The state of screening in the US: results of a national survey
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Disclosures: Advisory Boards of SCAA, Privit
Outline

- Brief overview of screening practices in the USA
- Recent AHA and ACC statements/papers
  - Gaps/Controversies/Issues
- Survey of US youth screening organizations
  (organizations attending this conference)
Current USA Pre-Participation system

Primary care (FP, IM, PEDs) sports med and team docs, NPs, PAs, chiropractors

PPE: Family and personal history, physical exam (AHA elements)

- Negative
  - Eligible for competition: Bethesdas
- Positive
  - Further testing
    - Negative
      - Bethesdas: Eligible for competition? If not, exercise Rx
    - Positive
      - Cardiologists
### TABLE. The 12-Element AHA Recommendations for Preparticipation Cardiovascular Screening of Competitive Athletes

**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 cardiac 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)§

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*Parental verification is recommended for high school and middle school athletes.
†Judged not to be neurocardiogenic (vasovagal); of particular concern when related to exertion.
‡Auscultation should be performed in both supine and standing positions (or with Valsalva maneuver), specifically to identify murmurs of dynamic left ventricular outflow tract obstruction.
§Preferably taken in both arms.²⁷
Use of 4th PPE in USA

**YES**
- All American Professional Teams (unique modifications)
- College (required on entry)
- High school
  - NFHS recommends
  - Leaves “process” to state associations
  - 4th PPE recommended in 48/51 states/DC

**NO**
- Youth (club) sports
  - No formal requirements for many sports
### Table 2. Comparison of history and physical examination versus ECG in the screening of young competitive athletes

<table>
<thead>
<tr>
<th>Study</th>
<th>Population</th>
<th>Positive results requiring further testing</th>
<th>Sensitivity to detect potentially lethal cardiovascular disease</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>History and physical</td>
<td>ECG</td>
<td>Total</td>
</tr>
<tr>
<td>Wilson [8]</td>
<td>2720 athletes and children aged 10–17 (UK)</td>
<td>2.5%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Bessem [9]</td>
<td>428 athletes aged 12–35 (Netherlands)</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Hevia [10]</td>
<td>1220 amateur athletes (Spain)</td>
<td>1.2%</td>
<td>6.1%</td>
</tr>
<tr>
<td>Baggish [6]</td>
<td>510 college athletes (USA)</td>
<td>6%</td>
<td>16%</td>
</tr>
<tr>
<td>Vetter [33]</td>
<td>400 children and adolescents (USA)</td>
<td>23.5%</td>
<td>7.8%</td>
</tr>
</tbody>
</table>

Asif 2012
Use of ECG screening in USA

**YES**
- Professional - NFL, NBA, NHL, MLS, MLB (> 90% of teams, Harris 2006)
- NCAA
  - 30-47% NCAA schools utilize ECG + PPE (ref: Coris, Asplund)

**NO**
- High school sports - 3.3-7.7 million
- Youth (club) sports - 44 million
Recent AHA and ACC statements/papers
Gaps/Controversies/Issues
Over 90 gaps identified

Major gaps/action plan:

1) Define outcome metrics/conduct high quality research

2) Promote optimal use of existing tools

3) Define normative values

4) Create state-wide task forces to coordinate and improve care
Few major points:

- Mandatory ECG screening in healthy young people 12-25 years of age is not recommended for athletes and non-athletes alike (Class III, Level C)

- Screening ECG (with H and P) may be considered in small cohorts (not necessarily limited to athletes) provided quality control can be achieved, and there is understanding of false +, false – (Class IIb, Level C)
Survey: US youth screening organizations January 2015

Team
- Sharon Bates (Anthony Bates Foundation)
- Toni Baumann (Burdick)
- Salim Idriss (Duke, CSRC)
- Christine Lawless (Univ of Nebraska)
- David Lawton (Bryan Heart, Lincoln Nebraska)
- Martha Lopez-Anderson (PHW)
- Marge Keehn (GE)
- Aimee Kops (Mortara)
- Valarie Morrow (Duke, CSRC)
- Michelle Snyder (PHW)
- Darren Sudman (Simons Fund)
- Theresssa Wright (Lilly, CSRC)
Our main questions:
1. Who are the organizations?
2. Who do they screen?
3. How do they screen (methods)?
4. How is data collected and stored?
   Type of machines
   Electronic or paper storage
5. Are organizations willing to share data in central repository?
6. Would data-sharing be contingent upon external funding?
List of 55 youth screening organizations was obtained from:
- Screen Across America
- Parent Heart Watch list
- Bates Foundation list

