Pre-Participation Exam

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OBJECTIVES

- Know the purpose of the preparticipation physical evaluation.
- List advantages & disadvantages of station-based vs individual PPEs.
- Learn “red flag” items from the history &/or physical that might limit clearance and require greater evaluation.
Purpose of PPE

- Medical issues that ↑ risk death + injury
- MSK conditions that limit safe play
  - H/o previous injury best predicts future injury
- Appropriate sports for athlete
- VERY LIMITED health maintenance
- SATISFY LEGAL REQUIREMENTS
Goal of Athlete/Parent/Coach

- To be cleared!!
Sports Deaths

463 HS deaths in 20 years

- 134 traumatic
  - Head 69%
  - Neck 16.3
  - Commotio Cordis

- 329 non-traumatic
  - CV 2/3
  - Heat related
  - Asthma
  - Sickle cell trait: rhabdomyolysis

Patrick Schoonover
14 yo hockey player died Nov 2014 during a game.

National Center for Catastrophic Sport Injury Research 1982-2003
The “Bible”

- Preparticipation Physical Evaluation, 4th ed, 2010
  - ACSM
  - AMSSM
  - AAFP
  - AAP
  - AOSSM
  - AOASM
- Member $34.95
Frequency of Exam

- **How often?**
  - Annual, every 2 yrs, entry level, prior to each season
- **Screening w/ Hx & PE**
  - Entrance to HS + college
  - Every 2yrs for HS
- **Interim Hx & BP**
  - Every year
Timing of PPE

- IDEAL: $\geq$ 6-8 wk before season
  Allows for:
  - W/u of medical issues
  - Rehabilitation MSK injuries
- REALITY: often day before practice starts! Ugh!
Who Performs the PPE?

- Different requirements for different states
  - Only exam for 80-90% of athletes all yr
- 21/50 states
  - Nurses + PA’s w/ or w/o supervision
- 11/50 chiropractors allowed
- NO standardization
Format

- Individual vs Mass Screenings
- Mass Screenings
  - Stations or one-on-one
- Each have pros & cons
Individual

- **Pros**
  - Counseling
  - Preventive care
  - Continuity
  - May be more comprehensive

- **Cons**
  - Expensive
  - Expertise varies
Mass Screenings

➢ Pros
  • Can include specialized personnel: ATCs, sports docs, PTs, RNs, etc
  • Less expensive
  • May be faster
  • Can include performance testing

➢ Cons
  • Organization varies
  • Impersonal; privacy issues
  • Avoid gymnasium PPEs
Components of PPE

- History
- Physical
- Clearance
History

- 63-88% problems found on Hx alone
- 57% of athletes restricted are identified on Hx

General History

- Ever restricted for any reason
- New illness/injury since last exam
- Chronic illness
- Hospitalizations
- Medications
- Allergies
  - Bee sting
  - EPI PEN
  - Latex, etc
Medication Questions

- **Current Medications**
- **Arrhythmias associated with:**
  - Bet-agonist
  - Methylxanthines
  - TCA
  - Decongestant
  - Macrolides (ie: Azithromycin)
- ↑ **Risk tendon injury and rupture:**
  - Fluoroquinolones
Surg Hx

- Any past surgery
  - Med or MSK
- Allow for appropriate rehab time
CV History

- Dizzy with exercise
- Passed out/nearly passed during/after exercise
- Chest pain during/after exercise
- Tire more easily than others
- Racing heart / skipped beats
CV History

- h/o high blood pressure / high cholesterol
- h/o heart murmur
- Severe viral illness in last month
- FH death before 50
- FH Marfan’s, HCM, long QT, arrhythmia
- Ever restricted from sports?
- Tests on heart: ECG / ECHO
CV History: Medications

- **Arrhythmia**
  - Beta agonist
  - Theophylline
  - TCA
  - Macrrolides
  - Pseudoephedrine

- **Sudden death**
  - Cocaine
  - Amphetamines
  - Ephedrine
  - Anabolic steroids
CV History

- 26% of NCAA schools included 9/12 items recommended by AHA
  - Div III the worst
  - 17% High Schools included 9/12
Sudden Death in Young Athletes

