

# ***FIMS Team Physician Development Course Outline***

## **TEAM PHYSICIAN**

### **I. Duties of the team physician**

#### **A. Athlete care**

1. Coordinate pre-participation screening, examination, and evaluation
2. Educate and counsel athletes regarding nutrition, strength and conditioning, ergogenic aids, substance abuse, and other medical problems
3. Fieldside assessment, triage, and injury management
4. Provide for medical management of injury and illness
5. Integrate medical expertise with other health care providers, including medical specialists, athletic trainers and allied health professionals
6. Coordinate rehabilitation and return to participation
7. Provide for proper preparation for safe return to participation after an illness or injury

#### **B. Additional duties**

1. Maintain clear lines of communication with the family physician, parents, coaches and support personnel of the athlete.
2. Continually upgrade own skills and knowledge through regular participation in continuing medical education activities.
3. Educate athletes, paramedical personnel and interested citizens.
4. The team physician is truly a role model

### **II. Code of ethics for the team physician**

- A. Have primary responsibility for the safety and well being of the athlete
- B. Abide by the guiding regulations of the medical profession
- C. Abide by the rules of the sport governing body
- D. Seek other medical opinions when in doubt, and then integrate this expertise as provided
- E. Preserve confidentiality in all circumstances.
- F. Do not seek secondary gain from commercial interests that in any fashion would alter that which is in the best interest of the athlete.

### **III. Traveling with the team**

#### **A. Pre-event**

1. Visit site, identify “danger zones”
2. Clarify roles and responsibilities of each member of the medical team
3. Clarify insurance issues in advance

#### **B. On the road:**

1. Keep banned medications separated from the traveling pharmacy
2. Function not just as a doctor, but also as psychologist, teacher and advocate
3. Keep organized, accurate records

#### **C. Media relations**

1. Confidentiality key
2. Clarify role in advance

## PREVENTING SPORTS INJURIES

- I. Preventing acute sports injuries
  - A. Pre-season physical conditioning program – general and sports-specific
  - B. Make proper warmup and cooldown part of every game and training session
- II. Ensure safe playing conditions
  - A. Ameliorate extreme temperatures (overheating – hyperthermia; over cooling – hypothermia)
  - B. Ensure the athlete uses appropriate safety equipment - helmets, padding, mouthguards, eyewear
- III. Preventing overuse sports injuries
  - A. Intrinsic risk factors
    - 1. Previous injury
    - 2. Poor conditioning/Muscle imbalances
    - 3. Anatomical abnormalities
    - 4. Nutritional factors
    - 5. Growth (in children)
  - B. Extrinsic risk factors
    - 1. Training errors, including abrupt increases in intensity, duration, or frequency of training
    - 2. Inappropriate workout structure, including
    - 3. Improper footwear

## PREPARTICIPATION EXAM

- I. Goals of the preparticipation exam
  - A. Assess overall health
  - B. Detect conditions that might cause injury
  - C. Detect conditions that may disqualify the athlete from participation in certain sports
  - D. Assess fitness for the chosen sport
  - E. Make recommendations for the exercise program
- II. Components of the preparticipation exam
  - A. Medical history
  - B. General medical health evaluation
  - C. An anatomical review
  - D. Flexibility evaluation
  - E. Strength assessment
  - F. Cardiovascular fitness assessment
  - G. Musculoskeletal exam
  - H. Equipment review
- III. Medical history
  - A. Along with physical exam, medical history is the most important component of preparticipation exam
  - B. May detect previous illnesses, injuries, and operations that affect sports participation and cause injuries
  - C. Areas of the medical history to pay special attention to include:
    - 1. Hospitalizations and surgery
    - 2. Medications
    - 3. Allergies
    - 4. Tetanus immunization status
    - 5. Family cardiovascular problems
    - 6. Skin problems
    - 7. Sprains, strains, or fractures
    - 8. Problems coping with heat or cold
  - D. Make sure athletes get medical history forms in advance
- IV. Physical exam
  - A. Along with medical history, physical exam is the most important component of preparticipation exam
  - B. Focus not just on cardiovascular endurance, but also strength and flexibility
  - C. Lack of strength and flexibility at the root of many sports injuries
  - D. Prescribe stretching and strengthening exercises to address deficits

## EXERCISE PHYSIOLOGY

- I. Energy sources
  - A. Carbohydrates stored as liver and muscle glycogen
  - B. Fatty acids stored as triglycerides
  - C. Proteins
- II. 3 basic energy systems
  - A. ATP-PC: Primarily for high-intensity activities lasting a few seconds
  - B. Glycolysis: Primarily for “all-out” activities lasting 1 to 3 minutes
  - C. Oxidative system: Primarily at rest and during low intensity endurance events
- III. Fundamental training principles
  - A. Specificity
  - B. Overload
  - C. Progression
  - D. Supercompensation
  - E. Reversibility
  - F. Tapering
  - G. Periodization
- IV. Summary of aerobic training guidelines
  - A. 3 to 5 days per week
  - B. 20 to 60 minutes
  - C. 60% to 90% maximum heart rate
- V. Summary of strength training guidelines
  - A. At least 2 to 3 days per week
  - B. Perform multi-set training protocols
  - C. Include functional, multi-joint exercises
- VI. Summary of flexibility training guidelines
  - A. Warm-up prior to stretching
  - B. Stretch before and after practice and competition
  - C. Perform 8 to 12 stretches
  - D. Hold static stretches for 20 to 30 seconds
- VII. Markers of overtraining
  - A. Increase (or decrease) in resting heart rate
  - B. Decrease body mass
  - C. Muscle tenderness
  - D. Loss of appetite
  - E. Sleep disturbances
  - F. Chronic fatigue
  - G. Psychological staleness
  - H. Flu-like symptoms
  - I. Decrease performance

