PREPARTICIPATION EVALUATION IN SPORTS MEDICINE ‘A Foundation’

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Objectives:
1) Discuss the importance of communication and coordination among the sports medicine team
2) Explain the precepts of osteopathic medicine as they relate to a team physician
3) Compare timing and setting of administering the preparticipation evaluation (PPE)
4) Categorize the medical and family historical components screened in the PPE
5) Distinguish the importance of vital signs and visual acuity
6) Outline physical exam screening techniques, with emphasis on the cardiovascular and musculoskeletal systems
7) Develop an approach to common positive screening questions,
8) Summarize challenges to the current structure of the PPE
9) Design ways to efficiently incorporate mental health and psychosocial factors into the PPE

Primary Care Sports Medicine
- Family Medicine, Internal Medicine, Emergency Medicine, Pediatrics, Physical Medicine and Rehabilitation
- Fellowship
- Team Physician Consensus Statement: "Has a working knowledge of musculoskeletal injuries, medical conditions, and psychological issues affecting the athlete"
- Medical Orthopedics
- Demand of Sport
- Office Hours
- Event Coverage
Doctor of Osteopathic Medicine

- Lake Erie College of Osteopathic Medicine
- Similar State Licensing and Accreditation
- Andrew Taylor Still
  - Founded 1874
  - Medical Challenges
- Rural and Underserved
- Certified in all Medical Specialties
- Patient-Centered vs. Disease-Centered

Osteopathic Medicine Precepts

1. The Body is a Unit
2. Structure and Function and Interrelated
3. The Body possesses Self-Regulatory Mechanisms
4. The Body has the Inherent Capacity to Defend and Repair Itself

Case Example:

A 15 year old Caucasian Female presents to your office requesting a physical for a ‘walk on’ tryout for the high school basketball team.
Case Example:

- She played soccer in middle school, but lost interest as a result of a series of knee injuries.
- Knee ACL injury 2 years ago with surgery.
- Feels more tired than usual and "in a fog." at that time, she recalls sitting out two practices after a collision with another player. At that time, she felt more tired than usual and "in a fog."
- No medications, although further questioning indicates that she occasionally takes Advil and recently started using a protein supplement that she ordered online.
- She has normal menstrual periods.

Overview:

1. Organized and Methodical Approach
2. Medical and Orthopedic concerns are identified by History approximately 75% of the time
3. There are no routine screening tests required in an asymptomatic athlete
4. Middle and High School student PPE history design should allow for review and verification from a parent or guardian
5. Refer Clearance
   - Additional information or diagnostics are available

Epidemiology

- Disqualification in less than 1 percent of athletes
- Further Evaluation in 3-13 percent
- Adolescent population – PPE becomes the Annual "Physical" in 50-80% of cases
Timing and Frequency

- At least 6 weeks before preseason practice
  - Records and Files
  - Diagnostic Testing
  - Rehabilitation

- No Consensus on Frequency
  - High School
    - Many Athletic Associations require annual evaluations
    - Middle School, Junior High, High School
  - College
    - Entry PPE
    - Initial History and Imposed Physical Exam

Setting

- School / Institution versus Office-Based
  - Communication
  - Uniformity
  - Comfort of Athlete
- Policy of School / Institution / State
  - Administrative

PreParticipation Physical Evaluation (PPE) Monograph, 4th Edition
Vital Signs: Blood Pressure (BP): 122/84, Pulse: 66,
Respiratory Rate (RR): 18, Temperature: 98.8 F
Height: 5’7” Weight: 154 lbs BMI: 24.1
Visual Acuity: Left: 20/25 Right: 20/20

- Vision and Blood Pressure Abnormalities are commonly detected on PPE.
- Importance of this documentation for the PPE and also acute visits.
- Wealth of information can be obtained by correlating and trending vitals.

**Preparticipation Physical Evaluation**

**HISTORY FORM**

(Note: This form is to be filled out by the patient and parent prior to seeing the physician. The physician should keep this form in the chart.)

Date of Exam: ________________________________________________________________________________________________

Name: __________________________________________________________________________________ Date of birth: ______________

Sex: _____ Age: _______ Grade: __________ School: __________________________ Sport(s): ______________

Medicines and Allergies: Please list all of the prescription and over-the-counter medicines and supplements (herbal and nutritional) that you are currently taking.