- Ruptured aortic aneurysm (Marfan’s) 3%
- Arrhythmogenic R ventric cardiomyopathy 3%
- Aortic stenosis 3%
- Atherosclerotic CAD 3%
- Dilated cardiomyopathy 2%
- Asthma 2%
- No structural cardiac abnormality 2%
- Heat stroke, drugs, trauma, cerebral artery <2%
SCD in Athletes: Epidemiology

- Not entirely known
- **US**
  - Incidence SCD 1:200,000  Maron JACC 1998
- **Italy**
  - Incidence 1:25,000
  - 2-5x ↑ risk of SCD > non-athletes  Corrado NEJM 1998
  - Arrhythmogenic R ventricular cardiomyopathy is #1 cause of SCD
SCD

- US: basketball & football
- Europe: soccer
- Males > Females 5:1
  
  Drezner Heart Rhythm 2008

- 80-90% SCD occur during training /competition
  - Vigorous physical exertion represents the trigger
HCM

- World Health Organization Definition
  - Left & /or right ventricular hypertrophy
  - Usually asymmetric (70%)
  - Involves interventricular septum

- Most common genetic CVD
- 1st described in 1958  Teare BHJ 1958
- HCM familial nature in 1960 Goodwin & Hollman

- Mortality 1-11% / yr depending on risk factors
HCM Epidemiology

- #1 cause of SCD in athletes
- 1:500-1000 LVH >15mm
  - CARDIA, n=4111, 1:500, ages 18-30, 4 US centers
  - 1:1000 met LVH in elite British athletes
- No racial predilection; male : female 3:2

Maron, Circulation 1995
Basarvarajaiah, JACC 2008
HCM Pathophysiology

- **Sliding Filament**
  - Increased energy cost of force, resulting in less energy to re-uptake calcium, inhibits diastolic function
  - Increase affinity of contractile elements to calcium
HCM Pathophysiology

- Histopathology
  - Myocyte hypertrophy
  - Fiber disarray
  - Abnormal relaxation of fibers
  - Increased cardiac fibrosis
Genetics of HCM

- Autosomal dominant
- Mutations in genes that encode sarcomere constituents
  - 60% of cases inherited LVH
- Metabolic cardiomyopathies mimic HCM
  - Glycogen storage
  - Mitochondrial

http://cardiogenomics.med.harvard.edu/mutation-db.tcl
Genetic Testing

- Useful to differentiate between athletic heart
- Expensive
  - $4000-5000
HCM Pathophysiology

- Diastolic dysfunction (prior to LVH)
- Left ventricular outflow obstruction
- Mitral regurgitation
- Ischemia
- Arrhythmias
HCM Symptoms

- Sudden cardiac arrest (80%)
- Dyspnea on exertion
- Chest pain
- Syncope/near-syncope
Diagnosis & Screening: H&P

- Low yield in screening
  Maron JAMA 1996

- AHA Recommends:
  - Personal hx chest pain, syncope, near syncope, sob, murmur
  - Family hx SCD < 50, HCM, DCM, Marfan’s, long QT, arrhythmia
  - Precordial auscultation in supine & standing
  - Femoral arteries
  - Blood Pressure
HCM Murmur

- Harsh, mid systolic heard across entire precordium (30-50% have murmur)
- Louder with valsala or standing
Diagnosis & Screening

- **Electrocardiogram**
  - 95% HCM patients abnormal EKGs
  - Inverted T waves, Q, LVH criteria
  - Abnormal intraventricular conduction

- **Chest xray**
  - Normal or cardiomegaly
Differential Diagnosis

- Athlete’s Heart
- Aortic Stenosis
- Hypertension
- Amyloidosis
- Glycogen storage diseases
Echocardiography

- Gold standard for diagnosis
- LV thickness > 1.5cm adults
- Asymmetrical septal hypertrophy
  - Septal:post wall thickness ratio >1.3
- Mitral valve systolic anterior motion (SAM)
SCD Risk Factors

- No RF = SCD <1% / year
- High risk = SCD 3-5% / year
  - > 1 of 5 risk factors
    1. Family history + SCD in 1st degree relative
    2. Massive LVH (>30mm)
    3. Significant ventricular ectopy
    4. Hypotension during exercise
    5. Unexplained syncope
Eligibility & Participation

- 36th Bethesda Conference Recommendations  JACC 2005
  - Probable or equivocal diagnosis of HCM should be excluded from competitive sports
  - Exceptions: golf, bowling, walking
  - Does not matter if s/p ICD, surgery, septal ablation, or pacemaker

