis anterior and posterior muscles
4. identify and locate the important neurovascular structures which are in close proximity to the ankle joint.

B. REGIONAL EXAMINATION OF THE ANKLE JOINT:

The physician should be able to:

1. inspect for obvious deformity, redness, contusion, swelling or evidence of open fracture.
2. local palpation of the following structures:
i. lateral and medial ligament complexes
ii. distal tibulofibular joints/syndesmosis
iii. the lateral and medial malleoli and medial deltoid ligament
iv the talar dome (anterior aspect)
v the achilles tendon
vi. the proximal fifth metatarsal
vii. the doralis pedis and posterior tibial pulses.
viii. the peroneal tendons
3. test active and passive range of motion.
4. perform anterior drawer testing of the ankle joint.
5. assess strength of the ankle inverter and everter muscles.
6. assess proprioception of the lower extremity
7. stress the distal tibial-fibular syndesmosis

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. describe the common mechanism of injury of the lateral ligament complex of the ankle joint.
2. list 3 common symptoms associated with a lateral ligament strain of the ankle joint.
3. list 2 predisposing factors to the development of lateral ankle injuries.

4. describe the mechanism for injury to the tibulofibular syndesmosis.

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. demonstrate and describe the significance of an anterior drawer test of the ankle joint.
2. demonstrate the physical signs which characterize grades 1, 2, and 3 lateral ligament sprain to the ankle joint.

E. DIAGNOSIS:

The physician will be able to:

1. identify normal plain radiographic anatomy of the ankle joint.
2. list the views required to adequately evaluate the acutely injured ankle joint on plain radiography.
3. list the indications for inversion stress views of the ankle joint, and describe their role in patient management.
4. list the indications for and limitations of CT, bone scanning and MRI in the evaluation of lateral ankle joint sprains

F. TREATMENT:

The physician will be able to:

1. prescribe appropriate treatment measures to the patient with an acutely injured ankle joint, including:
   i. Protect the injured part
   ii. Rest of the extremity
   iii. Ice application
   iv. Compressive dressings
   v. Elevation of the extremity {the P.R.I.C.E.} mnemonic.
   vi. oral anti-inflammatory medications.
2. prescribe and apply protective devices to limit ankle mobility during the acute painful phase, including:
   i. plaster posterior splints
   ii. air casts
   iii. Ace/tensor bandages
   iv. ankle taping/strapping
   v. commercially available ankle braces

vi. subtalar stabilization braces attached to orthotics

2. discuss the relative merits and problems with the above mentioned forms of immobilization.

3. prescribe crutches and non-weight bearing status in cases of grade II-III ankle sprain.

4. prescribe various physiotherapeutic modalities in order to minimize swelling and scar tissue formation.

5. prescribe early range of motion exercises.

6. prescribe strengthening exercises for the ankle joint everter and inverter muscles

7. describe a task specific plan for the patient to return to full recreational and occupational activity, including progressive agility drills.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. list and identify the following disorders which can occur with or mimic acute lateral ligament sprain of the ankle joint:

i. avulsion fracture of the tuberosity of the fifth metatarsal

ii. fracture of the metaphysis of the fifth metatarsal

iii. peroneal tendon subluxation/dislocation

iv. osteochondral fracture of the talus

v. tibiofibular diastasis/syndesmotic sprain

vi. avulsion fracture of the fibula or tibia

vii. deltoid ligament injury

References:

1. Balduini FC., Vegso JJ., Torg JS., Torg E. (1987). Management and rehabilitation of ligamentous injuries to the ankle. Sports Medicine 4, 364-380.

2. Lassiter TE. Jr., Malone TR., Garret WE. Jr. (1989). Injury to the lateral ligaments of the ankle. Orthopedic Clinics of North America 20, 629-640.

3. Larkin J., Barge M. Ankle, Hindfoot, and midfoot injuries. In: Sports Medicine for the school-age athlete. Editor; Reider B. W.B. Saunders Philadelphia, PA. 1991 pp 240-254.

4. McConkey JP. (1987). Ankle sprains, consequences and mimics. Medicine and Science in Sport and Exercise 23, 39-55.

PROBLEM 13 CHRONIC ANKLE INSTABILITY:

Case presentation: A 24 year old female presents to your office with complaints of ankle pain and recurrent sprains. She states that she cannot wear high heeled shoes because they cause her right ankle to buckle. She complains that if she even steps on a pebble the wrong way she will sprain her ankle. She relates the onset of her problems to a severe ankle sprain she suffered playing volleyball one year previously. Her therapy for that injury involved plaster of Paris casting for 4 weeks. Subsequent to the injury, she received no physical therapy and had performed no exercises on her own. She complains that her ankle will swell after a long walk. Otherwise she is well. On examination, she had a normal gait and normal foot architecture. There was wasting of the right gastrocnemius. There was poor balance on the right leg compared to the left, weakness of the ankle inverters and everters compared to the left side, and a grade I anterior drawer sign of the ankle joint. There was no talar tenderness. Plain radiographs were normal, but inversion stress views revealed opening of the talocrural joint to 20 degrees on the affected side and 10 degrees on the normal side. The patient was diagnosed as suffering from chronic ankle instability, and advised regarding conservative and surgical management. She selected a conservative regimen and was referred to a physical therapist. She performed ankle inversion and eversion strengthening drills, as well as heel raises. She used a balance board for proproceptive retraining. She was prescribed an aircast to use in all weight-bearing situations. After two months of treatment, the patient demonstrated considerable improvement in strength and balance, and had not experienced another ankle sprain.

A. ESSENTIAL REGIONAL ANATOMY: SEE PROBLEM 12A. Netter 492-499.

B. REGIONAL EXAMINATION OF THE ANKLE JOINT: SEE PROBLEM 12B.

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. list 3 symptoms suggestive of chronic ankle instability.
2. list 2 factors responsible for chronic ankle instability
3. inquire about rehabilitative efforts after previous ankle sprains

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. perform the following tests

i. one legged balance testing of the ankle joint

ii. talar tilt/inversion stress

iii. demonstrate strength of the ankle inverter and everter muscles

iv. examine for peroneal tendon subluxation

v. palpate the anterior aspect of the talar dome.

vi. demonstrate anterior and posterior capsular impingement signs of the ankle.

E. DIAGNOSIS:

The physician will be able to:

1. describe the normal plain radiographic anatomy of the ankle joint.

2. describe the usefulness of examination under anaesthesia to assess ligamentous integrity of the ankle joint.

3. recite the indications for arthrography, bone scan, CT and MRI in the evaluation of chronic ankle instability.

F. TREATMENT:

The physician will be able to:

1. list measures to prevent recurrent ankle sprain including:

i. prophylactic ankle taping/strapping

ii. high top shoes

iii. ankle stabilization braces

iv. air casts

2. prescribe a program of rehabilitaion exercises and activities to address:

i. ankle inversion and eversion strength

ii. lower extremity balance.

iii. ankle flexibility

3. list the use of therapeutic braces in chronic ankle instability

4. list the indications of and usefulness of surgical ankle ligament reconstruction.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. identify the following conditions which can complicate ankle sprain and lead to chronic instability: See Problem 12 G.

References:

1. Diamond JE. (1989). Rehabilitation of ankle sprains. Clinics in Sports Medicine. 8, 877-892.

2. Lassiter TE. Jr., Malone TR., Garret WE. Jr. (1989). Injury to the lateral ligaments of the ankle. Orthopedic Clinics of North America 20, 629-640.

3. Larkin J., Barge M. Ankle, Hindfoot, and midfoot injuries. In: Sports Medicine for the school-age athlete. Editor; Reider B. W.B. Saunders Philadelphia, PA. 1991 pp 240-254.

4. McConkey JP. (1987). Ankle sprains, consequences and mimics. Medicine and Science in Sport and Exercise 23, 39-55.

5. Balduni FC., Vegso JJ., Torg JS., Torg E. (1987). Management and rehabilitation of ligamentous injuires to the ankle. Sports Medicine 4, 364-380.

6. Karlsson J., Lansinger O. (1993). Chronic lateral instability of the ankle in athletes. Sports Medicine 16, 355-365

PROBLEM 14 PLANTAR FASCIITIS:

Case presentation: A 45 year old female began to notice the insidious onset of pain in her right heel six months prior to coming to your office. She had entered an aerobics program at her local church two weeks prior to noticing this pain. The pain was most severe with her first few steps in the morning. She also had significant pain when she rises from being seated for a long period of time. The patient finds it difficult to do her work as a teacher, as being on her feet for a long period of time tends to increase her pain. She experiences occasional numbness toward the arch of her foot, and she describes her arches as feeling "tired" or "bruised". There was no history of a seronegative spondyloarthropathy. Your examination revealed a pleasant, slightly obese woman with significant forefoot overpronation, six degrees of rearfoot varus alignment, and an additional six degree of forefoot varus alignment. She had pes planus and genu valgum. She had exquisite tenderness over the medial calcaneal tuberosity, which was exacerbated with toe dorsiflexion. She had decreased flexibility of the achilles tendons, and was only able to dorsiflex her ankle joints 5 degrees. Tinel's sign over the tarsal tunnel was negative. You diagnosed plantar fasciitis and prescribed a program of antiinflammatory therapy involving ice and enteric coated ASA, a stretching program for her plantar fascia and heel cords, a strengthening program for the intrinsic musculature of her foot and gastrocnemii, and semi-rigid orthotic devices to control her forefoot overpronation. Six weeks later, she is somewhat better, but still experiencing enough pain to make her stay home from work.

A. ESSENTIAL REGIONAL ANATOMY: Netter 492-505

The physician will be able to:

1. diagram the bones of the foot and ankle. (See Problem 12 A 1).
2. diagram the plantar fascia and its bony attachements
3. specify the location of the following anatomic structures in relation to the plantar fascia;

i. posterior tibial nerve, medial and lateral plantar nerves

B. REGIONAL EXAMINATION OF THE FOOT:

The physician will be able to:

1. inspect the patients standing and walking alignment.

2. evaluate the transverse and longitudinal arches of the foot and differentiate between cavus and planus longitudinal arch configurations.
3. assess the functional movements of pronation and supination.
4. palpate the following structures:

i. achilles tendon
ii. tarsal bones and metatarsal bones
iii medial calcaneal facet
iv. plantar fascia
v. posterior tibial and dorsalis pedis pulses
vi. tarsal tunnel
vii. metatarsophalangeal joints

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. list 3 symptoms suggestive of plantar fasciitis.
2. describe 2 intrinsic biomechanical factors which might predispose to the development of plantar fasciitis.
3. list 3 other factors which are involved in the etiology of plantar fasciitis.
4. list 2 systemic conditions which can be involved in the etiology of plantar fasciitis.

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. demonstrate the flexibility of the achilles tendon-gastrosoleus complex.
2. demonstrate 2 diagnostic maneuvres to exacerbate the pain of plantar fasciitis.
3. perform a tarsal tunnel Tinel's sign.
4. identify the position of "subtalar neutral".
5. measure rearfoot and forefoot alignment with a goniometer.

E. DIAGNOSIS:

The physican will be able to:

1. identify normal plain radiographic anatomy of the foot.

2. list the plain radiographic signs consistent with a diagnosis of plantar fasciitis.
3. describe the clinical significance of radiologically identified plantar heel spurs in relation to plantar fasciitis.
4. list the indications for, and limitations of, bone scan in individuals with heel pain.
5. list appropriate serologic investigations to rule out systemic factors involved in the etiology of plantar fasciitis.

F. TREATMENT:

The physician will be able to:

1. prescribe a program of modified activity to decrease the stresses placed on the plantar fascia.
2. identify and correct intrinsic biomechanical factors which predispose to plantar fasciitis including:

i. motion control shoes or semirigid orthotic devices for individuals with forefoot overpronation

ii. shock absorbing insoles, curved last shoes or soft orthotic devices for individuals with cavus, rigid feet.

iii. heel lift

iv. arch massage

4. prescribe an anti-inflammatory regimen including:

i. local ice application

ii. NSAID's

iii. physiotherapeutic modalities to decrease inflammation

5. prescribe a protocol of stretching exercises for the plantar fascia and the achilles tendon/gastrosoleus complex.
6. list the effectiveness and indications for "low-dye" taping and be able to apply this.
7. list the indications and describe exercises for the intrinsic muscles of the foot.
8. prescribe a protocol of strengthening exercises for the achilles tendon/gastrosoleus complex, and differentiate between eccentric and concentric exercises.
9. list the indications, limitations and complications of local corticosteroid injection.

10. prescribe a task-specific regimen to allow the patient to return to full activity.
11. list the indications for plantar fascia release, and describe the most commonly performed surgical procedures.
12. list the indications for use of a night splint, and explain its theoretical basis in the treatment of plantar fasciitis.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. differentiate between plantar fasciitis and the following conditions which can present with heel pain:
   i. tarsal tunnel syndrome
   ii. calcaneal stress fracture
   iii. nerve impingement syndromes in the hindfoot
   iv. achilles tendonitis

References:

1. Baxter DE., Pfeffer GB., Thigpen M. (1989). Chronic heel pain. Orthopedic clinics of North America ,20 563-570.

2. Torg JS., Pavlov H., Torg E. (1987). Overuse Injuries in sport: the foot Clinics in Sports Medicine, 6, 291-319.

3. Warren BL. (1990). Plantar fasciitis in runners. Treatment and prevention. Sports Medicine, 10, 338-345.

4. Chandler TJ., Kibler WB. (1993). A biomechanical approach to the prevention, treatment and rehabilitation of plantar fasciitis. Sports Medicine, 15, 344-352.

PROBLEM 15: ACHILLES TENDONITIS:

Case presentation: A 50 year old female presents to your office with a 6 week history of right heel discomfort. The patient first experienced this pain after going for a run with her 15 year old daughter. The route entailed a great deal of uphill terrain. The patient's pain was worse with any walking, and limited her in her occupation as a physician, where she is on her feet for prolonged periods of time. The patient had attended her doctor after one week, who diagnosed achilles tendonitis and prescribed rest, heat, and aspirin. After five more weeks the patient has had minimal improvement, and finds that heat application increases the swelling and redness and pain. The patient has no other sore joints, and a complete review of systems is normal. There is no family history of rheumatic conditions. On examination, the patient stands with planovalgus feet, which have significant overpronation during the midstance phase of gait. She had only five degrees of right ankle dorsiflexion, and slight right gastrocnemius wasting. There is thickening and crepitus over the achilles tendon on the right, with warmth and tenderness just proximal to the site of insertion on the calcaneus. Neurologic examination is normal. You concur with the diagnosis of achilles tendonitis, and order a CBC, ESR, serum uric acid level, rheumatoid factor test and a urinalysis. These are all normal. Plain radiographs reveal a bone spur on the proximal surface of the calcaneus at the insertion of the achilles tendon. You prescribe a regimen of modified activity, avoiding weight bearing acitivity, particularly hill walking or running. You advise the patient to ice the achilles area 15 minutes four times a day and prescribe Ibuprofen 400 mg po t.i.d. She is instructed how to perform achilles tendon/gastrosoleus complex stretching and concentric progressing to eccentric strengthening exercises, and given a protocol to gradually return to normal levels of activity. At her one month follow-up visit, the patient had less discomfort. Despite being prescribed a graduated program to return to activity, the patient went for a 6 mile run the day after seeing you. That evening her pain was worse than it ever had been.

