Sports Physicals

18th Annual Doernbecher Pediatric Review

DATE: OCTOBER 25, 2024 PRESENTED BY: JENNIFER HUANG, MD, MCR

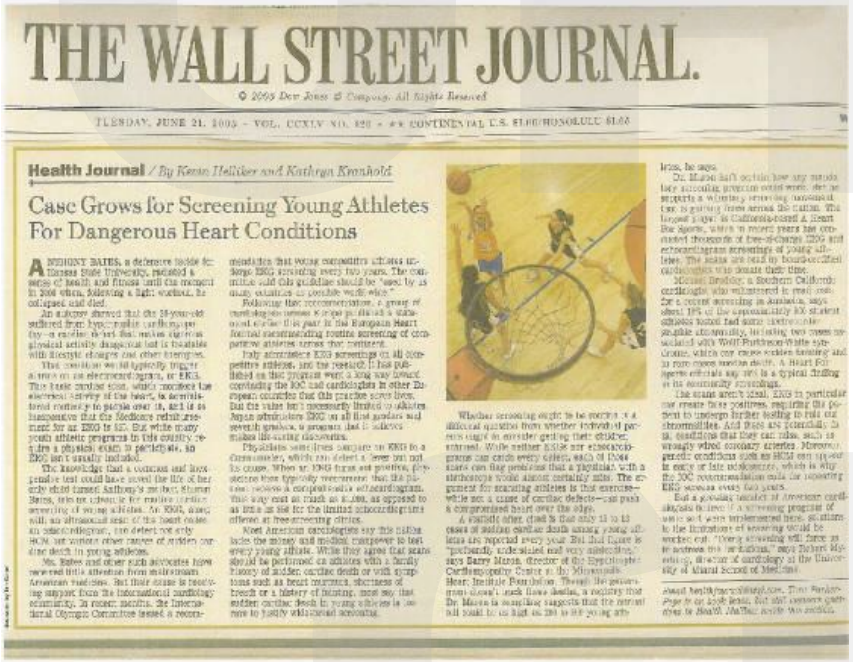
Objectives

- Review the causes of sudden cardiac death in athletes
- Review current history and physical exam guidelines for preparticipation sports evaluations
- Discuss red flags on the history and physical
- Review the recent AHA/ACC guidelines on eligibility and disqualification for competitive athletes
- Discuss the use of AEDs as secondary prevention
- Review current COVID guidelines

Impact of Sports Participation

- ~35-45 million youth 6-18 years of age participate in sports
- Physical and psychological health benefits
- Structured routine
- Immune system benefits

Sudden Cardiac Death in Athletes



THE WALL STREET JOURNAL.

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Health Journal / By Kevin Helliker and Kathryn Kranhold

Case Grows for Screening Young Athletes For Dangerous Heart Conditions

- Rare event
- Often due to a previously unrecognized cardiovascular disease
- True prevalence is not known, but estimated to be 0.5 – 2:100,000 athletes of high school age/ year
- 0.3% of athletes have a cardiac disease that puts them at risk of sudden death

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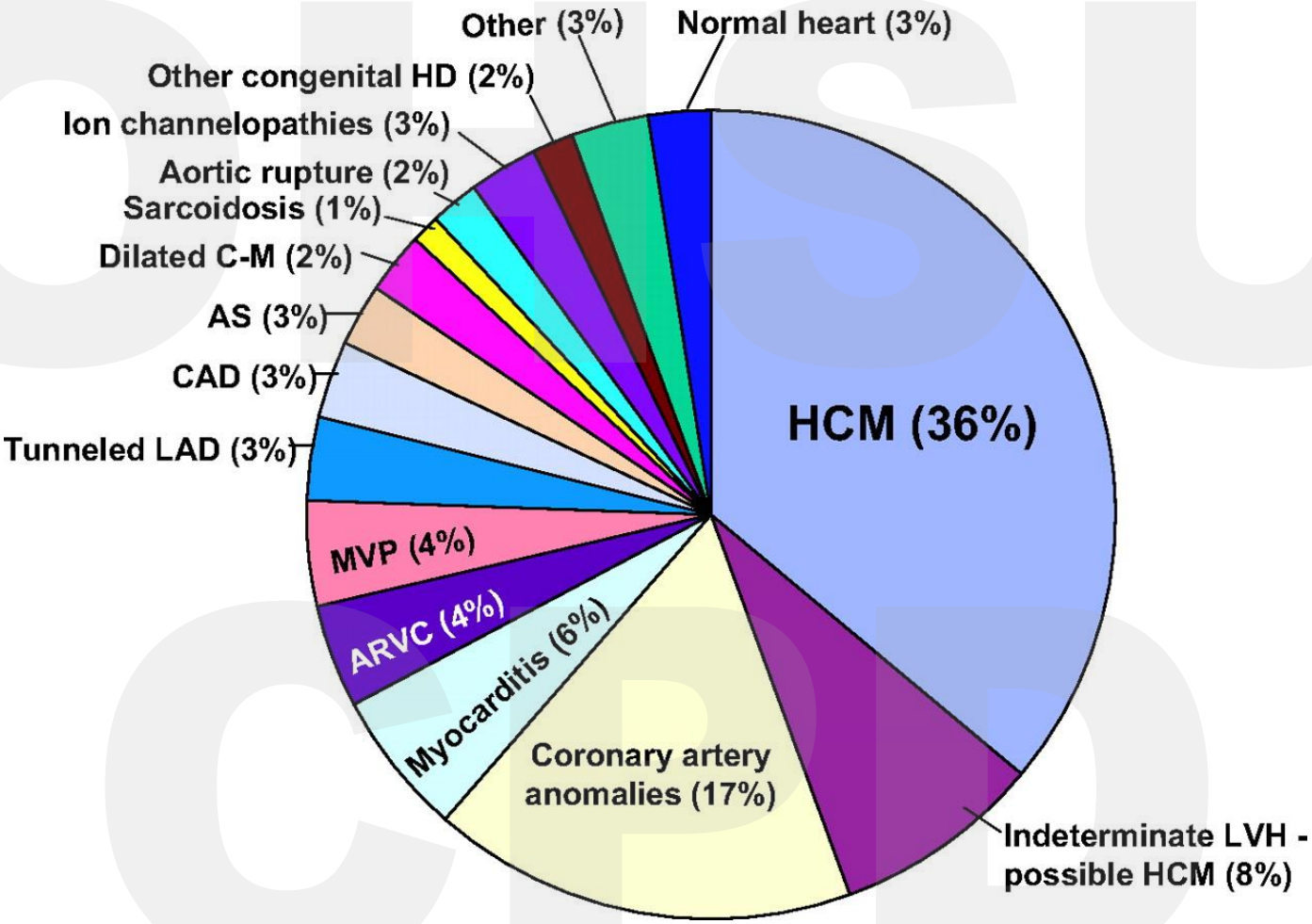
Distribution of cardiovascular causes of sudden death in 1435 young competitive athletes



Maron, B. J. et al. Circulation 2007;115:1643-1655

Circulation

Sudden Cardiac Death (SCD): Differential Diagnosis

Structural/Functional

1) **Hypertrophic Cardiomyopathy (HCM)***
2) Coronary Artery Anomalies
3) **Aortic Rupture/Marfan***
4) **Dilated Cardiomyopathy (DCM)***
5) Myocarditis
6) Left Ventricular Outflow Tract Obstruction
7) Mitral Valve Prolapse (MVP)
8) **Coronary Artery Atherosclerotic Disease***
9) **Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC)***
10) Post-operative Congenital Heart Disease

Electrical

11) **Long QT Syndrome (LQTS) ***
12) Wolff-Parkinson-White Syndrome (WPW)
13) **Brugada Syndrome***
14) **Catecholaminergic Polymorphic Ventricular Tachycardia (CPVT)***
15) **Short QT Syndrome ***