- In practice:
  - Only 10% cardiologists restrict activity above golf level  
    Lampert , J Cardio EPS 2006
Commotio Cordis

- Most common in children/adolescent
  - Mean age 13y

- Most commonly baseballs, hockey pucks, lacrosse, blow (ie. karate)
  Maron, Boerer, Pediatrics 2009

- Survival 15%,
  - only when defibrillation is prompt
Commotio Cordis

- Blow 15-30 msec before T wave peak (repolarization)
  - v. fibb - 1% cardiac cycle
- Blow during depolarization
  - heart block
- Mechano-sensitive ion channels activated by deformation of myocardial cell membrane
Coronary Artery Anomalies

- #3 CV cause of SCD 14-17%
- Left main from right sinus of valsalva
- Mechanism
  - Origin of coronary artery kinks acutely
  - Compression by anomalous artery between the aorta and pulmonary trunk
Coronary Artery Anomalies

■ Diagnosis
  - CP or syncope with exercise
  - Requires high index of suspicion
  - EKG, Stress EKG usually normal
  - Echo, MRI, CT-3D, CT angiogram, angiogram

  Girzadas, J Cardiovas Med 2009

■ Treatment
  - Stent, CABG
Marfan’s Syndrome

- # 6 cause SCD (3%)
- Flo Hyman ;1984 US Olympic Volleyball Silver Medalist
  - Died 1986, age 30, during Japanese league game
- Connective tissue disorder
  - Autosomal dominant
  - 1 in 10,000 in US
  - Molecular defect in fibrillin gene, Chromosome 15
Coronary Artery Disease

- 1st degree relative (MI<50)
- Male
- Smoker
- ↑ Chol
- Hypertension
- Obesity
Coronary Artery Disease

- Sergei Grinkov
  - Olympic Gold medal skater
  - Died 1995, 28 yo, during training in Lake Placid, NY
  - Autopsy: extensive CAD

- Jim Fix
  - Marathon runner
  - Died 1984, 52 yo, on a 10 mile run
  - 220lbs & + smoker before starting to run at 35 yo
Dermatology Questions

Skin Problems such as

- Herpes
- Ring worm
- Athletes foot
- MRSA
- Warts
- Blisters
- Rashes
- Itching
Heat Illness

➢ Ever ill exercising in heat?
➢ Previous h/o heat related illness
  ● ↑ risk for another event
➢ Acclimatization
  ● 7-14 days
  ● ↑ sweat rate
  ● ↓ NA+ in sweat
  ● Improved CV response to heat stress
Acclimatization
Hydration Guidelines

- 16-20 oz 2hr before practice
- Drink when thirsty (8 oz q 15 min)
- Rehydrate after practice w/in 2hr
- Weigh before & after
- 1-1 ½ L liquid for every kg lost
- Athletes replace only 2/3 fluid lost w/ voluntary replacement
Heat Illness: Risk Factors

- Pediatric population
- Poor fitness
- Previous h/o heat related illness
- Febrile illness
- Football (equipment)
- Diuretic, caffeine, antihistamine, SSRI, 2nd-gen neuroleptic, methylphenidate, anticholinergic, beta-blocker
Neuro History

- Head injury / concussion
- Knocked out, unconscious, memory loss
- Seizure
- Frequent / severe headaches
  - HA w/ exercise
- Numbness, tingling in UE / LE
- Stinger, burner, pinched nerve
- Unable to move arms/legs p being hit
Neuro Questions

- **Headaches**
  - Exercise assoc migraine
  - HTN
  - Trauma

- **Unable to move arms/legs**
  - Burner’s/stingers
  - Transient quadriplegia: congenital cervical stenosis
    - 900x ↑ risk for 2\textsuperscript{nd} episode
    - 3000x ↑ risk for quadriplegic injury
Respiratory Questions

- Cough during / after exercise, wheeze, trouble breathing w/ exercise
- h/o Asthma
  - FH asthma
- Ever used inhaler?
- h/o seasonal allergies
Respiratory History

✓ Asthma
  - Most common chronic illness in adolescents
  - 85% of asthmatic have exercise-induced sx
  - EIB: 10-35%

✓ Asthma deaths during sports
  - More common in those w/ mild asthma
  - Male basketball players
Optho History

- Problems with eyes or vision
  - Wear glasses / contacts
- Single eye
  - Not contraind to participation

GU History

- One testicle or kidney
  - Not contraind to participation

Sickle Cell Disease/Trait

- 8% AA SS trait
- Associated with sudden death in athletes
  - 20 fold ↑ risk death in military recruits
  - Due to rhabdo: met acidosis, renal failure, MSOF
Supplement Use

Ever taken anything to improve performance?