A. ESSENTIAL REGIONAL ANATOMY OF THE LEG: Netter 482-499

The physician will be able to:

1. diagram the bony anatomy of the lower leg including the tibia, fibula, and bones of the foot. (See Problem 12 A)
2. diagram the tendoachilles/gastrosoleus complex.

3. list the fascial compartments of the lower limb, and diagram the position of following neurovascular structures:
   i. superficial peroneal nerve
   ii. deep peroneal nerve
   iii. posterior tibial nerve
   iv. anterior and posterior tibial arteries
   v. peroneal artery
   vi. saphenous vein
4. describe the function of the muscle groups in the four fascial compartments of the leg and their innervation.
5. list the contents of the tarsal tunnel and specify its location

B. REGIONAL EXAMINATION OF THE LOWER LEG:

The physician will be able to:

1. inspect for muscular asymmetry or wasting of the tendoachilles area.
2. inspect for lower limb alignment and foot alignment
3. demonstrate active and passive range of motion of the ankle joint, observe the functional movement, and list the normal values in degrees.
4. palpate the achilles tendon/gastrosoleus complex
5. assess the neurovascular function of the lower extremity with specific reference to:
   i. the posterior tibial and dorsalis pedis pulses
   ii. the ankle jerk
   iii. sensation to light touch and pain
   iv. strength testing of the muscles of ankle plantar and dorsiflexion, subtalar inversion and eversion

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. list 4 factors and/or training errors which predispose to the development of achilles tendonitis.
2. recite three symptoms consistent with a diagnosis of achilles tendonitis.

D. SPECIFIC PHYSICAL FINDINGS IN ACHILLES TENDONITIS:

Th physician will be able to:

1. perform a Thompson test and describe its significance
2. perform a Tinel sign over the tarsal tunnel
3. identify areas of crepitus, nodules or defects in the achilles tendon
4. identify functional forefoot overpronation which may contribute to achilles tendonitis.
5. describe the "whipping action" of the achilles tendon which occurs during the stance phase of gait.
6. identify the area of relative avascularity of the achilles tendon.

E. DIAGNOSIS:

The physician will be able to:

1. describe the normal plain radiographic appearance of the foot and ankle.
2. identify and describe the significance of calcaneal bone spurs.
3. list appropriate serologic investigations to rule out systemic causes of achilles tendonitis.
4. list the usefulness and indications for ultrasound in the diagnosis and classifications of tendinopathies.

F. TREATMENT:

The physician will be able to:

1. prescribe appropriate activity modification to decrease the stress on the achilles tendon.
2. describe the use of anti-inflammatory modalities including, ice, NSAIDs and physiotherapeutic modalities
3. describe the use of the following appliances to correct biomechanical factors which may be contributing to the problem of achilles tendonitis:
   i. heel lift
   ii. semi-rigid and soft orthotic devices
   iii. motion control footwear
4. demonstrate safe exercises to increase the flexibility of the tendoachilles/gastrosoleus complex.
5. demonstrate concentric and eccentric exercises to increase the strength and endurance of the achilles tendon/gastrosoleus complex.

6. describe the potential concerns regarding cortisone injection in this area.
7. list the indications for surgery, and two common surgical procedures used in refractory achilles tendonitis.
8. outline a graduated program for the return to running (walk-run program).

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. identify the following disorders associated with posterior lower leg pain:
   i. tarsal tunnel syndrome
   ii. retrocalcaneal bursitis
   iii. calcaneal stress fracture
   iv. achilles peritendinitis/achilles tendinosis
   v. posterior tibial tendinitis
   vi. tibial stress syndrome
2. identify a ruptured achilles tendon
3. describe the association between systemic inflammatory conditions and achilles tendonitis

References:

1. Clement DB., Taunton JE., Smart GW. (1984). Achilles tendinitis and peritendinitis; Etiology and treatment. American Journal of Sports Medicine, 12, 179-184.

2. Pope CF. (1992). Radiologic evaluation of tendon injuries. Clinics in Sports Medicine, 11, 579-600.

3. Kibler WB., Chandler TJ., Pace BK. (1992). Principles of rehabilitation after chronic tendon injuries. Clinics in Sports Medicine, 11, 661-672.

4. Leach RE., Schepsis AA., Takai H. (1991). Achilles tendinitis: don't let is be an athlete's downfall. Physician and SportsMedicine, 19, 87-92.

5. Williams JGP. (1993). Achilles tendon lesions in sport. Sports Medicine, 16, 216-220.

6. Galloway MT., Jokl P, Dayton OW. (1992). Achilles tendon overuse injuries. Clinics in Sports Medicine, 11,771-782.

PROBLEM 16 TIBIAL STRESS SYNDROME:

Case presentation: A 36 year old female had been running recreationally for approximately one year, when she decided to train for a marathon. After her first run over ten miles in length, she began to experience medial tibial discomfort in her right leg. This pain was initially only present after her runs, but began to bother her during exercise. She persisted in her training, and the pain increased such that it causesd her pain with activities of daily living. She had recently purchased a pair of "racing" shoes which she trained in. She was otherwise in excellent health. She had tried over-the-counter anti-inflammatories without reduction in her pain. On examination the patient stood with forefoot pronation and had increased pronation with the stance phase of gait. She had reproduction of her typical tibial pain with hopping on the right leg. There was no evidence of muscle herniation in the lower leg, and repeated heel and toe raises did not lead to pain. There was a localized area of tenderness over the medial aspect of the tibia, at the junction of the middle and distal thirds. Neurologic examination was normal. Plain radiographic examination was normal. The patient was intent on training despite her physician's recommendations to the contrary, so a technetium bone scan was performed to confirm the diagnosis of tibial stress fracture. This showed a grade four tibial stress fracture. The patient was then encouraged to pool run, cycle, and ice the tibial area four times a day. She was prescribed a motion control training shoe more appropriate for her activity. She was given a comprehensive lower limb stretching and strengthening protocol. After eight weeks, she had no pain to hop on the affected leg, and began a walk-run program. In three more weeks she was again training well, and completed her marathon in just over 4 1/2 hours.

A. ESSENTIAL REGIONAL ANATOMY: SEE PROBLEM 15 A 1-5. Netter 482-493

B. REGIONAL EXAMINATION OF THE LOWER LEG: SEE PROBLEM 15 B 1-5

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. describe the relationship of leg pain to exercise, and the diagnostic significance of this relationship, including:
   i. time of onset of pain in the workout

ii. does the pain preclude continued activity?

iii. does the pain stop with cessation of the activity?

2. list extrinsic historical factors which can lead to tibial stress lesions including:

i. training errors

ii. inappropriate footwear

iii. poor running surfaces

iv. poor running technique

3. list intrinsic factors which can lead to tibial stress lesions including:

i. biomechanical malalignment

ii. muscle weakness/strength imbalance

iii. poor flexibility

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. identify the following features seen in patients with "shinsplints";

i. tibial tenderness and induration

ii. fascial compartment muscle hernias

iii. overpronation in the stance phase of gait

iv. a positive "Hop test"

v. assess for strength imbalance in the lower extremity (peroneal musculature and tibialis posterior)

vi. symptoms produced by repetitive muscle use in the clinical setting

E. DIAGNOSIS:

The physician will be able to:

1. describe the normal plain radiographic anatomy of the lower leg.

2. recite the limitations of plain radiography in the diagnosis of tibial stress lesions.

3. list the indications for technetium bone scintigraphy in patients with suspected tibial stress lesions.

4. list the indications, contraindications, and general usesfulness of intracompartmental pressure measurement in the investigation of lower leg pain associated with exertion.

5. list 4 etiological factors in the develpoment of stress fractures.

F. TREATMENT:

The physician will be able to:

1. advise the patient regarding the natural history of tibial stress syndrome.
2. prescribe:

i. modified activity to decrease impact loading
ii. ice application
iii. oral NSAIDs
iv. strength and flexibility exercises for the lower extremity

3. correct contributory intrinsic biomechanical factors including:

i. motion control shoes or semirigid orthotic devices for overpronation
ii. heel lift
iii. cushioning/flexible shoes for cavus/rigid feet
iv. long leg air casts

4. list the indications for referral to a physical therapist.
5. advise the patient with chronic exertional compartment syndrome regarding the relative efficacy of surgical and conservative treatment.
6. list the indications for fasciotomy in patients with chronic exertional compartment syndromes.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. list and identify the following disorders which fall under the umbrella term "shinsplints", and detail factors which help in differentiating the disorders:

i. posterior tibialis tendonitis
ii. tibial stress fractures
iii. fibular stress fractures
iv. peroneal tendinitis
v. tibial periostitis
vi. chronic exertional compartment syndromes
vii. acute compartment syndromes
viii. popliteal artery entrapment

References:

1. Styf J. (1989). Chronic exercise-induced pain in the anterior aspect of the lower leg. An overview of diagnosis. Sports Medicine, 7, 331-339.

2. Jones DC., James SL. (1987). Overuse injuries of the lower extremity: shin splints, iliotibial band friction syndrome, and exertional compartment syndromes. Clinics in Sports Medicine, 6, 273-290.

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4. Milgrom C., Giladi M., Stein M. (1986). Medial tibial pain. Clinical Orthopedics and Related Research, .213, 168-171.

5. Trevino S., Baumhauer JF. (1992). Tendon injuries of the foot and ankle. Clinics in Sports Medicine, 11, 727-740

PROBLEM 17: METATARSALGIA:

Case presentation: A 22 year old college student was working as a waiter for his summer employment. After the third week of work, the man began to experience aching in his forefoot after his shifts. With continued work, the pain began to increase, and was prohibiting the patient's sleep. After five weeks the patient could no longer work, and attended your clinic. His past medical history was unremarkable. He had been relatively sedentary during the spring. On examination the patient stood with genu valgum and pes planovalgus. There was overpronation during the stance phase of gait. The patient had a Morton's foot. There was collapse of the transverse metatarsal arch, and there was a large callous under the plantar aspect of the second and third metatarsal heads. There was hallux valgus. There was pain to hop on both feet. There was dramatic tenderness over the right and left second and third metatarsals. There was slight swelling and induration over the right metatarsals. Plain radiographs were normal. The patient's condition was diagnosed as bilateral metatarsalgia, with potential stress fractures of the 2nd and 3rd metatarsals. You elected to perform a bone scan which revealed focal increased uptake of both right and left second and third metatarsals. You advised the patient to stop work until simple walking was pain free. The patient was to cycle, swim or pool run to maintain cardiovascular fitness. Ice application and naproxen 250 mg. t.i.d. were prescibed. You referred the patient to an orthotist for a semirigid orthotic devices with a metatarsal pad to unweight the metatarsals. You see the patient after three weeks of this regimen, and he is pain free with hopping and walking. You prescribe a gradual return to full activity and work.

A. ESSENTIAL REGIONAL ANATOMY OF THE FOOT: SEE PROBLEM 12 A Netter 492-505

B. REGIONAL EXAMINATION OF THE FOOT: SEE PROBLEM 12 B

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. list 3 symptoms suggestive of metatarsalgia.
2. list 3 activities associated with the development of metarsalgia.
3. describe the association between improper footwear and the development of metatarsalgia.

4. differentiate between structural and functional metarsalgia.
5. list 3 systemic diseases which can present with metatarsalgia.
6. list 2 symptoms suggestive of an interdigital (Morton's) neuroma.
7. list 2 symptoms suggestive of a metatarsal stress (March) fracture.

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. identify and define the Morton's foot and describe its relationship to metatarsalgia.
2. describe how cavus and planus feet can be associated with metatarsalgia
3. identify evidence of abnormal stress patterns on the foot including:
   i. bunions/hallux valgus
   ii. callosities
4. define how the decreased transverse metatarsal arch contributes to metatarsalgia.
5. define the "Mulder's click" and perform this diagnostic maneuvre.
6. identify and define the classic appearance of gout.
7. palpate the interdigital nerve and recite the most common location of an interdigital neuroma.
8. recite 3 signs of peripheral vascular disease which may present with metatarsalgia.
9. identify evidence of peripheral neuropathies which may present with foot pain and or numbness.

E. DIAGNOSIS:

The physician will be able to:

1. recite the normal plain radiographic anatomy of the foot.
2. describe and identify the plain radiographic signs of the following causes of metatarsalgia:
   i. hallux valgus (bunion)
   ii. metatarsal stress fracture (early versus late)
   iii. gout
   iv. hallux rigidus ("turf toe")
   v. sesamoiditis

vi. rheumatoid arthritis

vii Frieberg's infraction

3. list the indications for technetium bone scanning in the patient with metatarsalgia.

