

The Sports Physical: What the heart is telling you?



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Objectives



- Review pertinent history, physical exam, and diagnostic studies for the adolescent sports physical
- Discuss common cardiac diagnoses and how to find them in this specific population
- Understand appropriate referrals, including when to restrict someone from participation



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Why the sports physical?



- **Size of the young athlete population***
 - Approx. 5 million competitive athletes at high school level each year
 - More than 500,000 college athletes
 - Difficult to obtain numbers of athletes in middle school and youth programs
 - Total number of athletes available for screening close to 10 million yearly
- **Risk Tolerance***
 - Impossible to achieve zero risk in competitive sports
 - There is a generally accepted small inherent risk of injury in competitive sports
 - Sudden deaths of young athletes are tragic events & assume high public profile

Death in Young Athletes*



- Approximately 1:200,000/year in high school athletes
- Males at greater risk than females
 - 9:1 ratio
- 95% of these due to underlying cardiac problems
 - Structural/Congenital
 - ✦ Hypertrophic cardiomyopathy
 - ✦ Coronary artery anomalies
 - ✦ Arrhythmogenic right ventricular cardiomyopathy (ARVC)
 - ✦ Marfan syndrome
 - Acquired
 - ✦ Myocarditis
 - ✦ Kawasaki Disease
 - ✦ Dilated Cardiomyopathy
 - Non-structural/Unrecognized
 - ✦ Commotio Cordis
 - ✦ Long QT syndrome
 - ✦ Arrhythmia

*Ackerman, M.J., Balady, G., Barry J. M., Berger, Cohen, D. S., Dimeff, R., Douglas, P.S., Glover, D.W., Hutter, A.M., Krauss, M.D., Maron, M.S., Mitten, M.J., Puffer, J.C., Roberts, W.O., Thompson, P.D. (2007). Recommendations and Considerations Related to preparticipation Screening for Cardiovascular Abnormalities in Competitive Athletes: 2007 Update. *Circulation*, 115(12), 1643-1655.

Goal of the Sports Physical



- It IS NOT to discourage or prevent participation in competitive sports
- It IS to maintain the health and safety of the athlete
- Goal as Providers:
 - Identify medical problems that place the athlete at risk for injury/illness
 - Identify correctable problems that might impair athlete's ability to perform
 - Help maintain health and safety of athlete
 - Assess athlete's fitness level for specific sport
 - Education athlete and parents
 - Meet legal and insurance requirements

Importance of Sports Participation



- **Adolescents rank failure to make a team worse than:**
 - Death of a close friend
 - Failure to pass a grade in school
 - Separation from parents
- **Benefits of Sports Participation**
 - Physical
 - Emotional
 - Social
 - Economic

Kung, M. (2008). Presentation from 33rd National Primary Care NP Symposium, July 13, 2008: *Sports Physicals, Legal Implications of Qualifying and Disqualifying Student Athletes*. Keystone, CO.

Who needs a sports physical?



- **Determined by institution/organization**
- **Older, school age children participating in:**
 - Organized sports teams
 - Competitive sports teams
 - Sports and Summer camps
- **Adolescents, wishing to:**
 - Participate in High School Sports
 - Attend Summer Camps
 - Some schools even require for Physical Education Class

What does it look like?



■ 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

Yes

No

Pollens

Food

Stinging Insects

Explain "Yes" answers below. Circle questions you don't know the answers to.

GENERAL QUESTIONS	Yes	No	MEDICAL QUESTIONS	Yes	No
1. Has a doctor ever denied or restricted your participation in sports for any reason?			26. Do you cough, wheeze, or have difficulty breathing during or after exercise?		
2. Do you have any ongoing medical conditions? If so, please identify below: <input type="checkbox"/> Asthma <input type="checkbox"/> Anemia <input type="checkbox"/> Diabetes <input type="checkbox"/> Infections Other: _____			27. Have you ever used an inhaler or taken asthma medicine?		
3. Have you ever spent the night in the hospital?			28. Is there anyone in your family who has asthma?		
4. Have you ever had surgery?			29. Were you born without or are you missing a kidney, an eye, a testicle (males), your spleen, or any other organ?		
HEART HEALTH QUESTIONS ABOUT YOU	Yes	No	30. Do you have groin pain or a painful bulge or hernia in the groin area?		
5. Have you ever passed out or nearly passed out DURING or AFTER exercise?			31. Have you had infectious mononucleosis (mono) within the last month?		
6. Have you ever had discomfort, pain, tightness, or pressure in your chest during exercise?			32. Do you have any rashes, pressure sores, or other skin problems?		
7. Does your heart ever race or skip beats (irregular beats) during exercise?			33. Have you had a herpes or MRSA skin infection?		
8. Has a doctor ever told you that you have any heart problems? If so, check all that apply: <input type="checkbox"/> ... <input type="checkbox"/> ...			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?		

