PREPARTICIPATION SPORTS PHYSICAL

Background

1. Should occur 4-6 wks prior to start of season
    - Musculoskeletal injuries can be rehabilitated
    - Abnormalities found during eval can be further assessed
2. American Heart Association recommends cardiovascular screening every 2 yrs with an interim history occurring in the intervening years
    - AHA Cardiovascular Preparticipation Screening of Competitive Athletes
        - http://circ.ahajournals.org/cgi/content/full/115/12/1643
3. Some states require annual Physical Exams (PEs)
    - Check with sports governing body of your state
4. Optimal setting, Primary Care Physician's office
5. Data lacking on effectiveness as a screening tool
    - Still widely performed
    - The 2010 Consensus guidelines for Preparticipation Physical Exams (PPE) suggest a PPE for all kids, even those not participating in sports, as a means to promote health and fitness[1]
6. Pre-participation Physical Evaluation Fourth Edition Monograph
    - http://ppesportsevaluation.org/body.html
7. Goals of pre-participation sports exam
    - Encourage safe participation, not exclude athletes from participating
        - 0.3%-1.3% denied clearance
        - 3.2%-13.9% required further evaluation
    - Screen for potentially life-threatening conditions
        - Cardiovascular abnormalities[2,3]
    - Identify issues that may affect health and safety
        - Supplement use
        - Eating disorders
        - Hearing or vision problems
    - Identify and rehabilitate previous musculoskeletal injuries
    - Meet administrative requirements for institutions
    - Chance to determine general health and serve as entry point into health care system
        - Not to substitute comprehensive adolescent evaluation
        - The 2010 consensus guidelines for the PPE suggest that physicians include topics like drug use, sexual activity, violence and mental health
    - To remove unnecessary restrictions on participation
    - To advise athletes regarding appropriate sports in which to participate

Clinical History

1. History crucial
    - Detects more abnormalities than Physical Exam (PE) (80%)
2. Personal and family medical History
    - Parents should be involved to provide complete family Hx
    - Prior surgeries, hospitalizations or known medical issues such as
        - Sickle cell anemia
        - Cardiac defects
        - Asthma

        - Heart Murmur
        - Systemic hypertension
        - Fatigue
        - Excessive/unexplained exertional dyspnea
        - Exertional chest pain
        - Current infection
    - Visual defects or neurologic issues
3. Previous injuries
    - Loss of time in both time of play and in school/work and current status of injury
    - Process of rehabilitation
    - Head injuries, including loss of consciousness and amnesia
    - Previous exclusion from any sports in past
4. Include questions that screen for increased risk of sudden cardiac death
    - Syncope, near syncope, chest pain, irregular heart beat, SOB, or fatigue DURING exercise
    - Personal History of hypercholesterolemia, hypertension, or heart murmur
    - Family History of[4]
        - Sudden death or sudden drowning
        - Hypertrophy cardiomyopathy
        - Dilated cardiomyopathy
        - Long QT syndrome
        - Marfan syndrome
        - Arrhythmias
        - Cardiovascular disease before age 50
    - Be aware, most often first sign of cardiac abnormality is sudden death
        - Screening not good for detecting asymptomatic cardiac abnormalities
    - American Heart Association Cardiovascular Preparticipation Screening of Competitive Athletes
        - http://www.americanheart.org
    - 36th Bethesda Guidelines-Eligibility Recommendations for Competitive Athletes with Cardiovascular Abnormalities[4]
        - http://www.csmfoundation.org/36th_Bethesda_Conference_-_Eligibility_Recommendations_for_Athletes_with_Cardiac_Abnormalities.pdf
5. Sickle cell trait
    - High altitude, low blood pH, or hypoxia can cause sickling
6. Heat illness
    - Exertional hyperthermia is leading cause of non-traumatic, non-cardiac death in athletes
    - If positive history, may participate in sports but must avoid extreme temperatures
7. Use of
    - Caffeine
    - Alcohol
    - OTC medications
    - Supplements
    - Illicit and/or banned drugs
8. Current prescribed and over the counter medications

9. Allergies and anaphylaxis
    - EpiPen on site if at risk for serious reaction
10. Menstrual Hx
    - Does the female athlete have normal menses and, if so, when her last menstrual period
    - Screen for female athlete triad (disordered eating, amenorrhea and low bone density)
11. Immunizations up to date
12. General concerns of parents or athlete