- Ephedra
  - Risks: death, stroke

- Steroids
  - 9% HS athletes use
  - 3% Jr HS

- Creatine

- Growth Hormone
Musculoskeletal Questions

- Sprains, strains, swelling w/ an injury
- Fractures
- Stress fractures
- Dislocations
- Pain, swelling in any joint
- Injury requiring sx, PT, brace, crutches, cast
- Use of special protective equipment
- Atlanto-axial instability
  - Down’s syndrome
Psych History

- Feel stressed
- Feel sad/hopeless
  - PHQ 2 screening
- Feel safe
- Cigarette/tobacco use
Female Athlete

- Nutritional Hx
  - Disordered Eating/Eating Disorders

- Menstrual Hx

- Bone Health
  - Stress fractures
  - Insufficiency fractures
Triad Screening Questions

- Have you ever had a menstrual period?
- How old were you when you had your first menstrual period?
- When was your most recent menstrual period?
- How many periods have you had in the last 12 months?
- Are you presently taking any female hormones (estrogen, progesterone, birth control pills)?
- Do you worry about your weight?
- Are you trying to or has anyone recommended that you gain or lose weight?
- Are you on a special diet or do you avoid certain types of foods or food groups?
- Have you ever had an eating disorder?
- Have you ever had a stress fracture?
- Have you ever been told you have low bone density (osteopenia or osteoporosis)?
ACSM POSITION STAND

Reduced Energy Availability with or without Disordered Eating

Low Energy Availability with or without an Eating Disorder

Functional Hypothalamic Amenorrhea

Optimal Energy Availability

Eumenorrhea

Subclinical Menstrual Disorders

Optimal Bone Health

Low BMD

Osteoporosis

Nattiv A: The Female Athlete Triad Position Stand. MSSE 2007
2014 Female Athlete Triad Coalition Consensus Statement on Treatment and Return to Play of the Female Athlete Triad:
1st International Conference held in San Francisco, California, May 2012 and 2nd International Conference held in Indianapolis, Indiana, May 2013

Mary Jane De Souza, 1 Aurelia Nattiv, 2 Elizabeth Joy, 3 Madhusmita Misra, 4 Nancy I Williams, 1 Rebecca J Mallinson, 1 Jenna C Gibbs, 5 Marion Olmsted, 6 Marci Goolsby, 7 Gordon Matheson, 8 Expert Panel

ABSTRACT
The Female Athlete Triad is a medical condition often observed in physically active girls and women, and involves three components: (1) low energy availability with or without disordered eating, (2) menstrual dysfunction and (3) low bone mineral density. Female athletes often present with one or more of the three Triad components, and an early intervention is essential to prevent its progression to serious endpoints that include clinical eating disorders, amenorrhea and osteoporosis. This consensus statement represents a set of recommendations developed following the 1st (San Francisco, California, USA) and 2nd (Indianapolis, Indiana, USA) International Symposium on the Female Athlete Triad. It is intended to provide clinical guidelines for physicians, athletic trainers and other healthcare providers for the screening, diagnosis and treatment of the Female Athlete Triad and to provide clear recommendations for return to play. The 2014 Female Athlete Triad Coalition Consensus Statement on Treatment and Return to Play of the Female Athlete Triad Expert panel has proposed a risk stratification point system that takes into account magnitude of risk to assist the physician in decision-making regarding sport participation, clearance and return to play. Guidelines are offered for clearance categories, management by a multidisciplinary team and implementation of treatment contracts. This consensus paper has been endorsed by the Female Athlete Triad Coalition, an International Consortium of leading Triad researchers, physicians and other healthcare professionals, the American College of Sports Medicine and the American Medical Society for Sports Medicine.