<table>
<thead>
<tr>
<th>Medicines</th>
<th>Pollens</th>
<th>Food</th>
<th>Stinging Insects</th>
</tr>
</thead>
</table>

Do you have any allergies?  "Yes"  "No"  If yes, please identify specific allergy below.

- Apparent in chart
- Involve all sports medicine staff, including coaching staff
- "Rescue Plan"
- Ex: Anaphylaxis and Epi-Pen (Epinephrine)
- Ex: Food Allergies
Medications

- ALWAYS ask about over the counter (OTC) medications and supplements (ingredients)
- Ex: Nonsteroidal Anti-Inflammatories (NSAID’s), Oral Contraceptive Pills (OCP), Athletic Performance Enhancement
- Federal Drug Administration reference
- NCAA Guidelines and Restrictions
  - www.NCAA.org/drugtesting

Medical/Surgical History

- Precise Injury and Surgical History
- Insist on detailed injury/surgical/rehabilitation dates and reports
- Collaboration with Orthopedic Surgeons and Out-of-State Providers

GENERAL QUESTIONS    Yes/No

1. Has a doctor ever denied or restricted your participation in sports for any reason?

2. Do you have any ongoing medical conditions? If so, please identify below:  "Asthma"  "Anemia"  "Diabetes"  "Infections"  "Other:   _______________________________________________

3. Have you ever spent the night in the hospital?

4. Have you ever had surgery?
HEART HEALTH QUESTIONS ABOUT YOU:

5. Have you ever passed out or nearly passed out DURING or AFTER exercise?
6. Have you ever had discomfort, pain, tightness, or pressure in your chest during exercise?
7. Does your heart ever race or skip beats (irregular beats) during exercise?
8. Has a doctor ever told you that you have any heart problems? If so, check all that apply: High blood pressure, Heart murmur, High cholesterol, Heart infection, Kawasaki disease, Other: ____________________
9. Has a doctor ever ordered a test for your heart? (For example, ECG/EKG, echocardiogram)
10. Do you get lightheaded or feel more short of breath than expected during exercise?
11. Have you ever had an unexplained seizure?
12. Do you get more tired or feel more short of breath more quickly than your friends during exercise?

HEART HEALTH QUESTIONS ABOUT YOUR FAMILY:

13. Has any family member or relative died of heart problems or had an unexpected or unexplained sudden death before age 50 (including drowning, unexplained car accident, or sudden infant death syndrome)?
14. Does anyone in your family have hypertrophic cardiomyopathy, Marfan syndrome, arrhythmogenic right ventricular cardiomypathy, long QT syndrome, short QT syndrome, Brugada syndrome, or catecholaminergic polymorphic ventricular tachycardia?
15. Does anyone in your family have a heart problem, pacemaker, or implanted defibrillator?
16. Has anyone in your family had unexplained fainting, unexplained seizures, or near drowning?

Cardiovascular – “Heart Health”

- Personal and Family Medical histories are extremely important
- Sudden Cardiac Death
- Atherosclerosis
- Sickle Cell Disease/Trait, Gastrointestinal Disorders
- Often genetic component to these diseases
**Importance of Family History**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Familial Association</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertrophic Cardiomyopathy</td>
<td>Familial - Autosomal Dominant (55%), Sporadic (45%)</td>
</tr>
<tr>
<td>Congenital Coronary Anomalies</td>
<td>No Familial predisposition</td>
</tr>
<tr>
<td>Myocarditis</td>
<td>No Familial predisposition</td>
</tr>
<tr>
<td>Arrhythmogenic RV Cardiomyopathy</td>
<td>Familial - Mutation in cell adhesion proteins</td>
</tr>
<tr>
<td>Dilated Cardiomyopathy</td>
<td>Familial - in some cases of primary disease</td>
</tr>
<tr>
<td>Aortic Stenosis</td>
<td>Familial - (mildly)</td>
</tr>
<tr>
<td>Mitral Valve Prolapse</td>
<td>Familial - primary disease can be autosomal dominant with incomplete penetrance</td>
</tr>
<tr>
<td>Long/Short QT Syndrome</td>
<td>Familial - Many subsets of mutations</td>
</tr>
<tr>
<td>Brugada Syndrome</td>
<td>Familial</td>
</tr>
<tr>
<td>CPVT</td>
<td>Familial</td>
</tr>
<tr>
<td>WPW Syndrome</td>
<td>Most are Nonfamilial</td>
</tr>
<tr>
<td>Marfan Syndrome</td>
<td>Familial - autosomal dominant (although variable expression)</td>
</tr>
</tbody>
</table>