F. TREATMENT:

The physician will be able to:

1. advise the patient regarding the natural history of metatarsalgia.
2. prescribe modified activity to decrease the stress on the forefoot.
3. prescribe anti-inflammatory therapy as appropriate.
4. list the indications for prescription of the following biomechanical devices for patients with metatarsalgia:

i. motion control/shock absorbing shoes

ii. soft and semirigid orthotic devices

iii. metatarsal pads

iv. metatarsal extensions

v. 2-5 metatarsal bars/sesamoid cutouts

vi. rigid soled shoes

vii. rocker bottom shoes

5. list the indications for cortisone injection in the patient with an interdigital neuroma.
6. list the indications for surgical release of an interdigital neuroma.
7. list the indications for bunionectomy.
8. recite the initial therapy for an acute gouty attack.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. identify and describe the following disorders which present as metatarsalgia:

i. sesamoiditis

ii. metatarsal stress fractures

iii. interdigital (Morton's) neuroma

iv. Tarsal Tunnel syndrome

v. gout

vi. hallux valgus

vii. hallux ridigus

viii. rheumatoid arthritis
ix. degenerative osteoarthritis
x. peripheral vascular disease
xi. peripheral neuropathies (diabetic, drug and alcoholic, nutritional)
xii. Frieberg's infraction

References:

1. Gould JS. (1989). Metatarsalgia. Orthopedic Clinics of North America,. 20, 553-562.

2. Torg JS., Pavlov H, Torg E. (1987). Overuse injuries in Sport: The foot. Clinics in Sports Medicine, 6, 291-321.

3. Clinical Policies. American Academy of Orthopedic Surgeons June 1992 p 4-6 abd 10-12.

PROBLEM 18 DEGENERATIVE OSTEOARTHRITIS (OSTEOARTHROSIS) OF THE HIP JOINT:

Case presentation: A 62 year old moderately overweight female presents to your office with the complaint of right hip pain. The pain began insidiously one year ago, and was initially only bothersome after the patient performed long hours of housework. The pain would subside with rest. However, over the pasts few months, the pain had become progressivley worse, and had begun to keep the woman awake at night. The hip was very stiff in the morning upon arising from bed. There were no other associated symptoms, and no other sore joints. The patient had experienced problems with her right knee in the past, having sustained cartilage damage, and undergone a total meniscectomy nine years previously. There was no family history of arthritis and no personal history of prior hip difficulties. On examination, the patient was in no acute distress. She had an antalgic gait, favoring the right leg. The pelvis was angled downward to the right, painful side while standing. There was no Trendelenberg's sign. There was a mild lumbar concave right scoliosis. There was no palpable vertebral or hip tenderness. There was decreased right hip range of motion in abduction, external rotation and extension, and decreased strength of the hip abductors. Plain radiographs of the hip revealed joint space narrowing with acetabular and femoral subchondral sclerosis and cysts, with acetabular osteophyte formation. A CBC, rheumatoid factor, uric acid and ESR were all within normal limits. The patient was diagnosed as suffering from osteoarthritis of the hip joint and told to avoid weight bearing and to lose weight. She was prescribed Feldene 20 mg p.o. o.d. The patient had some relief of her discomfort and was able to sleep more soundly. After one month of this therapy, the patient developed black stools and began to feel weak and lightheaded. She was taken to an emergency department and found to be experiencing upper gastrointestinal bleeding. Her hemoglobin was down to 94 g/L. The patient was stabilized and admitted to hospital. There was some difficulty controlling her GI bleeding, which was believed to be related to her NSAID use, and she required blood transfusions and a two week hospital stay. Upon discharge from hospital she had more pain in her hip than in the past, and was referred to an orthopedic surgeon who specialized in total hip joint arthroplasty. After being on a waiting list for three months, the patient had her scheduled operation. She tolerated the procedure well. At the one year follow-up

visit the patient was dong well, with no pain, normal sleep habits and actively involved in a Senior's swim class.

A. ESSENTIAL REGIONAL ANATOMY: NETTER 457-475.

The physician will be able to:

1. list and diagram the following anatomic structures:

i. coxal bone (ischium, ilium, pubis, ASIS, AIIS, PSIS, ischial tuberosity)

ii. femur (head, neck, greater and lesser trochanters)

iii. sacrum

iv. gluteal, hamstring, quadriceps, adductor, abductor, internal and external rotator muscle groups.

v. sciatic, femoral, obturator nerves

vi. femoral and profunda femoris arteries.

B. REGIONAL EXAMINATION OF THE HIP JOINT:

The physician will be able to:

1. assess the gait of the patient with hip pain
2. inspect the patient for;

i. leg length discrepancy

ii. pelvic obliquity

iii. lumbar scoliosis

iv. abdominal and lower extremity vascular integrity

v. lower extremity neurological assessment

3. assess hip range of motion
4. test hip muscle power (compared to the contralateral limb)

C. SPECIFIC HISTORICAL FINDINGS:

The physician will be able to:

1. list 3 symptoms suggestive of osteoarthritis (OA) of the hip.
2. describe how the following historical factors are related to the development of OA of the hip:

i. Legg Calves Perthes disease

ii. congential hip dislocation/acetabular dysplasia

iii. slipped capital femoral epiphysis

iv. obesity

v. occupational/recreational factors
vi. joint sepsis
vii. inflammatory diseases
viii. gender
ix. leg length discrepancy
x. sacro-iliac joint dysfunction

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. describe the importance of the following physical findings;
i. bony and local hip tenderness
ii. synovial hypertrophy
iii. adduction deformity of the involved hip
iv. pelvic obliquity
v. lumbar scoliosis
2. describe the usual pattern of hip range of motion limitation in OA.

E. DIAGNOSIS:

The physician will be able to:

1. describe the normal plain radiographic anatomy of the hip joint.
2. describe 3 typical plain radiographic findings in OA of the hip.
3. list the indications and usefulness of CT, MRI, and bone scan in the investigation of patients with suspected OA of the hip.
4. list appropriate serologic investigations to rule out systemic disease in the patient with OA of the hip.

F. TREATMENT:

The physician will be able to:

1. advise the patient regarding the natural history of DOA of the hip.
2. prescribe modified activity to the patient to ensure:
i. decrease impact loading of the hip associated with repetitive weight bearing.
ii. increase strength and flexibility of the hip joint musculature
3. list the indications, contraindications, side effects and usefulness of the following forms of pharmacologic therapy:
i. NSAIDs

ii. non NSAID analgesics
iii. muscle relaxants
iv. sedative hypnotics
4. list 3 pharmacologic methods used to prevent gastric NSAID induced injury and their relative efficacy.
5. prescribe specific exercises to maintain hip joint range of motion and strength.
6. list 3 exercises which allow maintenance of cardiovascular endurance without placing undue stress on the hip joint.
7. discuss the relationship between regular exercise and the development of degenerative arthritis.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. list the significance of the disorders in problem 18 C 2 in relation to DOA of the hip.

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5. Panush RS. (1990). Does exercise cause arthritis? Long-term consequences of exercise on the musculoskeletal system. Rheumatic Disease Clinics of North America, 16, 827-836.

V. COMMON PROBLEMS INVOLVING THE CERVICAL SPINE:

PROBLEM 19 MUSCULOLIGAMENTOUS STRAIN/SPRAIN OF THE NECK (THE WHIPLASH SYNDROME):

Case presentation: A 25 year old female seated in her automobile while stopped at a red light was struck from the rear, by a car that was sliding out of control. The patient was wearing a lap and shoulder harness, but still struck her head on the windshield. She thinks she may have been rendered unconscious for a short period of time after the accident. Within minutes of the collision she began to experience pain in her neck, and felt stiff. She also developed a severe headache which radiated form her occiput to the frontal region of her scalp. The patient was taken to a local emergency room where xrays were performed, but she is unaware what they showed. She was prescribed "muscle relaxants", but did not fill the prescription. She presents to your office the following morning, as the pain and stiffness had increased overnight. She had no paresthesiae, nor any weakness in the upper extremities. Her past medical history was unremarkable. On examination, the patient was in mild distress. She had lost her normal cervical lordosis, and had symmetrically decreased active and passive range of motion of the cervical spine in all planes. There was no spinous process tenderness, but there was bilateral tenderness over the trapezeii and sternocleidomastoid muscles. Shoulder range of motion was full, and upper extremity neurovascular status was normal. You obtain the xrays, and there is decreased cervical lordosis and a 1-2 mm anterior slip of C5 on C6, with no soft tissue swelling. You order flexion and extension views and obliques of the cervical spine, and these show no change in the slip, and are interpreted as normal. You diagnose a musculoligamentous sprain of the paracervical soft tissue structures and prescribe a non-steroidal agent and refer the patient to a physical therapist for isometric neck exercises, massage and local therapy with ultrasound. Despite good therapy, the patient is unable to perform her occupation as a police officer due to persistent neck pain and stiffness.

A. ESSENTIAL REGIONAL ANATOMY OF THE CERVICAL REGION: Netter 12-30

The physician will be able to:

1. list and diagram the following anatomic structures;

i. the cervical vertebrae

ii. the supporting soft tissue structures of the cervical spine including:

a. ligamenta flava

b. ligamenta nuchae

c. anterior and posterior longitudinal ligaments

d. intervertebral discs

e. sternocleidomastoid, trapezeius and scalene muscle groups

iii. the cervical nerve roots

iv. the vertebral artery

B. REGIONAL EXAMINATION OF THE CERVICAL SPINE

The physician will be able to:

1. inspect the cervical spine for:

i. maintenance of the cervical lordosis

ii. muscle spasm

iii. assymmetry of movement

iv. passive and active range of motion in degrees

2. palpate for:

i. bony tenderness

ii. muscular spasm, irritability, or tenderness

3. perform a complete neurovascular assessment of the upper extremity, including:

i. strength

ii. deep tendon reflexes

iii. sensation

iv. muscle tone

v. coordination

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. recite the common mechanism of injury in the "whiplash syndrome"

2. list 3 common symptoms of the "whiplash syndrome".

3. document any neurologic symptoms associated with the injury

4. document any upper airway or gastrointestinal symptoms associated with the injury.

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. document neurologic function accurately (Glasgow Coma Scale).
2. perform a cervical spine compression test (foraminal compression).
3. inspect and palpate the thoracolumbar spine for associated injury.

E. DIAGNOSIS:

The physician will be able to:

1. identify and describe the normal cervical plain radiographic anatomy with reference to:

i. bony alignment (four longitudinal lines)
ii. soft tissue swelling
iii. predental space
iv. odontoid process
v. vertebral fractures/dislocations

2. list the indications and contraindictations for performing flexion/extension/oblique radiographs of the cervical spine.
3. list the indications for CT and MRI of the cervical spine.

F. TREATMENT:

The physician will be able to:

1. recite the indications for emergency application of a hard (Philadelphia collar) and be able to apply this device.
2. recite the contraindications to removal of the collar prior to obtaining normal lateral cervical spine radiographs.
3. recite the indications, contraindications, benefits and complications of a soft cervical collar.
4. list the indications, contraindications, and complications of the following pharmacologic agents:

i. simple analgesics
ii. narcotic analgesics
iii. NSAIDs
iv. muscle relaxants
v sedative hypnotics

5. list the indications and uses of cyrotherapy and thermal therapy.

6. prescribe cervical spine, shoulder, and thoracoscapular flexibility and strenghtening exercises.
7. list the indications for referal to a physical therapist.
8. describe the effectiveness, indications and contraindications of alternative forms of pain control including TENS, accupuncture, ultrasound, interferential current and electric myostimulation.
8. advise the patient regarding the natural history of cervical spine musculoligamentous strain.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. list and identify the following disorders which can complicate the "whiplash syndrome":
   i. cervical spine fracture and/or dislocation
   ii. cervical disc prolapse
   iii. cervical degenerative disc disease.
   iv. fibrositis or fibromyalgia
   v. cerebral concussion
   vi. thoracic outlet syndrome
   vii. subacromial impingement syndrome
2. describe the psychologic factors which can effect the rehabilitation process in patients suffering the "whiplash syndrome"

References:

1. Hirsch, SA., Hirsch PJ., Hiramoto H., Weiss. (1988). Whiplash syndrome fact or fiction?. Orthopedic Clinics of North America, 19, 791-795.

2. Pennie BH., Agambar LJ. (1990). Whiplash injuries. A trial of early management. Journal of Bone and Joint Surgery, 72B, 277-279.

3. Maimaris C., Barnes MR., Allen MJ. (1988). Whiplash injuries' of the neck: a retrospective study. Injury, 19, 393-396.

PROBLEM 20 DEGENERATIVE DISC DISEASE OF THE LUMBOSACRAL SPINE:

Case presentation: A 40 year old male was moving house over a long weekend. This entailed a substantial amount of lifting and carrying heavy objects. As the patient was lifting a television set, he felt a sudden pain in his lower back. This pain radiated down his right leg to his foot. The patient was able to complete his move, but was unable to get out of bed the following morning due to back pain. The patient had significant pain radiating down his right leg that was increased by coughing or straining while attempting to defecate. There was a tingling sensation going to his foot. He had no previous history of back problems. The patient tried taking aspirin and Tylenol without relief. After being unable to do any activity of daily living for three days the patient presented to your office. On examination, the patient had a slow, guarded gait. His lumbar lordosis was decreased, and there was a list of the lumbar spine to the left. The patient could not move without pain. There was spasm and tenderness of the right and left paraspinal musculature. The patient had essentially no forward flexion of the lumbar spine, as this movement lead to severe pain down the right leg. Extension was only slightly limited and did not lead to pain. Straight leg raising to 35 degrees on the right lead to pain in the back and down the leg. LeSague's sign was positive, as was the slump test. The femoral stretch test was negative. Lower extremity reflexes were symmetrical as was strength and sensation. Rectal examination revealed normal tone and buttock sensation. There was no piriformis tenderness, and the sciatic notches were clear. Hip range of motion was full. Plain radiographs revealed minor degenerative changes at L5-S1. A CT scan revealed a prolapsed L5-S1 disc with slight nerve root compression of L5. The patient was given a prescription for bed rest on a firm surface in a pelvic tilt position until his acute pain decreased. He was given a nonsteroidal agent and told to use a heating pad. He was reassessed in a week and had less pain with simple activities of daily living, but could not do anything requiring even the slightest exertion. He was instructed how to perform McKenzie back extension exercises, and hamstring flexibility exercises. He was referred to a physical therapist for gentle mobilization and local lumbar therapy. Despite this regimen, after four months of intensive therapy the patient still had radicular pain, and was unable to work at his occupation as a firefighter. An appointment with a

neurosurgeon was made, but on the day of the appointment, the patient felt that his pain had resolved, and he was able to begin a slow return to full employment.

A. ESSENTIAL REGIONAL ANATOMY OF THE LUMBAR SPINE: Netter 144-150, 156-163.

The physician will be able to:

1. list and diagram the following structures:

i. the lumbar vertebrae

ii. the sacrum

iii. intervertebral discs (nucleus pulposus and annulus fibrosis)

iv. facet joints

v. interspinous ligaments, ligamenta flava, iliolumbar ligaments

vi. spinal cord/lumbo-sacral nerves

vii. thoracolumbar fascia

viii gluteal musculature, paraspinal musculature

ix. sciatic, femoral nerves, cauda equina

B. REGIONAL EXAMINATION OF THE LUMBAR SPINE:

The physician will be able to:

1. inspect for the following features:

i. abnormalities of gait

ii. assymmetry of spinal alignment

iii. scoliosis

iv. abnormal thoracic kyphosis or lumbar lordosis

v. accurate range of motion assessment in flexion, extension, lateral flexion and rotation

2. palpate for the following:

i. vertebral tenderness

ii. localized muscle spasm/tenderness

iii. pelvic alignment (iliac crest/ posterior superior iliac spine height)

iv. sciatic notch tenderness/piriformis tenderness

3. perform and recite the significance of the following tests:

i. straight leg raise

ii. femoral stretch

iii. LeSagues sign

iv. Slump test

v. lower extremity muscle strength assessment
vi. lower extremity deep tendon reflex assessment
vii. lower extremity dermatomal sensory assessment
viii. rectal examination
ix. buttock and perianal sensory assessment
x. stressing of the sacroiliac joints [Patrick Test (FABER test)]
xi. hip range of motion assesment
xii. leg length assessment lying and seated

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. recite 5 symptoms of lumbar disc disease
2. list 2 movements/activities which are said to cause acute disc prolapse.
3. list 2 activities which exacerbate lumbar disc disease.
4., list the significance of bladder and bowel incontinence.
5. describe the significance of pain exacerbated by a Valsalva maneuvre.