INTRODUCTION
This consensus statement is the first of its kind and represents a set of recommendations developed following the 1st San Francisco, California, USA and 2nd Indianapolis, Indiana, USA International Consensus Meetings on the Female Athlete Triad (Triad). It is intended to provide clinical guidelines for physicians, athletic trainers and other healthcare providers for the treatment of the Triad and to provide clear recommendations for return to play. The Consensus recommendations herein were developed using a consensus-based approach similar to that utilised by the International Consensus Statement on Concussion. 1 This consensus statement will serve as a supplement to the American College of Sports Medicine (ACSM) revised position stand on the Triad published in 2007. The 2007 position stand provided the scientific evidence documenting the existence and causes of the Triad. 2 Practical information for athletes, coaches, parents and a list of resources and helpful information on the Triad can be readily viewed on the Female Athlete Triad Coalition website at http://www.femaleathletetriad.org. This consensus paper has been endorsed by the Female Athlete Triad Coalition, an International Consortium of leading Triad researchers, physicians and other healthcare professionals, the American College of Sports Medicine and the American Medical Society for Sports Medicine.

While agreement exists concerning the primary guidelines and recommendations communicated in this document, the authors acknowledge that the underlying level of scientific evidence regarding some elements of the Triad, particularly related to treatment strategies, are still evolving. The treatment guidelines and return-to-play recommendations proposed herein are based on the published literature available to date, with consensus from the international team of experts convened at the two meetings. As such, management and return-to-play decisions should be based on informed clinical judgement keeping in mind individual risk factors and concerns as described herein.

DEFINITION OF THE FEMALE ATHLETE TRIAD MODEL
The Triad is a medical condition often observed in physically active girls and women, and involves any one or more of the three components: (1) low energy availability (LEA) with or without disordered eating (DE), (2) menstrual dysfunction and (3) low bone mineral density (BMD) (see figure 1). Female athletes often present with one or more of the three Triad components, and an early intervention is essential to prevent its progression to serious endpoints that include clinical eating disorders (EDs), amenorrhea and osteoporosis.

In 1997, the Task Force on Women’s Issues of ACSM published the first Triad position stand which described a syndrome of three distinct but
## Female Athlete Trend: Cumulative Risk Assessment

<table>
<thead>
<tr>
<th>Risk Assessment</th>
<th>Low Risk</th>
<th>Moderate Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low EA with or without DE/ED</td>
<td>No dietary restriction</td>
<td>Some dietary restriction; current/past history of DE</td>
<td>Meets DSM V criteria for ED*</td>
</tr>
<tr>
<td>Low BMI</td>
<td>BMI $\geq 18.5$; $\geq 90%$ EW; weight stable</td>
<td>BMI between 17.5-18.5; or $&lt; 90%$ EW; 5 $&lt; 10%$ wgt loss/month</td>
<td>BMI $\leq 17.5$ or $&lt; 85%$ EW or 10% wgt loss/month</td>
</tr>
<tr>
<td>Delayed Menarche</td>
<td>Menarche $&lt; 15$ yr</td>
<td>Menarche $15 &lt; 16$ yr</td>
<td>Menarche $\geq 16$ yr</td>
</tr>
<tr>
<td>Oligo-amenorrhea</td>
<td>$\geq 9$ menses in 12 months*</td>
<td>6-8 menses in 12 months*</td>
<td>$&lt; 6$ menses in 12 months*</td>
</tr>
<tr>
<td>Low BMD</td>
<td>Z-score $\geq -1.0$</td>
<td>Z-score between -1.0 and -2.0****</td>
<td>Z-score $\leq -2.0$</td>
</tr>
<tr>
<td>Stress Reaction/Fracture</td>
<td>None</td>
<td>1</td>
<td>$\geq 2$; $\geq 1$ high risk** or of trabecular bone sites***</td>
</tr>
<tr>
<td>Cumulative Risk</td>
<td>0 points</td>
<td>1 point</td>
<td>2 points</td>
</tr>
</tbody>
</table>

* = Current or past history; ** = High risk fracture = femoral neck (tension side), patella, anterior tibial cortex, medial malleolus, talus, tarsal navicular, 5th metatarsal, and great toe sesamoid; *** = Stress reaction/fracture of trabecular sites (femoral neck, sacrum, pelvis)  
EA = Energy availability; DE = Disordered eating; ED = Eating disorder; BMI = Body mass index; BMD = Bone mineral density; EW = Expected weight  
****Weight bearing sport
## Female Athlete Triad: Clearance and Return to Play (RTP) Guidelines by Medical Risk Stratification

