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CURRENT PERSPECTIVES

Developments in sports cardiology: The way to a brighter future

Evoluindo na cardiologia desportiva: direções para um futuro melhor

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Despite the substantial health benefits it provides, regular exercise can paradoxically act as a trigger for sudden cardiac death (SCD) in some individuals with underlying cardiovascular disease (CVD). Accordingly, ensuring safety during sports participation and minimizing the risk of adverse events has become a major concern for medical and sports organizations. Pre-participation screening protocols have been established to reduce the risk of SCD in competitive athletes and are recommended by most medical societies.[1] Optimal cardiovascular screening should maximize yield without excessive cost; however, the best screening strategy remains the subject of considerable debate and there are calls for further evidenced-based research.[2]

Likewise, with the growing population of amateur athletes, physicians are inevitably being confronted with an increasing number of queries regarding sports participation from individuals at risk or with established CVD. Reflecting the relative lack of large prospective trials supporting eligibility criteria and the fear of potential cardiovascular events, some physicians recommend overly conservative exercise restrictions. This attitude may then be conveyed to patients, who may become fearful of exercising at any level. Severe restrictions hence bear the unintended consequence of contributing to the growing epidemic of sedentary behavior and obesity.

It is imperative to balance the numerous benefits of exercise and the low risk of life-threatening events. Systematic research has demonstrated the cardiovascular and non-cardiovascular benefits of regular exercise, which range from improving quality of life to reducing overall mortality, and play a critical role in primary and secondary prevention of most CVD.[3] In the current era, sports cardiology is a key pillar of preventive cardiology and should spearhead the promotion of safe engagement in structured physical activity in order to encourage athletes' ambition to continue performing routine exercise and to improve their functional status following a diagnosis of CVD.

Transitioning out of an athletic career can put the athlete's identity in jeopardy and have a profound impact on their psychosocial functioning.[4] In view of this danger, it is of paramount importance to recognize mental distress and address psychological needs. Psychological support

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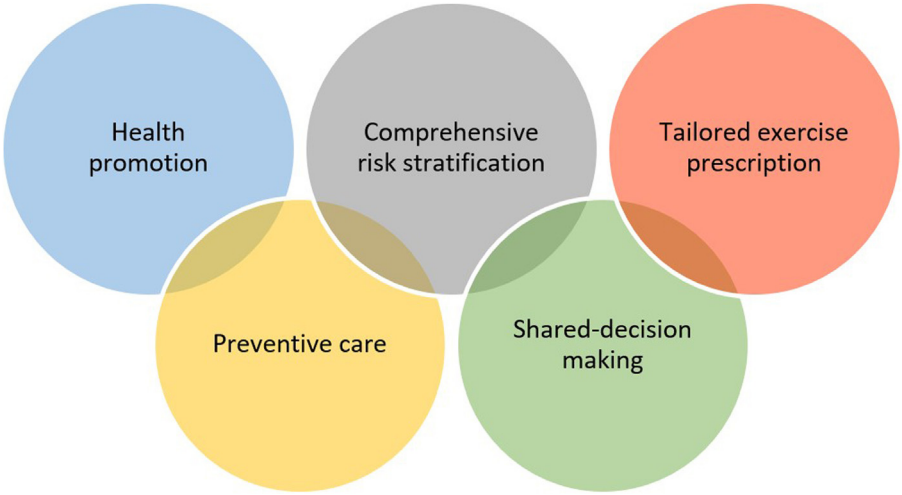

Figure 1 Cornerstones of modern sports cardiology.

should be considered when an athlete has been diagnosed with cardiac disease and/or is disqualified from competitive sports. It is also advised when an implantable cardioverter-defibrillator is recommended or if the athlete experiences SCD of a young relative, which may engender symptoms of depression, anxiety and post-traumatic stress.[5]