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. demonstrate the dermatomes for the lumbosacral nerve roots and assess their integrity.
2. describe the "crossover" straight leg raising sign and describe its significance.

E. DIAGNOSIS:

The physician will be able to:

1. describe the normal plain radiographic anatomy of the lumbosacral spine.
2. describe 3 common plain radiographic signs of degenerative disc disease.
3. list the indications for the use of plain radiography in patients with back pain.

4. list the indications and usefulness of the following diagnostic modalities in patients with suspected lumbosacral disc disease and/or disc prolapse:

i. myelography
ii. CT scanning
iii. bone scintigraphy
iv. MRI scanning
v. electromyography
vi. nerve conduction studies
vii. discography

F. TREATMENT:

The physician will be able to:

1. prescribe modified activity to decrease loading of the lower back and decrease pain.
2. list the usefulness of heat and cold forms of local compressive therapy
3. demonstrate positions which will allow the patient to rest as comfortably as possible.
4. discuss indications, contraindications and usefulness of the following forms of pharmacologic therapy:

i. NSAIDs
ii. analgesics
iii. sedative/hypnotics
iv. muscle relaxants
v. narcotics

5. discuss the importance of abdominal muscle strength and endurance in the treatment of patients with lower back pain and demonstrate safe and effective abdominal muscle strengthening exercises.
6. explain the role of tight hamstring musculature in the etiology and persistence of low back pain, and demonstrate safe and effective hamstring flexibility exercises.
7. demonstrate exercises to stretch the lumbodorsal fascia and to increase back extensor strength.
8. discuss the importance of strong and flexible spinal extensor muscles, and demonstrate a safe program of spinal extensor exercises using both concentric and eccentric muscle action.

9. discuss the concept of "centralization" of radicular pain and describe its role in the therapy of lumbar disc disease.
10. discuss the use of orthotic devices such as the "obus forme" seat and lumbosacral supports
11. list the indications for surgical referral in a patient with suspected lumbar disc disease.
12. list 2 surgical procedures for treatment of prolapsed intervertebral discs.
13. discuss the role of epidural corticosteroid and chemonucleolysis injections in the patient with disc prolapse.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. identify the following disorders which can present with lower back pain and radicular symptoms:
   i. spinal stenosis
   ii. facet joint syndrome
   iii. spondylolisthesis
   iv. spinal cord/vertebral tumors
   v. central disc protrusions

References:

1. Fast A. Low Back Disorders: (1988). Conservative management. Archives of Physical Medicine and Rehabilitation, 69, 880-891.

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PROBLEMS WHICH COMMUNICATE IMPORTANT PRINCIPLES IN DISORDERS OF THE MUSCULOSKELETAL SYSTEM:

PROBLEM 1 SCAPHOID FRACTURE:

Case presentation: A 17 year old male hockey player was skating down the wing when he was tripped by an opposing player. He fell on his outstretched left hand. He felt a crack in his wrist and experienced immediate discomfort. He was able to get up and continue in the game until it ended. At that time he was taken to a local emergency room by his coach. Plain radiographs of the wrist were normal, and the boy was told he had a sprained wrist and given a tensor bandage. The boys wrist continued to ache and he was unable to grasp his stick because of the discomfort. He was taken to his family doctor one week later because of the persisting pain, and repeat plain radiographs were performed. These were also negative. However, the boy had significant pain with palpation over the anatomic snuffbox. This prompted his doctor to apply a thumb spica cast with the presumptive diagnosis of a scaphoid fracture. The patient had his wrist re-examined ten days later, after the cast had been removed. A third set of xrays showed a fracture near waist of the scaphoid. The patient was then placed in a cast for ten weeks. After the ten weeks, the boy had his cast removed. He had persistent tenderness over the scaphoid bone, and plain radiographs showed no bony healing of the fracture site. The patient had trouble carrying out activities of daily living because of persistent pain and weakness in the wrist. The patient was referred to a hand surgeon who recommended surgery to unite the fragments of bone with a bone graft.

A. ESSENTIAL REGIONAL ANATOMY: Netter 426-431

The physician will be able to:

1. list and diagram the following wrist joint structures;

i. the radius and the ulna

ii. the carpal bones

iii. the metacarpal bones

iv. the radial, median and ulnar nerves

v. the radial and ulnar arteries

vi. the vascular supply of the scaphoid bone

B. REGIONAL EXAMINATION OF THE WRIST:

The physician will be able to:

1. inspect the wrist for:

i. gross deformity

ii. active and passive range of motion, including flexion, extension, radial and ulnar deviation, supination and pronation

iii. redness, swelling contusion

2. palpate the wrist, and identify:

i. the carpal bones

ii. the anatomic snuffbox.

iii. the radial and ulnar arterial pulses.

iv. radial, ulnar and median sensory and motor function in the wrist and hand

v. the radiocarpal joint

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. list 2 mechanisms of injury to the scaphoid.
2. describe 2 symptoms of injury to the scaphoid.

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. demonstrate 2 maneuvres to exacerbate the pain associated with a fractured scaphoid.

E. DIAGNOSIS:

The physician will be able to:

1. identify the normal plain radiographic anatomy of the wrist (See Problem 1A)
2. list the limitations associated with plain radiography of the wrist in the investigation of a potential scaphoid fracture.
3. list the indications and usefulness of scaphoid tomograms.
4. list the indications for repeat plain radiographs of the scaphoid.
5. list the indications and usefulness of technetium bone scanning in investigation of potential scaphoid fractures.

6. list the usefulness of CT and bone scan in the diagnosis and management of scaphoid fractures.
7. describe the concept of a clinical scaphoid fracture with normal plain radiographs.

F. TREATMENT:

The physician will be able to:

1. advise the patient regarding the natural history of scaphoid fractures.
2. list and identify the following complications:

i. delayed union.
ii. non-union
iii. avascular necrosis

3. list the indications for and be able to apply a thumb spica cast in the correct anatomic position, and detail the appropriate length of immobilization.
4. recite the implications of the site of scaphoid fracture (proximal versus middle).
5. list the indications for orthopedic referral and surgical correction (ORIF, bone grafting) of a non union of the scaphoid.
6. list two surgical procedures used to treat a non-unoion of the scaphoid.
7. list the indications for and usefulness of electromagnetic stimulation in the treatment of scaphoid fractures.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. identify the following disorders which may affect the wrist;

i. Colles fracture
ii. perilunate dislocation
iii. Bennet's fracture dislocation
iv. scapholunate disassociation
v. carpal tunnel syndrome

H. PRINCIPLES:

1. normal plain radiographs do not always rule out bony injuries, including fractures.

2. treatment for a fracture may be indicated on clinical grounds alone.
3. minor clinical findings such as swelling and contusion may lead to significant long term sequelae.
4. beware of the "sprained wrist".
5. treat any patient with anatomic snuffbox tenderness as if they have a scaphoid fracture, and cast them in a thumb spica.

References:

1. McCue FC., Mayer V. (1989) Rehabilitation of the hand and wrist. Clinics in Sports Medicine, 8, 737-738.

2. Culver JE., Anderson TE. (1992). Fractures of the wrist and hand in the athlete. Clinics in Sports Medicine, 11, 101-128.

3. Whipple TL. (1992). The role of arthroscopy in the treatment of wrist injuries in the athlete. Clinics in Sports Medicine ,11, 227-238.

PROBLEM 2: ULNAR COLLATERAL LIGAMENT INJURY OF THE THUMB (GAMEKEEPER'S THUMB, SKIER'S THUMB)

Case presentation: An 18 year old right hand dominant male, a novice skier, fell on his first run down the hill. He caught his right thumb on the snow and felt a snap and immediate discomfort. He skied down to the bottom of the hill and reported the accident to his teaching supervisor. The supervisor said the boy had "sprained" his thumb and told him to ice it. The pain persisted for a week, and the patient eventually sought medical attention. The physician at a walk in medical clinic noted swelling of the thumb at the metacarpophalangeal joint, and performed plain radiographs. These were normal, and the diagnosis was a "sprained thumb". The patient was told to ice his thumb, rest it, and elevate his hand. For the next week the boy could not use his hand to write and had a weak pincer grasp. This persisted for three weeks, and compelled the patient to attend his family doctor. The family doctor was concerned regarding ligaments in the thumb, and referred the patient to a hand surgeon. Two weeks later the hand surgeon demonstated grade III laxity of the ulnar collateral ligament, and scheduled the patient for open repair of the ligament.

A. ESSENTIAL REGIONAL ANATOMY OF THE THUMB: NETTER 426-445

The physician will be able to:

1. list and diagram the following anatomic structures
   i. the carpal bones
   ii. the metacarpal bones
   iii. the phalanges
   iv. the ulnar collateral ligament
   v. the radial collateral ligament
   vi. the intrinsic muscles of the hand

B. REGIONAL EXAMINATION OF THE THUMB:

The physician will be able to:

1. inspect the thumb area for gross deformity, open fracture, contusion, swelling.
2. palpate the carpometacarpal joint of the thumb for evidence of subluxation/dislocation.
3. assess the range of motion of the thumb in abduction, adduction, extension, flexion, and opposition.

4. assess the neurovascular status of the hand
5. assess the intrinsic musculature of the hand
6. demonstrate the integrity of the motor and sensory supply to the hand

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. list two mechanisms of injury to the ulnar collateral ligament of the thumb.
2. list two symptoms consistent with ulnar collateral ligament injury

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. perform an ulnar collateral ligament stress test compared to the unijured side.
2. perform an ulnar collateral ligament stress test with the use of local anaesthetic.
3. assess the volar plate of the metacarpophalangeal joint for concommittant injury.
4. list and demonstrate the clinical criteria for grades I,II,III ulnar collateral igament injury.

E. DIAGNOSIS:

The physician will be able to:

1. describe the normal plain radiographic appearance of the hand.
2. list the limitations of plain radiography in the investigation of ulnar collateral ligament injury.
3. list the indications and use of arthrography in the investigation of ulnar collateral ligament injuries.
4. recite the indications and usefulness of stress radioigraphs of the thumb.
5. differentiate between grades I, II, and III UCL injuries with stress testing.

F. TREATMENT:

The physician will be able to:

1. advise the patient regarding the natural history of ulnar collateral ligament injury.
2. list the general treatment principles for grades I,II, and III ulnar collateral ligament injury.
3. recite the indications for and apply a thumb spica cast.
4. list the length of immobilization necessary prior to range of motion exercises
5. fabricate and apply a removable splint for use after the initial period of immobilization.
6 protect the injured thumb upon return to potentially injurious activities, with measures such as abduction taping or splints.
7. list the indications for surgical treatment of ulnar collateral ligament injuries.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. describe the "Stener lesion" and its affect on management
2. describe the relationship between ulnar collateral ligament injury and chronic instability of the thumb.
3. describe the relationship between UCL injury and degenerative osteoarthrosis of the MCP joint of the thumb.

H. PRINCIPLES:

1. normal plain radiographs do not rule out significant pathology in the area of the thumb.
2. unless measures to document ulnar collateral ligament integrity are taken, then the diagnosis may be missed, resulting in long term functional impairment.
3. An apparently mild injury can have significant longterm consequences.
4. treat any patient with an injury consistent with damage to the UCL as if this is the case, and either arrange specialist intervention, or protect the injured extremity in a thumb spica and reassess.

References:

1. McCue FC., Mayer V. (1989). Rehabilitation of the hand and wrist. Clinics in Sports Medicine, 8, 748-751.

2. Kahler DM., McCue FC. (1992). Metacarpophalangeal and proximal interphalangeal joint injuries of the hand , including the thumb. Clinics in Sports Medicine, 11, 57-76.

3. Seto JL., Brewster CE., Randall CC., Jobe FW. (1991). Rehabilitation following ulnar collateral ligament reconstruction of athletes. Journal of Orthopedic and Sports Physical Therapy, 14, 100-105.

PROBLEM 3 STRESS FRACTURES OF THE PARS INTERARTICULARIS (SPONDYLOLYSIS):

Case presentation: A sixteen year old female gymnast presented to her family doctor because of a one month history of low back pain. She had been training 20 hours per week. The pain initially only followed intense workouts, but began to interfere with activities of daily living. The girl had no radicular pain, no numbness, no weakness, and normal bladder and bowel function. A Valsalva maneuvre did not exacerbate her pain. On examination there were no abnormalities noted by her physician, and plain radiographs were normal. The patient was told she had an "overuse injury" of her lumbar musculature, and told to rest and use enteric coated ASA. The girl said that rest was out of the question given her ensuing competition, and her physician said that the only problem would be pain, so she could train if she could tolerate the discomfort. The patient continued her vigorous schedule, and the pain became incapacitating. She could not go to school and any movement of her lower back led to pain. She was referred to a back specialist who documented an unusual gait described as a "pelvic waddle", increased lumbar lordosis, pain with extension of her lumbar spine, which was worse standing on the right leg. The girl had limited hamstring flexibility, with tightness at 50 degrees of straight leg raising bilaterally. The remainder of the examination was normal. Repeat plain radiographs with oblique projections were normal. A technetium 99 bone scan was performed which showed increased focal uptake of radiotracer in the right L5 pars interarticularis area. A CT scan was performed and documented a fracture of the right L5 pars interarticularis. The patient was advised that further participation in activities which lead to pain was contraindicated, and given advice regarding the potential benefits of anti-lordotic bracing. She refused to wear a brace. She was given a program of hamstring stretching, abdominal strengthening, and prohibited from engaging in any activities which lead to low back pain. One month later, the patient had no pain with activities of daily living and requested to return to gymnastic training. Advice to the contrary was given, but the patient began aggressive exercise. The first week went well, but then the patient developed more severe pain than in the past. Repeat plain radiographs revealed an L5 pars interarticularis fracture. A bone scan revealed increased ostseoblastic activity at L5 and at L4 both on the right side. The patient had a slow rehabilitative course

from that point on, was unable to return to athletic activity in the six months since her last visit. She had discomfort with many activities of daily living.

