



Sudden Cardiac Death (SCD)

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Disclosure

I have no relevant financial conflicts of interest to disclose related to this presentation

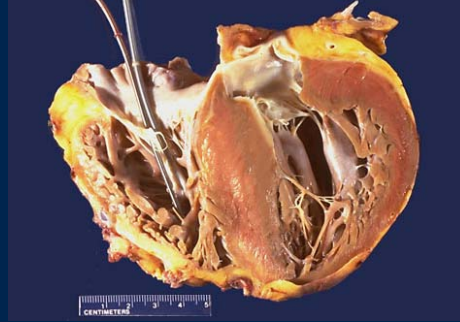
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Agenda

- Scope of the problem
- Causes of SCD
- Screening with H&P
- Use of ECG
- Screening guidelines
- Return after COVID



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Sudden Cardiac Death (SCD) – Athletes vs Non-Athletes

- SCD due to unsuspected congenital/genetic cv disease not limited to trained athletes
- Only 10-25% of 12-25 year-olds participate in organized sports
- It is very likely that the majority of youth who suffer SCD do so not participating in organized, competitive sports

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Scope of the Problem

- SCD is a rare event
- The intense media focus on these tragic events has given the impression that SCD occurs more often than it actually does
- “While this issue deserves our full attention, it would be unjustified to focus enormous resources screening only competitive athletes, possibly diverting resources from public health problems that have a greater impact on the broader population’s health”

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Preventing Sudden Cardiac Death

- Much more likely to identify potentially fatal cardiac lesion by taking a careful history than by doing a careful exam
- Does H&P + ECG result in more effective screening?
Controversial



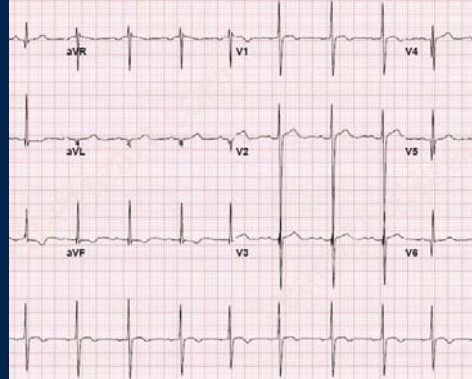
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Pros of Screening ECG's

- Readily available
- Can identify problems that may be missed on PE
 - LVH,
 - prolonged QT
 - rhythm disturbances
- Can be done “inexpensively”



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Obstacles to Mass Screening ECGs

- Large numbers – 10-12,000,000 U.S. middle & h.s athletes
- Low incidence
- Large # false pos & false neg (5-20%)
- Unfavorable cost/benefit
- Liability issues
- Lack of resources for performing & interpreting ECGs
- Interpreter variability, influence of ethnicity/race
- Need for repeat ECG screening
- Logistical challenges & costs related to confirmatory tests

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Results of Mass Screening

- Italy – reduction in SCD in young athletes. Limited applicability to U.S. due to different system of medicine, different pathology profile
- Israel – similar incidence of SCD (2.54 vs 2.66/100,000/yr) before & after screening program mandated
- Japan – ECG mandated for all school children since 1973 – no prescreening data, low (2-3%) incidence of ECG abnormalities (mostly minor)

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Current Evidence For/Against ECG

- To date, no large (enough) scale studies have been done
- Efforts currently underway to establish a national database
- Cardiologists continue to develop better ECG interpretation guidelines for athletes to decrease FP & FN

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PreParticipation ECHO

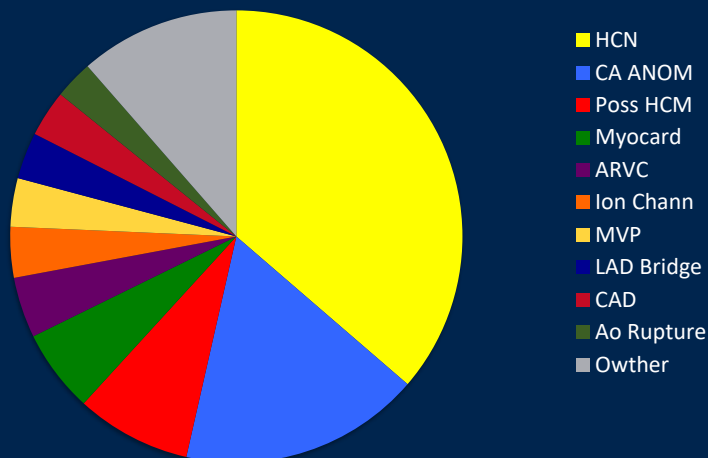
- 5 minute screening ECHO
- 2998 collegiate athletes, 2005-2013
- 159 (5%) had abnormal echo findings
- 3 had significant heart problems, 2 neg H&P
- 661 + H&P, 1 had abnormal echo

Modaff DS, et al. Usefulness of focused screening echocardiography for collegiate athletes. Am J Cardiol 2019; 123: 169-174.

