Injuries in Weekend Warriors to Professional Athletes: How Demographics Affects Medical Care

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• No relevant financial relationships
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Learning Objectives

• Evaluate and treat common conditions associated with sports/physical activity

• Screen and treat specific populations for injuries sustained in sports/physical activity

• Understand the basis for injury prevention utilizing general conditioning and sports specific conditioning

• Guidelines for pediatric sports/play intensity and longevity
Demographics

- Pediatrics
- Geriatrics
- Male
- Female
- Pregnant
- Disabled
Types of Activities

- **Professional Organized Sports**
  - Almost always requiring discipline, commitment, and training

- **Amateur Organized Sports**
  - Frequently requiring discipline, commitment, and training
  - Can include those with little activity specific conditioning

- **Group/Individual Organized Events**
  - Weekend/Evening leagues (softball, bowling)
  - Weekend Races/Events/Obstacle courses *(FASTEST GROWING IN US)*
    - Professionals, amateurs, and lay people participate side by side
    - Open entry, no requirement of previous participation/training

- **Individual Unorganized Events**
  - Solo exercise
  - Solo sports (running, cycling)
Conditioned vs Unconditioned

- Body adaptation to Metabolic, Neuromuscular, and Psychologic demands of activity with conditioned activity
- Sports Specific vs. Non-Sport Specific Conditioning/Training
- Training progression over reasonable amount of time
- Strength and Endurance AND FLEXIBILITY
- Effects on MSK Injury Recovery if unconditioned
  - Lower stress threshold for initial injury
  - Delayed vascularity and inflammatory response
  - Delayed early immobilization/weight bearing
  - Decreased threshold for re-injury despite adequate rehabilitation
Activity Enhancements

• Doping seen in professional athletes
  • World Anti-Doping Agency (WADA) and United States Anti-Doping Agency
  • List of banned substances [globalDRO.com]
  • Prohibited at all times
    • Anabolic Agents (ex: Stanozolol, EPO)
    • Beta-2 agonists (ex: Albuterol)
    • Stimulants (ex: Amphetamines, Psuedoephedrine)
    • Hormone Therapy
    • Diuretics (ex: Lasix, HCTZ)
    • Insulin
  • Prohibited in during Competitive Window
    • Narcotics/Opioids (except codeine)
    • Cannabinoids (whether psychoactive or not)
    • Corticosteroids

• You might be asked to sign Therapeutic Use Exemption for common but prohibited meds
Activity Enhancements

• Performance Enhancement seen in recreational athletes (often less aware of possible side effects/consequences)
  • Stimulants
    • Caffeine
    • ENERGY DRINKS
    • Amphetamines
    • Psuedoephedrine
  • Hormones
    • Testosterone
    • HCG
  • Cannabis
  • Alcohol
  • Albuterol
  • Increasing doses of prescribed medication
    • Anxiolytics
    • Narcotics/Opioids
Sports Medicine Pharmacology

- Analgesics
  - Acetaminophen
  - NSAIDs
  - Opioids (Underuse vs Overuse, Medical vs Legal)
  - Corticosteroids (intraarticular injection 48 hour rule?)
  - Not Aspirin (narrow therapeutic window)

- Antibiotics
  - Does the patient really need it?
  - Avoid Flouroquinolones generally, especially with concomitant steroid use (cumulative effect? Age a concern if over 50?), Prolonged QT

- Anti-hypertensives
  - If subject to testing, first line includes ACE, ARB, CCB
Common Injuries and Medical Issues

- Exacerbation of underlying medical conditions
- Muscle Strain
- Ligamentous Sprain
- Tendonitis/tenosynovitis
- Fracture/Dislocation
- Patella-femoral Syndrome
- Contusion
- Disc Injury
- Lacerations, Abrasions, Hematomas
- “Stingers” or “Burners”
- Headache
- Heat Stroke/Exhaustion
- Exercise Induced Hematuria (Athletic Psuedonephritis/Sports Hematuria)
- Exercise Induced Proteinuria
- Exertional Rhabdomyolisis
- Exertional Compartment Syndrome
Pediatric Athletes

- Childhood obesity is a growing problem in the US, and has tripled since the 1970s and nearly 1 in 5 children is obese.
- Only about 20% of High School seniors reports vigorous exercise, representing a major gradual reduction over last 40 years.
- Roughly 50% in organized sports in school or community, and 50% independent activities.
- Despite decrease in activity, athletic and MSK injuries are increasing.
- Playing through fatigue or pain is not appropriate for skeletally immature individuals.
- OVERUSE injuries much more common than acute injury.
- Contralateral films very useful.
Pediatric Athletes