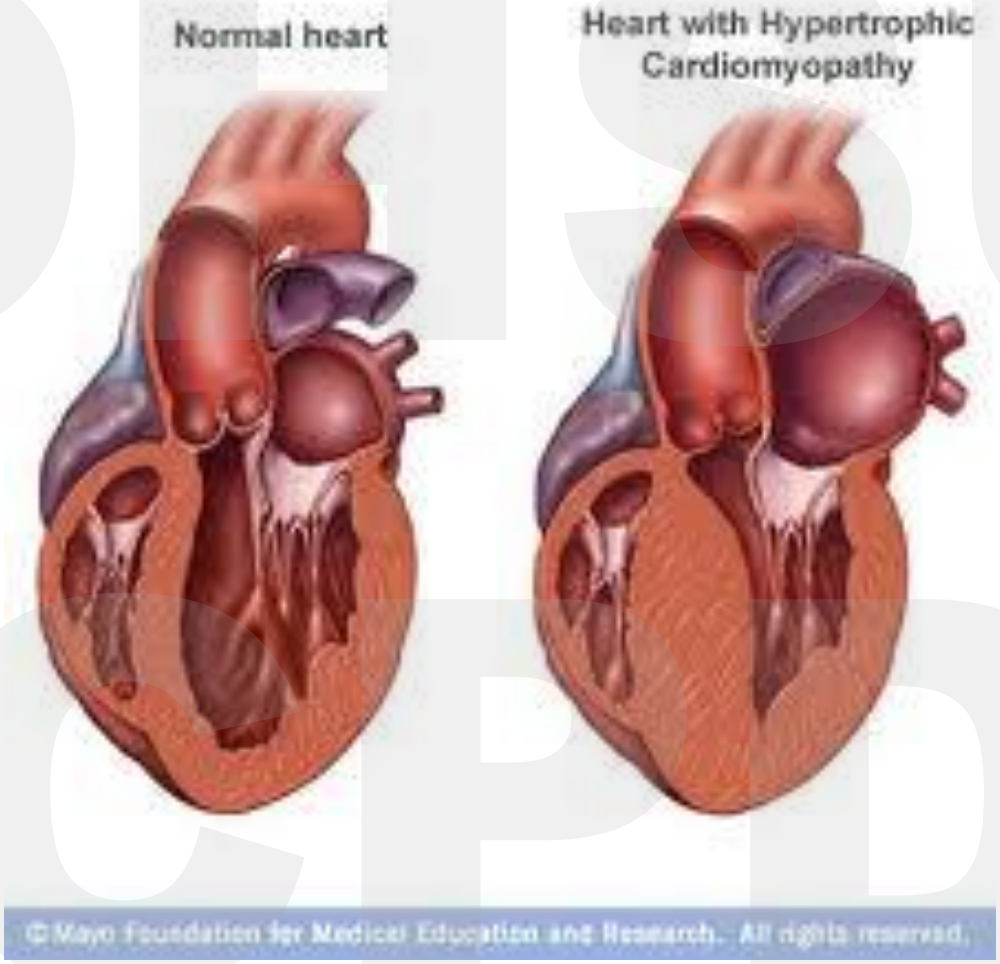
Other

17) Drugs and Stimulants
18) Primary Pulmonary Hypertension (PPH)
19) Commotio Cordis

*** Familial / Genetic**

Hypertrophic cardiomyopathy (HCM)

- Most common cause of sudden cardiac death in young athletes (1/3 of cases)
- Initially estimated prevalence of 1:500 in the general population, but recent studies show it may be closer to 1:200
- Genetic - Autosomal dominant, however, sporadic mutations occur
  - Variable penetrance
- Due to a defect in the genes that encode the sarcomere protein
  - Defect results in myofibrillar disarray and fibrosis
  - Myofibrillar disarray creates a substrate for electrical instability which results in ventricular arrhythmias


Normal heart
Heart with Hypertrophic Cardiomyopathy
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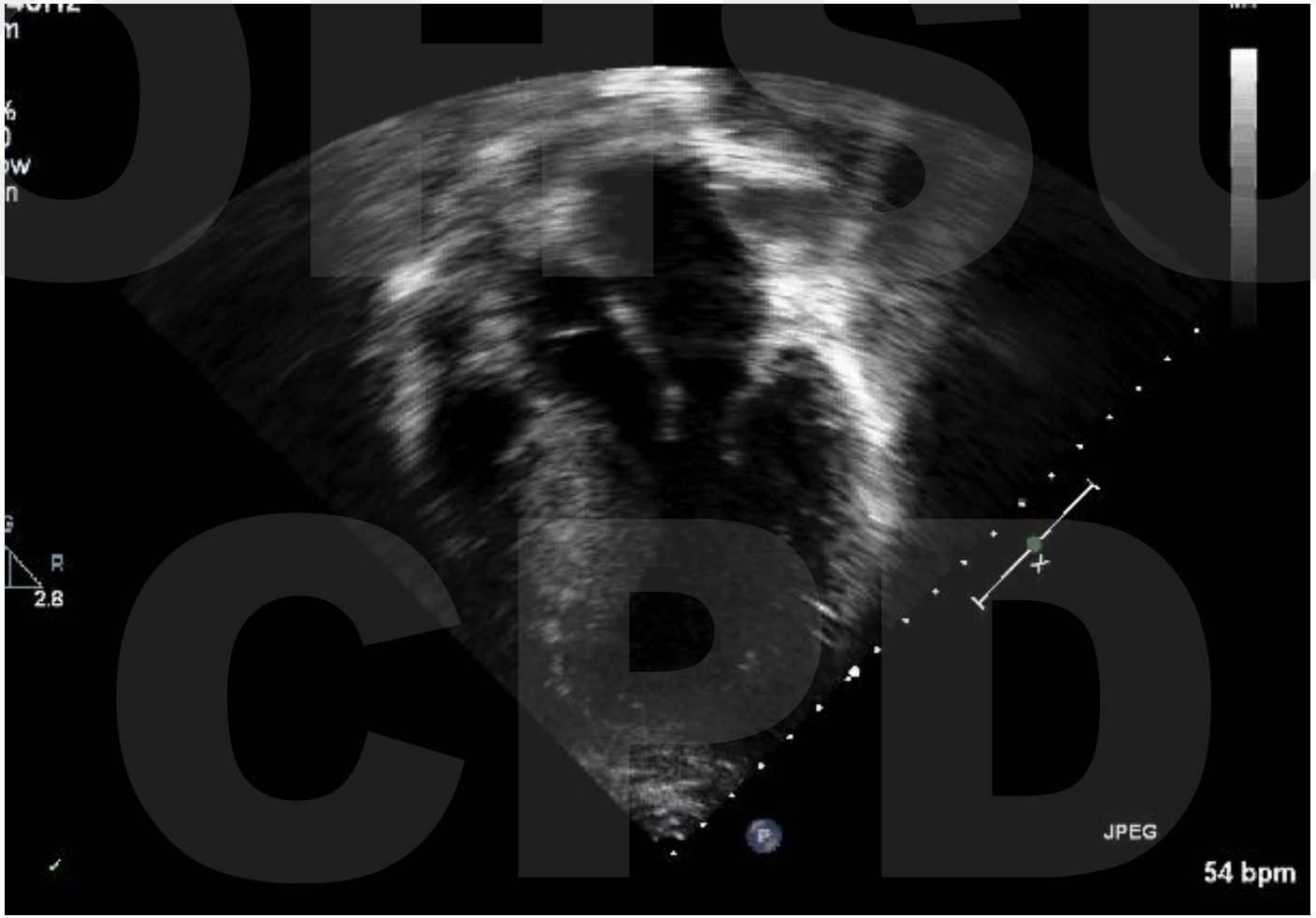
Echo of HCM



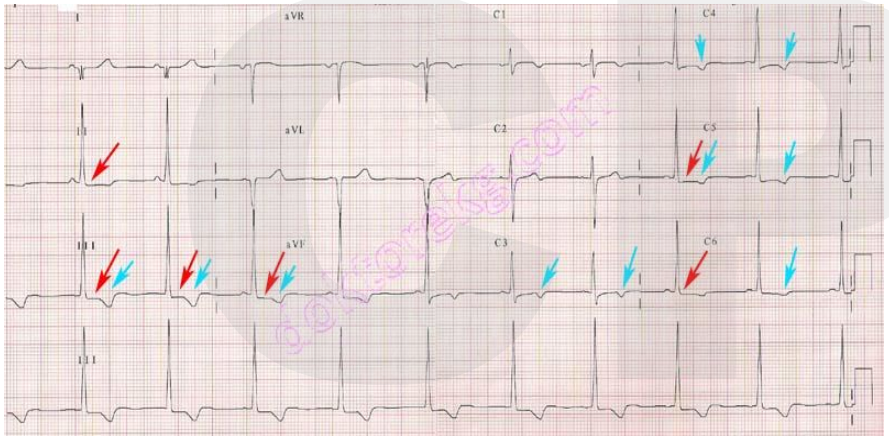
Hypertrophic cardiomyopathy

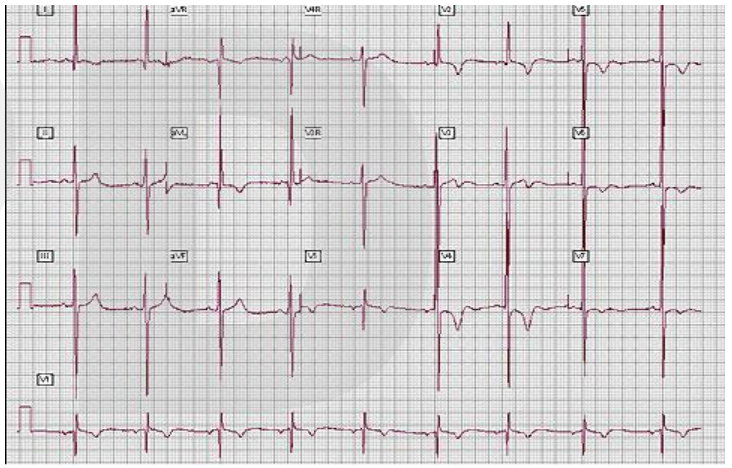
- Patients with HCM may have symptoms including chest pain with exertion, dyspnea with exertion, palpitations, or syncope with exercise but most patients are asymptomatic
- Sudden death may be the first clinical manifestation
- On physical exam there may be a murmur due to dynamic left ventricular outflow tract obstruction
  - Murmur increases with standing or Valsalva, decreases with squatting or hand grip
- May have S4 heart sound, prominent A wave on jugular venous pulse