There is a need to shift from a historically binary approach to a personalized management plan, which is (and will continue to be) part of sports cardiology as a subspecialty. Respecting the autonomy of the individual and prioritizing the shared decision-making (SDM) process enables the physician to deliver more liberal and tailored advice. This functions as a collaborative process that requires the physician to provide detailed information regarding the potential impact of sports, allowing the athlete and other stakeholders to engage in detailed conversations regarding risk perception and responsibility. Nonetheless, considering the limited evidence available, assessing the athlete's absolute risk of events can be challenging and should take into account the type and severity of disease and the individual's demographic and clinical characteristics, as well as the volume, intensity and type of sport.[6] To facilitate the assessment and guidance of both amateur and professional athletes with CVD and to ensure that both physician and athlete are supported, it is crucial to establish multidisciplinary networks and enable close liaison with experienced sports cardiology centers.

An individualized approach, based on a detailed clinical assessment, risk stratification and exercise prescription, is key to ensure safety and minimize risks. In this setting, cardiopulmonary exercise testing (CPET) plays a pivotal role. This is increasingly used in a wide spectrum of clinical applications, from assessing overall cardiovascular performance to screening for undiagnosed exercise intolerance. Furthermore, it is a powerful means to individualize recommendations regarding sports[7,8] and can be used to monitor the progression of exercise training.

Current European guidelines focus on the formulation of exercise prescriptions and intensity levels based on well-recognized indices and cut-offs, including maximum heart rate, heart rate reserve and VO_2 reserve. However, risk prediction equations are often derived from cross-sectional or longitudinal observations in populations of healthy subjects and cannot necessarily be applied in patients with CVD. In addition, the standard deviation around the regression line is often ignored, disregarding considerable individual variability.[9] In patients with disease- and/or drug (e.g. beta-blocker)-related chronotropic incompetence, derived percentages are particularly unreliable for assessing the relative intensity of aerobic effort.[10] Exercise prescription based on these indices could result in under- or overestimation of individual exercise intensities, causing the patient to train at a different level from that shown to have a proven clinical benefit.[7] By contrast, an integrated interpretation of gas exchange parameters that reflect different submaximal ventilatory thresholds (VT) enables the creation of individually determined exercise zones. Therefore, defining exercise intensity through accurate and tailored quantification in individuals with CVD, i.e. using VT, should be the preferred method to prescribe exercise on an individual level.[8] Training is critical to interpreting data appropriately and it is therefore advisable to consign CPET and exercise prescription to be performed by physicians with expertise in the field. Given its cost and limited availability, CPET cannot be applied in all clinical scenarios and may be dispensed with in low-to-moderate risk individuals, in whom alternative tools, such as exercise stress testing, may be preferred to investigate the cardiovascular response to exercise.

Other than promoting a healthy and active lifestyle, the ultimate goal of personalizing exercise prescription is to mitigate the risk of adverse events. Unfortunately, it is impossible to fully eliminate the hazards and reduce the risk to zero. Current recommendations highlight a clear need for policies to increase public awareness, community training in cardiopulmonary resuscitation (CPR), and the availability of automated external defibrillators (AEDs). All sports facilities should develop a first-aid training policy and an emergency action plan incorporating CPR and AED use to safeguard sports participation and further reduce the impact of exercise-related SCD.

In summary, healthcare professionals should be aware of the changing paradigm concerning the safe participation

of athletes with CVD in structured and individualized exercise training. A tailored exercise prescription has emerged as a vital component of the cutting-edge management of these individuals and may serve as an integral element in the SDM process, laying the groundwork for modern sports cardiology (Figure 1). CPET is a valuable tool for exercise prescription and should be more commonly used in clinical practice to optimize exercise recommendations. Incorporating a personalized exercise training program within the overall management plan is the current state of the art. This approach will ensure individuals with CVD are not deprived of the many benefits (physical and psychological) of exercise and will ultimately enable a safe exercise routine.

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Conflicts of interest

The authors have no conflicts of interest to declare.

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