THE PREPARTICIPATION ATHLETIC EVALUATION
MICHAEL D. GOODLETT, M.D., F.A.A.F.P.,
SPORTS MEDICINE TEAM PHYSICIAN
AUBURN UNIVERSITY

HISTORY of the PRE-PARTICIPATION EXAM (PPE)
- Initially suggested Teddy Roosevelt in 1905 due to sudden deaths seen in football
- Created about 30 years ago, primarily to look at congenital heart disease
- American Heart Association first developed screening guidelines in 2007
- Most recent guidelines form the 2010 PPE 4th edition monograph

LEARNING OBJECTIVES:
1. Review the guidelines for pre-participation sports physical
2. Understand the key things to identify in a medical history for a patient planning to participate in athletics
SCREENING HISTORY

THE PERSONAL AND FAMILY HISTORY OF THE ATHLETE REVEALS 64 TO 78% OF CONDITIONS THAT COULD PROHIBIT OR ALTER SPORTS PARTICIPATION, MAKING IT A MORE SENSITIVE TOOL THAN THE PHYSICAL EXAM


- PEARL: ASK WHO FILLED OUT THE FORM (THE ATHLETE OR THE PARENT?)
- PEARL: ASK THE IMPORTANT QUESTIONS AGAIN

RESULTS of PPE

• BJSM 2012: 5.5% of adolescents were deemed ineligible for sports


• PEARL: REMEMBER CLASSIFICATION OF SPORTS, MOST ATHLETES CAN SAFELY TAKE PART IN SOME TYPE SPORT

RESULTS of PPE

• 13% of athletes required further evaluation for undiagnosed hypertension, vision problems, nutrition, previous / current injuries, medical conditions


PEARL: BE THOROUGH AND QUICK TO RESOLVE / FOLLOW-UP ISSUES

PEARL: OBTAIN ALL PRIOR MEDICAL RECORDS CONCERNING CLEARANCE ISSUES

PURPOSE of PPE

• PPE purpose is to maximize the health of athletes and their safe participation in sports, not to disqualify

• > 30 million athletes younger than 18 years receive medical clearance to participate in sports every year.

ABSOLUTE CONTRAINDATIONS FOR SPORTS PARTICIPATION

- ACTIVE MYOCARDITIS OR PERICARDITIS
- ACUTE ENLARGEMENT OF THE SPLEEN OR LIVER
- HYPERTROPHIC CARDIOMYOPATHY
- LONG QT SYNDROME
- EATING DISORDER IN WHICH ATHLETE IS NOT COMPLIANT WITH THERAPY AND FOLLOW-UP, OR WHEN THERE IS EVIDENCE OF DIMINISHED PERFORMACE OR POTENTIAL INJURY BECAUSE OF THE EATING DISORDER

CONTRADICTIONS FOR SPORTS PARTICIPATION

- HISTORY OF RECENT CONCUSSION AND SYMPTOMS OF POSTCONCUSSION SYNDROME (NO CONTACT OR COLLISION SPORTS)
- POORLY CONTROLLED CONVULSIVE DISORDER (NO ARCHERY, RIFERY SWIMMING, WEIGHT LIFTING OR POWERLIFTING, STRENGTH TRAINING, OR SPORTS INVOLVING HEIGHTS)
- SICKLE CELL DISEASE (NO HIGH-EXERTION, CONTACT, OR COLLISION SPORTS)

Kurowski K, Chandran S. The preparticipation athletic evaluation Am Fam Physician. 2000; 61(9):2683-2690

CONTRADICTIONS FOR SPORTS PARTICIPATION

- RECURRENT EPISODES OF BURNING UPPER-EXTREMITY PAIN OR WEAKNESS, OR EPISODES OF TRANSIENT QUADRIPLEGIA UNTIL STABILITY OF CERVICAL SPINE CAN BE ASSURED (NO CONTACT OR COLLISION SPORTS)
- SEVERE HYPERTENSION UNTIL CONTROLLED BY THERAPY (STATIC RESISTANCE ACTIVITIES, SUCH AS WEIGHT LIFTING, ARE PARTICULARLY CONTRAINDICATED)

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LIMITATIONS of PPE

- Lack of data proving it prevents morbidity and mortality associated with sports participation
- PPE has not been successful in decreasing rates of sudden death during sports in young athletes
- AMERICAN HEART ASSOCIATION guidelines are often not followed or only partial followed

