Rising Incidence of Cardiovascular Events in Adolescent Athletes: Mandating ECG Testing in Sports Physicals

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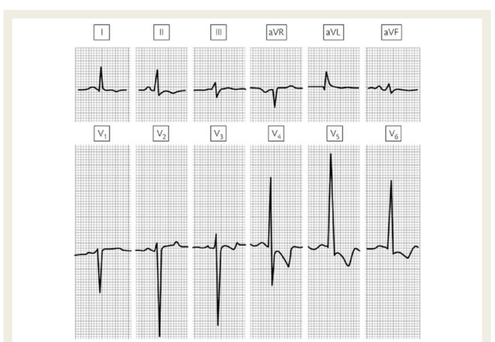
PICOT Question

Will mandating ECG readings as part of all sports physicals for high school, ages 14-18, male and female student athletes decrease incidence of cardiovascular events?

Literature Review

1. Databases: Cochrane library, CINAHL complete, PubMed, NATA
2. Key search terms: ECG screenings athletes, hypertrophic cardiomyopathy athletes, student athletes cardiovascular, athletic trainer ECG, death following athletic event, participation ages 14-18
3. Criteria list: Published in English, published in scholarly journals, and is peer reviewed. Aligns with research question. Involves or is in comparison to population of 14-18-year-old student athletes. Previous studies that have used ECG screenings in athletes.



ECG of an asymptomatic athlete who was diagnosed with HCM based on this screening.

Acknowledgements

We would like to extend our most sincere thanks to Dr. Linda Connelly for being our mentor and guiding us through this project. Additional thanks to Dr. Rachel Helbing for help in obtaining our articles.

Background

Hypertrophic cardiomyopathy (HCM) can lead to left ventricular hypertrophy, with stiffening of the myocardium, and eventually results in cardiac demand that exceeds supply. The body overexerts itself and the risk of sudden cardiac death (SCD) increases due to the inability to compensate. Young student athletes engaging in strenuous physical activity are at greater risk for SCD related to non-mandated comprehensive sports screening physicals. The top leading cause of death among student-athletes is cardiac-related, and experts suspect that one high school student will die every three days of sudden cardiac death (NATA, 2023). Electrocardiogram screening is the appropriate diagnostic test to identify this myopathy as it may indicate increased voltage of the QRS complex and inverted T waves in the lateral leads, allowing cardiologists to identify this problem before it results in SCD. Following European guidelines, the proposed policy would be to “recommend the use of... ECG,” in addition to the preexisting sports physical requirements which currently only includes “personal and family history and physical examination,” (Han, Lalario, Merro, et al., 2023) in the United States. “Preparticipation cardiac screening” will increase the detection rate of HCM and thus decrease life-threatening cardiac events (Han, Lalario, Merro, et al., 2023).

Synthesis of Findings

- The most ethical, economic, legal, sensitive, and effective screening tool for cardiovascular disease in athletes is an electrocardiogram. (7, 12)
- Preparticipation ECG assessments are relatively quick, non-invasive, and are a contributing tool in identifying 60% of diagnoses related to cardiac death, or SCD, in athletes (5, 8).
- Studies from that last decade have shown that hypertrophic cardiomyopathy was frequently a cause of sudden cardiac death in athletes (p=0.002), with the younger population being at the highest risk of unexpected SCD. The risk of HCM-related SCD in young athletes ranges from 0.1% to 6.6% per year. (2, 4)
- Although not all athletes with ECG-identified cardiovascular anomalies resulted in symptoms or a sudden cardiac event, abnormal screenings who were sent to a cardiologist follow-up were evaluated for their high risk of SCD. (13)
- A new designed and validated SCD risk prediction model, with >70% prediction accuracy, incorporated risk factors that are unique to pediatric hypertrophic cardiomyopathy to determine who qualifies for an ECG screening. (10)
- No randomized study has compared the additive benefit of the screening ECG; however, the false positive rate is now in an acceptably low range. (1)
- When cost of equipment screening and training is a non-variable, ECG is the most effective tool to detect HCM in athletes (11, 9)

Decision to Change

- The increasing incidence of sudden cardiac death related to hypertrophic cardiomyopathy can be screened for and prevented by conducting more inclusive preparticipation screenings in student athletes ages 14-18. (8, 11)
- A change in practice, mandating ECG screenings with sport physicals, is essential to decrease the incidence of SCD in student athletes.
- Partner with the National Athletic Trainers’ Association (NATA) to inquire about implementation, grants, and funding required for ECG screenings.

Evaluation

- In partnership with NATA, we would implement a nationwide policy which would mandate yearly ECG screenings prior to sports participation for all high school student athletes.
- Through screening, we will see decreased incidence of SCD in young athletes ages 14-18 who had asymptomatic HCM.

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