HCM Murmur

EKG findings associated with HCM

- Abnormal EKG in 70-90% of cases, but no typical EKG pattern
  - Hypertrophy pattern influences the EKG findings
- May have LVH, biventricular hypertrophy, increased R wave amplitude in right precordial leads, nonspecific ST or T wave abnormalities, abnormal Q waves

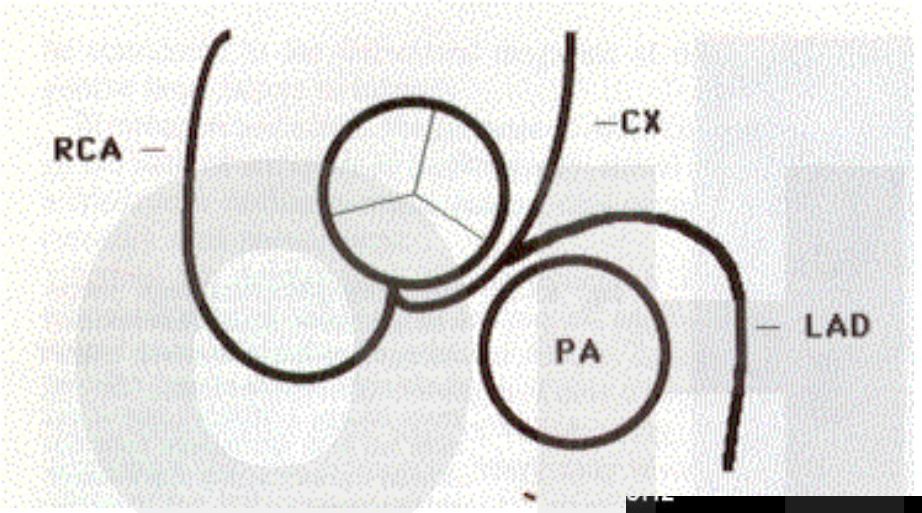




Anomalous origin of the coronary artery

- 2nd leading cause of sudden death in athletes
- Coronary artery (right or left) arises from the wrong aortic sinus
- Left main CA arising from the right sinus of Valsalva and traveling between the aorta and main pulmonary artery (intramural course) has the highest risk of sudden death, however, the right CA arising from the left sinus has also been associated with sudden death

PeaceHealth Medical Group


RCA
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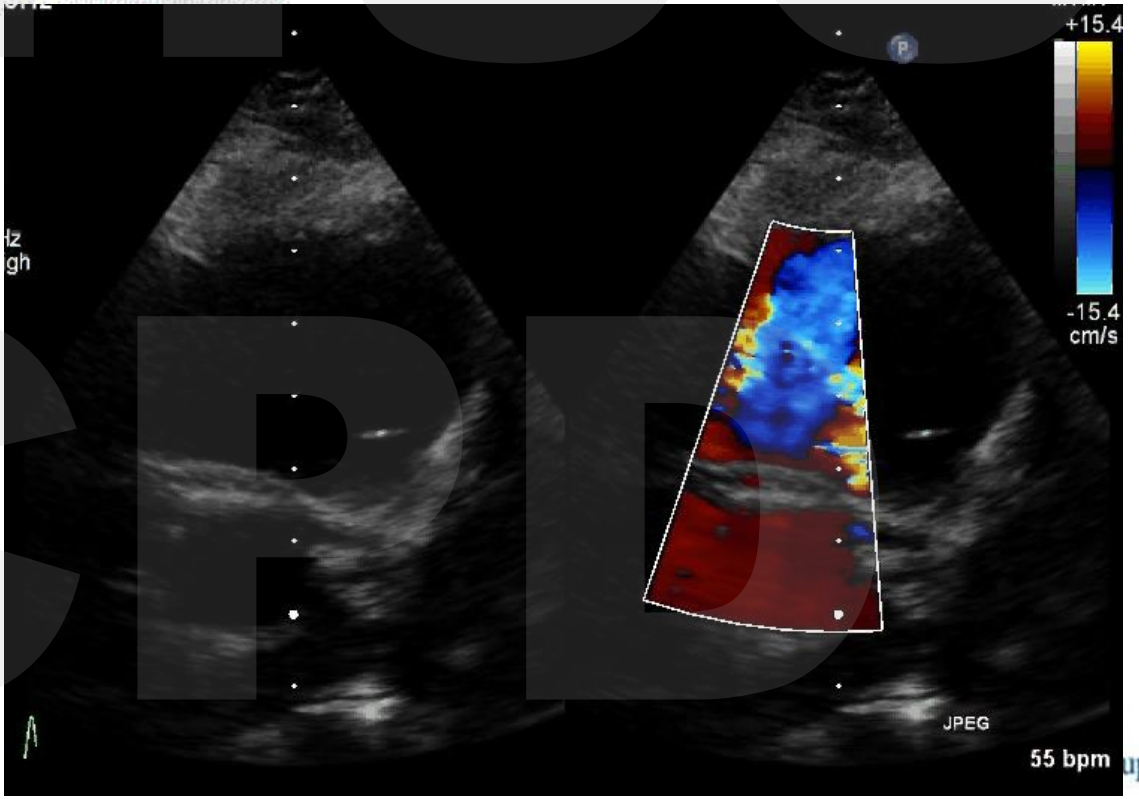
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Anomalous Coronary Arteries

- May have symptoms including chest pain or syncope with exertion but often asymptomatic
- Physical exam is typically normal
- EKG is also normal

Arrhythmias

- Long QT syndrome, Brugada syndrome, catecholaminergic polymorphic ventricular tachycardia (CPVT), Wolf-Parkinson-White (WPW)
- Likely underestimated as cause of sudden death due to negative autopsy findings
- Long QT, Brugada, and CPVT are inherited channelopathies
  - Important to determine if there is a family history of sudden death, syncope, or seizures

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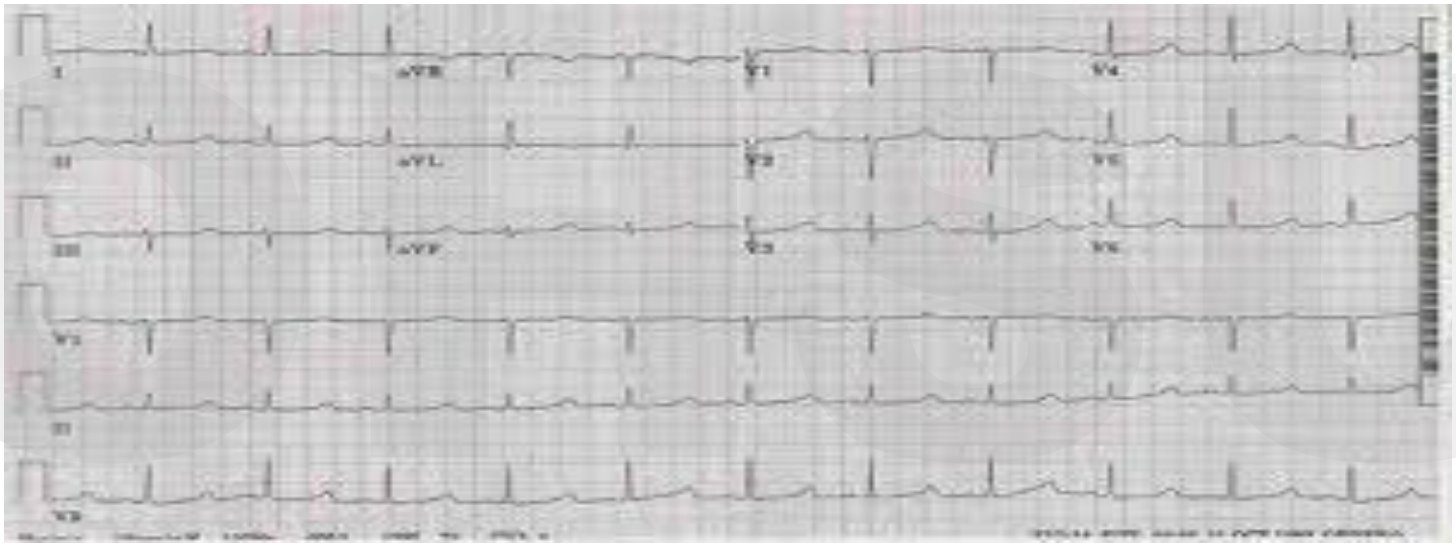
Arrhythmias