Link to 30 question survey

Distributed to organizations through PHW and Bates Foundation (no duplicates returned)
Results

- 55 sent
- 28 responded (51%)
- 2 omitted from analysis
  - Completed demographics
  - But, did not complete the survey
- 26 analyzed (47%)
What type of screening organization are you?
What region of country do you work in?
How is your organization funded?

- Private donations or...
- Research grant
- Federal or state...
- Corporate grant
- Hospital sponsored...
- University / college...
- For profit-
  Charge a fee...
- Other (please specify)
What year did you start screening?
Which age range do you screen?

Other = down to age 5 y/o, and teachers/coaches
What school population do you screen?
How many individuals do you screen annually?

Total screens since organization started: 384,745 (Mean 14,798, range 130 - 140K)
What does screening protocol include?

<table>
<thead>
<tr>
<th>Service</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete History and...</td>
<td>30%</td>
</tr>
<tr>
<td>Personal and Family Hist...</td>
<td>60%</td>
</tr>
<tr>
<td>Limited Physical...</td>
<td>10%</td>
</tr>
<tr>
<td>ECG (as a screening test)</td>
<td>90%</td>
</tr>
<tr>
<td>Echocardiogram (as a screen...)</td>
<td>50%</td>
</tr>
<tr>
<td>Echocardiogram (only if...)</td>
<td>30%</td>
</tr>
<tr>
<td>Blood Pressure Reading</td>
<td>70%</td>
</tr>
<tr>
<td>Height / Weight...</td>
<td>60%</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>10%</td>
</tr>
</tbody>
</table>

Physical exam (complete or limited) being done in about 50%
Is there a fee for screening?
Do parents or students sign:

- Informed Consent to...
- Waiver of Medical...
- Both?
- Neither?
- Do not know
Who is performing the cardiac exam?
Who is reading the ECG?
77% collect and store H and P. How?
96% collect and store ECG. How?
Which ECG machine do you use?
73% collect and store ECHO. How?
Which ECHO machine do you use?

- General Electric
- Philips
- Toshiba
- Sonosite
- Acuson
- Siemens
- n/a - We do not do ECHO
- Unknown
- Other (please specify)
Follow up after screening has occurred:

- We follow up positive...
- Those with positive...
- We are able to track outcomes...
- We have no follow up...
- Other (please specify)
92% are willing to submit deidentified data to central data repository.
Conclusions

- Despite controversies surrounding ECG screening, screening organizations exist in over $\frac{2}{3}$ of states.
- Most are funded through private or public foundations.
- Majority of organizations began screening between 2006-2014.
- Physical exam is often (50%) not included in the screen.
- < 10% in this cohort charge a fee.
Conclusions

- About 70% require both informed consent and waiver of medical liability
- Great majority of screening ECGs are read by cardiologists
- There is some electronic storage of H and P, ECG and ECHO
- A wide variety of ECG and ECHO machines are being used
- Some type of follow up is recommended in those with + findings
Conclusions

- 92% of organizations are willing to submit data to central data repository
- But, only 50% would do so without some type of funding/support
Huge Opportunity

- Retrospective
  - Over 384,000 screens since 1999, majority over past 8 years
  - Estimated 332,000 ECGS are stored
  - Can data be analyzed?

- Prospective
  - Estimated 40,000 screens/yr from this cohort of organizations alone
  - As new organizations are discovered, add to database of screening organizations
Points for discussion

- Given this data, what is feasibility of creating a repository with current methodology, and current data
- Going forward, would methods need revision?
- Collegiate schools have been surveyed multiple times since 2010, so not included in this data set
- Is collaboration with NCAA possible?
  - Collegiate schools could potentially add up to 200,000 students annually to the combined data set
  - Would set up opportunity for comparisons between populations
- Potential is there to compare PPE vs PPE plus ECG
Thanks!

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