

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

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- No off label usage



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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



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Demographics

- Pediatrics
- Geriatrics
- Male
- Female
- Pregnant
- Disabled



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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)



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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



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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



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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



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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 Fluoroquinolones 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



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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 Pseudonephritis/Sports Hematuria)
- Exercise Induced Proteinuria
- Exertional Rhabdomyolysis
- Exertional Compartment Syndrome



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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



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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



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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



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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



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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



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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



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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



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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



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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



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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



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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



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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



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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



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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



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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



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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.



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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



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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



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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



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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



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