



Editorial

Point-of-Care Ultrasound (POCUS) and the Screening of Canadian Collegiate Athletes

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See article by Moulson et al., pages 35–41 of this issue.

Preparticipation screening for athletes to detect people at risk of cardiac events is an important exercise that is practiced in variable and somewhat controversial ways.^{1–3} In this edition of the *Canadian Journal of Cardiology*, Moulson and colleagues describe their initial experience with the introduction of point-of-care ultrasound (POCUS) screening of collegiate athletes as part of preparticipation evaluation (PPE).⁴ Their research involved the development and preliminary evaluation of a novel protocol—Screening the Heart of the Athlete Research Program (SHARP) for the nonexpert administration of POCUS—preparticipation screening of 50 intercollegiate athletes. A subset of 19 athletes then underwent traditional echocardiographic examination, and correlation of the findings of the imaging investigations was assessed.

The authors acknowledge that there continues to be considerable debate concerning the approach to be taken in screening athletes and that such screening is currently being delivered inconsistently, if at all, in Canadian universities.^{1,5} There is an obvious need to improve this area of sports-medicine practice. Prominent in any discussion regarding PPE is the possibility of identifying cardiac anomalies that may predispose to sudden cardiac death (SCD) in sports settings.^{6–9} Such tragic fatalities, although rare, attract understandable attention, as they involve youth at the height of fitness competing in settings in which it is assumed that approaches to the prevention of such events are possible. Recent research has demonstrated, however, that contrary to many assumptions, the delivery of high-quality screening programs involving careful history taking, physical examination, electrocardiograms, and echocardiographic examination has failed to save lives or accurately predict those at risk of SCD.^{9,10} In Canada, a comprehensive examination of all SCD occurring during competitive sports in a large area of Ontario revealed that the incidence of such events was low and

concluded that 146,000 competitive athletes would have to be screened to identify 1 at risk of sudden cardiac arrest.¹¹

The challenge of introducing screening strategies when attempting to identify events with low incidence—or their antecedent conditions—is problematic, and recourse to criteria intended to guide such activities is regrettably infrequent in any discussion of the screening of athletes.^{12,13} Most recently, the Canadian Cardiovascular Society and Canadian Heart Rhythm Society jointly recommended a tiered approach to cardiac screening of competitive athletes in which a history and physical examination were considered fundamental, and an electrocardiogram was recommended only if indicated by the results of the history and examination.¹⁴

Against this background, Moulson and colleagues describe their efforts to improve the yield of the PPE by employing POCUS examination to identify anomalies of the left and right ventricles as well as of the aortic root, which have been identified as leading underlying causes of SCD. At the same time, it is the intent of their work to demonstrate that such testing can be conducted effectively and economically by nonexpert examiners. An inexpensive, accurate, and timely assessment of cardiac structure would afford a significant opportunity to enhance the effectiveness of PPEs while offering an opportunity to immediately address the understandable concerns and anxieties that are experienced by athletes when questions concerning the presence of cardiac conditions arise. The authors report “good” correlation of POCUS with standard echocardiographic examination in assessing some dimensions of the left ventricle (septum and end-diastolic volume) and the aortic root and “moderate” correlation in assessing the thickness of the posterior wall of the left ventricle. Assessment of right ventricular dimensions by POCUS resulted in “fair” and “poor” correlation with conventional echocardiography.

POCUS was performed by an internal medicine resident (with no previous training in ultrasonography) who underwent approximately 45 hours of training followed by ongoing, self-directed learning using a simulator. This is not an insignificant period of time, particularly for team physicians (where they exist) in Canadian universities, who might have no experience in the administration or interpretation of POCUS tests. It remains to be seen how many team physicians would

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be willing to undertake more than 45 hours of additional training to be able to perform POCUS at the time of PPE. Nonetheless, the use of hand-held ultrasound devices is becoming more common among sports medicine clinicians to facilitate the diagnosis and treatment of musculoskeletal conditions. It is not unreasonable, therefore, to speculate that such clinicians might be interested in expanding the applications of this technology; the findings of this study will be of definite interest to them.

Scans were obtained using a GE VScan (GE Healthcare, Chicago, IL), the cost of which is noted to be approximately \$8000. There will be obvious costs incurred by universities in ensuring the presence of appropriately trained clinicians or technicians to administer the scans, in addition to the costs associated with the purchase or lease of the device. In the Moulson study, POCUS took between 8 and 15 minutes; the administration of such tests in Canadian universities would therefore require 13.5 to 25 hours for every 100 athletes, a not unimportant consideration and also one with cost implications. The authors acknowledge that a limitation experienced in this study was the need to assess images offline, adding further time requirements. The age at which phenotypic expression of relevant cardiac anomalies/abnormalities might appear may vary, and thus subsequent POCUS testing may be required, with additional associated cost implications, depending upon the age of athletes at the time of initial examination.

This study was carefully conceived and conducted; it achieved its primary objective of demonstrating that it is feasible to obtain good-quality, relevant POCUS images efficiently and effectively in the course of PPE. The study population of 50 athletes from 12 sports was small but appropriate for this pilot investigation. The authors acknowledge that not all relevant structures were adequately captured and note that a limitation of the process was the limited ability of POCUS to assess right ventricular function; this is an important concern, given the role of arrhythmogenic right ventricular cardiomyopathy in contributing to SCD, particularly in certain well-defined ethnic populations.¹⁵ Valvular function and the coronary arteries were also not well visualized.

The use of POCUS—termed “insonation” by some—has been considered the fifth component of the physical examination following inspection, palpation, auscultation, and percussion.¹⁶ POCUS has applications in many clinical settings and is now an element of many undergraduate and residency training programs.¹⁷⁻¹⁹ Notwithstanding the emerging limitations of PPEs in appropriately identifying and protecting those deemed at risk of SCD, the ability of POCUS to clarify physical findings, allay anxiety, and preclude unnecessary investigations hints at an emerging role for this technology in sports-medicine settings. Sports physicians and exercise scientists will also benefit from the opportunity to apply experience with this technology in a variety of research undertakings. Moulson et al. have demonstrated in this proof-of-concept study involving a small number of university athletes that insonation can be performed as part of PPE and that this technology and the SHARP protocol warrant further assessment in larger trials. Their work is a fundamental step in the continuing evolution and evaluation of this powerful and increasingly ubiquitous imaging technology.

Disclosures

The author has no conflict of interest to disclose.

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