**Sickle Cell Trait Screening**

- Hemoglobin gene mutation of RBC
- United States - 8% of African Americans
- NCAA Division I and 2 tested
  - Sign written release declining
- Dehydration, Hyperthermia, Altitude
- Program include counseling and education (including coaching / administration)

**Hypertrophic Cardiomyopathy (HCM)**

- Approx. 35% of SCD in athletes (most common cause of SCD in young athletes)
- Asymmetric LV/ventricular septum hypertrophy (usually infants, adolescents, early adults)
- Harsh systolic ejection murmur (increases with Valsalva or squat to stand)
- EKG: Can have prominent Q waves, T wave changes, ST segment depression
- Diagnosis: Echocardiogram
- Participation: Based on Bethesda Conference Guidelines
Coronary Artery Disease (CAD)

- Most common cause of SCD in athletes >30 y/o
- Atherosclerotic plaque disruption (exercise may trigger disruption)

Diagnosis: Clinical, Exercise Stress Testing
Participation: Possible on individual basis; Goal to optimize medical/surgical management

BONE AND JOINT QUESTIONS
17. Have you ever had an injury to a bone, muscle, ligament, or tendon that caused you to miss a practice or a game?
18. Have you ever had any broken or fractured bones or dislocated joints?
19. Have you ever had an injury that required x-rays, MRI, CT scans, injections, therapy, a brace, a cast, or crutches?
20. Have you ever had a stress fracture?
21. Have you ever been told that you have or you have had an x-ray for neck instability or atlantoaxial instability? (down syndrome or dwarfism)
22. Do you regularly use a brace, orthotics, or other assistive device?
23. Do you have a bone, muscle, or joint injury that bothers you?
24. Do any of your joints become painful, swollen, feel warm, or look red?
25. Do you have any history of juvenile arthritis or connective tissue disease?

MEDICAL QUESTIONS
26. Do you cough, wheeze, or have difficulty breathing during or after exercise?
27. Have you ever used an inhaler or taken asthma medicine?
28. Is there anyone in your family who has asthma?
29. Were you born without or are you missing a kidney, an eye, a testicle (males), your spleen, or any other organ?
30. Do you have groin pain or a painful bulge or hernia in the groin area?
31. Have you had infectious mononucleosis (mono) within the last month?
32. Do you have any rashes, pressure sores, or other skin problems?
33. Have you had a herpes or MRSA skin infection?
34. Have you ever had a head injury or concussion?
35. Have you ever had a hit or blow to the head that caused confusion, prolonged headache, or memory problems?
36. Do you have a history of seizure disorder?
37. Do you have headaches with exercise?
38. Have you ever had numbness, tingling, or weakness in your arms or legs after being hit or falling?
39. Have you ever been unable to move your arms or legs after being hit or falling?
40. Have you ever become ill while exercising in the heat?
41. Do you get frequent muscle cramps when exercising?
42. Do you or someone in your family have sickle cell trait or disease?
43. Have you had any problems with your eyes or vision?
44. Have you had any eye injuries?
45. Do you wear glasses or contact lenses?
46. Do you wear protective eyewear, such as goggles or a face shield?
47. Do you worry about your weight?
48. Are you trying to or has anyone recommended that you gain or lose weight?
49. Are you on a special diet or do you avoid certain types of food?
50. Have you ever had an eating disorder?
51. Do you have any concerns that you would like to discuss with a doctor?

Diet / Weight Concerns

- Anorexia Nervosa, Bulimia, Addiction Medicine
- Nutritional Deficiencies
  - Inflammatory Bowel Disease, Celiac
- “Cutting” weight
- Laxatives, Diuretics, Diet Pills

FEMALES ONLY

52. Have you ever had a menstrual period?
53. How old were you when you had your first menstrual period?
54. How many periods have you had in the last 12 months?
Female Athletic Triad Clinical Risk Tool

- Energy Availability, menstrual function, bone mineral density
- Often described as disordered eating, amenorrhea, and osteoporosis
- Primary and Secondary Amenorrhea
- Hypogonadotropic Hypothalamic Amenorrhea
- Pregnancy

Physical Exam

- Focused based on History
- Considerations of Environment / Station
- Vital Signs (including Height, Weight, Visual Acuity)