- Long QT
  - Often asymptomatic, but can have palpitations, presyncope, syncope, or seizures as initial presentation
    - 10-30% present with sudden cardiac arrest, 33% present with syncope, 10% can present with seizure disorder
    - Syncope is due to self limited episodes of polymorphic ventricular tachycardia (Torsades)
    - Sudden death occurs when the arrhythmia degenerates into ventricular fibrillation
  - Involves defect in ion channels of the cell membrane resulting in abnormal myocardial action potential and prolonged QT interval on surface EKG
  - Long QT type 1 cardiac events are most commonly triggered by exercise (1/3 of cases are associated with swimming)
  - May be associated with congenital deafness
  - Autosomal dominant and recessive as well as acquired



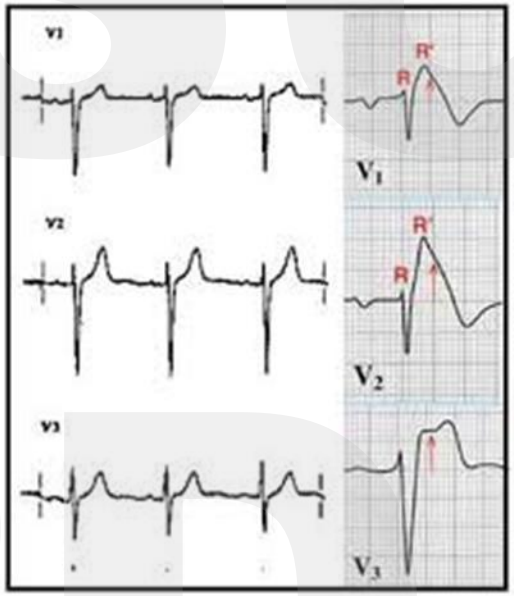

Medscape
www.medscape.com
Source: Cardiosource © 2007 by the American College of Cardiology Foundation

Arrhythmias

- Catecholaminergic Polymorphic Ventricular Tachycardia (CPVT)
  - **History of episodic exercise or emotion induced syncope**
  - Due to a mutation in the ryanodine receptor (RyR2) or Calsequestrin-2 (CASQ-2) genes – results in abnormal calcium regulation
  - Autosomal dominant or recessive inheritance or sporadic
  - Typically begins in late childhood and adolescence
  - Results in ventricular tachycardia that can degenerate into vent fibrillation
  - EKG and echo are normal, but can be induced with exercise testing

Arrhythmias

- Brugada
  - Also an inherited channelopathy – defect in sodium channel
  - Not as common in younger patients, but can result in SCD as initial symptom – fever may be a trigger
  - Characteristic EKG pattern
  - May have history of syncope

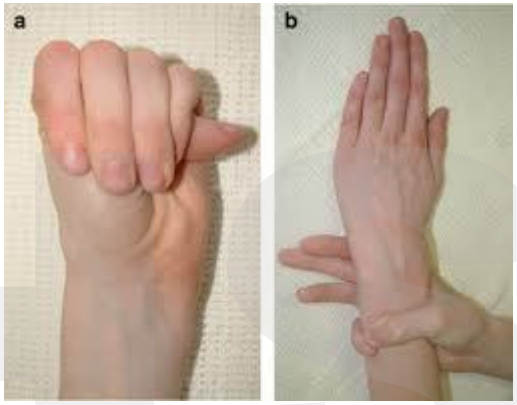


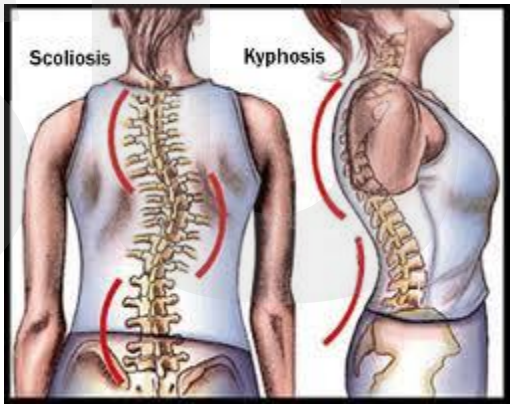
Arrhythmias

- Wolff-Parkinson-White (WPW)
  - More common that other types of arrhythmias but less likely to result in SCD
  - Often patients will have symptoms of episodic palpitations usually at rest but can be associated with exercise
  - Cause of SCD due to rapid conduction of atrial fibrillation to the ventricle with resultant ventricular fibrillation

Marfan

- Inherited in an autosomal dominant manner, but there may be sporadic mutations
  - Incidence of 1 in 3000 to 5000
  - Due to abnormality of the gene that encodes fibrillin-1 protein
- Characteristic body habitus – tall and thin with arm span > height
- Associated with musculoskeletal abnormalities (pectus deformity, kyphoscoliosis), joint hypermobility/ flexibility, and eye abnormalities (myopia, lens dislocation)
- Cardiac abnormalities include aortic dilation and mitral valve prolapse
  - Aorta may be prone to rupture/ dissection especially with high intensity and contact sports
- Specific diagnostic criteria





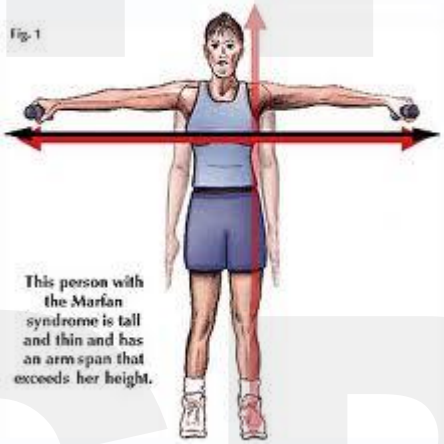
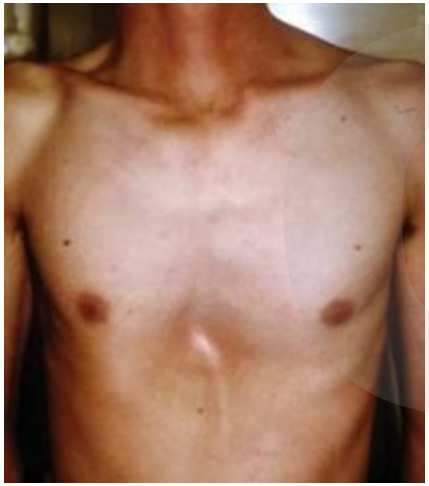


Fig. 1

This person with the Marfan syndrome is tall and thin and has an arm span that exceeds her height.



Myocarditis and Cardiomyopathies

- Myocarditis is the result of inflammation of the myocardium after a viral illness
  - Usually there is a viral prodrome
  - Myocellular damage results in ventricular dilation and dysfunction leading to heart failure
  - Risk of malignant arrhythmia during acute inflammatory phase
- Dilated cardiomyopathy
  - Often idiopathic, but can be inherited
  - Results in heart failure
  - Prone to ventricular arrhythmias and SCD

Recommendations for participation in competitive sport and leisure-time physical activity in individuals with cardiomyopathies, myocarditis and pericarditis

Antonio Pellicciaa, Domenico Corradob, Hans Halvor Bjørnstadc, Nicole Panhuyzen-Goedkoopd, Axel Urhausene, Francois Carref,Aris Anastasakisg, Luc Vanheesh, Eloisa Arbustinii and Silvia Priorij

EUROPEAN SOCIETY OF CARDIOLOGY

Table 2 Recommendation for competitive sport participation in athletes with cardiomyopathies, myocarditis and pericarditis

Lesion	Evaluation	Risk stratification	Recommendations	Follow-up
Athletes with definite diagnosis of HCM	History, PE, ECG Echo, ET, Holter	No SD in the relatives, no symptoms, only mild LVH, normal BP response to exercise, no complex ventricular arrhythmias	No competitive sports, with possible exception of low dynamic, low static sports (IA) in low-risk patients	Yearly
Athletes genotype-positive, phenotype-negative	History, PE, ECG, Echo	No symptoms, no LVH, no ventricular arrhythmias	Only recreational, non-competitive sport activities	Yearly
Athletes with definite diagnosis of DCM	History, PE, ECG, Echo, ET, Holter	No SD in the relatives, no symptoms, mildly depressed EF ($\geq$ 40%), normal BP response to exercise, no complex ventricular arrhythmias	No competitive sports, with possible exception of low-moderate dynamic and low static sports (IA, IB) in low-risk patients	Yearly
Athletes with definite diagnosis of ARVC	History, PE, ECG Echo, ET, Holter		No competitive sports, with possible exception of low dynamic, low static sports (IA)	
Athletes with active myocarditis or pericarditis	History, PE, ECG, Echo		No competitive sports	
Athletes after resolution of myocarditis	History, PE, ECG, Echo, ET, Holter (6 months after clinical onset of the disease)	No symptoms, normal LV function, no arrhythmias	All competitive sports	Every 6 months
Athletes after resolution of pericarditis	History, PE, ECG, Echo, ET, Holter (3 months after clinical onset of the disease)	No symptoms, normal LV function, no arrhythmias	All competitive sports	Every 6 months

ARVC, arrhythmogenic right ventricular cardiomyopathy; BP, blood pressure; DCM, dilated cardiomyopathy; ECG, electrocardiogram; Echo, echocardiography; EF, ejection fraction; ET, exercise testing; HCM, hypertrophic cardiomyopathy; Holter, 24-h ECG monitoring; LV, left ventricular; LVH, left ventricular hypertrophy; PE, physical examination; SD, sudden death; Sport type, see Table 6.