<input type="checkbox"/> High blood pressure	<input type="checkbox"/> A heart murmur		
<input type="checkbox"/> High cholesterol	<input type="checkbox"/> A heart infection		
<input type="checkbox"/> 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	Yes	No	
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?			
BONE AND JOINT QUESTIONS	Yes	No	
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?			
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 foods?			
50. Have you ever had an eating disorder?			
51. Do you have any concerns that you would like to discuss with a doctor?			
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?			

Explain “yes” answers here

I hereby state that, to the best of my knowledge, my answers to the above questions are complete and correct.

Signature of athlete _____ Signature of parent/guardian _____ Date _____

Wait a minute...



**THAT IS JUST THE HISTORY,
WHAT ABOUT THE “PHYSICAL EXAM”?**

AHA Screening Recommendations 2007



- **Personal History (5 items)**
 1. Exertional CP
 2. Syncope/near syncope
 3. Exertional fatigue/unexplained dyspnea
 4. Hx of Heart Murmur
 5. Hx of Elevated BP

- **Family History (3 items)**
 1. Premature sudden death (<50 yoa)
 2. MI, Stroke, CV disease (<50 yoa)
 3. HCM, Dilated Cardiomyopathy, Long QT, Marfan's, Ventricular arrhythmia

- **4 items for Physical Exam**

Options for release



- Cleared for all sports without restrictions
- Cleared for all sports without restrictions, with recommendations for further evaluation or treatment for _____
- Not Cleared
 - Pending further evaluation
 - For any sports
 - For certain sports _____
 - ✦ Reason: _____
- Recommendations _____

What is the heart telling you?



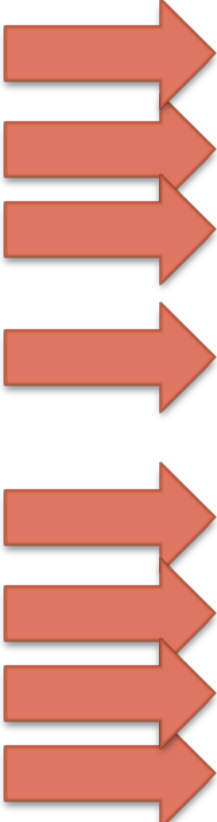
1. **“I AM HEALTHY AND I CAN PLAY SPORTS!”**
1. **“HELP ME! I MIGHT NOT BE ABLE TO DO WHAT THIS CHILD WANTS ME TO DO.”**

Let's review the causes of Sudden Death

Let's review the cries for help...



- Structural/Congenital
 - ✦ Hypertrophic cardiomyopathy
 - ✦ Coronary artery anomalies
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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?		

Physical Exam Findings



- Heart Murmur – pathologic?
- Elevated blood pressure in right arm
 - If High, check lower extremity BP
- Radial vs. Femoral pulse discrepancy
- Physical stigmata of Marfan's Syndrome
 - 2 or more of the following:
 - ✦ Height greater than 6 ' 0" male OR 5 ' 10" female
 - ✦ Scoliosis
 - ✦ Pectus excavatum
 - ✦ Arm span greater than height (>1.05 ratio)
 - ✦ Myopia

When considering restricting from sports consider:



- Does the problem place athlete at increased risk for injury/illness
- Is another participant at risk for illness/injury
- Can athlete safely participate with treatment
- Can limited participation be allowed while treatment is being completed
 - i.e. Getting in appointment with Cardiology is 3 months from now
- If clearance is denied, what other activities can athlete safely participate in, when can they play?
 - What steps are you going to take to “fix it”?
 - ✦ Sometimes this is a commitment to surgery

Kung, M. (2008). Presentation from 33rd National Primary Care NP Symposium, July 13, 2008: *Sports Physicals, Legal Implications of Qualifying and Disqualifying Student Athletes*. Keystone, CO.

Rice, S.G. & Council on Sports Medicine and Fitness. (2008). Medical Conditions Affecting Sports Participation. *Pediatrics*, 121(4), 841-6.

Take Care Policy #TCNP062. *Sports Physicals*. October 19, 2007. Take Care Health Systems.