  - Cardiovascular
  - Musculoskeletal
  - Dermatologic
  - ENT
  - Abdominal / GU
  - Neurological

American Heart Association recommends:

1. Cardiac Auscultation
   - Importance of Position (standing, seated, and with valsalva)
2. Femoral Pulses (consider coarctation of aorta)
3. Awareness of stigmata of Marfan Syndrome
4. Blood Pressure (Brachial Artery/Seated Position)
   - Cuff Size
Cardiac Auscultation

Murmur characteristics:

- LV outflow tract obstruction - Harsh Systolic Ejection Murmur
  - Usually Grade ≥ 3
  - Upper R sternal border
  - Increase with Decreased venous return (Valsalva, Supine to Stand)

- Any Diastolic murmur should be further assessed

- Physiologic, "Flow" (Hyperdynamic)
  - Adaptation to increased plasma volume in a conditioned athlete

MARFAN SYNDROME

- Connective Tissue Disorder
- Approximately 75-85% of cases are autosomal dominant (although variable expression)
- 2010 Revised Ghent Criteria
  - Focus on Aortic Root Criteria
  - Ectopia Lentis (Lens Dislocation, Diagnosed by slit-lamp exam)

- Systemic Score (Points assigned to):
  - Arachnodactyly (wrist sign, thumb sign), Chest Deformity, Arm Span > Height
  - Marfan (Aortic Insufficiency, MVP), Scoliosis, Kyphosis, Hyperlaxity

Physical Exam

- Cardiovascular
- Musculoskeletal
  - Screening Musculoskeletal, Focused Joint Exam from History
- Dermatologic
  - Lipodystrophy, HSV, Tinea, Infiltrations, Abnormal Nevi
- GI
- Abdominal / GU
  - Supine, 4 Quadrants, Offer chaperone, Testicular Exam, Pregnancy
- Neurological
Clearance

1. Cleared for all sports without restriction

2. Cleared for all sports without restriction with recommendations for further evaluation or treatment for ____________________________

3. Not Cleared
   • Pending further evaluation
   • For any Sports
   • For certain sports
   • Reason: ____________________________

4. Recommendations
   • Future Cardiac Diagnostic Testing
     - EKG and/or Echocardiogram
     - 13-Element American Heart Association Recommendations (PMHx, FH, Physical)
     - Italian Sports Medicine
     - NBA – Stress EKG

Future

Mental Health

- Screening Tools (PHQ-2, PHQ-9, GAD-7)
- Protocol for referral and follow up
- Challenges of Adolescence and College Environments
Psychosocial Component

- Body is a unit (Mind, Body, Spirit) is an osteopathic foundation
- Away from Home and Family
- Peer Pressure, Academic Challenges

Opportunity

- Alcohol Use
- Drug Use
- Suicide
- Mental Health
- Supplements
- Eating Disorders
- Sexually Transmitted Diseases
- Pregnancy and Contraception

Osteopathic Medicine Precepts

1. The Body is a Unit
2. Structure and Function are Interrelated
3. The Body possesses Self-Regulatory Mechanisms
4. The Body has the Inherent Capacity to Defend and Repair Itself
At the end of the day.....

- ALWAYS – Make sure there is understanding, time for questions, and a follow up “game plan”

- COMMUNICATION
  - Athlete, Coaching Staff, Parents, ATC, Physical Therapy, Colleagues, Orthopedic Surgeon, Office Staff, Strength and Conditioning, Dietitian

Inter-Professional Medical Home

- Drills and Mock Emergency
  - Emergency Action Plan
  - Cervical Spine Boarding

- Take a Student
  - Committee
  - Community Education

Conclusion

1. The PPE should serve as a foundation for the athletic season and should be arranged a minimum of 6 weeks before preseason practice
2. Coordination and Communication are of greatest importance among the sports medicine team
3. Never overlook vital signs and visual acuity
4. Include supplements and over the counter medications when discussing medications
5. Medical and Surgical History Documentation must be obtained
6. Physical Exam is focused, with emphasis on Cardiopulmonary and Musculoskeletal exams
7. Individualize the history and physical based on gender and previous injuries
Resources

5. Centers for Disease Control and Prevention: www.cdc.gov

References

1. American College of Sports Medicine, Position Stand: The Female Athlete Triad, 2007
4. Madden Christopher C, Putukian Margot, Young Craig C., McCarty, Eric C. Netter’s Sports Medicine. 2010