• Potential for delayed recovery from concussion, or require longer periods of cognitive rest

• Growth-Plate and Growth-Site Injuries

• Muscle Strains and Contusions are MC pediatric athlete injuries

• Fractures, SCFE, Apophysitis/Epiphysitis, Osteochondritis Dissecans, Osteonecrosis
  • Injury Equivalents
  • ACL rupture – Tibial Spine avulsion
  • Lumbar Strain – Spondylosis
  • Severe Low Back Pain – Spondylolisthesis
  • UCL tear – Medial epicondyle Apophysitis/Epiphysitis
  • Patellar Tendonitis – Osgood-Schlatter
  • Hip Strain – Avulsion Fracture
Pediatric Athletes

- Orthopedic Surgeons are seeing degenerative changes that was typically seen in professional athletes in their mid to late 20’s in the ABSENCE of traumatic events
- Growing structures more susceptible to stress
- Increase in strength and performance typically from neuromuscular adaptation and proficiency, rather than muscle hypertrophy until puberty
- Sport with most injuries for boys – Football
- Sport with most injuries for girls – Soccer
- Nutrition and proper hydration must be maintained with any activity
Pediatric Athletes

**Recommendations** - All sports with kids must

- Be at the level that closely matches their ability
- Should be supervised
- Proper protective equipment should be sized at beginning and middle of season to accommodate for growth/body changes
- Training programs should progress slowly and at the proper intensity to avoid injury
- **1-2 days a week and 2-3 months a year not engaging in sport, or competing in mechanically different sport**
  - 10 years
  - 15 years
  - Skeletal maturity 18-24
Pediatric Athletes

• Osteopathic Manipulative Treatment
  • Benefit well from soft tissue techniques addressing stress/tension imbalance
  • Great treatment for injury prevention or reducing likelihood of injury progression
  • Techniques include
    • Myofascial Release
    • Muscle Energy
    • Balanced Ligamentous Technique
    • Ligamentous Articular Strain
Geriatric Athletes

• Decreased muscle mass, strength, and function roughly 20% by age 65
• Decreased endurance and flexibility also roughly 20% by age 65
• Balance and coordination can be affected by nutritional deficiency in diet, inactivity, deconditioning, medical illness
• Injury recover often takes longer
• Especially susceptible to dehydration and heat illness
• Exercise can often delay the decrease of these components of health
Geriatric Athletes

- Exercise can delay and to a large degree prevent onset of dementia
- Exercise in populations with dementia showed improved neurocognitive testing, better function, and decreased degree of assistance
- Aerobic exercise 3-5 times a week may directly counteract decreasing vascular compliance associated with aging
- Encourage Canoeing, Hiking, Road bicycling, Rowing, Speed walking, Swimming, Tennis, Weight machines/resistance training
Geriatric Athletes

- Most common complaints preventing exercise
  - Short of Breath
  - Weakness
  - Knee Pain
  - Back Pain

- Maintaining muscle strength and cardio conditioning in middle age

- Addressing degenerative OA with oral/injectable meds
  - Steroid or Viscosupplementation – low risk, low to high yield results (patient specific)

- Physical therapy, Osteopathic Manipulation, Neuromuscular therapy
Geriatric Athletes

• Osteopathic Manipulative Treatment
  • Techniques should focus on maintaining maximum range of motion, as well as specific somatic dysfunctions identified
  • Great treatment for injury prevention or reducing likelihood of injury progression
• Techniques include
  • Counterstrain
  • Still’s Techniques
  • Facilitated Positional Release
  • Myofascial Release
  • Muscle Energy
Female Athletes

- **Female Athlete Triad** (under diagnosed, poor screening)
  - Energy deficiency with or without eating disorder
  - Menstrual disturbances/Amenorrhea
  - Bone loss/Osteoporosis/Abnormal bone quality
  - Secondary Amenorrhea can be most disruptive - Seen in nearly 70% of dancers and 65% of long distance runners
  - Disordered eating – up to 10% of gen pop, as high as 65% in certain sports (Gymnastics)
  - BMD deficiency can be as high as 20% in female athletes
  - Amenorrhea sometimes seen as a training goal
  - These athletes may present for something else (wrist pain, snapping hip), we must screen for Triad

- Multi-Disciplinary approach – Nutrition, Psychological, Medical, OB/GYN, Sports
  - MVI/Supplements, CBT, OCP, Possible SSRI
Female Athletes

- **ACL Rupture**
  - 2x – 10x ACL tear incidence depending on sport (non-contact > contact)
  - Pivoting, cutting, rapid deceleration
  - Decreases hip/knee flexion with landing from height
  - Increased femur IR, knee valgus, and imbalance favoring quad over hamstring (ant tib translation); small intercondylar notch window with small ACL (on average)
  - Some suggestion in lit about hormonal changes causing risk, not well supported
  - ACL Prevention/Reeducation program for sport specific drills and overall strengthening and imbalance correction
Female Athletes