A. ESSENTIAL REGIONAL ANATOMY OF THE LUMBAR SPINE: Netter 144-150, 156-163.

The physician will be able to:

1. list and diagram the following structures:

i. the lumbar vertebrae
ii. the sacrum
iii. intervertebral discs
iv. facet joints
v. interspinous ligaments
vi. ligamenta flava
vii iliolumbar ligaments
viii. spinal cord/lumbo-sacral nerves
ix. thoracolumbar fascia
x. gluteal musculature
xi. paraspinal musculature
xii. sciatic, femoral nerves
xiii. cauda equina

B. REGIONAL EXAMINATION OF THE LUMBAR SPINE:

The physician will be able to:

1. inspect for the following features:

i. abnormalities of gait
ii. assymmetry of spinal alignment
iii. scoliosis
iv. abnormal thoracic kyphosis or lumbar lordosis
v. accurate range of motion assessment in flexion, extension, lateral flexion and rotation in degrees

2. palpate for the following:

i. vertebral tenderness
ii. localized muscle spasm/tenderness
iii. pelvic alignment (iliac crest/ posterior superior iliac spine height)
iv. sciatic notch tenderness/piriformis tenderness

3. perform and recite the significance of the following tests:

i. straight leg raise
ii. femoral stretch
iii. LeSagues sign
iv. Slump test
v. lower extremity muscle strength assessment
vi. lower extremity deep tendon reflex assessment (KJ, AJ)
vii. lower extremity sensory assessment
viii. rectal examination
ix. buttock and perianal sensory assessment
x. stressing of the sacroiliac joints (Patrick's Test)
xi. hip range of motion assesment
xii. leg length assessment lying and seated

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. list 3 symptoms suggestive of pars interarticularis stress fractures (PISF).
2. list 3 factors which can lead to the development of a PISF.
3. list 3 forms of athletic activity which are high risk for PISF.

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. describe the typical gait a patient with PISF demonstrates
2. describe the typical posture manifested by patients with PISF.
3. describe the alternate leg standing test
4. describe the expected neurologic and muscular findings in patients with PISF.

E. DIAGNOSIS:

The physician will be able to:

1. describe the normal plain radiographic anatomy of the lumbar spine.
2. describe the limitations of plain radiography in the investiagation of PISF.
3. describe the indications and usefulness of oblique views of the lumbar spine with suspected PISF.

4. discuss the indications and usefulness of technetium bone scanning in evaluation of PISF.
5. discuss the role of CT scanning and MRI in the investigation of PISF.
6. describe the rrelationship between PISF, spondylolysis and spondylolisthesis.
7. list the criteria for radiographic grading of spondylolisthesis.

F. TREATMENT:

The physician will be able to:

1. advise the patient and their family regarding the natural history of PISF.
2. prescibe modified activity to avoid the production of pain.
3. discuss the potential benefits, risks and duration of antilordotic bracing.
4. discuss the various types of antilordotic braces commercially available.
5. discuss the use of specific abdominal and hamstring stength and flexibility programs.
6. list the indications for and usefulness of repeat plain radiography and bone scinitgraphy.
7. recite the indications for surgical stabilization of the unstable spondylolytic vertebrae.
8. list any future activity limitations which may be placed on patients with PISF, spondylolysis or spondylolisthesis.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. describe the relationship between PISF and Scheuermann's thoracolumbar kyphosis and spina bifida occulta.
2. describe the conditions of fibrous union and non union of PISF.

H. PRINCIPLES:

1. physically active adolsescents with back pain must have serious consideration given to the diagnosis of pars interarticularis stress fractures.

2. adolescents with back pain exacerbated by extension must have a bone scintigram if plain radiography, even with oblique views, is normal.
3. PISF can heal, but these patients require close clinical supervision.
4. PISF can progress to spondylolisthesis

References:

1. Steiner ME., Micheli LJ. (1985). Treatment of symptomatic spondylolysis and spondylolisthesis with the modified Boston Brace. Spine, 10, 937-943.

2. Frederickson BE., Baker D., McHolick WJ., Yuan HA., Lubicky JP. (1984). The natural history of spondylolysis and spondylolisthesis. Journal of Bone and Joint Surgery 66A, 699-707.

3. Saraste H. (1987). Long-term clinical and radiological follow-up of spondylolysis and spondylolisthesis. Journal of Pediatric Orthopaedics, 7, 6331-638.

4. van den Oever M., Merrick M.V., Scott JH. (1987). Bone Scintigraphy in symptomatic spondylolysis. Journal of Bone and Joint Surgery, 69B, 453-456

PROBLEM 4 OSTEOCHONDRITIS DISSECANS (OF THE KNEE JOINT):

Case presentation: An active 15 year old male presents to your office with a three month history of right knee discomfort. The boy initially had pain after a soccer game in which he twisted his knee while planted on it. He was able to play throughout the match, but during the night after the game his knee bothered him to the point of the patient being taken to a local emergency. Plain radiographs were performed, and revealed normal growth plates and were otherwise negative. The boy was told he had a sprained knee and given crutches and enteric coated ASA. After one week, the acute pain diminished sufficiently to allow the boy to return to soccer. However, after soccer games the patient would develop swelling of the knee and intense discomfort. The boy found that occassionally his right knee would feel unstable and "catch". There had been no true locking. Upon examination, the boy had a small right knee joint effusion with full range of active and passive motion. There was medial joint line tenderness and medial femoral condylar tenderness. Ligament testing was normal. Plain radiographs were normal, but a tunnel view revealed an area of decreased bone density over the lateral aspect of the medial femoral condyle. An MRI was performed and revealed a osteochondral defect in the same area which was suspicious on the plain films. Osteochondritis dissecans was diagnosed and the boy was referred to an orthopedic surgeon. Based on the boys symptoms of articular disruption the surgeon recommended arthroscopy with fixation of the lesion. The parents decided to pursue conservative treatment. The boy was placed in a Zimmer type knee splint, and given crutches for six weeks. At the end of this period, the boy had no pain, and began a slow return to full activity. At three weeks, however, the boy developed recurrent pain, swelling and catching of the knee joint. At that point the parents decided to proceed with the surgical procedure. Six months after the surgery and rehabilitation the boy returned to full activity without pain.

A. ESSENTIAL REGIONAL ANATOMY OF THE KNEE: Netter 476-483

The physician will be able to:

1. list and diagram the following knee joint anatomic structures;
   i. the femur, tibia and patella
   ii. the medial and lateral collateral ligaments
   iii the anterior and posteror cruciate ligaments

iv. the medial and lateral menisci

2. recite the functional significance of the above detailed structures

3. list the four components of the quadriceps musculature and describe their independent and corporate actions on the knee joint.

4. list the three major components of the hamstring muscle group, and describe their independent and corporate action on the knee joint.

5. list the 3 components of the pes anserinus muscle-tendon group, and describe their function on the knee joint.

6. describe the location of the following bursae:

i. prepatellar

ii. infrapatellar

iii. semimembranosus

iv. pes anserinus

7. describe the anatomic and functional significance of the iliotibial band in relation to the knee joint.

8. describe the anatomic arrangement of the quadriceps/patellar tendon extensor mechanism.

9. diagram the location of the following neurovascular structures in relation to the knee joint:

i. sciatic nerve

ii. common peroneal nerve

iii. tibial nerve

iv. popliteal artery

v. profunda femoris artery

vi. saphenous nerve

vii. obturator nerve

B. REGIONAL EXAMINATION OF THE KNEE JOINT:

The physician will be able to:

1. conduct an examination of the knee joint including;

i. standing lower limb alignment assessment

ii. gait assessment

iii. inspection for signs of muscle wasting, joint effusion, heat, redness bony abnormalities including posterior tibial sag.

iv. assess both active and passive range of motion

v. methods to demonstrate fluid in the knee joint

vi. palpate joint lines for evidence of meniscal tears or bony tenderness

vii. perform valgus and varus stress tests at 0 and 30 degrees of flexion to demonstrate the integrity of the medial and lateral collateral ligaments respectively.

viii. perform the following tests to demonstrate anterior cruciate ligament integrity:

a. Lachman test

b. anterior drawer test

c. pivot shift test

ix. perform McMurray's test to demonstrate meniscal tears

x. perform patellar compression tests and palpate the patellar facets to demonstrate patellofemoral pain and/or chondromalacia patella

xi. perform the patellar apprehension test

xii. perform a posterior drawer sign to demonstrate posterior cruciate ligament laxity

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. list 4 symptoms suggestive of osteochondritis dissecans (OCD) of the knee.
2. list 3 symptoms which suggest a disrupted articular suface in OCD.
3. describe how the following factors infuence the incidence of OCD:

i. age

ii. sex

iii. level of physical activity

4. list and describe 3 etiologic theories of OCD.
5. compare and contrast the etiological factors of OCD in children and adults

D. SPECIFIC PHYSICAL FACTORS:

The physician will be able to:

1. describe the type of gait assumed by paitents with OCD of the knee.
2. describe and perform Wilson's test.
3. describe the classic location of knee joint OCD and palpate for tenderness in this area.

E. DIAGNOSIS:

The physician will be able to:

1. describe the normal plain radiographic anatomy of the knee.
2. describe specific plain radiographic views used to increase the sensitivity of plain radiography in this condition.
3. describe the limitations of plain radiography in the diagnosis of OCD.
4. discuss the indication, and usefulness of the following diagnostic procedures in patients with suspected OCD of the knee:

i. arthrography
ii. MRI
iii. CT scan
iv. polytomography
v. bone scintigraphy
vi. arthroscopy

F. TREATMENT:

The physician will be able to:

1. describe the natural history of OCD to the patient and the family, and the difference between the adolescent and adult forms.
2. describe how the patients skeletal maturity effects the treatment regimen.
3. describe the general goal of therapy.
4. describe indications for nonoperative/conservative treatment.
5. recite the use and duration of non-weight bearing, immobilization therapy for patients with OCD.
6. list the indications for surgical treatment for patients with OCD of the knee.
7. list and describe two surgical procedures used to restore articular integrity in the patient with OCD of the knee.

G. ASSOCIATED DISORDERS:

The physician will be able to:

1. list three common sites aside from the femoral condyle for the development of OCD.

2. recite the relationship between OCD and long-term joint dysfunction.

H. PRINCIPLES:

1. children and adolescents with knee pain and symptoms of mechanical disruption need special plain radiographic notch views to rule out OCD.
2. therapy is guided by the skeletal maturity of patients.
3. aggressive therapy (surgery)can be indicated to restore normal joint integrity in patients with OCD.
4. normal plain radiographs do not rule out OCD.

References:

1. Graf BK., Lange RH. Osteochondritis dissecans. In: Sports Medicine for the school-age athlete. Editor; Reider B. W.B. Saunders Philadelphia, PA. 1991 pp 240-254.

2. Cahill B. (1985). Treatment of juvenile osteochondritis dissecans and osteochondritis dissecans of the knee. Clinics in Sports Medicine, 4, 367-384.

3. Ewing JW., Voto SJ. (1988). Arthroscopic surgical management of osteochondritis dissecans of the knee. Arthroscopy, 4, 37-40

PROBLEM 5 STRESS FRACTURES:

Case presentation: A 34 year old female was training for a local 10 kilometer road race. She was a regular competitior in such events. For approximately one month, prior to this event she had been experiencing right groin and hip discomfort. She had no previous trauma to the hip region. The patient had been amenorrheic for approximatley one year, was 5' 5" tall and weighed 110 lbs. She was concerned that she was developing osteoarthritis of the hip, as her mother had severe problems in this regard, and had recently had a total hip joint arthroplasty. She attended her family physician whom, at her urging performed plain radiographs of the hip joint. These revealed normal anatomy and her physician reassured her all was well. The woman then continued her vigorous training schedule, despite persistent and intensifying right hip discomfort. The pain began to bother her occasionally during the day when she was not training. The pain was not relieved by plain analgesics. She abstained from running the week prior to the race and had some improvement in her discomfort. During the road race the patient experienced a progressive increase in the pain in her right hip. At the 8 km. mark she experienced a sudden excruciating pain in her right hip and collapsed. Emergency attendants came to her aid and noted deformity of the right hip area. She was taken to hospital by ambulance where plain radiographs revealed a displaced fracture of the femoral neck. At operation there was no evidence of a pathological fracture, and it was diagnosed as a displaced full thickness stress fracture of the femoral neck. The patient's post operatative course was unremarkable, but she had pain with ADL for one year.

A. ESSENTIAL REGIONAL ANATOMY:

The physican will be able to:

1. describe four anatomic sites where stress fractures frequently occur.

B. REGIONAL EXAMINATION:

The physician will be able to:

1. palpate bony structures and identify:
   i. localized pain
   ii. induration
   iii. swelling.

C. SPECIFIC HISTORICAL FACTORS:

The physician will be able to:

1. list 3 symptoms suggestive of stress fractures.
2. list 3 activities/training errors which contribute to the development of stress fractures.
3. describe 2 theories regarding the etiology of stress fractures.
4. list limitations in using pain alone as an historical indicator of stress fractures.
5. describe the relationship between the timing of the onset of pain in a period of exercise and the development of stress fractures.

D. SPECIFIC PHYSICAL FINDINGS:

The physician will be able to:

1. define the "Hop test" and its significance.
2. identify biomechanical/alignment factors which may contribute to the cause of a stress fracture.
3. identify areas of muscle weakness or strength imbalanced which may contribute to the cause of a stress fracture.
4. identify areas of abnormal flexibility which may contribute to the cause of a stress fracture.

E. DIAGNOSIS:

The physician will be able to:

1. recite the limitations in using plain radiography to diagnose a stress fracture.
2. list the indications and limitations of bone scintigraphy in the diagnosis of stress fractures.
3. discuss the indications and limitations of the following diagnostic procedures:

i. ultrasound
ii. thermography
iii. CT scanning
iv MRI

F. TREATMENT:

The physician will be able to:

1. prescribe modified activity for the patient to decrease the stress on the fractured site.
2. prescribe an antiinflammatory regimen to decrease acute pain
3. attempt to correct biomechanical/alignment factors which may be contributing to the injury.
4. prescribe muscle strength and flexibility exercises to address problems of muscle weakness, imbalance or abnormal flexibility.
5. list four high risk stress fractures which have a greater propensity to nonunion or complete fracture.
6. list the indications and usefulness of electromagnetic stimulation in increasing the healing rate of stress fractures.
7. prescribe a regimen of graduated return to activity program for the patient at the appropriate time in the rehabilitative phase.
8. list the indications for immobilization of a stress fracture.
9. list 2 indications for surgical treatment of stress fractures.

G. ASSOCIATED DIDSORDERS:

The physician will be able to:

1. list 3 other causes of a positive bone scintigram aside from a stress fracture.
2. describe periostitis and how it relates to stress fractures.
3. discuss the concept of bone strain and asymptomatic positive bone scintigraphy.
4. discuss the relationship between amenorrhea, eating disorders and osteoporosis (the female athlete triad) and stress fractures.

H. PRINCIPLES:

1. normal plain radiographs do not rule out significant bony pathology.
2. stress fractures of the tarsal navicular, femoral neck, pars interarticularis and medial tibia which are full thickness have a guarded prognosis.
3. immobilization is rarely necessary for stress fractures.

4. stress fractures often have a multifactorial etiology, with both intrinsic and extrinsic factors contributing to injury.
5. navicular stress fractures which are complete or separated will often require bone grafting.

