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Font Size A A **A****Authors:** Dhutia H, Malhotra A, Finocchiaro G, et al.**Citation:** [Impact of the International Recommendations for Electrocardiographic Interpretation on Cardiovascular Screening in Young Athletes. *J Am Coll Cardiol* 2017; 70:805-807.](#) □**Summary By:** [David S. Bach, MD, FACC](#)

Study Questions:

How do revised international interpretation recommendations for electrocardiographic (ECG) screening in young athletes affect the number and cost of additional cardiac tests?

Methods:

Between 2011 and 2014, 4,925 previously unscreened athletes (85% male, 85% white) aged 14-35 years from 26 sporting disciplines in the United Kingdom (UK) were prospectively evaluated by cardiologists with a health questionnaire, physical examination, and 12-lead ECG originally interpreted using 2010 European Society of Cardiology (ESC) recommendations. Athletes with positive screening evaluations were referred for secondary investigations to confirm or refute a diagnosis of cardiac disease. The costs of secondary investigations were calculated based on the 2014/2015 UK National Health Service tariffs; the impact on cost after applying the international recommendations was evaluated retrospectively.

Results:

A total of 79 athletes (1.6%; 95% confidence interval [CI], 1.3-2.0%) had an abnormal health questionnaire or physical examination. Application of the international recommendations resulted in 146

(3.0%; 95% CI, 2.5-3.5%) athletes being classified as having a positive ECG, respectively, representing 86%, 50%, and 30% relative reductions compared to the 2010 ESC, Seattle, and refined criteria (all $p < 0.0001$). Along with the history and physical exam, inclusion of an ECG interpreted in accordance with the international recommendations resulted in 3.8% (95% CI, 3.3%-4.1%) of the cohort undergoing echocardiography, 1.2% (95% CI, 0.9%-1.5%) exercise stress testing, 1.0% (95% CI, 0.8%-1.1%) Holter, 0.9% (95% CI, 0.7%-1.2%) cardiac magnetic resonance imaging (MRI), and 0.4% (95% CI, 0.3%-0.7%) other tests (compared with the 2010 ESC criteria, representing a 66% reduction in the number of echocardiograms, a 29% reduction in the number of stress tests, a 17% reduction in Holters, and 25% reduction in cardiac MRI scans; all $p < 0.0001$). After additional investigation, 15 (0.3%; 95% CI, 0.2%-0.5%) athletes were diagnosed with serious cardiac disease (hypertrophic cardiomyopathy [$n = 6$], long QT syndrome [$n = 3$], Wolff-Parkinson-White [$n = 6$]). The overall cost of screening using the 2010 ESC recommendations was \$110 (95% CI, \$102-122) per athlete and \$35,993 (95% CI, \$33,474-39,896) per serious diagnosis. The Seattle and refined criteria, respectively, reduced the costs to \$92 (95% CI, \$84-103) and \$87 (95% CI, \$80-94) per athlete, and \$30,251 (95% CI, \$27,568-33,912) and \$28,510 (95% CI, \$26,329-32,123) per serious diagnosis. The international recommendations further reduced costs to \$80 (95% CI, \$74-91) per athlete screened and \$26,405 (95% CI, \$24,392-29,833) per serious diagnosis, respectively, representing a 27%, 13%, and 8% relative cost reduction compared with the 2010 ESC, Seattle, and refined criteria.

Conclusions:

The authors concluded that the international recommendations are associated with a significantly lower number of abnormal ECGs, and result in an impressive reduction in workload and cost of screening without compromising the ability to detect athletes with serious cardiac disease.

Perspective:

Pre-participation ECG screening of young athletes can lead to the detection of a relatively small number of athletes with serious underlying cardiac disease, but with associated financial costs (for additional testing) and the risk of disqualifying athletes who are not at risk. This study addresses another refinement in criteria for screening ECG interpretation in young athletes, which resulted in fewer athletes referred for additional testing, and therefore, lower associated costs. The population was predominantly white (athlete ECG patterns differ among races) and male, limiting the ability to extrapolate the findings to other populations. It does not address the potential moral hazard, if ECG screening is cost-effective and saves lives, of selectively screening only athletes rather than everyone.

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Keywords: *Arrhythmias, Cardiac, Athletes, Cardiac Imaging Techniques, Cardiomyopathy, Hypertrophic, Echocardiography, Electrocardiography, Exercise, Exercise Test, Heart Failure, Long QT Syndrome, Magnetic Resonance Imaging, National Health Programs, Physical Examination, Sports*

Suggested Materials

- [CardioSmart: New Guidelines Fine-Tune Heart Screenings in Young Athletes](#)

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