Controversies relating to preparticipation cardiovascular screening in young athletes: time for a realistic solution?

M Papadakis,1,2 N Chandra,1,2 S Sharma1,2

The sudden death of any young individual is a tragic event that causes immeasurable damage to family lives. The sudden death of a young athlete from a cardiac disorder is particularly emotive and is often associated with considerable media coverage, drawing attention to the youth, the athletic prowess of the individual and the number of life years lost consequent to a cardiac disorder that could have been detected during life. Most exercise-related sudden cardiac deaths (SCDs) are attributed to congenital or hereditary cardiac disorders that are asymptomatic in most victims.1-2 Unsurprisingly, the death of a young athlete often galvanises urgent discussions relating to preparticipation cardiac screening involving members of the community, sports physicians and governing bodies.

There is considerable resistance to implementing widespread cardiac screening of athletes. The low incidence of deaths and the low prevalence rates of all implicated disorders challenge the cost efficacy of such a programme. Furthermore, there are concerns relating to the overlap between the physiological adaptation to exercise and the cardiac disease resulting in false-positive results and unnecessary anxiety or even disqualification of an athlete from future competitive sport.3 It is also recognised that up to 11% of deaths in athletes occur at rest; therefore, cessation of sport will not necessarily prevent death in all athletes.1 Finally, there are issues relating to the lack of infrastructure and expert personnel trained in athlete’s heart and the broad phenotype of the heterogeneous disorders implicated in the sudden death of an athlete. The UK and many other Western countries do not favour screening of athletes. Indeed, screening of athletes in the UK is confined to elite sporting organisations such as the Premier League football association and the Lawn Tennis Association that mandate independently financed screening programmes in all youth athletes.

In the USA and Italy, preparticipation cardiac screening programmes are in existence to minimise the risk of sudden death due to cardiac disorders in young athletes.4 The US programme utilises a health questionnaire relating to cardiac symptoms and a family history of premature cardiac disease, as well as physical examination of the cardiovascular system. Unfortunately, the reputation of such basic screening programmes has been jeopardised by American physicians holding international expert status in sports cardiology studies that have emphatically demonstrated an extremely poor yield in identifying athletes with fatal disorders.5

In Italy, a state-sponsored screening programme has been in place since the late 1970s and includes a health questionnaire, a cardiovascular physical examination and a 12-lead electrocardiography (ECG). The Italian experience from Veneto has shown that screening with ECG has reduced the death rate in athletes from 4.19/100 000 person-years to 0.87/100 000 person-years during the period when screening mechanisms and expertise were developed and the full potential of screening is unlikely to have been realised. Consequently, the reported postscreening incidence of SCD is quoted as 1.57/100 000 person-years. This estimate is twofold higher than the reported incidence by Corrado et al of 0.87/100 000 person-years during the late screening period (1993–2004) and fourfold higher than the reported incidence of 0.43/100 000 person-years in the 2001–2004 period. Although a longer period may offer epidemiologically more robust results, it is important to acknowledge that the latter figure of 0.43/100 000 person-years is likely to provide a more accurate estimate of the real potential of screening that is reinforced by the fact that the incidence of SCD plateaus during the 2001–2004 period and is likely to have remained so during the proceeding years.

Furthermore, Elston and Stein underestimate the incidence of SCD in young (14–35 years old) individuals in the UK. A recent study analysing the Office of National Statistics data indicates around 400 SCDs per year in the UK in this age group, which is likely to be...
an underestimate of the true incidence given the experience from previous prospective epidemiological studies within the UK and potential misclassifications of SCDs as epilepsy or accidental drowning.\(^7\)

The study also fails to take into account current screening experience in the UK.\(^8\) Our own experience of screening highly trained athletes using the Italian model indicates a lower false-positive rate of 3.7%, compared with 9% by Corrado et al. This is most likely to reflect the differences in interpretation of an abnormal ECG because in our practice, isolated large QRS complexes, borderline right axis deviation, a borderline prolonged QTc\(^9\) and T-wave inversions in the right precordial leads in athletes <16 years old\(^10\) would not be indications for fur-

---

**REFERENCES**