Physical Exam

1. General
    - Optimal setting is in primary care office with one examiner[5]
2. Vital signs
    - Blood Pressure: elevated in 6% of routine PPEs
        - If elevated: let athlete sit quietly for 5 mins, repeat BP
        - If continues to be elevated, rest for 10-15 mins, repeat
        - Continued elevation: referral
        - Use pediatric BP guidelines
            - NHLBI Blood Pressure Tables for Children and Adolescents
                - http://www.nhlbi.nih.gov/guidelines/hypertension/child_tbl.htm
        - Stage 1 (>90th percentile for ht/wt) or pre-hypertension
            - Cardiovascular exercise is treatment of choice
        - Stage 2 hypertension (>95th percentile for ht/wt)
            - Participation restricted until hypertension controlled and no target organ damage
        - Some athletic governing bodies prohibit use of diuretics and beta-blockers
        - AAP Athletic Participation by Children and Adolescents who have Systemic Hypertension
            - http://aappolicy.aappublications.org/cgi/reprint/pediatrics;99/4/637.pdf
    - Pulse
        - Resting bradycardia common, if asymptomatic no participation restriction (elite adolescent pulse rarely less than 40-50)
    - Body mass index
        - Exercise restriction in eating disorders if
            - Compromised performance
            - Participation could cause injury or deterioration in health status
        - Restrictions may be necessary in morbidly obese
3. HEENT exam
    - Visual acuity, extra-ocular movements, baseline anisocoria (pupil size)
    - Hearing deficits, oral, dental abnormalities
    - Current or recent URIs, swollen lymph nodes, tender salivary glands
4. Cardiac examination[3,4,5]
    - Pulse and BP
    - Assessment of radial and femoral pulses (in setting of hypertension and concern for coarctation)

- Visual inspection of precordium
- Precordial palpation
  - Detects apical impulse location, thrills, or parasternal heave
- Auscultation
  - Regular rate and rhythm
  - Murmurs or other abnormal sounds
    - Measure quality, duration and changes of murmur with positional and provocative measures
      - Squatting increases venous return
      - Deep inspiration, Valsalva maneuver: decreases venous return
    - Further evaluation
      - Any diastolic murmur
      - Grade 2/6 or louder systolic murmur
      - Murmur which worsens with decreased venous return to heart
      - Murmur with which examiner is uncomfortable
      - Murmur of hypertrophic cardiomyopathy may sound like innocent murmur, except it is louder with standing and Valsalva and quieter with squatting
- 36th Bethesda Guidelines-Eligibility Recommendations for Competitive Athletes with Cardiovascular Abnormalities
- http://www.csmfoundation.org/36th_Bethesda_Conference_-_Eligibility_Recommendations_for_Athletes_with_Cardiac_Abnormalities.pdf
  - For ex: there are specific recommendations for pts w/heart block, QT prolongation, ventricular arrhythmias, etc, which take in account previous symptoms, risk of sports activity, and effect of exercise on heart

5. Pulmonary exam
   - Assess for decreased air movement
   - Assess for abnormal lung sounds
   - Further evaluation if history suggests Exercise induced asthma
6. Abdominal exam
   - Assess for tenderness, masses, hepato- or splenomegaly
   - Normal bowel sounds
7. Genital exam (males)
   - Single or undescended testes
   - Masses or hernias
   - Insufficient evidence exists for recommending for or against routine genital exams in boys playing sports[6]
   - Routine male genitourinary examination during the PPE, including testicular and hernia evaluation, is recommended by the American Academy of Family Physicians (AAFP), American Academy of Pediatrics, American College of Sports Medicine, American Medical Society for Sports Medicine, American Orthopedic Society for Sports Medicine, and American Osteopathic Academy of Sports Medicine.[7]

- The latest AAFP position statement reflects the USPSTF recommendation against routine screening for testicular cancer in asymptomatic adolescents and adults.[8]