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Causes of Sudden Cardiac Death 1866 Athletes



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History Findings Assoc/w Causes of SCD

Lesion	+FHx	↓ Exercise Tolerance	CP	Syncope	Palp
HCM	+	+	+	+	+
CAD	+	+	+		
Arrhyt	+		+	+	+
ALCA			+	+	
Aneur	+	+	+		

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Assessing Chest Pain

- **Pain** - vs SOB, tightness? Point (location)?
- **Quality** - sharp, burning, dull aching?
- **R** – Radiate? Relieved by rest, inhaler, water?
- **S** - Severity, worsened by (deep breathing)?
Other Sx (pre-syncope, palpitations, nausea, vision, recent cough, fever)?
- **T** - Timing (when did it start, how long, how many times/how often, at rest, after eating)?
Trauma?

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Accurate Medical History

- No studies on accuracy of PPE medical history information
- No strategies tested to improve accuracy of PPE medical history information
- Best bet may be education – parents, coaches, athletes

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Evaluation of Exercise-Related Cardiac Symptoms

- Clarify history - vasovagal syncope, chest pain without underlying dis., very common among teenagers
- Anginal chest pain – severe (>6/10), pressure-like or aching, assoc/w neck pain, arm pain, nausea, pre-syncope
- Exercise sx - refer to cardiologist
- Family Hx early MI – EKG

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Essentials of the Screening Cardiovascular Exam

- BP
- Auscultation, supine & standing
- Splitting of S2
- Palpation - thrill, LVI, RVI, simultaneous palp. of femoral & brachial arteries, peripheral pulses
- Murmur - location, intensity, timing, supine to sitting, squatting to standing, Valsalva

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Findings in Systolic Murmurs

Cause	Palpation	S2	Auscultation
Still's	Normal	Norm	Ejection, <3/6, vibrate best @ LLSB, ↓ Valsalva, upright
AS	LVI displaced, suprasternal thrill	Single	Ejection, 2-5/6, best @ 2RICS, ejection click
HCM	LVI displaced, thrill @ apex & LSB	Norm	Ejection, 2-4/6, best @ LLSB, ↑ Valsalva, upright
PS	+RVI, thrill @ LUSB	Split	Ejection, 2-5/6, LUSB, click
Coarct	↓ LE pulses c/w UE ↓ LVI displaced	Norm	Ejection, 1-3/6, radiates to L interscapular area
ASD	+RVI	Split, fixed	Ejection, 2-3/6, best @ LUSB
VSD	Precordial thrill	Norm	Holosystolic, 2-5/6 @ LLSB

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Response to Athlete Collapse

- Video analysis of athlete collapse (n = 24)
- Survival:
 - 92% when resuscitation initiated within 1 min
 - 36% when resuscitation delayed or not given
- Resuscitation methods varied (CPR, CPR + AED)

Steinskog DM, Solberg EE. Sudden cardiac arrest in sports: a video analysis. Br J Sports Med 2018; 0: 1-6

AHA Recommendations for Cardiac Screening of Young Athletes

- 14-point screening guidelines (history & physical)
- Standardization of questionnaire forms
- ECG may be used, for screening certain small groups, not necessarily limited to athletes, if well supported, & provided quality can be closely controlled
- Mandatory universal mass ECG screening in athletes or non-athletes is not recommended

COVID

Screening for Cardiac Involvement

- Great concern for myocarditis - inflammation of the heart muscle which may lead to fatal arrhythmias
- Recommendations are fluid and, with new data, changing rapidly.
- “flying blind”
- How widely available? How expensive?

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Return to Play After COVID (AAP): Mild or No Symptoms

- Mild sx (< 4 days fever >100.4, chills, myalgias, lethargy)
- “Must be cleared by physician”
- Screened with PPE cardiac screening questions (including sx w/exercise) & physical exam
- Any +s, refer to cardiology (ECG at minimum)

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Return to Play After COVID (AAP): Moderate Symptoms

- Mod sx (> 4 days fever >100.4, chills, myalgias, lethargy)
- Non-ICU hospitalization
- ECG
- Cardiology consultation
- ≥ 10 days since last + COVID test

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Return to Play After COVID (AAP): Severe Symptoms

- ICU stay or Multi-System Inflammatory Syndrome in Children (MIS-C)
- Extensive cardiology evaluation
- Consider return after 3-6 months

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Key Points

- Sudden cardiac death in athletes is an extremely rare event.
- Education about accurate history may improve reporting
- Refer abnormal/questionable murmurs, + exercise sx for further evaluation
- No definitive data on opt-in ECGs
- COVID guidelines are evolving

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