Table 1. Contraindications for Sports Participation

- Active myocarditis or pericarditis
- Acute enlargement of spleen or liver
- Eating disorder in which athlete is not compliant with therapy and follow-up, or when there is evidence of diminished performance or potential injury because of the eating disorder
- History of recent amendatory and symptoms of syncope
- Hypertrophic cardiomyopathy
- Long QT syndrome
- Poorly controlled convulsive disorder (no archery, rifery, swimming, weight lifting or powerlifting, strength training, or sports involving heights)
- Suspected coronary artery disease until fully evaluated (patients with impaired resting left ventricular systolic function less than 50%, exercise-induced ventricular dysrhythmias, or exercise-induced ischemia on exercise stress testing are at greatest risk of sudden death)

Adapted with permission from Kurowski K, Chandran S. The preparticipation athletic evaluation Am Fam Physician. 2000; 61(9):2683-2690

SICKLE CELL

- SICKLE CELL DISEASE (NO HIGH-EXERTION, CONTACT, OR COLLISION SPORTS)
- SICKLE CELL TRAIT (NO CONTRAINDICATIONS!!!)

PEARL: SCT IS AN OPPORTUNITY TO EDUCATE

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LIMITATIONS of the PPE

• National Federation of State High School Associations (NFHS) regards PPE as a prerequisite to sports but has no authority or ability to standardize PPE
• Inconsistencies between states (no national standard)

PREPARTICIPATION PHYSICAL EVALUATION 4th EDITION 2010

• Approved by the AAP, AAFP, ACSM,
• American Medical Society for Sports Medicine
• American Orthopedic Society for Sports Medicine
• American Osteopathic Academy of Sports Medicine

Primary objectives of the PPE:
• Screen for conditions that may life threatening or disabling
• Screen for predisposing injury or illness. (Example: recurrent injury or obesity)
PREPARTICIPATION PHYSICAL EVALUATION 4th EDITION 2010

Secondary Objectives:
• Determine general health
• Provide opportunity to initiate discussion of health related topics

RECOMMENDATIONS for the PPE
• Preferably performed by the Primary MD/DO
• Should be performed ideally at least 6 weeks prior to preseason practice (Allows time for rehabilitation )
• Periodicity is determined by state law

WHERE SHOULD YOU DO IT
• Individual exam / office setting best allows for privacy and continuity of care
• Pearl: The ideal situation is in the office with the physician, the athlete and their ATC!!

WHERE CAN YOU DO IT
• Station approach allows for entire athletic teams at one time
• Time efficient
• Often utilizes many levels of providers and specialists

SCREENING HISTORY
• THE HISTORY ALONE MAY UNCOVER 88% OF MEDICAL CONDITIONS AND 67% OF MUSCULOSKETAL PROBLEMS DURING THE PPE.
• PEARL: ASK WHO FILLED OUT THE FORM (THE ATHLETE OR THE PARENT?)
• PEARL: ASK THE IMPORTANT CV HISTORY QUESTIONS AGAIN

How Should You Do It
History
ASK ABOUT
• History of stress fractures or recurrent injuries
• Ongoing medical conditions
• Use of prescription/non-prescription drugs/supplements
• History of heat illness
HOW SHOULD YOU DO IT
History
ASK ABOUT
• History of allergies/anaphylaxis
• History of asthma or cough with exercise 10-79% of athletes (high school, collegiate, Olympic) have exercise induced asthma
• Recent History of Mono

HOW SHOULD YOU DO IT
History
ASK ABOUT
• History of concussions, head injury or seizures
• Menstrual history
• Screen for the female athlete triad - low energy availability (disordered eating), menstrual dysfunction, low bone density for age

HOW SHOULD YOU DO IT
History
ASK ABOUT
• History only a single normally paired organ (example: single kidney)
• History of bleeding disorder
• History of denied or restricted sports participation by another MD
PEARL: MUST PROTECT A SINGLE PAIRED ORGAN

COLLEGE SPECIFIC ASK ABOUT
• ADD/ADHD MEDICATION OR HISTORY OF DIAGNOSIS
• RE-ASK THE CV HX QUESTIONS
PEARL: NCAA DRUG TESTING PENALTY FOR UNDOCUMENTED STIMULANTS POSSIBILITY ONE YEAR OF ELIGIBILITY LOST
PEARL: NEED PROPER DOCUMENTATION OF ADD/ADHD DIAGNOSIS FOR DRUG TESTING/POSSIBLE ACADEMIC ACCOMMODATIONS

COLLEGE SPECIFIC ORTHO
ASK ABOUT
• PRIOR SURGERY
• PRIOR FRACTURES, STRESS FRACTURES
• PRIOR MRI, CT, BONE SCANS
• PRIOR PRP, STEM CELL, “CORTIZONE” INJECTIONS
• PRIOR CONCUSSIONS, “BURNERS/STINGERS”,LOC
PEARL: ASK ABOUT PRIOR SCHOOLS AND GET THEIR MEDICAL RECORDS

HOW SHOULD YOU DO IT
Physical Exam
• Height, Weight, & BMI
• Blood Pressure – 90th-94th% or >120/80 = prehypertension, >95th 3 occasions = hypertension (further evaluation), >99th%
+ 5mm Hg = severe hypertension (restrict from power lifting, high risk for catastrophic event)

HOW SHOULD YOU DO IT?

