

Editorial

## **Point-of-care testing to detect respiratory infections in athletes: what is the role?**

James H Hull<sup>1,\*</sup>, Martin Schwellnus<sup>2,3</sup>, Maarit Valtonen<sup>4</sup>

<sup>1</sup>Institute of Sport, Exercise and Health (ISEH), UCL, London, UK

<sup>2</sup> Faculty of Health Sciences, Sport, Exercise Medicine and Lifestyle Institute, University of Pretoria, Pretoria, South Africa

<sup>3</sup>International Olympic Committee (IOC) Research Centre, Pretoria, South Africa

<sup>4</sup>Research Center for Olympic Sports, Jyväskylä, Finland

\*Correspondence to Professor James H Hull; j. hull@rbht.nhs.uk

Acute respiratory illness (ARI) is the most common reason athletes seek acute medical care and represents a significant challenge to the sport and exercise medicine (SEM) clinician working ‘in the field’.<sup>1</sup> Faced with this issue, there is a need to determine if symptoms are caused by an acute respiratory infection (ARInf), establish if a specific antimicrobial treatment is indicated, evaluate the risk of transmission and provide appropriate advice regarding the safety of ongoing sports participation.

Recent technological advances now offer clinicians the ability to rapidly (ie, in less than an hour) analyse respiratory samples and identify the presence of pathogens via genetic signatures. This approach, with molecular respiratory point-of-care testing (ResPOCT), can now be used not only for SARS-CoV-2 but also a panel of common pathogens causing respiratory infections, including viruses (eg, rhinovirus, seasonal coronaviruses, influenza viruses, and respiratory syncytial virus (RSV)) and some bacteria (eg, *Bordetella pertussis*, *Chlamydia pneumoniae* and *Mycoplasma pneumoniae*).

The accuracy and validity of ResPOCT have been tested against laboratory-based methods and are increasingly being used in ‘out-of-hospital’ settings.<sup>2,3</sup> Moreover, the development of more versatile and portable devices should prompt the logical question of whether this approach should be deployed more widely to enhance the care provided to athletes. This commentary discusses the potential role and ongoing knowledge gaps regarding ResPOCT in athletes.

### **ResPOCT in the assessment of an athlete with suspected ARInf—what do we know?**

Four studies<sup>4-7</sup> have provided detailed insight regarding the deployment of ResPOCT in an SEM context. These studies have demonstrated that ResPOCT can be used successfully to detect infectious pathogens in athletes presenting with an ARI. This is important because research undertaken several decades ago, although with more limited access to immediate testing, in summer sports athletes revealed that one in four cases of ARI had a proven infectious aetiology.<sup>8,9</sup> Thus, while it might be assumed that all ARI arise from infection, the data suggest that ARI can also arise from allergies±inflammation.

In 2018, Team Finland successfully deployed ResPOCT at the Winter Olympics, to detect influenza infection, leading to an immediate change in athlete care. Specifically, antiviral therapy (oseltamivir) was administered to treat six athletes and was given prophylactically to 32 athletes (34% of squad), thereby reducing transmission risk.<sup>5</sup> The use of ResPOCT also revealed five RSV infections, prompting vigorous infection control measures. At the same event, Team USA deployed ResPOCT to detect seven influenza infections, despite atypical clinical presentations.<sup>4</sup>

During the 2019 Nordic Ski World Championships, Team Finland again used ResPOCT to detect infection (RSV, seasonal coronavirus and metapneumovirus) in 10 (38%) athletes and 14 (39%) staff, leading to the avoidance of unnecessary antibiotic prescription and successful control of an outbreak.<sup>6</sup> The subsequent, ongoing, deployment of ResPOCT by Team Finland, as part of a rigorous infection mitigation strategy, has contributed to a significant reduction in the prevalence of ARinf.<sup>7</sup>

In summary, the ability to detect the causative agent of ARI in athletes has several seemingly obvious benefits, including facilitation of more accurate diagnosis, shaping clinical decision-making and treatment and acting to minimise outbreaks.

**ResPOCT in the assessment of the athlete with suspected ARinf—what do we need to know?**

The reports above highlight how ResPOCT can be successfully deployed; however, there remains equipoise within the SEM community regarding the necessity of this test. In this respect, several issues are often raised (table 1).