Let's Practice



CASE STUDIES

Case #1



- 14 year old female presents with SOB with exercise
- Active with softball, basketball, and track.
- Kept up with teammates until last couple of years
- Occasional palpitations with intense exercise
- Denies syncope
- PMH is negative
- Family hx significant for an uncle who drove his car off the road and died at age 25

Case #1



- **Physical Exam is normal with the exception of a murmur**
 - Soft systolic ejection, non-harsh
 - Grade 1-2/6
 - Localized at RUSB and audible at LMSB
 - Diastole is clear

Recommendations



- Do you restrict?
- Refer to Cardiology
- What is the likely diagnosis?

- *Not Cleared, pending further evaluation*
 - *EKG or Echo if it is several months for Cardiology evaluation*
 - *Holter Monitor or Event Monitor?*

- Why?
 - Family History of Uncle that died at age 25
- What?
 - Rule out: arrhythmia, Long QT, HCM

Case #2



- 16 year old male with BP of 149/70 in R arm
- Hx of BP above the 90th % since age 12
- Weight 120kg, Height 5'6", BMI 39.1kg/m²
- Denies CP, palps, dizziness, or syncope
- Denies visual changes, HA, or urinary symptoms
- PMH significant for tonsillectomy and tubes
- FHx – father, PGF, and paternal uncles with HTN, PGF had stroke at 65 yoa, Hyperchol father, PGF
- Social Hx – denies drugs, EtOH, tobacco

Case #2



- **What other information do we need?**
 - **Diet and Nutrition History**
 - ✦ **Diet**
 - Drinks at least 2 – 20 oz Mtn Dews per day
 - Occasionally has a Monster Energy drink
 - Has one glass of water while brushing teeth in the AM
 - Favorite snack includes beef jerky and sunflower seeds
 - Busy schedule requires “quick meals”
 - Not fast food – but frozen meals, cans of soup, and Mac N Cheese
 - ✦ **Exercise**
 - Football practice – 5 days per week
 - Plays offense line
 - Weight lifting & “conditioning” – 3 days per week

Recommendations



- Do you restrict? NO
- Why *would* you restrict?
- Diet and Lifestyle education
 - Set small goals
 - ✦ Decrease/Eliminate caffeine intake
 - ✦ Increase water
 - ✦ Avoid salty foods (Na >25% Daily intake)
 - ✦ Increase AEROBIC activity
 - F/U in 3 months
 - ✦ Blood Pressure check in office or by school nurse
 - If no change despite lifestyle modifications THEN refer to cardiology

Case #3



- 12 year old male
- Adopted – Family hx is unknown
- Denies cardiac symptoms
- Height 5' 11", Weight 110#, BMI 15.8kg/m²
- PMH
 - significant for pneumothorax in infancy
 - wears heavy eye correction
 - scoliosis,
 - wears orthotic support for flat feet

Case #3



- **What else do we need to know?**
 - Arm span – 75”
 - ✦ Arm span:Height ratio = 1.07
 - BP – 120/54
 - ✦ Wide pulse pressure
 - **Facies**
 - ✦ Long thin face, deep set/downward slant eyes, crowded teeth, small jaw
- **What is your diagnosis? Marfan's**
 - Aortic root dilation
 - Sudden Death

Recommendations



- **Restrict until Cardiology evaluation**
 - Need to know aortic root dimensions
 - Need to start Beta blocker and/or ARB therapy
- **If allowed to play now, most will *eventually* be restricted from competitive sports**
 - Education and preparation to withdraw from competitive sports later on
 - ✦ Sometimes it is best not to get started

Case #4



- 12 year old male w/ murmur
- Healthy, active athlete with no cardiac symptoms
- Murmur appreciated at preschool physical
 - Heard off and on
 - Soft systolic ejection murmur evaluated in Cardiology and said to be innocent
 - Last physical exam was 5 years ago
- PMH is negative
- FH – brother and maternal uncle with murmur but known significant cardiac history

Case #4



- **Physical Exam**
 - Height, weight, vitals within normal limits
 - Murmur
 - ✦ Grade 2/6 low pitched, mildly harsh SEM
 - ✦ Heard best along the LMSB, radiates to the RUSB
 - ✦ Difficult to determine if there is a split S2 or ejection click
 - Pulses equal in upper and lower extremities w/o brachio-femoral delay

Recommendations



- **Do you restrict?**
 - No, but should have follow-up evaluation with Cardiology
- **What is your differential?**
 - Aortic or Pulmonary Valve stenosis
 - Sub-aortic membrane
 - HCM?
- **Dx**
 - Non-stenotic, good functioning, bicuspid appearing AV

Questions?