## NUTRITION

- I. Macronutrient composition - diets rich in whole grains, vegetables, and fruits (high-carbohydrate foods):
  - A. Help prevent disease
  - B. Maintain body weight
  - C. Optimize athletic performance
- II. Carbohydrates are core
  - A. Carbohydrates - what the body relies on most for fuel during exercise
  - B. Amount of carbohydrates stored in body directly impacts stamina and endurance
- III. Carbohydrate loading
  - A. Pre-exercise meal of primarily high carbohydrate, low fat foods for easy, fast digestion
  - B. Immediate nutritional priority after prolonged/heavy exercise is rehydration, closely followed by restoration of body's carbohydrate stores
- IV. Lipids
  - A. Many athletes neglect fat intake, fearing increase in body fat
  - B. Remind athletes that intake of 20-25% of calories from fat not only acceptable but *recommended*
- V. Proteins
  - A. Protein catabolism during exercise most apparent when body's carbohydrate stores are low - especially after prolonged strenuous exercise when alanine-glucose cycle may account for 40-50% of total glucose released by liver
- VI. Balance of Micronutrients
  - A. Vitamins and minerals found in wide range of foods
  - B. Intake of vitamins and minerals positively related to energy intake, so deficiencies rare if eat balanced diet
- VII. Antioxidants
  - A. Intake of antioxidants improves antioxidant status of body
  - B. May decrease damaging effect of radicals-formation, especially during strenuous exercise
- VIII. Calcium
  - A. Women who train intensively and reduce body weight to the point of adversely affecting menstruation may develop premature osteoporosis, even with normal calcium intake
- IX. Fluid Balance
  - A. Excessive sweating during exercise causes significant losses of water-soluble minerals through body water, thus decreasing physical performance capacity
  - B. To maintain performance capacity and prevent health risks from dehydration, athletes must replace water and some minerals during training and competition
  - C. Water/mineral replacement especially important during sustained exercise under hot and humid ambient conditions, and also in recovery period
- X. Pre-exercise feeding
  - A. Readily digestible meal
  - B. Contributes to the energy and fluid requirements of the planned exercise
  - C. High in carbohydrates and relatively low in lipids and proteins
  - D. Generally eat about 3 hours before competition
- XI. Weight loss
  - A. Combine increased exercise and decreased energy intake
  - B. Mode and level of exercise generally should result in increase of daily energy expenditure by 300 kcal
- XII. Female Athlete Triad
  - A. Unhealthy focus by female athletes on achieving and/or maintaining "ideal body weight" and/or "optimal body fat"
  - B. Caused by:
    - 1. Pressure to attain good results
    - 2. Pressure from coaches
    - 3. Unrealistic self-expectations
    - 4. Societal pressures
    - 5. Low self-esteem and poor body image
  - C. Use team approach for treatment

## MEDICAL CONDITIONS

- I. Exercise and infections
  - A. Intensive exercise may increase risk of infections
  - B. Common infections include:
    - 1. Upper respiratory tract infections (endurance athletes)
    - 2. Skin infections (contact sports)
    - 3. Water-borne infections (water sports)
  - C. Upper respiratory tract infections (URTI)
    - 1. Affect nasopharynx
    - 2. Symptoms local, sometimes systemic
    - 3. Most common infection in adults, athletes included
    - 4. High intensity exercise may increase risk
    - 5. Several sports-specific precautions lower risk in athletes
    - 6. Don't play sports until symptoms resolve
  - D. HIV
    - 1. Risk of transmission in sports small but real
    - 2. In sports, transmission occurs as result of contact between blood of infected athlete and open wound of non-infected athlete
    - 3. Proper care of open wounds necessary in contact/collision sports
  - E. Otitis externa/"swimmer's ear"
    - 1. Describes variety of conditions affecting external auditory canal
    - 2. Water washes out protective cerumen; leads to easier bacterial/fungal colonization
    - 3. Diagnosis is clinical – findings range from erythema to discharge, itching, dull tympanic membrane and hyperkeratotic epithelium
    - 4. Often culture *Pseudomonas aeruginosa* or *Aspergillus*
    - 5. Management: no water sports until resolved, clean-out, use topical analgesics and hydrocortisone
    - 6. Prevention is key
  - F. Management of localized infections
    - 1. Upper respiratory tract infections – no competition or training if systemic symptoms
    - 2. Skin infections – topical anti-microbial agent; restrict physical contact with others where appropriate
    - 3. Vaginitis – topical anti-microbial agent; for cystitis or pelvic inflammatory disease, systemic antibiotics and activity restriction
    - 4. Conjunctivitis –topical antibiotic; for severe, systemic medications and activity restriction
- II. Exercise-induced bronchospasm (EIB)
  - A. Occurs frequently in athletes
  - B. Typically begins 5-15 minutes after exercise; athlete may benefit from refractory period
  - C. Diagnosis confirmed by measuring lung function before and after exercise
  - D. Pharmacologic prophylaxis is inhaled beta2-adrenergic agonists or cromolyn sodium; consider inhaled corticosteroids or other medications
  - E. Provide practical advice to athletes
- III. Gastrointestinal symptoms during exercise
  - A. May interfere with training or competition
  - B. Cause may be totally unrelated to exercise, such as infection, cancer, ulcer
  - C. Medication may be considered – be certain it is not on "banned" list
  - D. Once symptoms are attributed only to exercise and not to any organic disease, provide practical advice to athletes

## FIELDSTIDE ASSESSMENT

- I. Primary Survey Tips
  - A. Identify and reverse any life threatening injuries in a stepwise fashion
  - B. “ABCDE” approach
  - C. Always suspect a cervical spine injury, provide in-line immobilization of the neck until it is cleared from injury
  - D. Practice universal body precautions
- II. Secondary Survey Tips
  - A. Perform in a controlled environment
  - B. Detailed examinations of any injured system or joint; rule out associated injuries
  - C. Administer first aid treatments
- III. Triage Tips
  - A. The athlete should be safe from further injury, effective in participating, and relatively pain free before returning to play
  - B. “When in doubt, sit it out”
- IV. Pre-event Planning Tips
  - A. Proper preparation is the key to successful event coverage
  - B. At minimum, the physician must be able to communicate with further medical staff, have adequate medical supplies to initially treat, and a means of transferring an athlete to an appropriate medical facility
  - C. Study the competition venue for areas of potential injury and access to injured athletes
  - D. Practice the emergency protocols
  - E. Consider temperature, weather and environment as potential risks