Cardiomyopathies

- Arrhythmogenic right ventricular dysplasia (ARVD)
  - Inherited – more common in Italians from Northern Italy
    - Estimated prevalence is 1:1000
  - Scarred appearance of the RV free wall – fibrofatty replacement of myocardium
  - Results in ventricular arrhythmia
  - May have history of palpitations, pre-syncope, syncope, atypical chest pain

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Table 5 Recommendation for amateur and leisure-time sport activities in individuals with cardiomyopathies

Lesion	Sports not recommended	Sports allowed on individual basis	Sports permitted
Definite diagnosis of HCM, or DCM, or ARVD/C	Baseball Basketball Road cycling Ice hockey[a] Rowing/canoeing Rock climbing Scuba diving Sprinting Soccer Squash[a] Tennis (single) Track events High-intensity weights Windsurfing[b]	Moderate-intensity weights Cross country skiing (flat course) Horseback riding[a] Jogging Running Motorcycling[a] Sailing[b] Stationary rowing Swimming[b]	Stationary bicycle Bowling Brisk walking Golfing Moderate hiking Skating[c] Tennis (doubles) Treadmill Low-intensity weights

Recreational sports are categorized for eligibility qualitatively, as follows: (1) generally not recommended or strongly discouraged; (2) to be assessed clinically on an individual basis, and (3) generally permitted. ARVC, arrhythmogenic right ventricular cardiomyopathy; DCM, dilated cardiomyopathy; HCM, hypertrophic cardiomyopathy. [a]These sports involve the potential for traumatic injury, which should be taken into consideration for individuals with a risk for impaired consciousness. [b]The possibility of impaired consciousness occurring during water-related activities should be taken into account with respect to the clinical profile of the individual patient. [c]Individual sporting activity not associated with the team sport of ice hockey.

Congenital Heart Disease

- With the exception of coronary artery abnormalities, CHD is rarely a cause of sudden death in athletes
- Aortic stenosis occasionally may result in sudden death even in patients who do not have severe stenosis
- Most patients with CHD have a known history
- The recent AHA/ACC offers guidelines for athletic participation in athletes with congenital heart disease

Primary Prevention: Pre-participation Evaluation

- Goal: Appropriately restrict; appropriately clear
- Be thorough and conscientious
- Are there any warning signs or family history?

AHA 2007 screening guidelines

- Felt to be an effective strategy to raise the suspicion of cardiovascular disease
- Consists of 12 items
  - 8 personal and family history and 4 physical exam
- A positive response or finding in any 1 or more of the 12 items is sufficient to trigger further work-up and/or referral for cardiovascular evaluation

AHA Statement 2007

Medical History

Personal history

1. Exertional chest pain/discomfort
2. Unexplained syncope/near syncope
3. Excessive exertional and unexplained dyspnea/fatigue, associated with exercise
4. Prior recognition of a heart murmur
5. Elevated systemic blood pressure

Family History

6. Premature death (sudden and unexpected, or otherwise) before age 50 years due to heart disease, in ≥1 relative
7. Disability from heart disease in a close relative <50 years of age
8. Specific knowledge of certain conditions in family members: hypertrophic or dilated cardiomyopathy, long-QT syndrome or other ion channelopathies, Marfan syndrome, or clinically important arrhythmias

Physical examination

9. Heart murmur
10. Femoral pulses to exclude aortic coarctation
11. Physical stigmata of Marfan syndrome
12. Brachial artery blood pressure (sitting position)

Circulation 2007

2010 PPE endorsed by AAP, AAFP, AMSSM, ACSM, AOSSM, AOASM

- **HEART HEALTH QUESTIONS ABOUT YOU**
  - Have you ever passed out or nearly passed out DURING or AFTER exercise?
  - Have you ever had discomfort, pain, tightness, or pressure in your chest during exercise?
  - Does your heart ever race or skip beats (irregular beats) during exercise?
  - 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: _____
  - Has a doctor ever ordered a test for your heart? (For example, ECG/EKG, echocardiogram)
  - Do you get lightheaded or feel more short of breath than expected during exercise?
  - Have you ever had an unexplained seizure?
  - Do you get more tired or short of breath more quickly than your friends during exercise?
- **HEART HEALTH QUESTIONS ABOUT YOUR FAMILY**
  - 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)?
  - 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?
  - Does anyone in your family have a heart problem, pacemaker, or implanted defibrillator?
  - Has anyone in your family had unexplained fainting, unexplained seizures, or near drowning?

What questions should be asked?

- **Medical history** is the most important part of the cardiovascular PPE
- Best to personally interview the athlete and the parent
  - Family concerns or observations compliment the picture of the adolescent's health
  - Parents should verify elements of the history
- Ask open ended questions
- Have a checklist that helps probe for potential cardiac disease

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What questions should be asked?

- Personal history
  - Focuses on symptoms such as chest pain, chest tightness, shortness of breath, dyspnea, near syncope, dizziness, syncope, exercise intolerance, and fatigue
  - Symptoms in the context of physical activity are typically more concerning and may be harbinger of cardiovascular disease
  - Detailed medication history including both prescribed medications and supplements
    - Questions about illicit drug use including performance enhancing drugs (steroids, human growth hormone, amphetamines)

What questions should be asked?

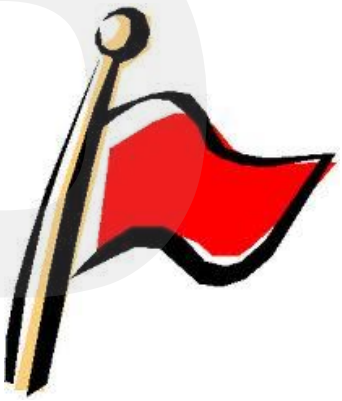
- Past medical history
  - History of rheumatic fever, Kawasaki disease, myocarditis, pericarditis, congenital heart disease, history of heart murmurs, hypertension
- Family history
  - Often underestimated, but very important given that many causes of sudden death are inherited
  - Searching for silent cardiac disease entails asking specific questions about unexplained or sudden deaths and accidents (such as drownings or car accidents), SIDS, or death in someone under the age of 50 years

Key points with the exam

- Vital signs are important – especially blood pressure
  - BP should be assessed and compared to normal values by gender, age, and height
- Features of Marfans should be assessed
  - Kyphoscoliosis, pectus deformity, arm span > height, joint hypermobility, arachnodactyly
- Cardiac auscultation
  - Focuses on heart sounds, murmurs, and clicks
  - Examination should be performed in the supine and standing position
- Assessment of femoral pulses

Red Flags

- AHA recommendations state that a positive response to any of the 12 recommended items is judged sufficient to trigger a referral to a cardiologist
- These include:
  - Syncope or near syncope with exertion
  - Chest pain/ discomfort with exertion
  - Palpitations at rest
  - Excessive SOB or fatigue with activities
  - Family history of Marfan, long QT syndrome, HCM, or clinically significant arrhythmia
  - Family history of sudden death especially in a first degree relative
  - Systolic murmur or diastolic murmur
  - Stigmata of Marfan syndrome



Are we doing a good job with screening?

- No universally accepted or mandated standards for screening high school and college athletes
  - Every state, athletic association, and school district has different requirements for the PPE
  - If there is a requirement it usually only applies to organized athletics through the schools and not to other athletic or physical activities (club sports, individual sports, dance, etc)
- No certification guidelines for health care professionals who perform such screening
  - Many types of practitioners are doing the evaluation including physicians, NPs, PAs, naturopaths, chiropractors, and athletic trainers

Are we doing a good job with screening?

- There has been an improvement in the last 20 years
- In 1997 40% of states had either no formal screening requirement or the PPE was judged to be incomplete or inadequate
- In 2005 81% of states were judged to have an adequate PPE (>9 of the 12 of the AHA recommended items). Only 2% of states were felt to have an inadequate PPE (< 4 of the 12 items)

Are we doing a good job with screening?

- Oregon Schools Activities Association (OSAA) has its own policy regarding PPE of athletes
- *ORS 336.479, Section 1 (3) :"A school district shall require students who continue to participate in extracurricular sports* ***in grades 7 through 12*** *to have a physical examination* ***once every two years****." Section 1(5)"Any physical examination required by this section shall be conducted by a (a) physician possessing an unrestricted license to practice medicine; (b) licensed naturopathic physician; (c) licensed physician assistant; (d) certified nurse practitioner; or a (e) licensed chiropractic physician who has clinical training and experience in detecting cardiopulmonary diseases and defects."*
- Current 2023 OSAA PPE form contains 10 of the 12 AHA recommended items
- A survey distributed in 2000 to OSAA participating high school athletic directors showed that 53% of schools who responded to the survey had PPEs which contained fewer than 5 of the AHA recommended items while only 27% were implementing the PPE form recommended by the OSAA.

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Does screening work?