References:

1. Marti B., Vader JP., Minder CE., Abelin T. (1988). On the epidemiology of running injuries. American Journal of Sports Medicine, 16, 285-293.
2. Stanish WD. (1984). Overuse injuries in athletes: A perspective. Medicine and Science in Sport and Exercise, 16, 1-7.
3. Renstrom P., Johnson RJ. (1985). Overuse injuries in sports. A review. Sports Medicine, 2, 316-333.
4. Giladi M., Milgrom C., Simkin A., Danon Y. (1991). Stress Fractures: identifiable risk factors. American Journal of Sports Medicine, 19, 647-652.
5. Meyer SA., Saltzman CL., Albright JP. (1993). Stress fractures of the foot and leg. Clinics in Sports Medicine,12, 395-414.

Chapter 6
Results
Expert Validation, Curriculum Evaluation and Consensus Outcome Measures:

Table VIII: Results of the expert curriculum validity survey. 10 of the 12 experts surveyed responded to the questionnaire. 1. Strongly disagree, 2. Disagree, 3. Neutral opinion, 4. Agree, 5. Strongly agree

1. The course goals outlined in this curriculum cover important aspects of clinical practice.

4.60 +/- 0.52

2. The course goals outlined in this curriculum cover aspects of medical practice which are currently neglected in the medical education process.

4.30 +/- 0.67

3. The terminal objectives listed in this curriculum are comprehensive.

4.50 +/- 0.53

4. Fulfillment of the enabling objectives should lead to the achievement of the terminal objectives.

4.40 +/- 0.52

5. The musculoskeletal disorders considered by this curriculum do not represent the most common problems seen in clinical practice.

1.42 +/- 0.52

6. The enabling objectives provide the student with an adequate set of skills to conduct clinical practice successfully.

4.50 +/- 0.53

7. This curriculum would not be a valuable addition to an undergraduate teaching program.

1.11 +/- 0.32

8. This curriculum would be a valuable addition to a Family Practice residency program.

4.66 +/- 0.69

9. The long format of this curriculum (appendicular portion) is a more valuable educational format than the terminal and enabling objectives.

4.30 +/- 0.82

CONSENSUS OUTCOME MEASURES

These are the comments by the experts who were surveyed to validate the curriculum. They are transcribed verbatim.

"In the space provided here, please provide your general comments/criticisms regarding this curriculum on common musculoskeletal disorders. Comments regarding the appropriateness and completeness of the terminal and enabling objectives would be apprecitated. Similarly, please provide your thoughts on the "twenty most common musculoskeletal disorders" listed in the Table of Contents."

1. I feel this is one of the best and most comprehensive presentations of this type of curriculum to this date. It is articulate and comprehensive, yet not over inclusive. My one concern relates to the goals (page 1). By specifying diagnoses, does this mean that other problems are simply important as differential diagnoses-at what point for instance does mechanical back pain become a goal. Perhaps one should not specify these diagnoses but rather make a goal oriented statement such as:

1) To become competent in history taking, physical examination and patient management skills in common musculoskeletal problems.

Which problems these are, then are articulated in your sections following in terminal and enabling objectives. It is my understanding that goals should be broader than objectives-thus by eliminating the specification of diagnosis, the student may be encouraged to think of all the important areas you covered.

I quess an example would be...if the goal is ACL injury, then why should I follow through on all the terminal and enabling objectives referring to PCL, LCL etc.

By eliminating this specification and making the goal broad you can then focus down through your application of objectives.

This is a great document and may I have a copy of the final draft?

With warm regards,

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Family Medicine and Sport Medicine
University of Calgary

2. Generally excellent! Congratulations. With regard to the twenty most common disorders, I would consider deleting multidirectional instability of the shoulder and chronic ankle instability, and adding medial epicondylitis and ilio-tibial band friction syndrome.

Gaetan Tardif M.D., FRCPC
President
Canadian Physical Medicine and Rehabilitation Society

3. Both versions provide a "gold standard" in terms of educational objectives. They represent what every core physician should know at some point in their career, i.e. as a medical student at exam time. It may be unrealistic to expect every family practitioner to have ongoing knowledge at this level. The content knowledge approach feels more practical and may be usable in a clinical setting such as during a Family Medicine Residents Block time, orthopedic or sports medicine rotation.

Jeff Robinson M.D., C.C.F.P.
Family Medicine and Sport Medicine
Universiy of Alberta

4. Agree with the curriculum. Terminal and enabling objectives are appropriate and complete. Agree with 20 most common musculoskeletal disorders.

I question the ease of all family practice residents mastering all this material in a short rotation. Perhaps continual exposure over the two years. I am focussed on U.B.C.'s one month rotation as it is now structured. We need to rethink its presentation.

D.B. Clement M.D., FACSM
Director, Alan Mcgavin Sport Medicine Centre
Professor, University of British Columbia

5. Thank you for asking me to review this most ambitious and needed project. Overall I think your curriculum as outlined is excellent. It certainly fills a much needed gap in the family medicine curriculum.

Any family medicine curriculum should be designed to train an individual to deal very effectively with common conditions. The conditions which you have listed under course goals may well be the most common musculoskeletal conditions seen by a family doctor. However I think it is also very important for the family practitioner to recognize less common conditions and even though they may not have the training to effectively deal with these problems, at least they know when they need help. In that regards, I notice that there seemed to be no mention of inflammatory arthritic disorders. The prevalence of rheumatoid arthritis is 1% of the population at large. In middle age and older groups this increases with all of the other inflammatory arthritides to possibly 2-3% of the population. Even though acute arthritis such as gout or pseudogout or septic arthritis are relatively uncommon today, they are in a sense medical emergencies that should be at least recognized by the family doctor and appropriately referred quickly. Osteoarthritis is probably the most prevalent muscuoloskeletal conditon particlularly as an individual ages. I think it needs slightly more emphasis in your curriculum as well.

I would suggest that there be at least a small section outlining key features of inflammatory arthritis to help the practitioner differentiate a patient with a new onset of morning stiffness, pain, and swelling of certain joints. The laboratory tests again should be roughly outlined to suggest that the practioner may want to order a sedimentation rate or a C-reactive protein. Likewise I think some of the key features of the symmetry of small joints in rheumatoid arthritis and the other articular features of lupus in the seronegative spondyloarthropathies should be mentioned, at least in passing.

I have noticed in my practice that many family practitioners have difficulties determining who does, and does not have an inflammatory arthritis, and consequently the patient is often delayed in referral to a specialist for a confirmation and further management.

Some of the skills that I think are absolutely critical for a family doctor include joint aspiration. You have already covered joint aspiration of the knee which is the most imporant. I think there should at least be reference made to aspiration of the first MTP joint which is relatively simple. This is the only way to confirm a diagnosis of gout and yet is very seldom performed.

Given the prevalence of osteoarthritis I think it's necessary to discuss osteoarthritis as it affects the knee, hips, and small joints of the hand and management with analgesics prior to the use of anti-inflammatory drugs.

In some of your sections you have some excellent references for further reading. What also may be helpful is reference to a textbook that would cover many of these topics. Is there such a textbook of musculoskeletal medicine available for family practice trainees? If there is no textbook available for referencing then perhaps you should consider expanding your thesis to a monograph which could be used as reference for this curriculum. I would be pleased to assist you in any of the rheumatologic sections.

I am very impressed at the content and the work that has gone into this thesis. If I can be of any further assistance please don't hesitate to contact me.

Yours truly,

Glen Thomson M.D. FRCPC
Director of Rheumatology Services
University of Manitoba, Faculty of Medicine
St. Boniface General Hospital, Winnipeg MB

6. Thank you for asking me to review the Sports Medicine curriculum. I think this should be a part of the medical curriculum.

Neil, you would have been proud of me. During my pediatrics rotation I correctly diagnosed a girl as having a tarsal navicular stress fracture who had been diagnosed by all the other staff as having a gonococcal arthritis. In the end they realized I was right!

Harry Hoff M.D.
Rotating Intern,
Manitoba Affiliated Teaching Hospitals
Winnipeg, MB.

7. Thank you for asking me to comment on this curriculum. It is a most impressive piece of work and when it is implemented will add immeasurably to the education of physicians insofaras the treatment of musculoskeletal disorders is concerned. The scope and content of the material is outstanding. In particular though not mentioned in the document and supporting material, I think this work would be of fundamental importance in developing a curriculum study guide and other material for the Canadian Academy of Sport Medicine (CASM) diploma examination in Clinical Sport Medicine. (In this respect I wonder whether it might be possible to obtain a copy of the complete work currently in existence)

Not encountered here, but perhaps implicit is the expectation that physicians should be familiar with accepted pharmaceutical and physiotherapeutic approaches to the treatment of musculoskeletal conditions. I assume these are dealt with elsewhere.

I have made comments, only a few, specific to the curriculum on "posts-it-notes" in the relevant places.

One area of deficiency in the "twenty most common musculoskeletal disorders" is the absence of problems relating to the wrist and hand. In particular

i) mallet finger

ii) ulnar collateral ligament sprain of the thumb

iii) boxer's fracture

iv) Colles fracture

which raises the question to whether "common", straightforward fractures shouldn't also be included in the list.

Finally I also wonder whether ability to diagnose and manage ganglions and prepatellar and olecranon bursitis might be added to the list.

In summary: excellent work, thorough and thoughtful in its presentation; a few suggestions for additions.

Andrew Pipe M.D.
Sport and Cardiovascular Medicine
Civic Hospital, Ottawa
Former President, Canadian Academy of Sport Medicine

8. I have reviewed the submitted documents. I have little experience with curriculum development at any level. I do of course have some experience with student and family practice resident teaching. There has, however, been no formal education in that regard. With that in mind, I have reviewed your submission and I hope my comments are of some help. Overall, I think this is an excellent presentation. In general terms the terminal and enabling objectives are complete. There are a few exceptions. This curriculum is applicable to medical students in family practice or residency training programs. There are in my mind, some omissions. These omissions may be necessary due to the constraints of the program or I may have missed elements of it in some way. The areas include acute tendo-achilles rupture and patellar dislocation. There are some minor ones which might be mentioned in the differential of some of the subjects in sections, such as navicular stress fracture, femoral neck stress fracture. Although these are not common they are important and should be drawn to the attention of students studying in this area at this level. There are many other examples.`

The long format was studied more carefully than the preliminary one. On page 20, I make a special point of teaching students to examine patients in a sitting position. I find that a great deal of information is available. Topographical anatomy is much easier to identify and such elements as posterior cruciate ligament deficiency and patellar tracking and all of its variations are much more easy to see. You might consider some of these.

On page 21 the subsections seem inconsistent in that there are three areas for examination of posterior cruciate laxity and three subsections for anterior cruciate laxity. This is somewhat confusing to me and it may be better if it were tightened up and placed in one category with better organization.

In some of the subsections in the long format there does not seem to be consistency from pathological condition to another. I think it would be easier for students to learn if they have a consistent approach. As an example, describing the natural history of entities is placed at number 1 in some sections and number 5 in others. The total program could be tightened up.

The bibliography sections appear to be adequate for this level of training. There are other resources. I have submitted a reprint of a manuscript on a related subject that may or may not be of interest.

I have completed the questionnaire. The responses are unemotional. Basically, I think this is an excellent curriculum but I find it hard to bring myself to strongly agree or disagree on this or any other subject. I recognize that this is brief. I hope it helps. Good luck with your continuing interest in medical education.

J.P. McConkey M.D., F.R.C.S.(C)
Orthopedic Surgeon
Alan McGavin Sport Medicine Center
University of British Columbia

Chapter 7
Discussion:

Of the 20 musculoskeletal conditions selected as most commonly encountered in clinical practice, 6 involved the foot and ankle, 5 the knee joint, 4 the shoulder, and one each for the elbow, hip, neck and back. The majority of these conditions involve outpatient, nonsurgical care in the initial stages of clinical management. This has implications with regard to the most appropriate venue for the teaching of musculoskeletal problems. DiPaola (1986) and others have exposed some of the weaknesses of the hospital-affiliated teaching of musculoskeletal disorders and recommended more outpatient experience for student physicians (Kahl, 1987).

The results of the needs assessment survey revealed that physicians practising family medicine, sport medicine, rheumatology and physical medicine rated their undergraduate training in musculoskeletal disorders as being below average. This would suggest that current undergraduate medical curricula dealing with musculoskelatal disorders requires improvement. This conclusion would support statements by Kahl (1987), DeLorenzo (1990), DiPaola (1986) and others concerning the need to improve the medical education process with regard to muscuolskeletal disorders. The inadequacy of undergraduate musculoskeletal medical curricula as demonstrated in this survey would also support the work of Goldenberg et al. (1985) who demonstrated that 39% of family practice residents demonstrated incompetence in the examination and treatment of patients with musculoskeletal disorders.

The family medicine physicians also rated their <u>postgraduate</u> training in musculoskeletal disorders as being below average. Musculoskeletal disorders are responsible for over 20% of patient visits to family physicians (Marshland, 1976, DeLorenzo, 1990). The needs assessment survey (Table VII) indicates that

musculoskeletal problems are perceived as an extremely important part of a family physician's clinical practice. Therefore, it is evident that this disparity between the burden of musculoskeletal conditions seen in clinical practice and the current education provided to physicians in this area should be addressed by appropriate changes in the family medicine curriculum.

Several ways to improve the teaching of musculoskeletal disorders to family medicine residents exist. Each training institution should develop and/or implement a curriculum dealing with common musculoskeletal problems (see chapters 6 and 7). Kahl (1987), DiPaola (1986) and others have stressed the inclusion of common outpatient musculoskeletal problems in such curricula (Schumacher, 1981). These prepared curricula could be implemented throughout the country.

The specific medical practitioner best suited to teach musculoskeletal disorders to family medicine residents has yet to be determined. Based on the results of this survey, the disciplines of sport medicine, orthopedic surgery and physical medicine encounter many of the same common musculoskeletal conditions in clinical practice. However, the patient population seen by rheumatologists has a greater representation of the inflammatory arthropathies compared to the other groups of physicians (see Table III). Therefore, it would appear that the rotation to best prepare the family medicine resident for their eventual clinical competency demands in the area of musculoskeletal disorders would be in a sport medicine, orthopedic surgery or physical medicine outpatient clinic. As DiPaola (1986) states, if orthopedic surgery training is involved, it should include a greater proportion of clinical contact based in an outpatient environment, and less in the operating theater.

The Royal College of Physicians of rheumatology, orthopedic surgery and physical medicine rated their post-graduate training as being above average to

excellent. This would indicate a general satisfaction with the current teaching practices in these fields, and that the curricula used in these residencies prepare the physicians for the eventual clinical competency requirements.

The sport medicine practitioners rated their post-graduate training in the area of musculoskelatal disorders as between average and above average. This is of some concern, as the treatment of musculoskeletal problems would be considered one of the greatest competency requirements of this group of practitioners. This is supported by the needs assessment survey, which documented that the treatment of musculoskeletal problems is perceived as an extremely important part of the clinical practice in sports medicine (see Table VII). The lack of a specific training program for sport medicine practitioners, and the variable criteria across Canada for inclusion in this discipline makes general statements with regard to the education of this group of physicians more difficult. This difficulty would be reduced by more consistency in sport medicine training programs in general, as well as the development of specific curricula for the teaching of musculoskeletal problems within these programs.