## REHABILITATION

- I. Pathophysiology of injury and repair – The stages of injury
  - A. Inflammatory stage (2-4 days)
  - B. Fibroplastic-repair stage (4-6 weeks)
  - C. Restoration-remodeling stage (months-years)
- II. Medications as part of the rehabilitation process
  - A. Analgesics
  - B. NSAIDs
  - C. Muscle relaxants
- III. Physical modalities
  - A. Cold modalities – superficial cold
  - B. Heat modalities – superficial heat, deep heat
  - C. Electrical modalities
  - D. Traction
- IV. Phases of rehabilitation and management principles
  - A. Acute phase (first 48-72 hrs):
    - 1. Inflammation control
    - 2. RICE
    - 3. Medications
    - 4. Modalities
    - 5. Maintain flexibility, range of motion
    - 6. Cross train
  - B. Subacute/recovery stage (3 days–3 weeks):
    - 1. Restore joint and soft tissue flexibility
    - 2. Stretching
    - 3. Strengthening
    - 4. Resistance exercise
    - 5. Stretch-shortening cycle (plyometrics)
    - 6. Endurance
  - C. Functional phase (weeks to months):
    - 1. Improve neuromuscular control and correct maladaptive behaviors
    - 2. Sports-specific and multiplane activity
    - 3. Functional retraining
    - 4. Kinetic chain
    - 5. Balance and proprioception
    - 6. Agility drills.

## DOPING

### I. Prohibited Classes of Substances

- A. Stimulants
- B. Narcotics
- C. Anabolic Agents
  - 1. Anabolic androgenic steroids
- D. Beta-2 agonists
- E. Diuretics
- F. Peptide hormones, mimetics and analogues
  - 1. Chorionic gonadotropin (hCG);
  - 2. Pituitary and synthetic gonadotropins (LH);
  - 3. Corticotropins (ACTH, tetracosactide);
  - 4. Growth hormone (hGH);
  - 5. Insulin-like growth factor (IGF-1);
  - 6. Erythropoietin (EPO);
  - 7. Insulin

### II. Classes of Substances Prohibited in Certain Circumstances

- A. Alcohol
- B. Cannabinoids
- C. Local anesthetics
- D. Glucocorticosteroids
- E. Beta-blockers

### III. Prohibited Methods

- A. Blood doping
- B. Administering artificial oxygen carriers or plasma expanders
- C. Pharmacological, chemical or physical manipulation of the urine

## SPECIAL POPULATIONS

- I. Pre-pubertal children
  - A. Variety of enjoyable activities
  - B. Delay sport specialization, in general
  - C. Compared with adults, greater risk of hypo/hyperthermia – be attentive, hydrate
  - D. Decreased muscle flexibility/bone strength from rapid growth – decrease training during rapid growth spurts
- II. Strength training for youth
  - A. Strength training can be effective and safe, and help prevent injuries
  - B. Mainly neuromuscular adaptation
  - C. Goals: learn safe strength training principles, improve balance and proprioception, decrease injury incidence/severity
  - D. For safety, must be well supervised, equipment adjusted for size; gradual, progressive increase in sub-maximal resistance
- III. Adolescents
  - A. Pubertal development variable; growth rapid; body composition changes
  - B. Decreased strength of bone at physis (growth plate) and metaphysis near peak height velocity; fractures more likely than sprains at wrist and ankle
  - C. Muscles may be “short” relative to adjacent long bones, especially muscles that cross two joints.
  - D. Weight control an issue for sport weight class, or for psychosocial reasons
  - E. Substance experimentation/abuse
- IV. Gender differences
  - A. Pre-pubertal
    - 1. Almost all motor skills acquired at similar ages
    - 2. Similar linear increase in muscle strength
    - 3. VO<sub>2</sub>max of girls is 85-90% that of boys
    - 4. No difference in endurance running performance
  - B. Adolescence
    - 1. Marked acceleration of boys’ strength gain, gender difference greatest for upper extremities
    - 2. Boys gain more strength than girls with same training program
    - 3. Girls’ VO<sub>2</sub>max decreases to 70% of boys, but still approximately 90% when expressed relative to fat-free mass
    - 4. Greater gender difference in endurance running performance by mid-teens
- V. Women: young adult
  - A. Wide cultural variations in sport activities available to women; required clothing may increase hyperthermia risk, interfere with vision
  - B. Compared with young adult men
    - 1. Lower VO<sub>2</sub>max (but same VO<sub>2</sub>max when expressed relative to fat-free mass)
    - 2. Decreased muscle cross-sectional area and bone size
    - 3. Less muscle hypertrophy with strength training (unless use exogenous anabolic steroids)
    - 4. No difference in strength trainability expressed as percentage increase
  - C. Special musculoskeletal considerations: more frequent
    - 1. Patellofemoral dysfunction,
    - 2. Anterior cruciate ligament rupture,
    - 3. Idiopathic scoliosis
  - D. Special medical considerations:
    - 1. Iron deficiency
    - 2. Disordered eating/female athlete triad
    - 3. Thermoregulation differences
  - E. Pregnancy:
    - 1. Regular exercise good for mother and fetus
    - 2. Mother should eat, rest, and hydrate appropriately
    - 3. Avoid exercise in heat/humidity, especially exercise with high intensity
    - 4. Monitor intensity carefully

VI. Senior athletes

- A. Less physical decline among physically active
- B. Can even increase VO<sub>2</sub>max, muscle strength, muscle size
- C. Special musculoskeletal considerations:
  - 1. Increased incidence of osteoarthritis and tendinosis
  - 2. Uneven training schedule (“weekend warrior”)
- D. Special medical considerations: cardiovascular disease

## HEAD AND NECK INJURIES

### I. Cervical spine injury

#### A. History

1. Blow to the head or forceful bending/twisting of the neck
2. May have experienced sensory change

#### B. Exam

1. Do not move the athlete
2. Do not remove equipment unless necessary to establish/maintain airway
3. Always assume unconscious athlete has neck injury
4. Palpate for tenderness, deformity
5. Perform focused neurologic exam

#### C. Treatment

1. If suspicion of neck injury, immobilize cervical spine and transport athlete for further evaluation/treatment

#### D. Return to action

1. When neck has normal range of motion and strength and athlete can meet normal demands of sport
2. If any spinal cord injury has occurred, consider referral to specialist for return to play recommendations

