PREPARTICIPATION EVALUATION IN SPORTS MEDICINE

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Objectives:

1. Organize the screening historical components of the preparticipation evaluation (PPE)
2. Construct an ideal setting and time frame for an annual PPE program as part of your practice
3. Distinguish the importance of communication and coordination of the sports medicine team
4. Discuss the importance of vital signs, visual acuity, surgical history, allergies, and medications/supplements
5. Explain the approach to common positive screening questions, using concussion and the female athlete as examples
6. Classify the components of a focused physical exam, with emphasis on the cardiopulmonary and musculoskeletal systems
7. Introduce Psychosocial considerations for the athlete.
Case Example:

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

- She played soccer in middle school, but lost interest as a result of a series of knee injuries

- ACL injury 2 years ago with surgery. She also recalls sitting out two practices after a collision with another player. At that time, she felt more tired than usual and “in a fog.”

- She reports 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:

- Medical and Orthopedic concerns are identified by history approximately 75% of the time

- Research Evidence from validated historical questions

- PPE should be performed at least 6 weeks before preseason practice
  *Records and Files
  *Diagnostic Testing

- Organization and Methodical Approach

- Middle and High School student PPE history design should allow for review and verification from a parent or guardian

- There are no routine screening tests required in an asymptomatic athlete

- No shame in deferring participation until further 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 30-80% of cases

Frequency

- No Consensus
- High School
  - Many Athletic Associations require annual evaluations
  - Middle School, Junior High, High School
- College
  - Entry PPE
  - Interim History and targeted Physical Exam
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

Do you have any allergies? ¨ Yes ¨ No If yes, please identify specific allergy below.
Medicines Pollens Food Stinging Insects
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?

Allergies

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

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

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
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, A heart murmur, High cholesterol, A 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 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 cardiomyopathy, 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?

- Personal and Family Medical History is extremely important (Often details need gathered)
- Sudden Cardiac Death
- Asthma, Sickle Cell Disease/Trait, Gastrointestinal Disorders
- Often genetic component to these disorders
### 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%) (Genetic Testing Available)</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>

### 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 scan, 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 have you 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?

Concussion

- “traumatically-induced, transient disturbance of central neurologic function”
- Signs and Symptoms are variable, and remember that there is NOT always a headache
- Second Impact Syndrome and Postconcussion Syndrome
- Consider return to play only when there are no further symptoms
- Graded Return to Play (RTP)
- Role of Neuropsychiatric Testing
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 foods?

50. Have you ever had an eating disorder?

51. Do you have any concerns that you would like to discuss with a doctor?

- Nutritional Deficiencies
- Anorexia Nervosa, Bulimia, Addiction Medicine
- Under 20 years old, BMI percentiles are specific to age and sex
- “Cutting” weight
- Laxative, 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
- Energy Availability, menstrual function, bone mineral density
- Often described as disordered eating, amenorrhea, and osteoporosis

- Primary and Secondary Amenorrhea
- Low Iron and Anemia
Physical Exam

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

- Cardiovascular
- Musculoskeletal
- 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)
Cardiac Auscultation

*Murmur characterization* - *Further Assessment Needed*

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

2. **Mitral Valve Regurgitation** (concern HCM or dilated Cardiomyopathy)
   - Holosystolic murmur (greatest at apex)

3. **Aortic Stenosis** - Systolic Ejection Murmur
   - Upper R sternal border
   - Increase with Increased venous return (Squat, Stand to Supine)

4. **Any** Diastolic murmur

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Cardiac Auscultation

*Murmur characterization*

- Physiologic, ‘Flow’ (Hyperdynamic)
  - usually Grade < 3
  - Upper sternal border
  - Increase with Increased venous return (Squat, Stand to Supine)
  - Adaptation of increased plasma volume in a conditioned athlete
MARFAN SYNDROME

- Connective Tissue Disorder
- Diagnosis based on Ghent Criteria (Major and Minor Criteria List)
- Affects multiple organ systems
- Can result in progressive weakening and dilation of proximal aorta (with potential for aortic rupture) and degeneration of mitral and aortic valves (AV insufficiency)
- Approximately 75-85% of cases are autosomal dominant (although variable expression)
- Mutation in fibrillin-1 gene

Hypertrophic Cardiomyopathy (HCM)

- Approx. 33% of SCD in athletes (most common cause of SCD in young athletes)
- Prevalence: 1/500 (general pop.) and 1:1000 - 1:1500 (competitive athletes)
- Asymmetric LV/ventricular septum hypertrophy (usually manifests adolescent/early adult)

- Harsh systolic ejection murmur (INCREASES with Valsalva or squat to stand (decrease venous return)(only 25% have murmur)
- EKG: Can have prominent Q waves, T wave changes, ST segment depression (abnormal EKG in up to 95% of HCM)
- 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)
- However, exercise-related sudden death in adults estimated 1:15,000 – 1:18,000
- Diagnosis: Clinical; Exercise Stress Testing
- Participation: Possible on individual basis; Goal to optimize medical/surgical management

Epidemiology of SCA

National Center for Catastrophic Sport Injury
July 2014 - January 2015 -- 48 cases of Sudden Cardiac Arrest
- 56% (27 athletes) died
- 60% (29 athletes) were high school and 19% (9 athletes) were middle school
- 40% (19 athletes) were football players and 27% (13 athletes) were basketball players
Clearance

- Cleared for all sports without restriction
- Cleared for all sports without restriction with recommendations for further evaluation or treatment for __________
- Not Cleared
  - Pending further evaluation
  - For any Sports
  - For certain sports
    - Reason ______________________

- Recommendations

Opportunity

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

- Close Follow Up
- Try to tie back into primary care physician office visit
Psychosocial Component

- Overall well-being and BIG PICTURE of current circumstances
- Body is a unit (Mind, Body, Spirit) is an osteopathic foundation
- Away from Family
- Peer Pressure, Academic Challenges
- Alcohol, Tobacco, Drugs
- “Mini” Medical Home in the Training Room
- Do you have questions or concerns about soccer or anything at all?

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
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

Day in “The Office”

- Low Back Pain
  - ‘Disc’Pathology
  - ‘Sciatica’
- Rotator Cuff Tendinitis
- Tendinitis / Bursitis
- Exercise-Induced Asthma
- Neck Stiffness / Whiplash
- Tennis Elbow
- Osteoarthritis
- Concussion
- Hip Pain
- Knee Pain
- Ankle Sprain
- Groin Pain
- Osteoporosis
Day in “The Office”

- Achilles Tendinitis
- Shin Splints
- Carpal Tunnel Syndrome
- Stress Fracture
- Fibromyalgia
- Trigger Finger
- Running Injuries
- Throwing Injuries

- Fitness Goals
  - Weight Loss
  - Strength Training
  - Conditioning
  - Marathon
  - Triathlon

- Falls Prevention
- Cross Training

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