

Sudden Cardiac Arrest during Participation in Competitive Sports.

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Family practitioners are frequently tasked with assessing fitness, such as for driving, work duties, and (return to) sport participation. In the sport setting, although many competitive athletes have dedicated physicians to perform Pre-Participation Examinations (PPEs), this responsibility frequently falls to their family physician. Reasons for this are varied, and include the lack of a physician associated with a competitive youth team, or "clubs" rather than "varsity" designated teams at the post-secondary level, for instance. Investigations as a part of this evaluation can be hard to determine, and this is especially true with respect to the cardiac system, given the potentially serious complications (e.g. sudden cardiac arrest (SCA)), in the otherwise generally healthy competitive athlete.

This NEJM article "sought to identify all sudden cardiac arrests that occurred during participation in sports activities within a specific region of Canada to determine their cause." From this arose a discussion of which causes may have been identifiable, to estimate the efficacy of screening systematically during a PPE.

SCA was defined as an abrupt loss of vitals resulting in death or successful resuscitation. It was considered "during sport participation", if the event occurred during or within 1 hour following an activity estimated to have involved exerting at >3 METS. "Competitive" was defined as an organized or sanctioned event certified by an official, whereas it was classified as "non-competitive" if it was not formally organized/sanctioned. Presumably, competitive athletes were the focus, as they are the individuals who would present for a PPE.

The authors used the Rescu Epistry registry - a prospective, comprehensive registry of all EMS attended (via 911) cardiac arrests that occurred out-of-hospital. They obtained information from multiple sources (e.g. ER reports, discharge summaries, autopsies, etc.). It is unclear why events occurring in private were excluded, with inclusion criteria specifically identifying public locations only, when such events did not need to be witnessed. That is, 1681/3825 cases of out-of-hospital SCAs were excluded for "location", which would seem to miss individuals who could have had an SCA at home within 1 hour following sport participation, for example. This region in Ontario had a population of 6.6 million, including urban and rural regions. The study period was 2009 to 2014, and individuals aged 12-45 were included in an attempt to catch young athletes potentially eligible for screening, as well as the maximum number of individuals with heritable cardiac syndromes, while reducing the overlap with SCA secondary to coronary artery disease (CAD).

Results: 74 cases of SCA in a public space occurred (as defined above) during sports; 16 during competitive and 58 during non-competitive sports. Focusing on competitive athletes (again, as defined above), there were 9 deaths and 7 survivors (43.8% survival) and sufficient data to determine the cause of the SCA in 10/16 cases. Similar survival was seen in the non-competitive category (44.8%). The incidence of SCA in competitive athletes was 0.76 cases per 100,000 athlete-years (highest rate: 1.17 for ages 12-17, lowest rate: 0.41 for ages 35-45). This rate has

been reported as 4.84/100,000 person-years in the general population, of the same age range, according to the authors.

On autopsy of 2 competitive non-survivors and 4 competitive survivors, there was no identifiable cause, and they were considered primary arrhythmias. That is, these 6 cases were found to have either a normal cardiac structure at autopsy, or in the case of the survivors, normal echo or cardiac catheterization. Interestingly, most SCAs in competitive athletes were race events and soccer events (4 each). The gym (12) and running (9) were the most common activities in the non-competitive. For both competitive and non-competitive, the predominant cause varied by age: <35, structural and primary arrhythmia; 35-45, CAD. Also of note, hypertrophic cardiomyopathy and arrhythmogenic right ventricular cardiomyopathy were uncommon causes.

Perhaps most importantly, two competitive athletes had structural abnormalities (i.e. hypertrophic cardiomyopathy) that were likely to have been identified during a PPE with an ECG or echo. However, one of these individuals had actually been previously assessed for presyncope, and was found to have a normal ECG and echo. Amongst competitive survivors, none had a condition likely to have been identified with cardiac screening. The authors also use a broad definition of "competitive" - one that would include "beer league" hockey, university intramural or "community sport and social league" participants, for example, which frequently are organized events with referees – and exclusion of these participants (who are unlikely to present for PPE) perhaps would change these figures.

This study indicates that SCA in competitive athletes is rare, and raises questions about systematic screening for cardiac conditions in athletes, as a part of PPEs. There is a great deal of controversy ongoing and no clear consensus, and although this interesting study adds to the current knowledge, I eagerly await the forthcoming Canadian guidelines on the subject, to help inform my decision making in regards to investigations to pursue!

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