### II. Head injury

#### A. History

1. Direct blow to head
2. Loss of consciousness may or may not occur

#### B. Exam

1. Assess level of consciousness
2. Check cranial nerve function
3. Examine for possible cervical spine injury

#### C. Treatment

1. For more severe head injury, emergency transport for treatment
2. For very mild concussions, individualized based on established guidelines

#### D. Return to action

1. When head injury appears mild, no concussion has recently occurred, and normal mental status and motor function
2. Refer to published guidelines

### III. Brachial plexus neurapraxia

#### A. History

1. Burning or tingling sensation down the arm following lateral bending of the neck

#### B. Exam

1. May have decreased sensation and/or strength in the upper extremity
2. Examine for evidence of cervical spine injury

#### C. Treatment

1. Symptoms usually self-limited
2. If symptoms prolonged, may need to strengthen weakened muscle groups

#### D. Return to action

1. When normal strength and range of motion

### IV. Epistaxis (nosebleed)

#### A. History

1. Direct blow to the nose

#### B. Exam

1. Nose deformity or pain on palpation of the nasal bones suggest possible fracture
2. Identify bleeding anteriorly from the nostrils or posteriorly along the oropharynx

- C. Treatment
    - 1. Anterior nosebleed – sit athlete forward while pinching nose under the nasal bones, applying pressure for at least 10 minutes; if bleeding continues, consider vasoconstrictor spray, cauterization or anterior packing of nostrils
    - 2. Posterior nosebleed – transport to medical facility for posterior packing
  - D. Return to action
    - 1. When bleeding stops
- V. Dental injuries
- A. History
    - 1. Direct impact to the mouth/teeth
  - B. Exam
    - 1. Bleeding or swelling around a tooth or gum
    - 2. Cracked, chipped or missing tooth
    - 3. Check the teeth that are adjacent to obviously injured teeth for loosening
  - C. Treatment
    - 1. Dentist should evaluate within 24 hours if severe
    - 2. For tooth avulsion, immediately reposition tooth, after rinsing in water, in clean socket; transport athlete to medical/dental facility
    - 3. If socket is not clean, store tooth immediately in an appropriate medium
  - D. Return to action
    - 1. When there is no risk of further damage to tooth
    - 2. Consult dentist for recommendations
    - 3. Mouthguards can reduce the risk of injury to teeth
- VI. Eye injuries
- A. History
    - 1. Direct contact with the eye
    - 2. Often complain of eye pain, blurred vision, tearing
    - 3. Floating spots, flashes of light, partial or complete loss of sight, and decreased quality of vision suggest internal eye injury
  - B. Exam
    - 1. Check visual acuity
    - 2. Examine pupils, extraocular movements, and peripheral field vision
    - 3. Perform fundoscopy with an ophthalmoscope if possible
    - 4. Apply fluorescein to the eye to identify corneal abrasion with a cobalt blue light
  - C. Treatment
    - 1. Transfer the athlete to a medical facility for immediate evaluation if there is decreased visual acuity, bleeding, or internal injury to the eye
    - 2. Protect the eye with an eye shield and avoid any direct pressure to the eye
  - D. Return to action
    - 1. When pre-injury visual acuity recovers, the athlete is asymptomatic, and adequate time has passed to let the eye injury heal
    - 2. Polycarbonate, protective eyewear can prevent eye injuries
    - 3. An ophthalmologist can make return to play recommendations in complicated cases
- VII. Ear injuries
- A. History
    - 1. Usually due to direct trauma, pressure change, or infection
    - 2. Middle and inner ear injuries may present with hearing loss, dizziness, vertigo, pain, or ringing in the ears
    - 3. External ear problems present with pain and swelling
  - B. Exam
    - 1. Check hearing in both ears
    - 2. Examine the external and middle ear with an otoscope
    - 3. Nystagmus suggests an inner ear problem

C. Treatment

1. Acute hearing loss, sudden severe ear pain, and/or bleeding or cerebrospinal fluid leak from the ear canal should be evaluated immediately
2. A ruptured tympanic membrane usually heals spontaneously
3. Antibiotics can resolve external and middle ear infections

D. Return to action

1. When the athlete has adequate hearing to participate safely and effectively in sport
2. Avoid water sports until a ruptured tympanic membrane heals
3. Avoid activities involving altitude/pressure changes, while experiencing nasal congestion
4. Proper headgear and hearing protection can prevent ear trauma

## SHOULDER INJURIES

- I. Shoulder fractures
  - A. History
    - 1. Direct blow or axial load
  - B. Exam
    - 1. Local tenderness and swelling, possible deformity
  - C. Treatment
    - 1. Reduction/internal fixation/immobilization where appropriate
    - 2. Rehabilitation to include periscapular stabilization
  - D. Return to action
    - 1. When athlete can meet demands of sport
- II. Glenohumeral shoulder dislocations
  - A. History
    - 1. Fall, or fall combined with separate impact (such as from another player)
    - 2. Athlete often feels shoulder pop out of joint
  - B. Exam
    - 1. Usually athlete holds shoulder adducted and externally rotated
    - 2. Obvious deformity
  - C. Treatment
    - 1. Consider immediate reduction
    - 2. Consider surgical stabilization
  - D. Return to action
    - 1. When athlete can meet demands of sport
- III. Acromioclavicular shoulder separation
  - A. History
    - 1. Impact to point of shoulder (from fall or blow)
  - B. Exam
    - 1. Local tenderness
  - C. Treatment
    - 1. Sling, surgery rarely indicated
  - D. Return to action
    - 1. When pain permits and athlete can meet demands of sport
- IV. Sterno-clavicular shoulder separation
  - A. History
    - 1. Direct blow to the outside of the shoulder
  - B. Exam
    - 1. Tenderness and palpable deformity
  - C. Treatment
    - 1. Anterior SC separation – consider closed reduction; rarely stays reduced but surgical stabilization rarely indicated
    - 2. Posterior SC separation – requires emergent evaluation and generally needs reduction
  - D. Return to action
    - 1. When athlete can meet demands of sport
- V. Acute muscle/tendon rupture
  - A. History
    - 1. Sudden forcible contraction followed by severe pain
    - 2. May hear or feel a “pop”
  - B. Exam
    - 1. Weakness, palpable defect
  - C. Treatment
    - 1. Surgical repair generally indicated, depends on severity and location
    - 2. Strengthen when sufficiently healed