<table>
<thead>
<tr>
<th>Clearance and RTP Recommendations by Risk Stratification</th>
<th>Cumulative Risk Score*</th>
<th>Low Risk</th>
<th>Moderate Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Clearance</td>
<td>0 – 1 point</td>
<td>✖️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provisional/ Limited Clearance</td>
<td>2 – 5 points</td>
<td></td>
<td>✖️</td>
<td></td>
</tr>
<tr>
<td>Restricted from Training and Competition</td>
<td>≥ 6 points</td>
<td></td>
<td></td>
<td>✖️</td>
</tr>
</tbody>
</table>

* = Cumulative Risk Score determined by summing score of each present risk factor from Cumulative Risk Assessment
Exam

- General
- Ht, Wt, BMI, BP
- HEENT
- CV
- Abdomen
- Skin
- MSK
Vitals

- **BP**
  - Normal: $< 120$ / $< 80$
  - PreHTN: $120-139$ / $80-89$
  - Stage I HTN: $140-159$ / $90-99$
  - Stage II HTN: $\geq 160$ / $\geq 100$
  - 3 consecutive readings, 3 different occasions

- **Ask about:**
  - Caffeine, Nicotine, Ephedrine, Stimulants, etc
HEENT

- Eyes
  - Anisocoria
HEENT

- Otitis Media
- Otitis Externa
- Califlower ear
HEENT

- Leukoplakia
  - EBV
  - HIV
  - Tobacco
    - pre-cancerous
HEENT

- Dentition
  - bulimia
Pharynx

- High arched palate seen in Marfan’s syndrome
CV Exam

- Precordial auscultation
  - Lying & standing
- Femoral artery pulses
  - Coarctation
- Eval for signs of Marfan’s
CV exam

- Murmur ↓ sitting; ↑ lying
  - Athletic heart
- Harsh murmur ↓ sitting; ↑ lying
  - Aortic stenosis
- Murmur ↑ standing; ↓ lying
  - HCM
Marfan’s: Skeletal

- Arm span > ht

This person with the Marfan syndrome is tall and thin and has an arm span that exceeds her height.
Marfan’s Skeletal

- Scoliosis
- Kyphosis
Marfan’s Skeletal

- Pectus
Marfan’s Skeletal
Marfan’s Joint Hypermobility
Marfan’s: Len Dislocation
CV: Routine Tests

- NOT RECOMMENDED BY AHA
- Lots of controversy about this topic!
- ECG
  - 95% HCM abnl, long QT
  - Poor specificity
- 2D ECHO
  - Poor sens + spec
CV Referral

- Murmur ≥ III/IV
- Diastolic Murmur
- Murmur louder standing / valsalva
  - HCM
  - ↓ blood flow → ↑ obstruction at outlet
- Hypertension
  - 3 separate, consecutive BP > 120 / 80
- Signs of Marfan’s
Resp

➢ Auscultation
  ● Wheeze
  ● Rhonchi
  ● Equal breath sounds
Abdominal Exam

- Spleen size
- Liver size
GU

- Hernia
- Testicular mass
  - anterior
GU

- Single kidney
  - NO high contact
  - Wear “flak” jacket for moderate contact sports
- Single Teste
  - WEAR CUP
Musculoskeletal

- Joint
  - ROM
  - Effusion
- Muscle
  - Strength
  - Symmetry
Musculoskeletal

- Symmetry muscles
- Pelvic obliquity
- Shoulder height
Neck ROM
Musculoskeletal Exam

- Shoulder shrug
- Deltoid strength
Musculoskeletal Exam

- **Shoulder ROM**
  - Pitchers often: $\uparrow$ ER, $\downarrow$ IR

- **Elbow ROM**
  - Tennis: $\downarrow$ flex dom arm
Musculoskeletal Exam

- Supination / pronation
Musculoskeletal Exam

- Make a fist
- Spread fingers
- ROM IP joints
- Alignment
Musculoskeletal Exam

- Squat + walk
- Hip, knee, ankle ROM
Musculoskeletal Exam

- Stand on tip toes
  - Calf strength
  - Arch formation
Musculoskeletal Exam

- Forward bend
  - Hamstring flexibility
  - Scoliosis
  - Rib hump
Musculoskeletal Exam