Common diagnostic coding systems make it difficult to determine an accurate quantification of case load data with regard to musculoskeletal injuries and disease. The nonspecific nature of these coding systems prohibits the first step in the preparation of a comprehensive, competency-based curriculum--the identification of specific disorders commonly encountered in clinical practice. The disorders chosen in this study were generally conditions which involve a specific body region and specific tissue, often with a temporal factor such as relative acuity of the problem, used to modify the precise diagnosis. Such specificiy is not found in the Royal College of General Practitioners (RCGP) or International Classification of Health Problems in Primary Care (ICHPPC) coding systems (see pages 10-11). These coding systems use diagnostic clusters of

musculoskeletal disorders which often do not specify tissue type, precise joint or temporal information. It is evident that it would be difficult to prepare learning objectives for a diagnostic cluster of musculoskeletal disorders involving "pain in joint" (RCGP # 408) or "other nonarticular rheumatism" (ICHPPC # 7280 see Table I and II).

The precise musculoskeletal diagnoses obtained in this survey allow the preparation of precise learning objectives. Other studies which have examined the competency needs amongst primary care practitioners, such as the Marshland study of the content of Family Practice (1976), have used less specific diagnostic clusters such as those seen in Table I. The most common musculoskeletal cluster seen in the Marshland study representing 2.4% of patient visits to family physicians was "sprains and strains". However, the knowledge and skills required to effectively deal with an anterior cruciate ligament sprain is different from the knowledge and skill required to manage a quadricep strain. These factors make the preparation of a curriculum with specific learning objectives from such imprecise data as that supplied from the Marshland study (1976) and others, a difficult endeavour.

Chapter 8
Conclusion:

Musculoskeletal disorders are responsible for a substantial percentage of patient visits to primary care physicians, and are perceived as an extremely important part of the clinical practice of family medicine, sport medicine, rheumatology, physical medicine and orthopedic surgery. The medical education process to date has failed to provide student physicians with adequate knowledge, skill or attitudes in order to competently deal with the burden of musculoskeletal problems. This disparity was addressed by first, defining the twenty most common musculoskeletal disorders encountered in clinical practice. This served to outline the specific competency requirements necessary in clinical medicine. Second, terminal and enabling objectives were formulated to assist student physicians in learning the required cognitive, manual and attitudinal material to effectively deal with these conditions. Third, a more detailed musculoskeletal study guide was prepared using a traditional content knowledge approach.

This curriculum was evaluated by an expert validity survey. The experts surveyed rated the curriculum as covering important aspects of the clinical practice of medicine, which were neglected in the current medical education process. The terminal objectives were considered comprehensive, covering musculoskeletal problems which represented the most common disorders encountered in clinical practice. The curriculum was strongly endorsed as a valuable addition to undergraduate or family medicine teaching programs.

These curricula on musculoskeletal disorders could be implemented into the medical education process using the final six steps in Harden's Ten questions to ask when planning a course or curriculum (1986). The implementation would be

affected by local educational resources, expertise in this discipline, and current educational practises in the specific regions.

Appendix 1:

Physician Questionnaire and List of Musculoskeletal Disorders

Dear Dr. ,

My name is Dr. Neil Craton. I am involved in the preparation of a curriculum on common musculoskeletal disorders as part of my graduate thesis at the University of British Columbia. This curriculum is intended to address the disparity between the limited teaching provided to medical students in musculoskeletal disorders, and the significant burden these conditions represent in clinical practice. I would appreciate your time and expertise in helping to develop this curriculum.

Enclosed is an alphabetically arranged list of musculoskeletal disorders. Please circle the twenty most common disorders that you face in your clinical practice. If you cannot find a specific diagnostic entity, please feel free to write it in the space provided at the end of the alphabetic list.

I would also ask that you specify up to ten musculoskeletal conditions which you did not select as being common, but which you feel should be included in a curriculum due to their clinical importance, severity, or value in teaching important principles. Remember, we would like you to circle the most common problems you are faced with. I suggest you prepare a list of the 20 specific disorders you see most commonly, then look for them on the enclosed list. Rank order is not important.

The average time to complete this questionnaire is ten minutes.

Thank you very much for your anticipated cooperation.

We would sincerely appreciate if you could return the completed form in the self addressed, stamped envelope by March 30, 1993.

Yours truly

Neil Craton BSc. M.D.

Circle the most accurate response:

1. Please list the percentage of your clinical time spent in the following areas;
   a. family practice _____%
   b. orthopedic surgery_____%
   c. sports medicine_____%
   d. rheumatology_____%
   e. rehabilitation medicine_____%
   f. other (please specify)_____ _____%
2. My practice is;
   a. rural
   b. urban
3. Treating musculoskeletal disorders is;
   a. an extremely important part of my clinical practice.
   b. an important part of my clinical practice.
   c. an average part of my clinical practice.
   d. a relatively unimportant part of my clinical practice.
   e. an extremely unimportant part of my clinical practice.
4. With respect to musculoskeletal disorders, my undergraduate training was:
   a. excellent
   b. above average
   c. average
   d. below average
   e. completely inadequate
5. With respect to musculoskeletal disorders, my post-graduate training was:
   a. excellent
   b. above average
   c. average
   d. below average
   e. completly inadequate
6. Please now circle the twenty most common disorders you face in your clinical practice.
7. Please list from 5-10 disorders which you feel should be included in a curriculum due to their severity of outcome, importance, or value in teaching principles of musculoskeletal disorders.

ANKLE;

chronic ankle instability
deltoid ligament sprain (eversion sprains)
fracture distal tibia, fibula (with/without dislocation)
lateral ligament sprain (inversion sprains)
osteochondral fracture: talus (osteochondritis dissecans)
peroneal tendonitis/subluxaton
subtalar joint dysfunction

BACK:

degenerative disc disease
facet syndrome
intervertebral disc prolaspe with nerve root irritation (sciatica)
kyphoscoliosis (scheuermann's, adolescent postural kyphosis)
muscular back strain
pars interarticularis defects (spondylolysis, spondylolisthesis)
quadrataus lumborum syndrome
scoliosis (all types)
spinal stenosis
spondylosis and apophyseal osteoarthritis
vertebral fractures (all sites)

ELBOW AND FOREARM:

avulsion fractures (all sites)
degenerative osteoarthritis of the elbow
elbow dislocations (all sites)
fracture of radius and or ulna in forearm (all non Colles radial fractures)
humeral fractures (all sites)
lateral epicondylitis (tennis elbow)
medial epicondylitis (pitcher's elbow)
olecranon bursitis
olecranon fractures
osteochondritis dissecans (all sites- little leaguers elbow)
posterior interosseous nerve entrapment
radial head dislocation (nursemaids elbow)
radial head fractures
triceps tendonitis
ulnar neuritis

NECK:

brachial plexopathy (stinger, burner, brachial plexus neuritis)
cervical spine fractures (all sites)
cervical stenosis
degenerative cervical osteoarthritis
prolapsed cervical disc
torticollis (all causes)
whiplash syndromes (musculoligamentous strains)

NON-REGIONAL DISEASE ENTITIES AFFECTING THE MUSCULOSKELETAL SYSTEM:

ankylosing spondylitis
bony malignancies (all types)
enteropathic arthritis
fibrositis syndrome (fibromyalgia, fibositis)
gout and other crystal induced arthropathies
reflex sympathetic dystrophy
Reiter's disease
osteoid osteoma
osteomyelitis
osteochondrosis
osteoporosis
psoriatic arthritis
rheumatoid arthritis
sarcoidosis
septic arthritis
systemic lupus erythematosus

FOOT;

calcaneal apophysitis (Sever's disease)
calcaneal fractures
cavus feet
clubfoot
cuboid subluxation
toe extensor tendonitis
flatfeet (pes planus, overpronation)
toe flexor tendonitits
hallux valgus (bunions)
longitudinal arch strain
metatarsalgia
metatarsal fractures (including Jones fractures)
metatarsal stress fractures
Morton's neuroma (interdigital neuroma)
plantar fasciitis (calcaneal bone spurs)
sesamoiditis
tarsal coalition
tarsal fractures
tarsal stress fractures (navicular stress fractures

LOWER LEG;

achilles tendonitis (including acute/chronic/rupture)
anterior tibialis tendonitis/tenosynovitis (skate-bite)
chronic exertional compartment syndromes (all compartments)
fibular stress syndrome/fracture
gastrocnemius strain/rupture (either head)
posterior tibial tendonitis/tenosynovitis
proximal tibiofibular joint dysfunction
tibial fractures (including tibial-fibular fractures)
tibial stress syndrome /fracture(Shinsplints)

PELVIS, HIP ,THIGH;

avulsion fractures of the pelvis (apophysitides-all sites)
dislocation of the hip
femoral stress fractures
groin strain (adductor strain-all adductor muscles)
hamstring strain (all muscles)
hip abductor strain (gluteus medius-tensor fascia lata syndrome)
iliac crest contusion
iliopsoas tendonitis
iliotibial band friction syndrome
legg-calves-perthes disease
myositis ossificans
osteitis pubis
osteoarthritis of the hip
piriformis syndrome
pelvic fractures (all sites-stress)
pelvic fractures (all sites-traumatic)
quadriceps strain
sacroiliac joint dysfunction
slipped capital femoral epiphysis
traumatic femoral fractures
trochanteric bursitis (hip pointer)

SHOULDER:

acromio-clavicular separations (all grades)
atraumatic osteolysis of the distal clavicle
axillary nerve palsy
bicipital tendonitis (including rupture)
calcific tendonitis (all sites)
clavicle fracture (all sites)
deltoid tendonitits
frozen shoulder (adhesive capsulitis)
humeral fractures (all proximal sites)
impingement syndrome (rotator cuff tendonitis, supraspinatus tendonitis, painful arc syndome, subacromial bursitits)
rotator cuff tears
scapulohumeral fibrosis
shoulder dislocation (glenohumeral dislocation, anterior and posterior)
shoulder instability (post-traumatic and multidirectional)
sternoclavicular joint injuries

KNEE;

anterior cruciate ligament tear (acute and chronic)
baker's cyst (including rupture)
bursitis (prepatellar, infrapatellar-housemaids knee)
fat pad impingement
femoral fractures (all distal sites)
hamstring tendonitis (all muscles)
lateral collateral ligament strain (acute and chronic)
medial collateral ligament tear (acute and chronic)
meniscal cysts
meniscal tears (degenerative, acute, chronic)
osteoarthritis (any compartment)
osteochondritis dissecans (femoral and patellar)
patellar fracture
patellar subluxation and dislocation
patellar tendonitis (Sinding-Larsen-Johannson)
patellofemoral pain syndrome (chondromalacia patellae, anterior knee pain syndrome)
pes anserine bursitis /tendonitis
posterior cruciate ligament tear (acute and chronic)
semimembranosus bursitis
tibial apophysitis (Osgood-Schlatter's disease
tibial plateau fracture

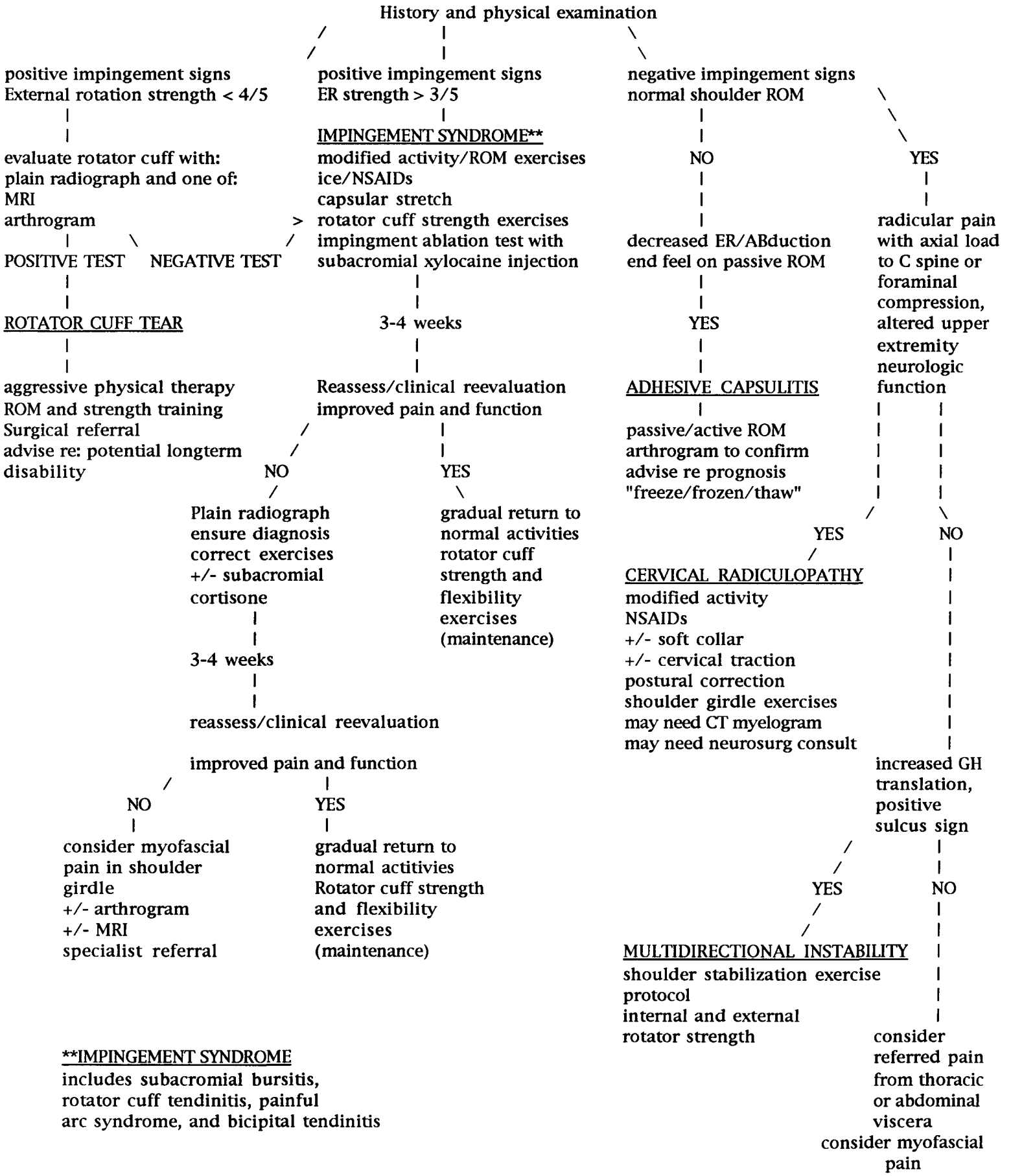
WRIST AND HAND:

avascular necrosis of the lunate (Kienbocks disease)
boxer's fracture (metacarpal fracture-all sites)
carpal instability
carpal tunnel syndrome
Colles fracture (fracture of the distal radius- all types Smith, Barton)
de Quervains tenosynovitis
dupuytrens contracture
extensor tendonitis
flexor tendonitis
ganglion of synovium, tendon, bursa, nerve
interphalangeal dislocation
metacarpal fracures with displacement (Bennet's fracture)
perilunate dislocation
scaphoid fracture (acute/chronic/nonunion)(all carpal fractures)
tendon avulsions (mallet finger, baseball finger)
tendon lacerations/avulsions (all tendons)
ulnar nerve compression at wrist (tunnel of Guyon syndrome)
ulnar collateral ligament rupture (skier's/gamekeepers thumb)
volar plate injuries
wrist capsulitis