- D. Return to action
  - 1. When athlete can meet demands of sport
- VI. Shoulder pain, non-acute
  - A. History
    - 1. Gradual onset of pain
    - 2. Single specific location, multiple locations, or diffuse
    - 3. Consider pre-existing strength/flexibility deficits
  - B. Exam
    - 1. Determine specific locations of tenderness
    - 2. Shoulder hypermobility
    - 3. Pain with special tests
    - 4. Flexibility; strength of shoulder and shoulder stabilizers; check scapulothoracic motion
  - C. Treatment
    - 1. Make specific diagnoses where possible
    - 2. Strengthen entire kinetic chain
    - 3. NSAIDS, RICE
  - D. Return to action
    - 1. Normal strength and flexibility, preferably pain-free

## ELBOW, HAND, AND FINGER INJURIES

- I. Elbow fracture
  - A. History
    - 1. Severe elbow pain following fall or direct blow
  - B. Exam
    - 1. Possible deformity
    - 2. Major concern is circulation
  - C. Treatment
    - 1. Splint as found, or flexed slightly (20-30 degrees)
    - 2. Urgent/emergent transport for complete evaluation/treatment
  - D. Return to action
    - 1. Internal fixation may result in more prompt return to action
    - 2. Must be pain-free with range of motion and strength to meet the demands of the sport
- II. Elbow dislocation
  - A. History
    - 1. Severe elbow pain following fall on outstretched hand with elbow extended
  - B. Exam
    - 1. Deformity, abnormal posterior prominence
    - 2. Circulation may be decreased
  - C. Treatment
    - 1. May consider on-field reduction if certain of diagnosis and have appropriate experience
    - 2. Splint in 30-60 degrees flexion
    - 3. Emergent transport for complete evaluation/treatment
  - D. Return to play
    - 1. When sufficient range of motion, strength, and confidence in required technical skills for the sport
    - 2. Consider continued use of elbow brace for sports
- III. Lateral epicondylitis
  - A. History
    - 1. Chronic pain on the outer elbow, often associated with racket sports
  - B. Exam
    - 1. Local tenderness and swelling
    - 2. Pain with resisted wrist extension, especially with pronated forearm
  - C. Treatment
    - 1. Remove factors causing injury
    - 2. Rest, ice, compression, NSAIDs, compressive sleeve or band
  - D. Return to play
    - 1. When normal grip strength is restored and forearm rotation strength is normal
- IV. Osteochondritis dissecans of the elbow
  - A. History
    - 1. Gradual onset of pain, seen most often in throwing athletes, gymnasts, or wrestlers
    - 2. Pain with throwing, or upper extremity weight-bearing
  - B. Exam
    - 1. Mild to moderate effusion
    - 2. Slight decrease of motion, particularly supination
    - 3. Tenderness at radiocapitellar joint
  - C. Treatment
    - 1. Stop activities causing injury
    - 2. Surgical interventions may be indicated
  - D. Return to action
    - 1. When elbow motion pain-free, osseous lesion healed, and strength is normal
- V. Elbow medial collateral ligament insufficiency
  - A. History
    - 1. Gradual onset of medial elbow pain related to repetitive valgus extension overload

- B. Exam
    - 1. Pain and laxity with valgus stress
    - 2. Ulnar nerve symptoms may be present
  - C. Treatment
    - 1. If severe, condition may require surgical reconstruction
  - D. Return to action
    - 1. Generally takes one full year following surgery
    - 2. Pitchers usually take two years to regain optimum performance
- VI. Medial epicondylitis
- A. History
    - 1. Valgus extension overload, especially in skeletally immature athletes
    - 2. In skeletally mature athletes, may co-exist with medial collateral ligament insufficiency
  - B. Exam
    - 1. Localized tenderness over medial epicondyle
    - 2. Pain with resisted pronation/wrist flexion
  - C. Treatment
    - 1. Rest, ice
    - 2. Regain lost motion and restore strength
    - 3. Assess and correct throwing biomechanics
  - D. Return to action
    - 1. When pain-free and can meet the demands of the sport
- VII. Forearm/wrist fractures
- A. History
    - 1. Severe forearm/wrist pain following fall or direct blow
  - B. Exam
    - 1. Possible deformity
    - 2. Major concern is circulation
  - C. Treatment
    - 1. Splint as found
    - 2. Urgent/emergent transport for complete evaluation/treatment
  - D. Return to action
    - 1. Internal fixation may result in more prompt return to action
    - 2. Must be pain-free with range of motion and strength to meet the demands of the sport
- VIII. Carpal navicular (scaphoid) fracture
- A. History
    - 1. Wrist pain following fall onto outstretched hand
    - 2. Pain may be only moderate
  - B. Exam
    - 1. Tenderness in anatomic “snuff box”
    - 2. Wrist motion slightly limited
    - 3. Initial x-rays may be negative
  - C. Treatment
    - 1. Ice, splinting, elevation
    - 2. Open reduction and internal fixation required for significant displacement
  - D. Return to action
    - 1. If sport places high demands on wrist, return to action not permitted until fracture healing is complete and strength and range of motion are sufficient for the sports demands
- IX. Carpal tunnel syndrome
- A. History
    - 1. Gradual onset of median nerve symptoms that may awaken sleeping athlete
  - B. Exam
    - 1. Tinel’s sign positive over median nerve at wrist
    - 2. Decreased sensation of the thumb, index finger and long finger