- PPE screening with H & P alone does not have sufficient sensitivity to guarantee detection of all CV abnormalities linked to sudden death
- Sensitivity and specificity not completely known

Does screening work?

- A study published in 2010 screened 510 college athletes. All participants underwent an echocardiogram and EKG in addition to a standard PPE
  - Cardiac abnormalities with relevant sports participation risk were observed in 11/510 (2.2%), however, after further diagnostic testing only 3/11 were restricted
  - Screening with H & P alone detected 5/11 athletes
    - Sens 45.5%, spec 94.4%
  - EKG in addition to H & P detected another 5 athletes (10/11)
    - Sens 90.9%, spec 82.7%

Baggish, A et al. Cardiovascular Screening in College Athletes with and without electrocardiography. Ann Int Med. 2010; 152: 269-275.

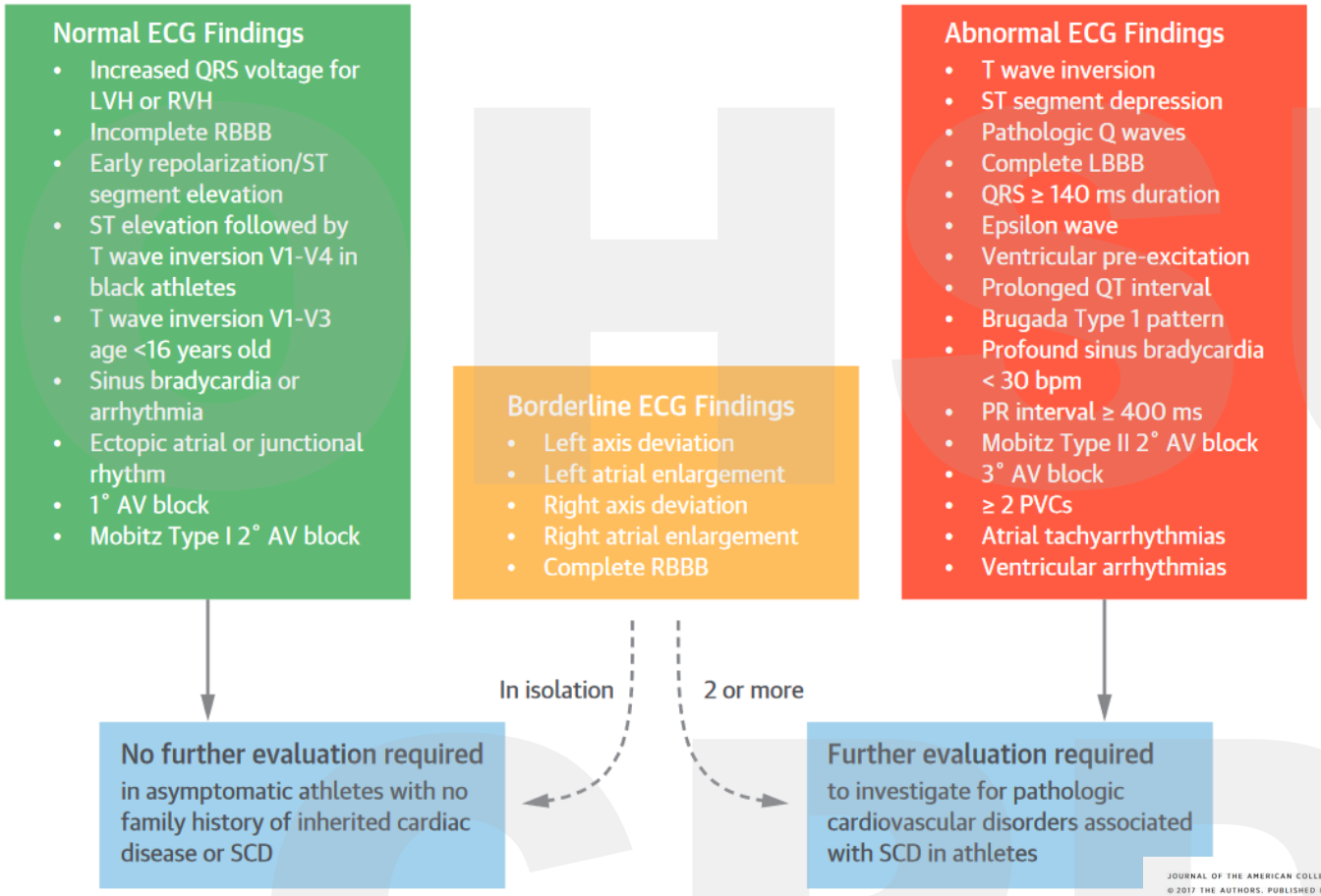
Cardiac abnormalities detected w/ exam and EKG

- Bicuspid aortic valve – Murmur; normal EKG, no restriction
- Bicuspid aortic valve - Murmur and click; normal EKG; no restriction
- MVP - Murmur; normal EKG, no restriction
- MVP - Murmur; normal EKG, no restriction
- MVP - Normal exam, normal EKG, no restriction (echo only diagnosis)
- Pulmonic stenosis - Murmur; normal EKG, restricted due to moderate pulmonic stenosis
- LV hypertrophy – normal exam, EKG w/ increased QRS voltage, LAE; no restriction
- LV hypertrophy – normal exam, EKG with increased QRS voltage and t-wave abnormality, Restricted due to hypertrophic cardiomyopathy
- LV dilation – normal exam, Ekg w/ LBBB; no restriction
- LV dilation – normal exam, EKG w/ LBBB; restricted due to viral myocarditis
- RV dilation – normal exam, EKG w/ RBBB; no restriction

Should EKG be part of the PPE?

- Controversial topic
- Europe Society of Cardiology and the Olympic committee endorse the use of EKG as part of the PPE
  - Implemented after sudden death rate in Italian athletes decreased from 3.6 to 0.4: 100,000 after using EKG as part of the PPE
- Currently the AHA does not support the use of EKG as part of its PPE recommendations
  - False positive rate
  - Unnecessary restriction
  - Cost of implementing this type of program (est of $2 bil/year ?)
  - Infrastructure involved – is it practical and feasible with the current health care system?

FIGURE 1 International Consensus Standards for Electrocardiographic Interpretation in Athletes



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CURRENT OPINION

International Recommendations for Electrocardiographic Interpretation in Athletes

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Who, when, and where?

- Competitive athletes only?
- What age should screening begin?
- How often should it occur?
- Who should do the screening and where should it take place?

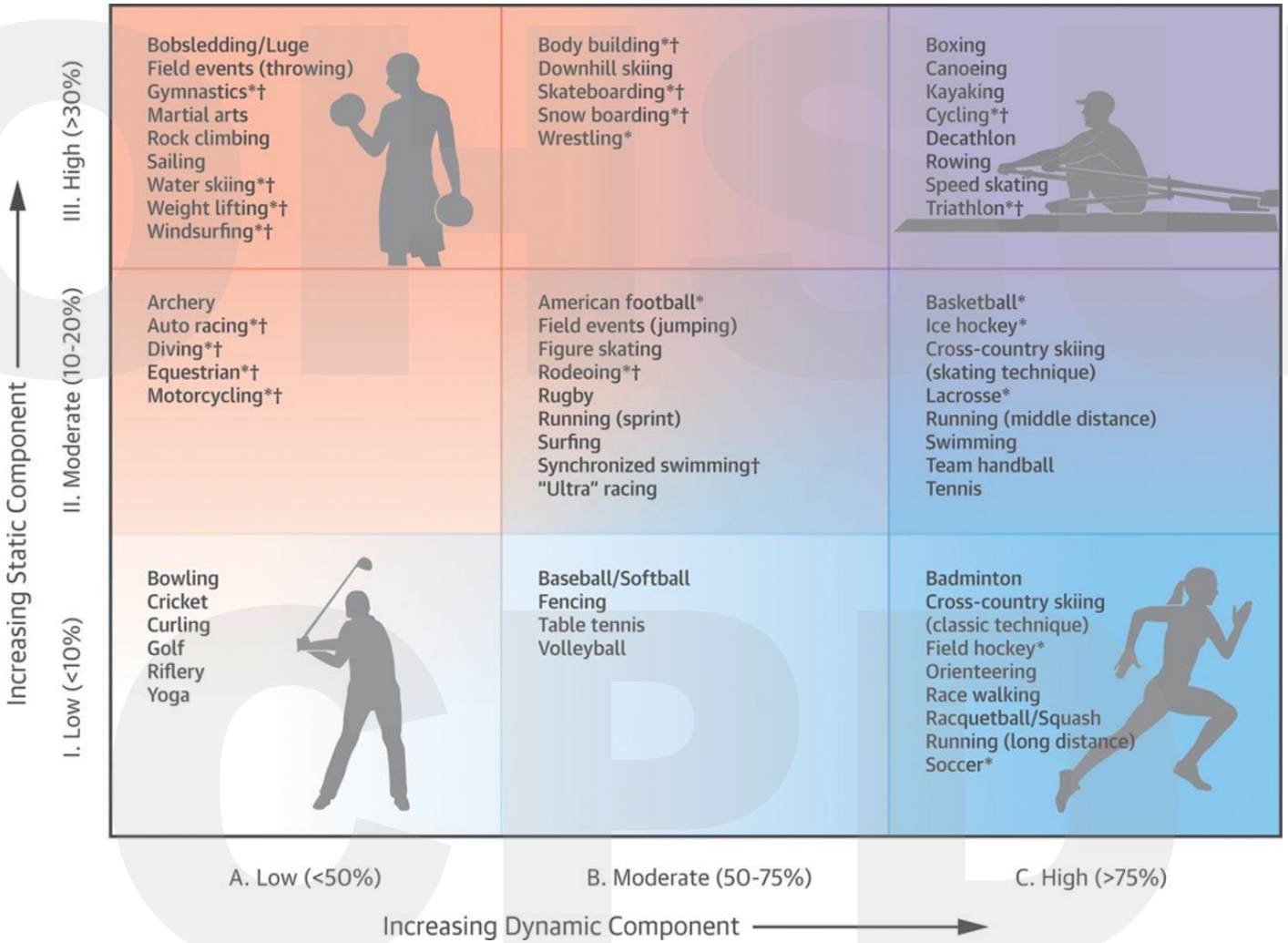
2015 AHA/ACC Scientific Statement for Competitive Athletes with Cardiovascular Abnormalities