Specify up to ten musculoskeletal conditions which you did <u>not</u> select as common, but feel should be included in a curriculum due to their severity, clinical importance., or value for teaching general principles:

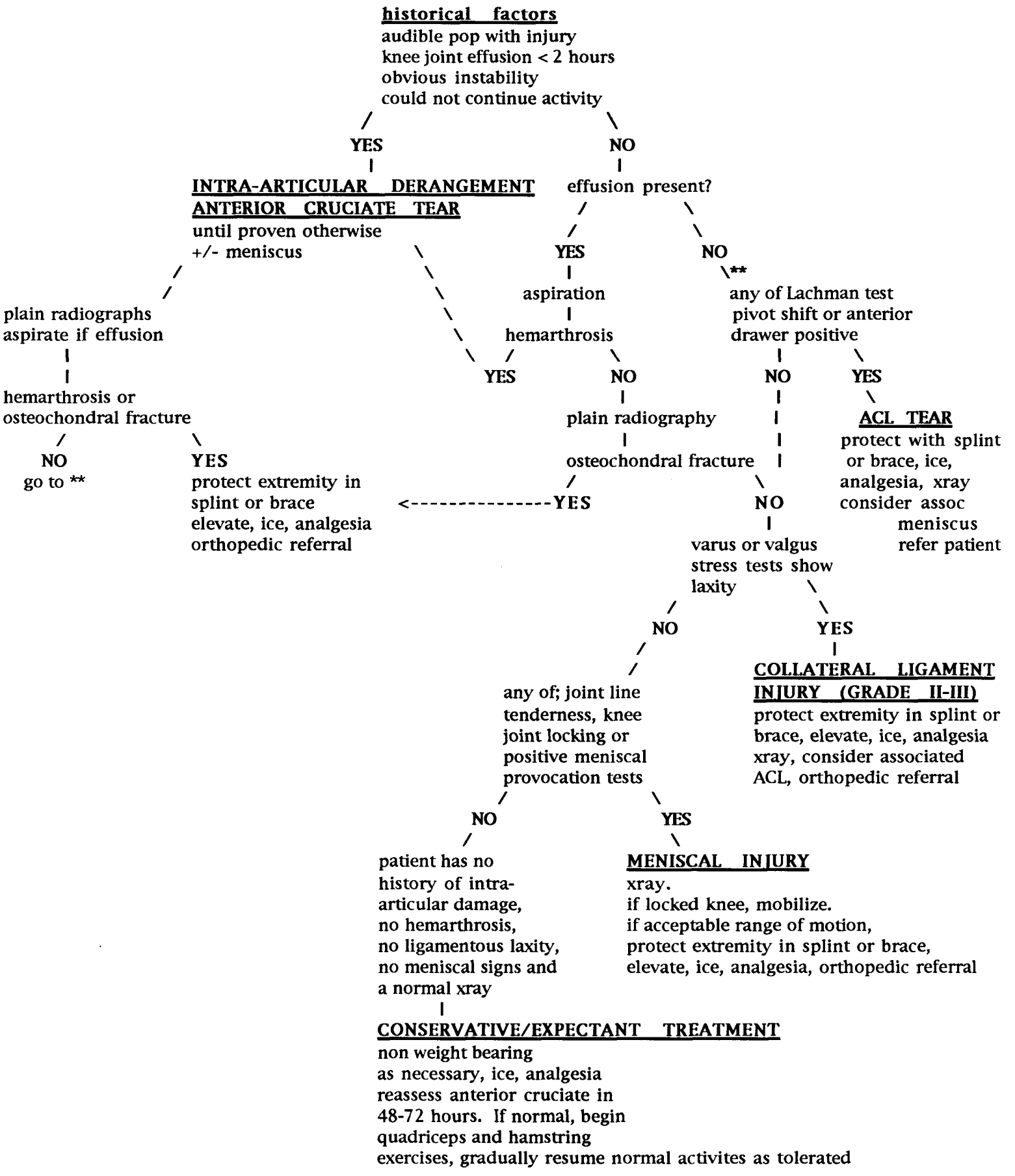
1. _____ 6. _____
2. _____ 7. _____
3. _____ 8. _____
4. _____ 9. _____
5. _____ 10. _____

APPENDIX II: PATIENT MANAGEMENT ALGORITHMS
ALGORITHM FOR CHRONIC SHOULDER PAIN

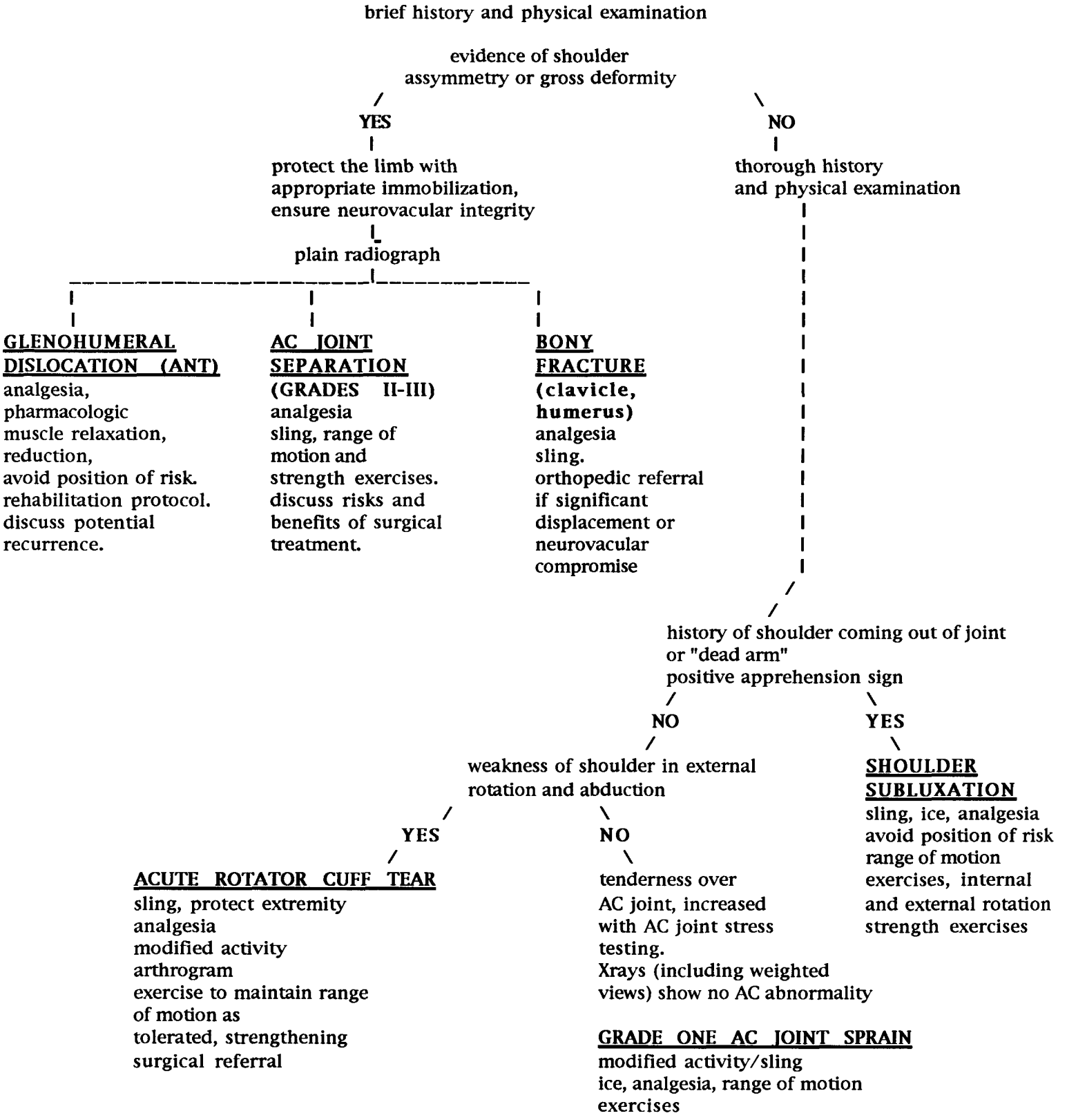


**IMPINGEMENT SYNDROME
includes subacromial bursitis, rotator cuff tendinitis, painful arc syndrome, and bicipital tendinitis

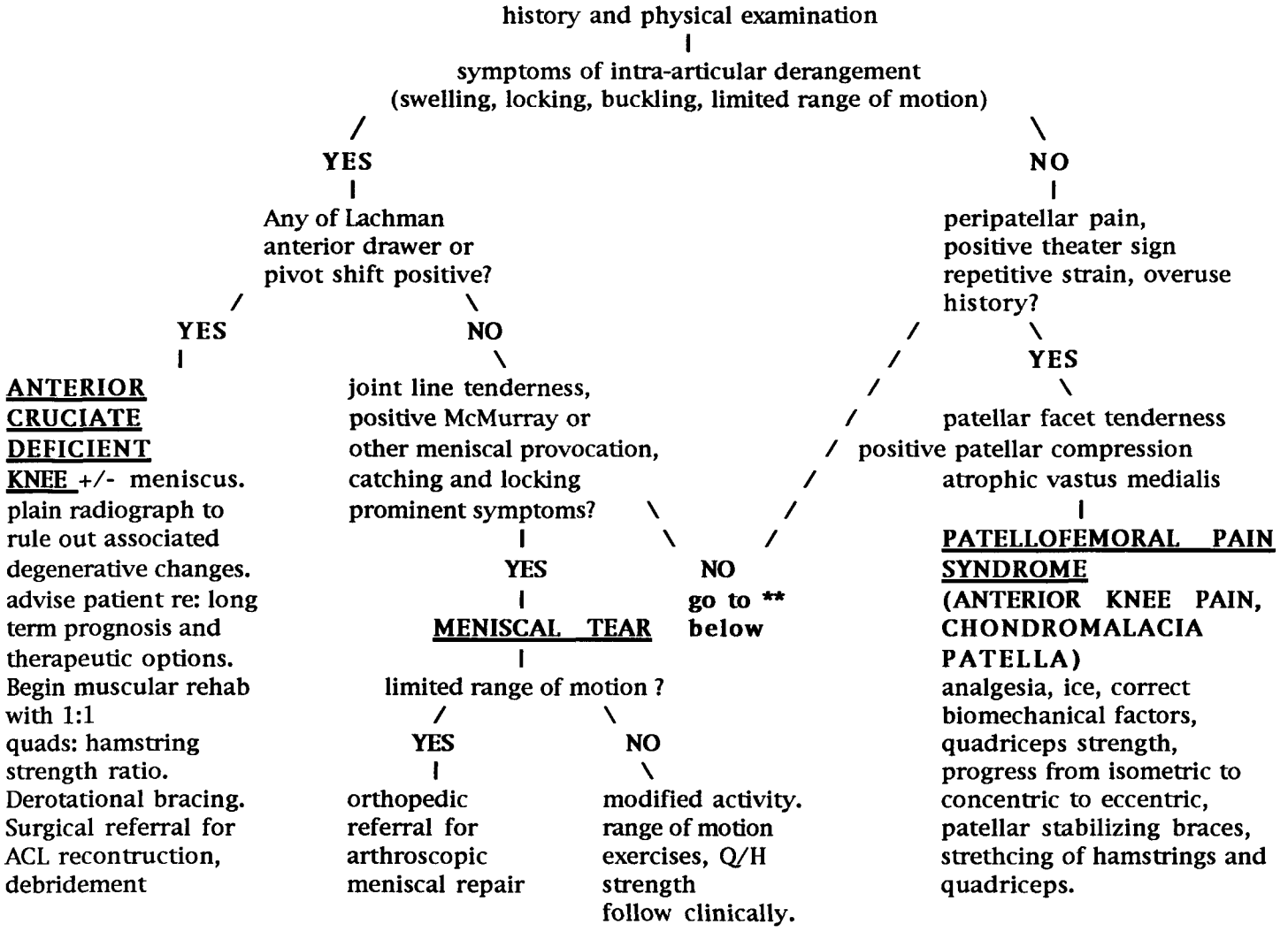
ALGORITHM FOR ACUTE KNEE INJURIES



ALGORITHM FOR ACUTE SHOULDER JOINT INJURIES



ALGORITHM FOR CHRONIC KNEE PAIN



Appendix III. Expert validation letter.

Dear Dr. July 27, 1993

Thank you for considering to review this manuscript. You have been chosen as an expert in your field of practice to help establish the validity of this curriculum concerning common musculoskeletal problems.

This curriculum was prepared using a competency based curriculum planning technique. This technique is dependent on a determination of what is common in clinical practice, and attempting to prepare the student for these needs. Physicians from the disciplines of Family Medicine, Sports Medicine, Orthopedic Surgery, Rheumatology and Physical Medicine and Rehabilitation selected the musculoskeletal disorders included in this curriculum. This curriculum is designed to be used in the post-graduate internship/family medicine residency training period.

You will notice the curriculum is separated into two formats. The first is organized into terminal and enabling objectives (short curriculum). The terminal objectives are what the student should be able to do after working through the curriculum. The enabling objectives, are divided into knowledge (cognitive), skill (motor) and attitude (behavioral) objectives. These objectives are designed to provide the student with the requisite knowledge, skill, and attitudes to achieve the terminal objectives. They serve as guideposts to the final destination. The second section is a more detailed form of curriculum. It has sample case histories, and references to review articles on salient areas in the literature related to the clinical problem being studied. It represents the "content knowledge" approach to curriculum planning, and will be included as an appendix in the final thesis document, to serve as a study guide. You have been asked to review only a subsection of this final document. A table of contents has been included to list the other conditions covered in this format.

If you cannot review this document in thirty days, please return it in the self addressed envelope. If you can, write your criticism directly on the document, and complete the enclosed questionnaire, and return this in the provided envelope. Thank you again for your time and expertise,

Yours truly
Neil Craton B.Sc. M.D.

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