

## Protecting respiratory health of athletes: an Olympic challenge

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The summer of 2024 will be remembered in part for the XXXIII Olympic and Paralympic Games in Paris, France. The Games provide a platform to highlight the value of sporting participation and remind us of the widespread health benefits of regular exercise, including for cardiovascular, metabolic, mental, and respiratory health.

A key part of the mission of the International Olympic Committee Medical and Scientific Commission (IOC-MSC) is to protect athlete health, through the prevention of injuries and illness, both non-infectious and infectious. The IOC-MSC recently identified respiratory health as an important issue for athletes, commissioning an expert group to provide guidance in this area. This commission is timely and appropriate; respiratory symptoms, such as wheeze, cough, and breathlessness, are the most common symptoms reported by athletic individuals and their presence is heightened when exercise is performed in environments with poor air quality. Moreover, asthma is recognised to be the most prevalent chronic medical condition encountered in elite endurance sport athletes, affecting approximately one in five individuals; a rate that has not changed over the past four decades. Finally, acute respiratory illness is generally the most common reason an athlete will seek medical assistance at a major sporting event. In summary, respiratory issues represent a major burden in the context of competitive sport and significantly affect athlete health, wellbeing, and performance. Lessons learned from evaluating this population could benefit the care of all active individuals and those participating in vigorous exercise.

The reason for the high prevalence of respiratory issues in athletes remains to be determined. It has been hypothesised that undertaking repeated, vigorous exercise, in potentially noxious environmental settings (eg, competitive swimming in highly

chlorinated swimming pools), has a direct and deleterious impact on airway health; airway hyper-responsiveness appears to develop over the course of a career in some groups of elite athletes (ie, swimmers) and can regress on exercise cessation. Indeed, the repeated episodes of hyperpnoea, necessitated by vigorous exercise, could lead to the development of distinct airway pathobiology, with studies revealing airway cellular changes akin to a form of airway injury. As such, it has been argued that asthma in athletes could be viewed as an occupational lung disease.

To protect the respiratory health of elite athletes globally and apply any relevant findings to a general population of highly active individuals, we believe that respiratory and sport physicians and organisations must campaign to ensure: (1) better understanding of the mechanisms of disease in this area as noted above, to protect individuals before the onset of respiratory issues, optimise therapeutics, and provide best advice on safe participation during sport; (2) improved detection and diagnosis of respiratory disorders during exercise and better quantification of disease burden; (3) that physically active individuals are protected from exposure to poor air quality and establish evidence-informed guidelines or procedures for when to cancel or postpone training and competition; and (4) that systems are created to deploy our current knowledge in areas of the planet with fewer resources to promote health equity.

Most guidelines stress the importance of detection and optimal treatment of respiratory issues before exposure to repeated high-intensity exercise. It is apparent, however, that on a global level we are currently falling short of this ambition. In this respect, some industrialised countries have strategies (eg, UK Olympic programme) to detect and address asthma in elite athletic populations. However, this approach is not globally delivered and currently most countries appear to have adopted a reactive approach to respiratory health in athletes. This approach might be initiated too late in an athlete's career—eg, providing asthma treatment in an elite swimmer who has been training for years in a highly chlorinated pool.

The issue of ensuring adequate and early detection of respiratory issues, however, is not straightforward in elite athletes as there exist several so-called mimics for asthma. Fortunately, over the past decade there has been increased awareness of such conditions. In this respect, exercise-induced laryngeal obstruction (EILO), characterised by transient partial closure of the laryngeal inlet during vigorous exercise, is increasingly well recognised as a cause of symptoms at high intensity and affects roughly 5% of active adolescents and young adults. Correct diagnosis of this condition is important, to ensure that athletes receive targeted care and avoid unnecessary asthma treatment. Yet precise diagnostics, such as continuous laryngoscopy during exercise (CLE) are sparsely available outside Northern Europe, North America, and Australia. In addition, there is a lack of readily available detection methods for less common conditions that cause respiratory issues in athletes, including breathing pattern disorder and excessive dynamic airways collapse (EDAC). Standardised guidance related to real-time incorporation of environmental or infection data do not exist as of yet. In summary, we can do better with currently available diagnostics.



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The availability of diagnostics and therapeutics are part of the challenge of promoting health equity among athletes of diverse backgrounds globally. Regrettably, very little is known about the health impact of respiratory disease in athletes outside of high-income industrialised nations, including in those with short or long-term exposure to poor indoor or outdoor air quality. Acute exposure to ozone during exercise can result in dyspnoea, cough, and a decline in pulmonary function and exercise performance. Training facilities or competition venues are often closely situated to industrial areas and there is frequently very little consideration of competition scheduling (ie, location and timing of events in relation to daily variations in pollution levels). In aquatic facilities, measurement of trichloramine levels is technically very challenging, yet when performed, often exceed recommended thresholds. Finally, rural and urban areas are increasingly affected by prolonged particulate matter events such as those arising from wildfires and seasonal haze.

Overall, the aforementioned factors raise a question of whether the medical community could do more to better translate knowledge and advocate to ensure respiratory health in athletes is better protected in all locations. Thus, acting to align with the IOC roles to encourage and support measures relating to the medical care and health of athletes. Moving forward, to be better global stewards of available knowledge, it is important to ensure the availability of basic resources such as spirometry, as well as more advanced diagnostics such as CLE, and easy access to therapeutics for common respiratory diseases around the world. Moreover, there is a need to develop simple diagnostics for EILO, EDAC, and breathing pattern disorder as well as to advance the effectiveness of therapeutics for these conditions to support physical activity. Finally, there is a need to understand the acute and cumulative effects of infection and poor air quality, a need to understand the effectiveness of interventions aimed at mitigating these effects, and advocate for countermeasures that are found to be effective.

The recent tragedies within the Olympic Movement, related to athlete mental health, harassment, and abuse, ultimately prompted reflection and then enhanced strategies to protect health and improve care. It is now beholden to the respiratory community to act as

advocates for the respiratory health of athletes, to prioritise their care and to do so in a globally inclusive way.

MM reports research funding from the International Olympic Committee and Association of Summer Olympic International Federations and meeting attendance funding from FIFA Science, World Anti-doping Association, and the International Olympic Committee. All other authors declare no competing interests.