- Full exam of any joint:
  - Previously injured
  - Abnormality identified on screening exam
MK Exam: Predictors for Injury

- Previous injury
- Poor muscle strength or muscle strength imbalance
- Poor proprioception
- Knee or ankle laxity
- Quad or hamstring inflexibility
- ? Gen ligamentous laxity
- ??? Q-angle/tib tub sulcus angle
Levels of Clearance

- Cleared without restrictions
- Cleared after further evaluation
- Not cleared
Sports Classifications

- Collision
- Limited Contact/Impact
- Non-contact
  - Strenuous
  - Moderately Strenuous
  - Nonstrenuous
Sports by Contact Level: Contact / Collision

- Football
- Basketball
- Soccer
- Boxing
- Ice Hockey
- Field Hockey
- Lacrosse

- Diving
- Martial Arts
- Rugby
- Ski Jumping
- Team Handball
- Water Polo
- Wrestling
Sports by Contact Level: Limited

- Baseball
- Softball
- Gymnastics
- High Jump
- Pole Vault
- Cycling
- Cheerleading
- Volleyball
- Snowboarding
- Skating
- Handball
- Windsurfing
- Ultimate Frisbee
- Horseback Riding
- Skiing
- Squash
Sports by Contact Level: Noncontact

- Tennis
- Track
- Running
- Golf
- Dance
- Crew
- Bowling
- Archery
- Body Building
- Curling
- Discus, javelin, Shotput
- Weight lifting
- Riflery
- Sailing
Clearance

- Risk to self or others
- Available treatment for identified d/o
- Protective equipment needed?
  - Cup, flak jacket, cowboy collar
- ? Limited participation
  - Rehab’ing from injury
- Alternate sport acceptable
Clearance

- 0.2-1.9% disqualified
  - 38% HTN
  - 12% optho: retinal detach, single eye
  - 10% GU: single teste, cancer
  - 8% neuro: concussion, brain bleed

- 11.9% require f/u

Magnes 1992 PSM
Absolute Contraindications

- Myocarditis
- Fever
- Current significant diarrhea
- New per Triad Coalition
  - BMI <16
  - Purging 4x or > per wk
No Restriction

- Hepatitis (chronic)
- HIV
- Diabetes
- Seizures: well controlled
- Asthma
Participation

- HCM: NO
- CAD: Based on stress testing
- Coarctation
  - Mild, peak SBP < 230: no restrictions
  - After repair: 4-6mo
- Infective endocarditis
  - RTP: nl fx, size
  - NO participation for 6mo after dx
  - Arrhythmia risk
- Aortic Stenosis
  - Mild: no restrictions
  - Mod: low risk sports
Exculpatory Waiver

➢ Contract
  - Athlete agrees not to sue & releases involved parties from liability
  - Questionable validity

➢ Others recommend
  - Athlete writes out his/her understanding of the diagnosis & risks & recommendations
Hypertension

- Evaluation for secondary causes
- Participation / Clearance
  - Mild-mod, no end organ: no restrictions
  - Severe: restrict until controlled
- Stage I
  - Lifestyle changes
  - Meds if lifestyle not effective
Neuro History: Seizure

- No seizure in last 6 mo
  - Unlimited participation

- If Seizure in last 6 mo
  - No water sports (esp diving)
  - No archery / riflery
GU

- Single kidney
  - NO high contact
  - Wear “flak” jacket for moderate contact sports
- Single Teste
  - WEAR CUP
- Single eye
  - Wear eye protection
Sickle Cell Disease

- SSD: all ok except
  - High exertion
  - Collison
  - Contact
  - AVOID: overheating, dehydration, chilling

- Trait
  - Avoid timed trials first week of practice
Validity of PPE

- Prevention of injury + death
  - No change in sudden death after widespread institution of PPE
  - No difference in injury rate + PPE vs. – PPE
  - F/U often not structured
  - No good data
    - No trials comparing venues, contents, practitioners
Validity PPE

- 130 sudden deaths in screened athletes
  - 8 dx at PPE (6%)
  - 79% of those with HCM
    - NO SIGNS OR SX AT PPE
Summary

- PPE may be the only med interaction
- Hx more sensitive than PE in uncovering conditions w/ risk of SCD
- Pay special attention to previous injuries/illness
- Try to allow participation at some level
- Watch out for “mines”!