Physical Exam

- **Visual Acuity**
- Eye protection is recommended by all athletes, the AAP and AAO
- Required if best corrected vision in one eye is 20/40
- **Very High Risk** – Contact sports
- **High Risk** – Any sport with a ball, puck, bat or racquet

HOW SHOULD YOU DO IT?

Physical Exam

- Oral cavity, Nose, Ears
- Cardio Vascular, Lungs, Abdomen
- **GU (Males only)**


PEARL: DO A MORE THOROUGH EXAM ON PREVIOUSLY INJURED BODY PARTS

HOW SHOULD YOU DO IT?

AHA Recommendations

- Structural cardiac problems leading to fatal arrhythmias account for >90% of sudden death in athletes < 30 yr, 36% from hypertrophic cardiomyopathy, 8% from idiopathic LVH, 17% from coronary artery anomalies.
- Annual incidence of sudden cardiac death = 1/100,000 – 1/200,000 high school teens – most are previously asymptomatic


PPE should include:

- Personal and family history
- Exertional chest pain/discomfort
- Exertional syncope or near-syncope
- Excessive exertional and unexplained fatigue
- Prior recognition of heart murmur
- Elevated BP
**HOW SHOULD YOU DO IT**

**AHA Recommendations**

**ASK ABOUT:**
- Premature death (sudden and unexpected in family) before 50 yr
- Disability from heart disease in a close relative <50 yr
- Specific knowledge of certain cardiac conditions in family members (hypertrophic or dilated cardiomyopathy, long QT syndrome (or other ion channelopathies), Marfan syndrome, clinically important arrhythmias

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**PHYSICAL EXAM**

- Heart Murmur – cardiac exam includes auscultation both supine and standing w/ Valsalva to identify murmurs of Left ventricle outflow obstruction (HCM)
- Femoral pulses (to exclude aortic stenosis)
- Physical stigmata of Marfan Syndrome
- Brachial artery blood pressure (sitting), preferably

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**Screening EKG NOT recommended by the ACC / AHA in asymptomatic patients during the physical exam**

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1 or more positive responses to cardiovascular screening questions may be enough to trigger a cardiology referral

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Table 2. American Heart Association Recommendations on Screening for Cardiovascular Abnormalities in Competitive Athletes

<table>
<thead>
<tr>
<th>Personal history</th>
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<td>Family history</td>
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<td>Physical exam</td>
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</table>

Table 2. American Heart Association Recommendations on Screening for Cardiovascular Abnormalities in Competitive Athletes
## Preparticipation Examination Appendix

**Patient stands straight with arms at sides, facing examiner. Normal findings: symmetry of upper and lower extremities and trunk.**

Common abnormalities include enlarged acromioclavicular joint, enlarged sternoclavicular joint, asymmetric waist (leg-length difference or scoliosis), swollen knee and swollen ankle.

**Patient looks at the ceiling, looks at the floor, touches right (and left) ear to shoulder and looks over right (and left) shoulder. Normal findings: patients should be able to touch chin to chest, ears to shoulders and look equally over the shoulders.**

Common abnormalities, which include loss of flexion, loss of lateral bending and loss of rotation, may indicate previous neck injury.

**Patient stands in front of examiner with arms at side. Examiner tries to hold shoulder down while patient tries to shrug.**

Common abnormalities include atrophy or weakness of muscles indicating shoulder, neck or trapezius nerve abnormalities.
Patient holds arms out from sides horizontally and tries to lift them (while examiner holds arms down). Normal findings: strength should be equal in both arms, and deltoid muscles should be equal in size.

Common abnormalities include loss of strength and wasting of the deltoid muscle.

Patient holds arms out from sides with elbows bent at 90 degrees; patient raises hands vertically as far as they will go. Normal findings: Hands go back equally and at least to upright vertical position.

Common abnormalities: loss of external rotation, which may indicate shoulder problem or old dislocation.

Patient holds arms out from sides, palms up, and completely straightens and bends elbows. Normal findings: motion should be equal on left and right sides.

Common abnormalities, which include loss of extension and loss of flexion, may indicate old elbow injury, dislocation, fractures, etc.

Patient holds arms down at sides with elbows bent at 90 degrees, then twists palms up and down. Normal findings: palms should go from facing the ceiling to facing the floor.

