To Screen or Not to Screen: Preventing Sudden Cardiac Death in Athletes

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The news is always shocking: A seemingly healthy athlete, apparently in his or her physical prime, drops dead on the field without warning. The diagnosis? Sudden cardiac death (SCD). The condition is both tragic and confusing. After all, if cardiovascular experts agree that exercise is one of the best things you can do for your heart, why does it go so horribly wrong for a small subset of athletes? What can be done to prevent it? These questions make sudden cardiac death a hot topic among cardiologists, athletes, and parents alike. In a recent review article in the Methodist DeBakey Cardiovascular Journal, cardiologists from the Massachusetts General Hospital (MGH) explore the causes of SCD and the controversy surrounding screening programs.

Although SCD is exceedingly rare—with latest estimates ranging from 1 in 40,000 to 1 in 80,000 fatalities per year—it ranks as the most common cause of death for athletes. Moreover, SCD is a stealthy killer; for many victims, the first symptom is death. The best estimates are that around 30 percent of victims experienced some warning signs before their death (See "Red flags: Tell you patients to consult you if they notice any of these symptoms"). SCD's unpredictability makes it a more common focus for cardiologists than the incidence numbers might suggest.[1]

"Fortunately, sudden cardiac death is not a common occurrence, but in my clinical practice, I spend a lot of time focusing on how to prevent it," explains Dr. Meagan Wasfy, a sports cardiologist at MGH's Cardiovascular Performance Program and lead author of the review article. "Physicians and residents want to know how to evaluate symptoms that may indicate an underlying cardiovascular issue in an active person."

RED FLAGS: TELL PYOUR PATIENTS TO CONSULT YOU IF THEY NOTICE THESE SYMPTOMS

- Chest pain
- Shortness of breath
- Worsening athletic performance
- Heart palpitations
- Fainting or feeling like they're about to faint

HELPFUL SCD RESOURCES FOR HEALTHCARE PROFESSIONALS

Sudden Cardiac Death in Athletes »

NCAA Interassociation Consensus Statement on Cardiovascular Care of College Student-Athletes »

University Interscholastic League of Texas Sudden Cardiac Death Awareness Form »

AHA/ACC Scientific Statement: Eligibility and Disqualification Recommendations for Competitive Athletes with Cardiovascular Abnormalities »

Making the condition even more difficult to predict is that the causes and risks vary by age, race, gender, nationality, and perhaps even sport. For instance, the review reports that male, black, Division 1 basketball players have the highest risk of SCD among NCAA athletes, although the precise reason isn't clear. In "young competitive athletes" (broadly interpreted as people under age 35 who are involved in a sport that requires intense regular training), inherited hypertrophic cardiomyopathy (HCM) and coronary anomalies seem to be responsible for the most deaths. Older athletes, particularly those who are adjusting to increased activity, have the highest risks of SCD (at approximately 21 per 1 million athletes per year). But, for them, the most common cause is pre-existing atherosclerotic coronary artery disease (CAD). (Paradoxically, regular exercise is one of the best ways to prevent CAD, making early detection even more important.) However, these trends don't necessarily hold true outside of the United States; in Italy and Denmark, for instance, arrhythmogenic right ventricular cardiomyopathy causes a quarter of SCD fatalities.[1]

Mysterious causes aside, Wasfy says that "the much hotter topic for debate is how to screen athletes that may be at risk for sudden cardiac death." You need only browse various heart association websites and news articles to find that the medical

community—and general public—are deeply divided on the issue of whether electrocardiography (ECG) should be a part of routine preparticipation screenings for athletes. The major American cardiology organizations, the American Heart Association (AHA) and the American College of Cardiology (ACC), do not recommend ECG as part of a standard screening; instead, they advise screenings that follow a 14-point (recently upgraded from 12-point) list of questions targeting personal and family medical history and a physical examination. However, ECGs are used much more routinely in European athlete screenings. Both the European Society of Cardiology and the International Olympic Committee guidelines include a resting 12-point ECG in standard screenings.[1]