- Older, multi-parous – pelvic floor dysfunction, incontinence

- Stress incontinence (40-50% women engaged in sport)
  - Timed voiding, scheduled fluid intake, Kegel exercises

- Urge Incontinence (15-20% women engaged in sport)
  - Bladder training, Antimuscarinics
Female Athletes

- **Pregnant Athlete**
  - Encourage exercise and CV activity
  - Maintain CV health, less weight gain, less abd/pelvic/back pain, less risk of depression and gestational diabetes
  - Moderately strenuous activity 4-5 days a week, HR at 70-80% max
  - Fetal benefits seen in neurobehavioral development, healthy (low to mid range) birth weight
  - Previously inactive women should be encouraged to very slowly and gradually increase activity under supervision
  - **Absolute Contraindications to exercise in pregnancy**
    - Heart Disease, Restrictive lung disease, incompetent cervix, 2nd/3rd trimester bleeding, ruptured membranes, premature labor, preeclampsia
    - Symptoms – dyspnea, headache, chest pain, contractions, vaginal bleeding
Female Athletes

- Osteopathic Manipulative Treatment
  - Techniques addressing female demands specifically center around pregnant female
  - Assistance with pain associated with stretch receptor activation in pelvic and abdominal tissues
  - OMT in pregnancy associated with decreases in use of assisted device for delivery, length of labor, blood pressure, low back pain, SI dysfunction
- Techniques include
  - Counterstrain
  - Ligamentous Articular Strain
  - Still’s Techniques
  - Myofascial Release
Male Athletes

- **Testicular Trauma**
  - Torsion, Rupture, Hematoma
  - Pain and nausea
  - Rupture might be indicated if no transillumination, or normal palpable structures
  - Penetrating trauma must address infection and tetanus
  - Scrotal US
    - Low severity treated with ice, rest, analgesia
    - Torsion (younger pts) – infarction/tissue death in as little as 6 hours. Surgical emergency

- **Single functional testicle** – Contact sports contraindicated, patient must wear protective cup and use caution
Male Athletes

- **Inguinal Hernia vs Sports Hernia**
  - Inguinal hernia with herniation of abdominal contents into defect which require surgical repair for definitive treatment when needed:
    - Direct - abdominal wall (Hesselbach's triangle)
    - Indirect - internal inguinal ring
    - Femoral – femoral ring

- **Sports Hernia (Athletica Pubalgia)**
  - Misnomer – refers to groin pain in absence of diagnosed indirect, direct, or indirect hernia
  - “Result from chronic, repetitive trauma or stress to the musculotendinous portions of the groin” – UpToDate
  - Rarely sudden onset, usually overuse of lower abdominal or upper thigh structures.
Disabled Athletes

- Intellectual and Physical
  - Physical impairment has 10 subcategories

- Injury rates are very similar between disabled athlete and those without disability in summer and winter sports.

- Paralympic infrastructure has surged since 2000
Disabled Athletes

• Wheelchair Athletes
  • Median and Ulnar Nerve entrapments, Shoulder overuse injuries

• Spinal Cord Injuries
  • Autonomic dysregulation, Orthostatic hypotension, Incontinence, Muscle tone/spasticity

• Vision loss
  • No contact sports, Projectile sports with adequate protection, Impaired depth/proprioception affects reaction time, driving sports
Disabled Athletes

• Down Syndrome (does not imply disabled, but frequently biomechanically abnormal with changes in gait, coordination, locomotion)
  • Atlanto-Axial Instability in 10-20%, 1-2% symptomatic
    • Symptomatic – No sports, consider surgical eval
    • Asymptomatic – Sport restriction (gymnastics, cheerleading, power lifting, skiing, diving, football)
• Cervical X-ray will show >3-4mm Atlanto-odontoid distance
• Absolute contraindication for HVLA of that segment
Disabled Athletes

- Osteopathic Manipulative Treatment
  - Techniques addressing specific musculoskeletal deviations from typical anatomy, or changes in common compensatory pattern matching patient specific changes in gait/locomotion
  - Techniques include
    - Counterstrain
    - Ligamentous Articular Strain
    - Still’s Techniques
    - Myofascial Release
    - Balanced Ligamentous Technique
    - Facilitated Positional Release
    - High Velocity, Low Amplitude
    - Muscle Energy
Selected References

- https://www.cdc.gov/healthyschools/obesity/facts.htm
THANK YOU