- C. Treatment
    - 1. Rest, ice, splinting
    - 2. Surgical release indicated for recalcitrant symptoms
  - D. Return to action
    - 1. When symptoms have resolved and weakened muscles are strong enough to meet demands of the sport
- X. DeQuervain's disease
- A. History
    - 1. Gradual onset of dorsoradial wrist pain
  - B. Exam
    - 1. Local swelling over the involved tendons
    - 2. Pain with stretch of the involved tendons ("Finkelstein's test")
  - C. Treatment
    - 1. Rest, ice, splinting; eliminate factors causing condition
    - 2. Oral NSAIDs; corticosteroid injection if recalcitrant
    - 3. Surgical release if does not respond to non-operative treatment
  - D. Return to action
    - 1. Wear splint if possible (even after symptom resolution to prevent recurrence)
- XI. Hand laceration/human bite
- A. History
    - 1. Obvious loss of skin integrity with or without active bleeding
    - 2. Injury may have occurred when athlete's hand impacted another athlete's teeth
  - B. Exam
    - 1. Examine finger sensation, circulation, and active motion
  - C. Treatment
    - 1. For active bleeding, apply clean compressive dressing and transport urgently/emergently for further assessment/treatment
    - 2. Do not close human bite lacerations; strongly consider antibiotic treatment; observe carefully for signs of infection
  - D. Return to action
    - 1. When healing sufficient to meet demands of the sport
- XII. Metacarpal fractures
- A. History
    - 1. Boxer's fracture - hand pain after hitting object/opponent with closed fist
    - 2. Metacarpal shaft fracture - hand pain after fall or direct blow
  - B. Exam
    - 1. Local tenderness
    - 2. Boxer's fracture – metacarpal head palpable in the palm
    - 3. Metacarpal shaft fracture – obvious metacarpal deformity best visualized from the dorsum
  - C. Treatment
    - 1. May accept some angulation; accept almost no angulation of index, but progressively more angulation acceptable with third, fourth, and fifth metacarpal neck fractures
    - 2. For shaft fractures, little angulation can be accepted
    - 3. To maintain reduction, internal fixation often required
  - D. Return to action
    - 1. When healing is solid (or fracture can be safely protected with an immobilization device) and athlete has no pain

- XIII. Proximal thumb fractures
  - A. History
    - 1. Pain and swelling at base of thumb following fall or direct blow
  - B. Exam
    - 1. Thumb appears deformed
    - 2. x-ray provides anatomic diagnosis
  - C. Treatment
    - 1. Minimally displaced – well-molded cast or splint
    - 2. In skeletally mature – need anatomic position, using internal fixation as necessary
  - D. Return to action
    - 1. When hand is pain-free, full range of motion, and good strength
    - 2. May need padded splint
- XIV. Thumb ulnar collateral ligament sprain/”gamekeeper’s thumb”
  - A. History
    - 1. Fall onto outstretched hand with thumb abducted
  - B. Exam
    - 1. Tenderness at ulnar aspect, base of thumb
    - 2. Abduction stress shows instability and/or pain
    - 3. Use x-ray to check for Stener lesion (interposed tissue)
  - C. Treatment
    - 1. Individualize based on athletes’ needs
    - 2. If no Stener lesion, either immobilize until healed or consider surgical repair/reconstruction
    - 3. With Stener lesion, need to remove interposed tissue surgically and then repair/reconstruct
  - D. Return to action
    - 1. Minimum 6-8 weeks; may require 10-12 weeks
    - 2. When full, pain-free range of motion
- XV. “Jammed finger” (describes several conditons affecting interphalangeal joints)
  - A. History
    - 1. Finger joint pain often following blow to tip of extended finger
  - B. Exam
    - 1. Differential diagnosis includes shaft fracture; sprain/dislocation of interphalangeal joint; and/or intra-articular fracture
    - 2. Tenderness usually localized to specific area injured
  - C. Treatment
    - 1. Shaft fractures –
      - a) Cannot accept any rotational or ulnar/radial deviation
      - b) May accept slight angulation into extension or flexion
      - c) Internal fixation usually needed to hold reduction
    - 2. Interphalangeal joint dislocation –
      - a) Closed reduction usually is stable
      - b) May need surgical stabilization for large articular fragment
      - c) For activity, dorsal splint and “buddy tape”
    - 3. Other ligament injury –
      - a) Splint or “buddy tape” as needed
  - D. Return to action
    - 1. If no significant fracture, may return to activity with splint/”buddy tape” when pain allows
    - 2. Any fracture must be sufficiently healed to meet the demands of the sport

## HIP, PELVIS, AND SPINE INJURIES

- I. Adductor and hamstring strains
  - A. History
    - 1. Sudden eccentric contraction with sudden pain
  - B. Exam
    - 1. Local tenderness, swelling, muscle spasm
  - C. Treatment
    - 1. RICE; no stretching until acute symptoms have resolved
    - 2. Emphasize dynamic eccentric strengthening
  - D. Return to action
    - 1. When pain resolves
- II. “Hip pointer” (iliac crest contusion)
  - A. History
    - 1. Direct blow
  - B. Exam
    - 1. Point tender; often muscle spasm
  - C. Treatment
    - 1. RICE; crutches as needed
    - 2. Stretching particularly important
  - D. Return to action
    - 1. When pain resolves and can meet demands of sport
    - 2. May need special protective padding
- III. Avulsion fractures
  - A. History
    - 1. Usually adolescent
    - 2. Sudden pain in apophyseal region following forceful muscle contraction
  - B. Exam
    - 1. Local tenderness
    - 2. Hip usually held in flexion
    - 3. Test for specific point of injury by having athlete contract attached muscle, i.e.
      - a) Anterior superior iliac spine – sartorius attachment
      - b) Anterior inferior iliac spine – rectus femoris
      - c) Iliac apophysis – abdominals
      - d) Lesser trochanter – iliopsoas
      - e) Ischial tuberosity – hamstrings
  - C. Treatment
    - 1. Crutches as needed
    - 2. RICE
    - 3. Gentle stretching as pain decreases
  - D. Return to action
    - a) Normal range of motion and strength
    - b) Usually 4-8 weeks
- IV. Osteitis pubis
  - A. History
    - 1. Chronic, progressive pubic/groin pain
  - B. Exam
    - 1. Tenderness directly over symphysis
  - C. Treatment
    - 1. Rest, NSAID’s, heat
    - 2. Prolonged rehabilitation (typically 3-9 months)
  - D. Return to action
    - 1. When symptoms allow

## V. Snapping hip

- A. History
  - 1. Usually gradual-onset
  - 2. Generally either iliotibial band or iliopsoas tendon
- B. Exam
  - 1. Iliotibial band – local tenderness; positive Ober test
  - 2. Iliopsoas tendon – palpable snapping anteromedial hip region with flexion/extension
- C. Treatment
  - 1. Iliotibial band – rest, ice, stretch ITB
  - 2. Iliopsoas tendon – rest, NSAID's, heat, core strengthening
- D. Return to action
  - 1. When able to meet demands of sport

