Sudden Cardiac Arrest in Athletes

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Scope of the Problem Relating to Screening and Prevention of Sudden Death in Athletes

- > 5 Million individual competitive high school athletes
- > 500,000 college athletes
- 5,000 professional athletes

Circulation 2007; 115: 1643-1655
Incidence of Sudden Cardiac Death in NCAA Athletes

• All cases of sudden death in NCAA student athletes were identified using an NCAA database, weekly search of public media reports and catastrophic insurance claims from 2004 – 2008

• There were 273 deaths and a total of 1,969,663 athlete participant years

Circulation 2011; 123:1594-1600

Harmon K G et al. Circulation 2011;123:1594-1600
Incidence of Sudden Cardiac Death in NCAA Athletes

- Overall: 1:43,770
- Male: 1:33,134
- Female: 1:76,646
- African American: 1:17,696
- Caucasian: 1:58,653

Circulation 2011; 123:1594-1600
Incidence of Sudden Cardiac Death in NCAA Athletes

- Basketball: 1:11,394
- Swimming: 1:21,293
- Lacrosse: 1:23,357
- Football: 1:38,497
- Cross Country: 1:41,695

Circulation 2011; 123:1594-1600
Incidence of Sudden Cardiac Death in NCAA Athletes

- Division I: 1:29,186
- Division II: 1:42,457
- Division III: 1:95,032

Circulation 2011; 123:1594-1600
Incidence of Sudden Cardiac Death in NCAA Athletes

- Division I Black Male Basketball 1:1,281
- Division I White Male Basketball 1:3,947

Circulation 2011; 123:1594-1600
Figure. Distribution of cardiovascular causes of sudden death in 1435 young competitive athletes.

- HCM (36%)
- Coronary artery anomalies (17%)
- Indeterminate LVH - possible HCM (8%)
- Myocarditis (6%)
- ARVC (4%)
- MVP (4%)
- Tunneled LAD (3%)
- CAD (3%)
- AS (3%)
- Dilated C-M (2%)
- Sarcoidosis (1%)
- Aortic rupture (2%)
- Ion channelopathies (3%)
- Other congenital HD (2%)
- Other (3%)
- Normal heart (3%)

Hypertrophic Cardiomyopathy (36-44%)
Hypertrophic Cardiomyopathy
Coronary Anomalies (17%)
Dilated Cardiomyopathy (2%)
Dilated Cardiomyopathy
Bicuspid Aortic Valve Disease

Bicuspid Aortic Valve

Normal Valve

Cusps

Bicuspid Valve

Aorta

Aortic Valve

CCF ©2009
Bicuspid Aortic Valve
Should an EKG be Included in the Pre-participation Evaluation?

• The American Heart Association says no, cost per life saved is $3.4 Million for an annual cost of $2 Billion per year

• The European Society of Cardiology says yes based on extensive Italian experience with screening EKG’s
The Italian Experience
1979-1996

• 33,735 athletes screened
• 621 (1.8%) were disqualified for cardiovascular reasons:
  – 38% rhythm and conduction abnormalities
  – 27% hypertension
  – 21% valve disease
  – 3.6% hypertrophic cardiomyopathy

NEJM 1998; 339:364-369
<table>
<thead>
<tr>
<th>Cause</th>
<th>Athletes</th>
<th>Non-Athletes</th>
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<tr>
<td>ARVD</td>
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<tr>
<td>Anomalous Coronary</td>
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The 12 Element AHA Recommendations for Pre-participation Cardiovascular Screening of Competitive Athletes
Personal History

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

6. Premature death (sudden and unexpected, or otherwise) before age 50 due to heart disease in one or more relatives

7. Disability from heart disease in a close relative <50 years of age

8. Specific knowledge of certain cardiac conditions in family members such as HCM, DCM, LQTS, Marfan’s, or arrhythmias
Physical Examination

9. Heart murmur
10. Femoral pulses to exclude aortic coarctation
11. Physical stigmata of Marfan syndrome
12. Blood pressure
Collapsed and Unresponsive Athlete

- AIRWAY
- BREATHING
- CIRCULATION
- Rhythm assessment with an AED
Implement Emergency Action Plan

- Have certifications in BLS (ACLS?)
- Know location and use of AED
- Call EMS, have prearranged protocols with local EMS agencies
Differential Diagnosis of Non-Traumatic Syncope or Pre-Syncope

- Cardiac arrest
- Exertional heat stroke
- Heat exhaustion
- Hyponatremia
- Hypoglycemia
- Exertional sickling
- Neurocardiogenic syncope
- Seizures
- Pulmonary embolus
- Cardiac arrhythmia
- Valvular disorders
- Coronary artery disease
- Cardiomyopathy
- Ion channel disorders
- Other structural heart disease
AT’s are the Front Line

• Be vigilant
• Keep in constant communication with the athletes
• Obtain accurate data when events happen
• Work closely with the medical team
• Follow the medical team’s instructions