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Editorial

Screening for Sudden Cardiac Death in Young Athletes. do we Have the Data?

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Sudden cardiac death in our youth is especially tragic, and over the past few decades there has been controversy regarding universal screening with electrocardiograms to rule-out the most common causes of sudden cardiac death (SCD) [1-4]. There are legitimate concerns about allocation of resources, healthcare costs, and the burden of false positive testing on the patient and family. However, what is the current consensus, and can local communities find a solution and work together to prevent tragedy before it strikes?

The ultimate objective of screening is to detect silent cardiovascular abnormalities that predispose our youth to SCD. The reported incidence of SCD varies, with studies showing a range of 0.6 to 6.2 per 100,000 persons, and some studies showing increased incidence in the competitive athletic population up as much as two-fold, with 25% of SCD occurring during sports [1,5-7]. Sudden cardiac death in otherwise healthy youth is most likely attributed to congenital disorders including, but not limited to, cardiomyopathies, ion channelopathies such as a long-QT syndrome and Brugada, arrythmogenic right ventricular dysplasia (ARVD), and Wolff Parkinson White syndrome [1,2,5,8]. Of all the cardiovascular anomalies, only 0.3% predispose the youth to SCD, disproportionally affecting our male population by 3 - 5 fold, and an additional 3-fold incidence in black male athletes [3,6].

In the United States, hypertrophic cardiomyopathy (HCM) represents the most common cause of SCD in youth, implicated in approximately one-third of cases [2,4]. HCM has an overall prevalence of 1 in 500 persons and an annual risk of death of < 1% [2,5]. The second most common etiology is anomalous anatomy of a coronary artery, which may only be detected with abnormal history such as syncope or chest pain [2].

Since the 1970s, Italian law mandates pre-participation screening for all competitive athletes ages 12 - 25 years old with a history, physical, and electrocardiogram (ECG) [4,7]. The data shows a reduction in SCD incidence since implementing pre-participation screening in the athlete population [7], most likely secondary to identification of underlying HCM [7], although the most common etiology of SCD in this population is AVRD [2]. In addition, the European society of Cardiology and International Olympic committee both endorse ECG as part of the pre-participation exam [6].

All groups are focusing efforts on the high risk competitive athletic population, and there is data to suggest screening is catching a large proportion of youth with HCM, which is promising for potential screening programs in the United States, however implementing a national program including only competitive athletes could cost upwards of $2 billion USD annually [1]. For all-comers, cost per life-year estimates range from $91,000 USD for a 14-year old and $204,000 USD for an 8-year old screened, regardless of activity level [5,8].

On the contrary, screening of athletes has not gained worldwide traction due to lack of data regarding efficacy and overall cost [3]. The American Heart Association (AHA) supports ECG screening, however in conjunction with a history and physical exam, in an effort to improve sensitivity and specificity [3]. Current recommends for interpretation of ECG for SCD in youth were updated at the 2nd Summit on Electrocardiogram Interpretation in Athletes in Seattle,

Washington, in 2015 with the goal of refining interpretation based on modern data, with a reduction of false positive rate to 3% [3,9]. This provides a detailed framework by which clinicians can interpret ECGs on the basis of what is truly abnormal in an otherwise healthy, athletic young adult.

Is there any role for the local effort? Many communities throughout the United States have implemented similar screening on a volunteer basis by healthcare professionals and the general public. The largest U.S. based program, Young Hearts for Life in Illinois, has screened over 230,000 students since its inception in 2006, identifying nearly 3,000 students requiring follow-up, with a false positive rate of only 1.2% [10], paving the way for other communities to follow suit.

In conclusion, SCD from a treatable cause in youths can represent a catastrophic event. With data showing a reduction in mortality after implementing screening programs, experts and communities must continue to make strides to initiate local action and refine screening guidelines to identify those at highest risk for SCD while reducing financial and time commitments. As more volunteer-based programs implement screening, we can possibly help our youth and communities from these catastrophic events.

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