## VI. Stress fracture of the femoral neck

- A. History
  - 1. Gradual onset groin or thigh pain
- B. Exam
  - 1. Usually, pain with internal rotation
  - 2. Imaging for diagnosis
- C. Treatment
  - 1. Compression fractures – weight-bearing as tolerated, but only when pain-free
  - 2. Tension-type fractures often require internal-type fixation
- D. Return to action
  - 1. When fully healed

## VII. Back strain

- A. Exam
  - 1. Back pain, with or without pre-existing back problem
  - 2. No neurologic symptoms
- B. Diagnosis
  - 1. Spine and/or paraspinal muscle tenderness, spasm
- C. Treatment
  - 1. Symptomatic, followed by stretching and strengthening
- D. Return to action
  - 1. When able to fulfill demands of specific sport

- VIII. Herniated disk
  - A. History
    - 1. Acute or gradual onset of pain
    - 2. Radicular symptoms
    - 3. Presentation in adolescence often atypical
    - 4. Pain worse with flexion, coughing, sitting
  - B. Exam
    - 1. Pain with motion
    - 2. Neurologic abnormality
  - C. Treatment
    - 1. Non-operative, symptomatic, therapeutic exercises
    - 2. Surgery when persistent or with progressive neurologic deficit
    - 3. Bowel or bladder symptoms suggest cauda equina syndrome – a surgical emergency
  - D. Return to action
    - 1. When pain-free with normal range of motion and strength
- IX. Spondylolysis
  - A. History
    - 1. Gradual onset, athlete involved in flexion-hyperextension maneuvers
  - B. Exam
    - 1. Pain with hyperextension
  - C. Treatment
    - 1. Anti-lordotic brace or symptomatic
    - 2. Core strengthening; correct flexibility deficits
    - 3. Surgery occasionally indicated
  - D. Return to action
    - 1. When asymptomatic

## KNEE INJURIES

### I. ACL rupture

- A. History
  - 1. Sudden deceleration or valgus/rotational force
- B. Athlete “Heard a pop”
  - 1. Rapid onset of marked swelling
- C. Exam
  - 1. Positive Lachman
- D. Treatment
  - 1. Surgical treatment generally necessary
  - 2. Functional non-operative treatment occasionally successful for athletes
  - 3. 6-12 months rehabilitation before return to action
- E. Return to action
  - 1. Full range of motion
  - 2. At least 90% normal strength and endurance

### II. MCL rupture

- A. History
  - 1. Valgus force
  - 2. Minimal to significant swelling depending on degree
- B. Exam
  - 1. Local tenderness
  - 2. Valgus stress test indicates severity
- C. Treatment
  - 1. For isolated, protected mobilization, weight-bearing as tolerated
- D. Return to action
  - 1. Pain free, full range of motion, at least 90% normal strength and endurance

### III. Meniscus tear

- A. History
  - 1. Twisting and/or flexion injury; possible associated ligament rupture
  - 2. Swelling may be sudden or occur over 24 hours
- B. Exam
  - 1. Focal joint line tenderness
  - 2. Pain with compression/rotation test
- C. Treatment
  - 1. Arthroscopic surgery often indicated for specific diagnosis and treatment
- D. Return to action
  - 1. Timing dependent on whether meniscus repaired or partially excised
  - 2. Full range of motion, able to meet demands of sports

### IV. Patellar dislocation

- A. History
  - 1. Sudden giving way sensation of kneecap going out of place; may reduce spontaneously or remain locked in dislocated position, rapid, marked swelling
- B. Exam
  - 1. Patella may still be dislocated, usually laterally
  - 2. Exquisite tenderness medial to patella (retinaculum)
  - 3. Tender anterior lateral femoral condyle may indicate articular fracture
  - 4. Possible associated ACL tear will give positive Lachman
- C. Treatment
  - 1. Early mobilization, possible arthroscopic surgery for treatment of articular fracture and/or medial repair

- D. Return to action
  - 1. Full range of motion
  - 2. Normal muscle strength, especially medial quadriceps
  - 3. When athlete can meet demands of sport
- V. Posterior cruciate ligament rupture
  - A. History
    - 1. Blow to proximal anterior tibia, usually with hyperextended or flexed knee
    - 2. Extent of injury often not apparent
  - B. Exam
    - 1. Positive posterior sag test, positive posterior drawer
    - 2. Check for associated ligament/meniscus injury
  - C. Treatment
    - 1. Individualized as to operative/non-operative
  - D. Return to action
    - 1. Full range of motion
    - 2. Strength and endurance to meet demands of sport
- VI. Anterior knee pain, non-acute
  - A. History
    - 1. Gradual onset of pain
    - 2. Single specific location, multiple locations, or diffuse
    - 3. Effusion suggests more serious problem
    - 4. Consider previous injuries to any portion of the limb
  - B. Exam
    - 1. Determine specific locations of tenderness
    - 2. Patellar mobility
    - 3. Muscle flexibility and strength
  - C. Treatment
    - 1. Make specific diagnoses where possible
    - 2. Generally, stretching and strengthening to correct deficits
    - 3. NSAIDS, RICE
  - D. Return to action
    - 1. Full range of motion, no effusions, and able to meet demands of sport