Common abnormalities, which include lack of full supination and full pronation, may indicate an old injury of the forearm, wrist or elbow.

Patient makes a fist, opens the hand and spreads the fingers. Normal findings: fist should be tight and fingers straight when spread.

Common abnormalities, which include a knuckle protruding from the fist and a swollen or crooked finger, may indicate old finger fractures or sprains.

Patient squats on heels, duck-walks four steps and stands up. Normal findings: maneuver is painless, heel-to-buttock distance is equal on left and right sides and knee flexion is equal during the walk.

Common abnormalities include inability to fully flex one knee and inability to stand up without twisting or bending to one side.
Patient stands up straight with arms at sides (with back to the examiner). Normal findings: symmetry of shoulders, waist, thighs and calves.

Common abnormalities include high shoulder (scoliosis) or low shoulder (muscle loss), prominent rib cage (scoliosis), high hip or asymmetric waist (leg-length difference or scoliosis), and small calf or thigh (weakness from an old injury).

Patient bends forward slowly with knees straight and touches the toes. Normal findings: patient bends forward straightly and smoothly.

Common abnormalities include patient twisting to one side (low back pain) and asymmetric back (scoliosis).

Patient stands on the heels and then rises up on the toes. Normal findings: equal elevation on right and left sides, symmetry of calf muscles.

Common abnormalities include wasting of calf muscles (Achilles injury or old ankle injury).

**PPE CASE STUDY**

17YO BM

**HISTORY OF RIGHT KNEE “MCL SPRAIN” 2 WEEKS PRIOR AT ALL-STAR GAME**

**HISTORY OF RIGHT TIBIA ORIF FOR “GROWTH PLATE REPAIR” 09-2011**

PE: TTP OVER RIGHT MEDIAL TIBIAL PLATEAU, RIGHT KNEE OPENS 1+ TO VALGUS STRESS TESTING, 1 CM. LLD (R<L)

X-RAY SERIES RIGHT KNEE ORDERED, PRIOR MEDICAL RECORDS REQUESTED
RADIOLOGY REPORT Right Knee
Series: Multiloculated cystic bone lesion with thin sclerotic margins abutting the articular surface is most suggestive of a giant cell tumor. Aneurysmal bone cyst and chondromyxofibroma are also possibilities. No pathological fracture is seen at this time.

MRI REPORT Right Knee With and Without Contrast: Medial aspect of the proximal right tibia involving the metaphysis extending into the subchondral bone has a 36 x 37 x 69 mm multiloculated nonaggressive appearing lesion. A giant cell tumor is favored. Aneurysmal bone is a second most likely consideration. Orthopedic oncology consultation for possible resection is recommended.

SURGICAL PROCEDURE
1. Open biopsy, right tibia bone lesion. (Pathology=Simple bone cyst)
2. Curettage and bone grafting of benign cyst of the right proximal tibia
GOALS ACCOMPLISHED BY A GOOD PRE-PARTICIPATION PHYSICAL EXAMINATION

• Legal conditions are met for the institution involved
• Conditions that might adversely affect an athlete during sports participation can be identified. These conditions primarily involve the cardiac and orthopedic systems but are not limited to them
• The overall general health of the athlete can be determined
• A relationship on the part of the athlete has begun with the team physician that will continue during athletic participation


GOALS ACCOMPLISHED BY A GOOD PRE-PARTICIPATION PHYSICAL EXAMINATION

• A venue has opened that will enable the athlete to discuss various nonathletic concerns.
• Appropriate advice and feedback can be given concerning such areas as nutrition, warm-up, cool down, and proper conditioning
• A network to support health care of that person has been established or enlarged
• Preventive concerns such as seat belts, drinking, and other high risk behaviors common to the adolescent age group can be addressed


References


5/8/2017
References


AAP History/Physical Exam/Clearance Forms: http://www.amssm.org/Content/pdf%20files/PPE2010RevisedForm.pdf


The Preparticipation Athletic Evaluation

<table>
<thead>
<tr>
<th>TABLE 1: Cardiac Risk Factors for Preparticipation Evaluations: Critical Questions</th>
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<tr>
<td>Emotional stress or depression, or awareness of health?</td>
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<tr>
<td>Exertional arrhythmias or syncope, or unexplained syncope?</td>
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<tr>
<td>Past history of coronary artery disease or systemic hypertension?</td>
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<tr>
<td>Known family history of hypertension, diabetes mellitus, or cardiac disease?</td>
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</tbody>
</table>

Family history of coronary artery disease or known/unknown cardiovascular disease in first or second-degree relatives younger than 50 years? (Male warns if younger than 40 years)