8. Skin exam
   - Rashes, lesions, open wounds
9. Neurological exam
   - History of chronic "stingers/ burners" (now redefined as concussion)
     - Check upper extremity strength, deep tendon reflexes, cervical spine exam
   - Persistent symptoms of concussion are contraindication to contact sports
   - Return to sport after concussion: See Sports Related Concussion
   - Perform neurological exam
     - Cranial nerves
     - Cerebellar function
     - Strength
     - Sensation
     - Orientation
     - Concentration
     - Memory
   - Consider neuropsychological testing for high contact sports
10. Musculoskeletal exam
    - Complete exam of high risk areas (i.e. shoulder, knee and ankle) may increase probability of finding injuries when examiner does not know injury history[9]
    - General inspection
      - Assess for asymmetry
      - A tilt of head to one side (may indicate primary c-spine injury, primary or secondary trapezius strain, or other cervical muscle spasm)
      - Prominence of one acromioclavicular joint (indicates previous shoulder separation)
      - Asymmetric shoulder heights
      - Asymmetric iliac crest heights (scoliosis, leg length discrepancy, or lumbar paraspinous muscle spasm)
      - Swelling of an extremity
      - Long limbs, arachnodactyly and pectus deformity of the chest (stigmata of Marfan's)
    - Neck
      - Range of Motion (ROM): any limitation of ROM, weakness or pain
        - Exclude from contact sports until further evaluation
    - Shoulder
      - Raise arms from side and touch hands above head
        - Keep elbows extended
      - Hold arms in front of body
        - Examiner presses down on hands
        - Repeat at 90° of abduction
      - Place hands behind neck and bring elbows back as far as possible (apprehension or inability to perform may indicate previous shoulder dislocation that has not healed properly and may require surgical intervention)

- Elbow
  - Extend and flex elbows with arms to side
  - Pronate and supinate with elbows flexed at 90°
- Hands
  - Spread fingers and then make a fist
- Back
  - Inspect back from behind and in front for scoliosis (contraindication to play if angle of curvature is severe, i.e. >40 degrees)
  - Palpate spine, assess for tenderness
  - Flex and extend back
    - Assess for any pain elicited from ROM
- Lower leg
  - Observe from behind and have athlete rise onto toes
- Knee
  - Ask athlete to flex their quadriceps and look for asymmetry
    - Atrophy of the vastus medialis obliquus, demonstrated by asking the athlete to contract his or her quadriceps muscles, is characteristic of prior knee or leg injury that leads the athlete to abnormal use
  - Ask athlete to squat and take four steps forward (duck walk)
    - Inability to perform walk should lead to exclusion from play until a further assessment can be completed
  - Assess for a prominent tender tibial tuberosity (if diagnostic for Osgood-Schlatter disease, needs rehab program but could participate in sports along with program)
- Ankle
  - Have athlete hop five times as high as he or she can on each foot

Diagnostic Testing

1. Cardiovascular testing
   - Screening EKG vs. Echo
   - NOT recommended currently based on available data due to relative low incidence of disease and rate of false positives[3,4]
   - Additional cost makes testing inefficient and prohibitive
2. Concussion baseline testing
   - Consider neuropsychological testing of baseline state for sports with high risk of concussion[10]
   - Pen and paper or computerized versions available but controversy and possible medicolegal risk of interpreting results exist so consider referral for formal neuropsychological testing
     - ImPACT, CogState, Headminders-CRI and Automated Neuropsychological Assessment Metric (ANAM) have significant cost and training associated with them
     - Sport Concussion Assessment Tool 2 (SCAT2) commonly used as a sideline evaluation[10]

Clearance

1. End goal
    - Determine level of participation in which athlete can be involved without increased risk of injury or death from sports participation
2. Full clearance
    - No medical problems or restrictions
3. Clearance with limitation and recommendations for treatment, rehab or further work-up
    - Pt with asthma must be under adequate control and have rescue inhaler available during participation
    - Rehabilitation of chronic shoulder injury before allowing to play
    - Make sure athlete and family and coach are all aware of plan and follow up
4. No clearance until further evaluation or rehabilitation
    - Active wheezing during office exam
    - Rehabilitation of a shoulder injury causing limitations in strength or ROM
5. Disqualification from all sports or a specific sport
    - Athletes with single organs may be disqualified from contact sports without adequate protection
    - Athletes with symptomatic hypertrophic cardiomyopathy
    - Patients with Down's Syndrome who have atlanto-axial instability
    - Common conditions that lead to sports disqualification
        - Cardiac, Respiratory, and Central Nervous System Conditions
        - Spinal, Systemic, Dermatologic, Paired-Organ, and Others
    - The Special Olympics has different standards for disqualification from sports
        - Preparticipation Physical Examination for the Special Olympic Athelete[11, 12]

Patient Education

www.aap.org/healthtopics/sports.cfm

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