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New report reveals optimal way to detect young athletes at risk of sudden cardiac death

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Although rare, sudden cardiac death in young athletes raises serious concerns, especially because most victims report no warning symptoms. Pre-participation screening aims to identify children, adolescents, and young adults at risk, but there is not yet consensus regarding the best way to accomplish this. A new report in the *Canadian Journal of Cardiology* sheds light on this controversial topic by describing a new screening protocol that offers advantages over American Heart Association (AHA) recommendations and shows that the electrocardiogram (ECG) is the best single screening method.

Cardiologists from the University of British Columbia Vancouver Coastal Health, Vancouver, BC, Canada, compared their own innovative screening protocol to that recommended by the AHA. Both protocols use 12-lead ECGs and questionnaires. However, one problem associated with the AHA questionnaire is the high rate of false positives (identifying someone as having a serious condition when he does not). A false-positive result requires extensive further testing and consultation with a cardiologist, leading to worry, secondary testing, and higher costs. The researchers' new evidence-based questionnaire was designed to better differentiate between symptoms indicative of serious cardiac disease and those related to more benign conditions. The AHA method also involves a physical exam conducted by a physician that includes listening to the heart (auscultation).

Investigators screened more than 1400 young competitive athletes ages 12-35 years. Approximately half underwent the AHA recommended screening, and the other half the experimental protocol. Seven participants were found to have serious heart conditions, and six were identified by ECG. Only two of the seven would have been detected as the result of a medical history and physical exam.

"The current study provides further evidence to support the use of the ECG as an important tool in the screening of young competitive athletes," explained lead investigator James McKinney, MD, MSc, of the Division of Cardiology of the University of British Columbia. "The ECG is more sensitive in detecting heart muscle problems (cardiomyopathies) and potentially life-threatening electrical disorders such as Wolff-Parkinson-White and long QT syndrome."

"An Achilles heel of pre-participation screening has long been the unacceptably high false-positive rate and the costs associated with screening large numbers of athletes," noted co-investigator Saul Isserow, MBBCh, of the Division of Cardiology of the University of British Columbia. In the study, the false-positive rate of the new protocol was less than half that of the AHA protocol (3.7% vs. 8.1%).

Investigators found that the physical examination was unhelpful and costly. The physical exam prompted further evaluation in 10 athletes without identifying any of the athletes who actually had heart disease and contributed to higher false-positive rates. "This is not surprising because cardiac auscultation requires years of experience and conditions during mass screening are not ideal for meticulous cardiac auscultation," commented Michael Papadakis, MBBS, MD, and Sanjay Sharma, MBChB, MD, of St. George's University of London in an accompanying editorial.

The research indicates that a screening protocol that includes a more specific questionnaire and ECG, but excludes a physical examination, eliminating the need for an on-site physician, would be desirable to optimize efficiency and produce important cost savings. The researchers calculate that eliminating physician costs would result in huge reductions in per person screening costs (\$14.42 for new protocol vs. \$97.50 for AHA protocol) and costs per diagnosis (\$3,822.70 vs. \$41,320.49, respectively).

"A large proportion of sudden cardiac deaths in young athletes are secondary to inherited or congenital cardiac diseases that are detectable during life and for which several therapeutic options are available to minimize the risk of death. Pre-participation screening is widely used to detect athletes at risk of exercise-related sudden cardiac death, but the optimal approach remains elusive," added Dr. Papadakis and Dr. Sharma.

The results of this study indicate the need to harmonize the results of research findings with current practice. Still to be determined is the important question of whether screening saves lives.

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