- Group consensus regarding the medical risks imposed by competition on an athlete with a cardiovascular abnormality
- Meant to guide participation in competitive sports
  - Important component of a competitive sports activity concerns whether athletes are able to properly judge when it is prudent to terminate physical activity
- Definition most easily applied to high school, college, and professional athletics
  - Individual clinical judgment regarding competitive youth sports for children < 12 years
- The recommendations do not apply to non-competitive, recreational activities

2015 AHA/ACC Scientific Statement

- **Firm disqualification should be confined to individual athletes with probable or conclusive evidence of disease rather than those with borderline findings**
  - Minimize unnecessary restrictions from sports or stigma of a cardiac diagnosis
  - May permit the occasional athlete to participate who might otherwise be at some risk
- Not all sports involve identical types of intensity
- However, intensity of conditioning regimens often exceed competition itself

Classification of sports.



Benjamin D. Levine et al. Circulation. 2015;132:e262-e266

American Heart Association.

Recommendations for physical activity and recreational sports

- AHA scientific statement in 2004 makes recommendations for patients with Genetic Cardiovascular Disease (ie HCM, channelopathies, ARVD, and Marfan syndrome) who wish to continue with recreational activities
- Important that patients with these conditions continue to have an active lifestyle even though they may be restricted from competitive athletics
- Similar to 2015 AHA/ACC guidelines for competitive athletics in that it breaks activities into high, moderate, and low intensity
- Uses a graded scale for each activity regarding permissibility of the activity for each condition

Secondary Prevention

- Not all causes of SCD can be prevented even with every diagnostic tool currently available
- Automated external defibrillators (AEDs) should be present in public places especially where athletic activities take place
- An emergency action plan for SCA should be implemented when possible (ie first responders trained in CPR and AED use)
- Goal is to quickly activate EMS and provide access to AED within 3 to 5 minutes

OHSU

Secondary prevention

- **Rapid response with CPR and AED use saves lives!!**
- The single greatest factor affecting survival after out of hospital SCA is the time from arrest to defibrillation
- Chance of survival declines by 7-10% for every minute that defibrillation is delayed
- Recent study evaluated survival of young athletes with SCA if early defibrillation was achieved
  - Cohort of 1710 high schools with on site AED
  - 36 cases of SCA (14 athletes)
  - 94% received bystander CPR and an AED deployed a shock in 30/36
  - 64% survived to hospital discharge (including 9/14 athletes)

Drezner, JA et al. Effectiveness of emergency response planning for sudden cardiac arrest in United States high schools with automated external defibrillators. Circulation. 2009; 120: 518-25.

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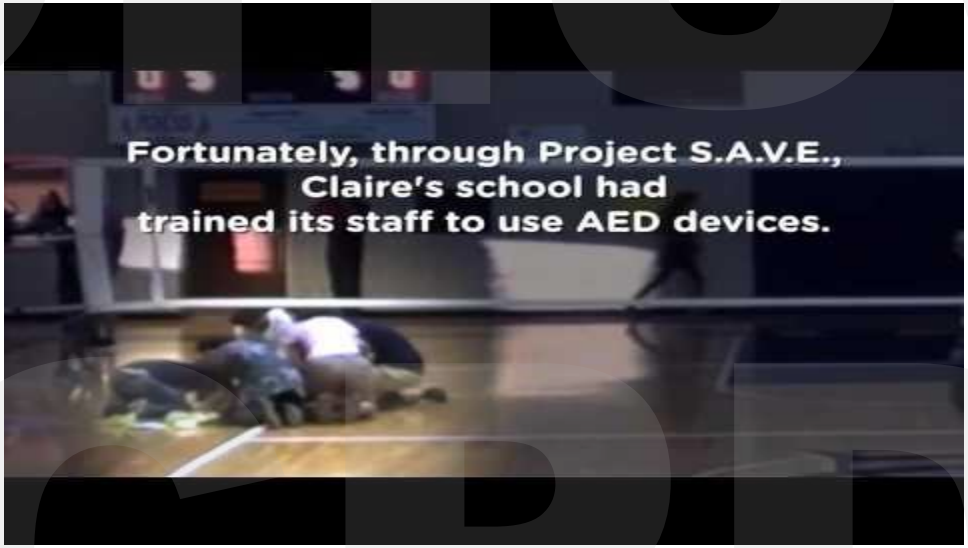

Fortunately, through Project S.A.V.E.,
Claire's school had
trained its staff to use AED devices.

Other AED Programs

- Project ADAM
  - https://www.cookchildrens.org/cardiology/project-ADAM/Pages/default.aspx
- Hopey's Heart Foudation
  - https://www.hopeysheart.org/aed-grant-program/
- So many more

Summary (1)

- Sudden cardiac arrest/ death in athletes is a rare event and often due to an undetected cardiac abnormality
- Hypertrophic cardiomyopathy is the most common cause, followed by coronary artery abnormalities, cardiomyopathies, and arrhythmias
- The preparticipation evaluation may be able to detect cardiovascular abnormalities if it is done properly, however, it has a low sensitivity
- AHA and AAP/AAFP have provided specific guidelines for the PPE
- PPE requires asking specific questions about the athlete's own history as well as a detailed family history

Summary (2)

- A positive response to any of the 12 items on the AHA guidelines may warrant further work-up or referral to a cardiologist
  - Important to have a low index of suspicion
  - However, must be careful to not inappropriately restrict
- For those patients who have a known cardiovascular disease the 2015 AHA/ACC guidelines offer recommendations for competitive athletics
- AEDs for secondary prevention do save lives in those athletes who suffer a cardiac arrest despite appropriate screening
- Refer to Return to Play guidelines for Post-COVID patients

Food for Thought

- Although sudden cardiac death in a young athlete is catastrophic and devastating it is important to keep perspective
  - There are ~ 75 cardiac deaths in young athletes/ year, but 115 deaths due to other causes (blunt force trauma, commotio cordis, heat stroke, etc)
  - Preventable causes of death such as accidents, homicides, and suicide are much more common in adolescents including athletes
    - MVA is 2500 x more common than a cardiac event during sports

References and resources

- American Academy of Pediatrics
  - www.aap.org
  - https://services.aap.org/en/pages/2019-novel-coronavirus-covid-19-infections/clinical-guidance/covid-19-interim-guidance-return-to-sports/
- American Heart Association
  - www.heart.org

School Sports Pre-Participation Examination – Part 1: Student or Parent Completes

Revised April 2023

HISTORY FORM

(Note: Form to be completed by the patient and parent/guardian prior to seeing the provider. Providers keep a copy in the patient's record. Schools keep a copy in the student's education records according to the requirements of the Family Education Rights and Privacy Act (FERPA). Under FERPA, education records may include any student's health records that are maintained by schools.)

Please scan QR code for updated mental health related resources.

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 ☐ Foods ☐ Stinging Insects

Over the last two weeks, how often have you been bothered by any of the following problems?
Give answers as 0 to 3, using this scale: 0 = Not at all; 1 = Several days; 2 = More than half the days; 3 = Nearly every day

Little interest or pleasure in doing things:	0	1	2	3	Feeling down, depressed, or hopeless:	0	1	2	3

Note to Providers: If combined score is 3 or greater, the student should be further evaluated with the PHQ-9 to determine whether they meet criteria for a depressive disorder.

Explain "Yes" answers below. Circle questions you do not know the answers to.