## LOWER LEG INJURIES

- I. Fracture
  - A. History
    - 1. Severe pain following a non-contact injury or a direct blow
  - B. Exam
    - 1. Deformity often visible
  - C. Treatment
    - 1. Splint acutely
    - 2. Watch carefully for development of acute compartment syndrome, which requires emergent surgical treatment
    - 3. Consider rigid internal fixation to allow earlier return to sport.
  - D. Return to action
    - 1. Full range of motion, sufficient fracture and soft tissue healing
    - 2. Able to meet demands of sport
- II. Non-traumatic lower leg injuries: common etiology
  - A. Inadequate shock absorption
  - B. Excessive pronation
  - C. Training errors
- III. Stress fracture
  - A. History:
    - 1. Aching pain continues long after activity stops
    - 2. Pain localized to a narrow area
    - 3. May have been preceded by period of diffuse tenderness
  - B. Exam
    - 1. Tenderness localized to narrow area
    - 2. Pain usually reproduced by 3-point bending
  - C. Treatment
    - 1. Active rest
    - 2. Remove causes
  - D. Active rest until pain-free, then gradual, progressive return to activity
- IV. Exertional compartment syndrome
  - A. History
    - 1. Most frequently in anterior or deep posterior compartment of the lower leg
    - 2. Generally resolves very quickly after cessation of activity
    - 3. May be accompanied by numbness
  - B. Exam
    - 1. Local swelling, tenderness with activity
    - 2. Pain on passive stretch of the involved muscles
    - 3. Possible decreased sensation
  - C. Treatment
    - 1. Orthoses, technique changes
    - 2. Fasciotomy
  - D. Return to action
    - 1. May continue to participate even if symptomatic
- V. Shin splints/posteromedial tibial stress syndrome
  - A. History
    - 1. Diagnosis of exclusion
    - 2. Pain related to activity, may persist for hours after stopping activity
    - 3. Posteromedial tibial pain and tenderness, without signs of posterior compartment syndrome
  - B. Exam
    - 1. Usually excessive hindfoot pronation
    - 2. Pain with inversion of the ankle against resistance

- C. Treatment
    - 1. Remove causes
    - 2. Taping, NSAID'S
- VI. Posterior tibial tendinitis
- A. History:
    - 1. Nagging pain, occasionally burning
    - 2. Worse with activity
  - B. Exam
    - 1. Tenderness along tendon itself
    - 2. Often related to tight gastrocnemius
  - C. Treatment
    - 1. RICE, arch support
    - 2. Remove causes
  - D. Return to action
    - 1. May play while symptomatic
    - 2. Remember that the same forces that cause the tendonitis may cause subsequent distal tibial stress fracture if not corrected
- VII. Peroneal tendinitis
- A. History
    - 1. Pain from boot-top pressure (skating, skiing)
    - 2. Pain related to sports that use peroneals greatly (skating, ballet)
  - B. Exam
    - 1. Local tenderness and swelling
  - C. Treatment
    - 1. RICE
    - 2. Remove causes, pad tender area
  - D. Return to action
    - 1. May participate with mild symptoms (pain that resolves as soon as activity stops)
    - 2. Same forces may cause subsequent fibular stress fracture
- VIII. Anterior tibial, extensor digitorum, and hallucis longus tendinitis
- A. History
    - 1. Usually from pressure from equipment
    - 2. Rarely from repetitive tensile forces
  - B. Exam
    - 1. Local tenderness
    - 2. Pain with muscle contraction against resistance
  - C. Treatment
    - 1. Remove cause
    - 2. Pad tender area
  - D. Return to action
    - 1. May participate with mild symptoms (pain that resolves as soon as activity stops)
    - 2. For persistent symptoms, stop aggravating activity until completely resolved, then progressively resume while remaining pain-free

## ANKLE AND FOOT INJURIES

- I. Ankle ligament injuries
  - A. History
    - 1. Mechanism of injury
    - 2. Location of pain/swelling
    - 3. Function immediately following injury
  - B. Exam
    - 1. Point of maximal tenderness
    - 2. Anterior drawer and talar tilt test
    - 3. Syndesmosis squeeze test and external rotation test
  - C. Treatment
    - 1. Non-operative, functional
    - 2. RICE
    - 3. Protected mobilization
    - 4. Range of motion and strengthening exercises
    - 5. Proprioceptive training
    - 6. Operative treatment rarely indicated for acute sprains
  - D. Return to action
    - 1. Full, pain-free ROM, 90% normal strength and function
- II. Achilles tendinitis
  - A. History
    - 1. Acute or chronic
  - B. Exam
    - 1. Local tenderness, possible associated retrocalcaneal tenderness/swelling
    - 2. Tendon thickened in chronic
  - C. Treatment
    - 1. Correct training error
    - 2. Stretch calf muscles
    - 3. Heel lift
    - 4. Anti-inflammatory medication/modalities
    - 5. Avoid steroid injection
  - D. Return to action
    - 1. After symptoms resolve
    - 2. Continue stretching and possibly, heel-lift
- III. Turf toe
  - A. History
    - 1. Forced hyperextension, often repeated episodes
    - 2. Initial pain/swelling often minor
  - B. Exam
    - 1. Local tenderness, first MTP
  - C. Treatment
    - 1. Non-operative - taping, orthoses
  - D. Return to action
    - 1. When athlete can meet demands of sport
- IV. Hallux rigidus
  - A. History
    - 1. Repetitive jamming of first MTP
  - B. Exam
    - 1. Tender to palpation; sesamoids often tender
    - 2. Pain at maximal dorsiflexion
  - C. Treatment
    - 1. Change footwear, rigid or semi-rigid orthoses, oral NSAIDs
    - 2. Intra-articular steroid injection for recalcitrant cases
    - 3. Surgery as last resort

- D. Return to action
  - 1. When athlete can meet demands of sport
- V. Sesamoid dysfunction
  - A. History
    - 1. Repetitive impact
  - B. Exam
    - 1. Sesamoid tenderness
    - 2. Pain with first MTP dorsiflexion
  - C. Treatment
    - 1. Functional orthoses
    - 2. Surgery occasionally indicated
  - D. Return to action
    - 1. When athlete can meet demands of sport
- VI. Stress fractures of the foot
  - A. History
    - 1. Repetitive impact
    - 2. Persistent, aching pain worsens with activities
  - B. Exam
    - 1. Local tenderness and swelling
    - 2. Pain with axial loading and/or rotational motions of the foot
  - C. Treatment
    - 1. Refrain from activity
    - 2. Protected weightbearing/immobilization as needed
    - 3. Frequently non-union of navicular or 5<sup>th</sup> metatarsal base stress fracture –these may require surgery
  - D. Return to action
    - 1. When athlete can meet demands of sport
- VII. Plantar fasciitis
  - A. History
    - 1. Pain in arch and/or heel
  - B. Exam
    - 1. Local tenderness and swelling
    - 2. Tight heel cord
  - C. Treatment
    - 1. Stretch heel cord and plantar fascia
    - 2. Oral NSAID, viscoelastic heel pad, arch taping
    - 3. May consider steroid injection
  - D. Return to action
    - 1. When athlete can meet demands of sport