AMERICAN HEART ASSOCIATION'S 14-POINT CARDIOVASCULAR PREPARTICIPATION SCREENING CHECKLIST

***Personal history:**

1. Chest pain/discomfort/tightness/pressure related to exertion
2. Unexplained syncope/near-syncope*
3. Excessive exertional and unexplained dyspnea/fatigue or palpitations, associated with exercise
4. Prior recognition of a heart murmur
5. Elevated systemic blood pressure
6. Prior restriction from participation in sports [New question as of 2014]
7. Prior testing for the heart, ordered by a physician [New question as of 2014]

Family history:

8. Premature death (sudden and unexpected, or otherwise) before age 50 attributable to heart disease in ⩾1 relative
9. Disability from heart disease in close relative <50 y of age
10. Hypertrophic or dilated cardiomyopathy, long-QT syndrome, or other ion channelopathies, Marfan syndrome, or clinically significant arrhythmias; specific knowledge of certain cardiac conditions in family members

Physical examination:

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

*Judged not to be of neurocardiogenic (vasovagal) origin; of particular concern when occurring during or after physical exertion.

**Refers to heart murmurs judged likely to be organic and unlikely to be innocent; auscultation should be performed with the patient in both the supine and standing positions (or with Valsalva maneuver), specifically to identify murmurs of dynamic left ventricular outflow tract obstruction

***Preferably taken in both arms."

Source: American College of Cardiology[2]

Both sides of the debate have merit. Indeed, ECGs do seem to increase the sensitivity of screenings; however, there is very little research to determine whether ECG-enhanced screenings actually reduce SCD cases. Moreover, given the different patient populations and causes of SCD, there is no one-size-fits-all test to capture all at-risk patients, and the AHA and ACC believe that the possible benefits of mandatory ECG testing are outweighed by the potential burdens from scarce resources, increased costs, and false-positives that would lead to unnecessary additional testing.[1]

Wasfy's clinic handles pre-participation screening for Boston-area athletic programs ranging from high school to professional levels, so she's well acquainted with the pros and cons of ECG testing. "We do offer ECG screenings in concert with local collegiate athletic programs and sports teams, but that's because we've had comprehensive discussions with these programs about their athletes' profiles," she says. She cautions that any program that does adopt routine ECG screenings should work with an expert cardiologist who can distinguish between the normal physiological changes that occur in an athlete's heart and abnormalities that may signal a more worrisome underlying condition. Such experts can help keep specificity high but false positives low, thus avoiding unnecessary additional testing or psychological stress for the patient.

When it comes to screening individuals, such as an older inactive adult who is concerned about starting a regular exercise program, the game changes. In this case, Wasfy advises clinicians to instigate in-depth discussions about the pros and cons of ECG testing and the patient's risk profile before deciding whether to use ECG. Healthcare professionals can use the AHA's 14-point checklist as a starting point.

However, for certain populations, especially older adults at higher risk of CAD (that is, men over 45 and women over 55 with diabetes, high cholesterol or blood pressure, obesity, or a history of smoking) Wasfy says that an exercise ECG (or "stress test") can "actually make a lot of sense." After all, for asymptomatic but inactive and high-risk patients, "seeing upfront if they have problems or symptoms in an exercise study in a safe office setting can be reassuring," says Wasfy. "Current guidelines support these screenings in certain cases prior to starting a new exercise program."

Despite the debate surrounding SCD and screenings, Wasfy distills her message to healthcare professionals to a few key points. "First, no test is perfect, so even ECG or more complex imaging can miss a portion of occult cardiac disease," she says. "And although testing can be reassuring, no test is a free pass; if a patient feels that something's not right with his or her body and symptoms develop, they should get back in contact with their doctor."

Perhaps her most important message is the importance of continuing to prescribe exercise. “Sudden cardiac death is an extraordinarily rare occurrence, and the benefits of exercise far outweigh the very small and difficult-to-predict risk of SCD,” Wasfy emphasizes. “In no way should we allow the specter of this unlikely event make us any less enthusiastic about recommending exercise for our patients.”

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Laura Gerik is an intern at the *Methodist DeBakey Cardiovascular Journal.*

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