GENERAL QUESTIONS	YES	NO
1. Do you have any concerns you would like to discuss with your provider?		
2. Has a doctor or other healthcare professional ever denied or restricted your participation in sports for any reason?		
3. Do you have any ongoing medical issues or recent illness?		
4. Have you had a COVID-19 infection that required hospitalization?		
THESE QUESTIONS LET US KNOW ABOUT THE HEALTH OF YOUR HEART	**YES**	**NO**
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, flutter in your chest, 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, electrocardiography (ECG) or echocardiography.		
10. Do you get lightheaded or feel shorter of breath than your friends during exercise?		
11. Have you ever had a seizure?		
THESE QUESTIONS LET US KNOW ABOUT HEART HEALTH IN YOUR FAMILY. PLEASE ANSWER AS BEST YOU CAN.	**YES**	**NO**
12. Has any family member or relative died of heart problems or had an unexpected sudden death before age 35 years (including drowning or unexplained car accident)?		
13. Does anyone in your family have a genetic heart problem such as hypertrophic cardiomyopathy (HCM), Marfan syndrome, arrhythmogenic right ventricular cardiomyopathy (AR VC), long QT syndrome (LQTS), short QT syndrome (SQTS), Brugada syndrome or catecholaminergic polymorphic ventricular tachycardia (CPVT)?		
14. Has anyone in your family had a pacemaker or an implanted defibrillator before age 35?		

THESE QUESTIONS LET US KNOW ABOUT ANY BONE OR JOINT PROBLEMS THAT COULD LIMIT YOUR ABILITY TO BE PHYSICALLY ACTIVE.	YES	NO
15. Have you ever had a stress fracture or an injury to a bone, muscle, ligament, joint or tendon that caused you to miss a practice or game?		
16. Do you have a bone, muscle, ligament, or joint injury that bothers you?		
THESE QUESTIONS LET US KNOW ABOUT ANY CURRENT OR PAST MEDICAL ISSUES	**YES**	**NO**
17. Do you cough, wheeze, or have difficulty breathing during/after exercise?		
18. Are you missing a kidney, an eye, a testicle (males), your spleen, or any other organ?		
19. Do you have groin or testicle pain or a painful bulge or hernia in the groin area?		
20. Do you have any recurring skin rashes, or rashes that come and go, including herpes or methicillin-resistant Staphylococcus aureus (MRSA)?		
21. Have you had a concussion or head injury that caused confusion, a prolonged headache, or memory problems?		
22. Have you ever had numbness, had tingling, had weakness in your arms or legs or been unable to move your arms or legs after being hit or falling?		
23. Have you ever become ill while exercising in the heat?		
24. Do you or does someone in your family have sickle cell trait or disease?		
25. Have you ever had, or do you have any problems with your eyes or vision?		
THESE QUESTIONS LET US KNOW IF YOU ARE PROVIDING YOUR BODY WITH ENOUGH ENERGY (FUEL) WHEN YOU ARE PHYSICALLY ACTIVE	**YES**	**NO**
26. Do you worry about your weight?		
27. Are you trying to or has anyone recommended that you gain/lose weight?		
28. Are you on a special diet or do you avoid certain types of food or food groups?		
29. Have you ever had an eating disorder?		
30. Have you ever had a menstrual period? (If yes, please answer the following questions.)		
31. How old were you when you had your first menstrual period? _____		
32. When was your most recent menstrual period? _____		
33. 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 _____

ORS 336.479, Section 1 (3) "A school district shall require students who continue to participate in extracurricular sports in grades 7 through 12 to have a physical examination once every two years." Section 1(5) "Any physical examination required by this section shall be conducted by a (a) physician possessing an unrestricted license to practice medicine; (b) licensed naturopathic physician; (c) licensed physician assistant; (d) certified nurse practitioner; or a (e) licensed chiropractic physician who has clinical training and experience in detecting cardiopulmonary diseases and defects."

 OHA mental health related resources can be found on the OSAA website via the QR code above or at https://www.osaa.org/resources.

MURMUR EVALUATION – Auscultation should be performed sitting, supine and squatting in a quiet room using the diaphragm and bell of a stethoscope.

Auscultation finding of:

1. S1 heard easily; not holosystolic, soft, low-pitched
2. Normal S2
3. No ejection or mid-systolic click
4. Continuous diastolic murmur absent
5. No early diastolic murmur
6. Normal femoral pulses
   (Equivalent to brachial pulses in strength and arrival)

Rules out:

VSD and mitral regurgitation
Tetralogy, ASD and pulmonary hypertension
Aortic stenosis and pulmonary stenosis
Patent ductus arteriosus
Aortic insufficiency
Coarctation

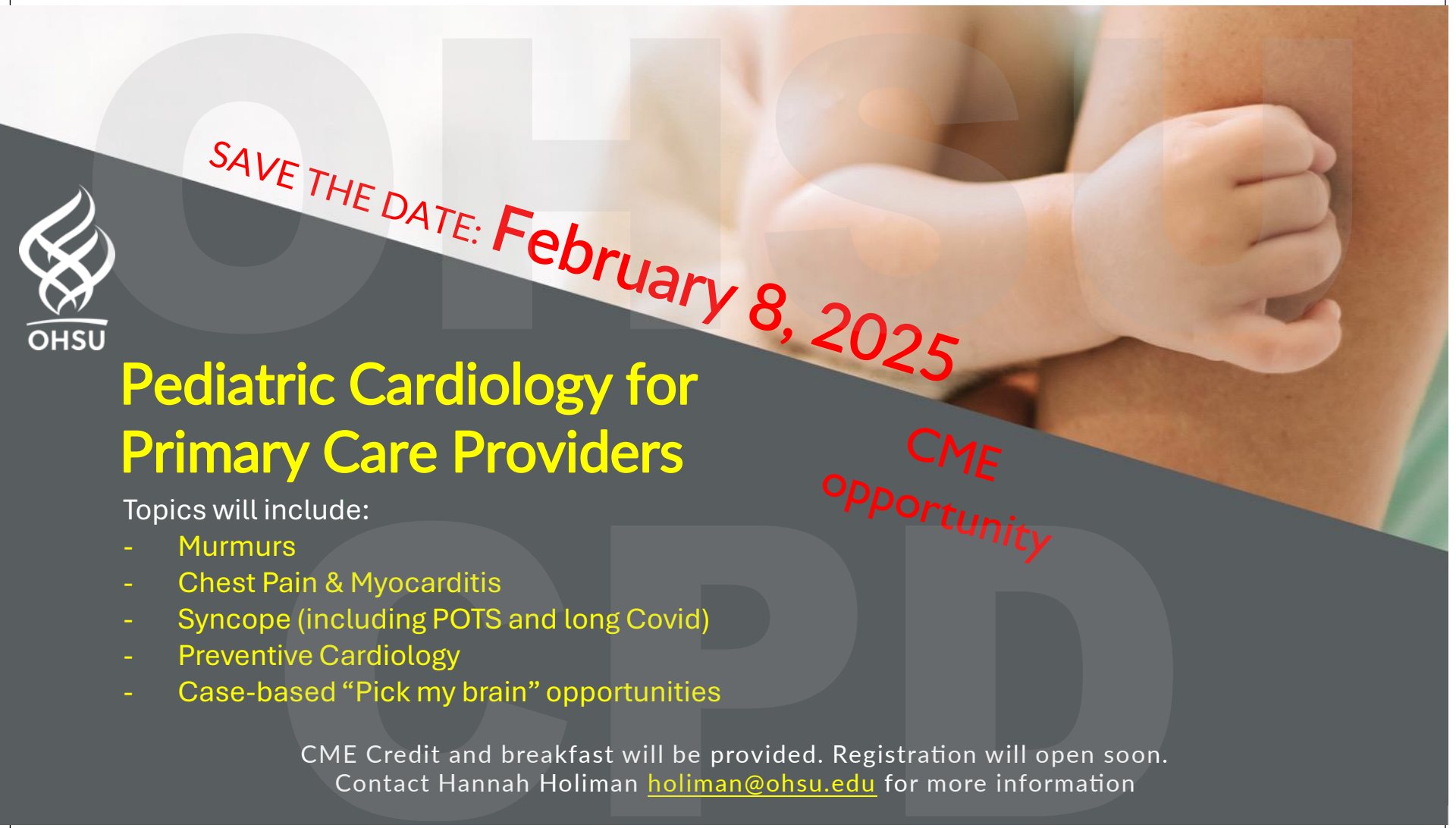
MARFAN'S SCREEN – Screen all men over 6'0" and all women over 5'10" in height with echocardiogram and slit lamp exam when any two of the following are found:

1. Family history of Marfan's syndrome (this finding alone should prompt further investigation)
2. Cardiac murmur or mid-systolic click
3. Kyphoscoliosis
4. Anterior thoracic deformity
5. Arm span greater than height
6. Upper to lower body ratio more than 1 standard deviation below mean
7. Myopia
8. Ectopic lens

Questions?


Championships
1
Pan American Championships
Santa Clara, CA. USA


HOME



SAVE THE DATE: **February 8, 2025**

Pediatric Cardiology for Primary Care Providers

CME opportunity

Topics will include:

- Murmurs
- Chest Pain & Myocarditis
- Syncope (including POTS and long Covid)
- Preventive Cardiology
- Case-based “Pick my brain” opportunities

CME Credit and breakfast will be provided. Registration will open soon.
Contact Hannah Holiman holiman@ohsu.edu for more information