**Table 1** Application of point-of-care testing for respiratory infections (ResPOCT) in sport and exercise medicine (SEM) practice: considerations and research questions

Application of ResPOCT in SEM practice	
Considerations	Unanswered research questions
Accuracy	<ul style="list-style-type: none"> <li>▶ SEM-specific studies to evaluate precision of testing in geographically diverse settings, based on background epidemiology.</li> <li>▶ Need to evaluate precision of small, portable devices.</li> <li>▶ Need to determine risk of false-negative studies, in real-world setting.</li> </ul>
Treatment guidance	<ul style="list-style-type: none"> <li>▶ Ability for ResPOCT to influence clinician treatment choice and lead to improved antibiotic stewardship.</li> <li>▶ Use of antivirals in sporting context and impact on recovery and return to play (RTP).</li> <li>▶ Evaluation of pathogen-specific patterns of recovery and RTP.</li> <li>▶ Studies to determine if identification of pathogens adds value to risk assessment/RTP strategy, that is, when compared with clinical evaluation alone.</li> </ul>
Practicality	<ul style="list-style-type: none"> <li>▶ Need for a prospective cost-effectiveness analysis and compared with other investigations routinely performed. Outcomes may include assessment of antibiotics stewardship.</li> <li>▶ Practical ability to perform testing 'in the field', potentially in large numbers; i.e. skillset, time and consumables.</li> </ul>
Athlete and coach buy-in	<ul style="list-style-type: none"> <li>▶ Evaluation of athlete, medical and coaching team experience with testing, including qualitative experience.</li> <li>▶ Studies needed to evaluate impact of positive result in asymptomatic and (in mild illness) athletes, that is, how this alters management.</li> </ul>

ResPOCT, respiratory point-of-care testing.

Certainly, the main goal of any diagnostic test is to guide clinical decision-making and to positively inform patient management. Many clinicians challenge the value of ResPOCT on the basis that effective pharmaceutical treatment choice is currently very limited for viral pathogens and indeed is only currently available for influenza and SARS-CoV-2. Several ResPOCT devices, however, can also identify bacterial pathogens, that is, prompting other

antimicrobial treatment. Moreover, even in the absence of specific antiviral treatments, the positive identification of a viral pathogen confirms infectious aetiology and thus should act to promote general infection management strategies (ie, as opposed to use of allergy-based or other treatment strategies) and should act to improve antibiotic stewardship. This is yet to be established and requires prospective evaluation (table 1), but the aforementioned studies highlight that ResPOCT may be deployed to detect contact cases and thus to intervene to reduce transmission risk. It remains unclear, however, if the positive identification of a specific (viral) pathogen specifically alters or informs an isolation strategy (ie, above and beyond an empiric strategy) and studies are needed in this area.

It is also currently unclear, if the identification of a specific (viral) pathogen informs the other important clinical decisions to be undertaken by the SEM clinician, such as the need to limit sporting participation and guide safe return to sport. In this respect, viral infections can be associated with pathology in multiple organ systems. Myocarditis is arguably the most concerning health risk in this context and data collected early in the COVID-19 pandemic rapidly progressed our understanding of the risk of this complication with SARS-CoV-2. It appears that viruses such as adenoviruses, enteroviruses and influenza viruses are associated with the development of myocarditis, but this appears to be far less common following the most prevalent seasonal respiratory pathogens, that is, rhinoviruses and coronaviruses.<sup>10</sup> As such, ResPOCT may inform risk stratification; however, further studies are needed to understand how risk from ARinf could be characterised by the positive identification of a specific pathogen. Until this time, SEM clinicians may wish to use ResPOCT in cases where there is diagnostic uncertainty (eg, the case of an athlete with nasal symptoms) and in symptomatic athletes where it is felt that positive identification of a specific pathogen alters management, that is, to inform use of antimicrobial treatment.

This acknowledged, an obvious question for SEM clinicians and their healthcare organisations, concerns the cost-effectiveness of deploying ResPOCT in a sports medicine setting. To date, there has been no cost-benefit analysis of this approach and while the current cost appears to be acceptable for some elite sporting organisations (ie, several international teams plan to use ResPOCT at the Paris Olympic and Paralympic games), it is not clear how ResPOCT compares with other investigations that may be considered or undertaken, in the assessment of an athlete with ARI.

### **Looking towards the future and use of ResPOCT to enhance athlete care**

In a world where technological advances offer an increasing number of diagnostic or point-of-care tools, ResPOCT needs to establish its value and role within the SEM clinicians' 'medical bag'. We believe that ResPOCT is an important tool to ensure SEM practice moves beyond management strategies based on a clinician's 'best guess' and arbitrary rules (eg, the neck check), to provide a more informed approach to the management of ARinf in athletes. It also offers an opportunity to undertake research to better understand this prevalent issue. The use of ResPOCT has the potential to improve antibiotic stewardship, prevent nosocomial infection and enhance risk stratification. Further studies are now needed to help shape the way this modern clinical tool is used within the SEM setting and to ensure that it is cost-effective and accessible in a globally inclusive and equitable way, to enhance the care of all athletes.

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