Editorials

Point-of-care testing for respiratory infections during and after COVID-19

INTRODUCTION

The public's attitude to testing is likely to change in response to SARS-CoV-2 testing. We expect it will not be long before we are asked why tests are not offered for other respiratory infections. Prior to COVID-19, the initial management of most respiratory tract infections (RTIs) was conducted without microbiological testing, with many suggesting the consequent diagnostic uncertainty[1] to be a leading cause of antibiotic overprescribing[2] and resistance.[3] Standard laboratory methods are too slow for initial decision making necessitating the use of rapid point-of-care testing. This technology, advocated as key to future antimicrobial stewardship,[4] is now available and able to provide comprehensive respiratory virus panel results, including SARS-CoV-2, in 45 minutes.[5–7]

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POINT-OF-CARE TESTING

Last winter, our team led the first exploratory investigation of the use of a multiviral point-of-care test using upper respiratory tract swabs in UK primary care. We found testing was acceptable to patients and improved clinician diagnostic certainty.[8] However, clinicians were concerned about the absence of randomised trial evidence of effectiveness.[8]

While the upper respiratory tract is the only universally accessible location for sampling, swabbing is an inexact science. Even swabs taken by trained clinicians result in zero pathogen detection in up to 28% of symptomatic people.[9–11] This likely represents suboptimal sampling, perhaps from an uncolonised region, rather than absence of pathogens in the respiratory tract. Conversely, in a small study published in 2017, we detected potentially pathogenic respiratory viruses in the upper respiratory tracts of 26% of asymptomatic children.[9]

Nonetheless, interest in the role of point-of-care testing for antimicrobial stewardship is growing. The 2014 National Institute for Health and Care Excellence adult pneumonia guidelines recommend the use of C-reactive protein (CRP) testing in patients presenting to primary care with suspected community-acquired pneumonia.[12] The recommendation is based on randomised controlled trial evidence demonstrating the effectiveness of CRP testing in reducing antibiotic prescribing.[13–15] Yet 6 years later, the primary care uptake of CRP testing is remarkably low. Why?

We hypothesise that, in addition to unresolved discussions regarding who should pay for the test, clinicians may be uncertain as to how the test works. After all, an elevated CRP only indicates host immune activity, not that the infection is bacterial, nor that the infection has a poor prognosis. The mechanism by which CRP testing works could be simply that the low prevalence of elevated CRP in primary care, an element not always reported in the trials,[13,14] more often than not favours a 'no antibiotic prescribing decision'. And test results are often regarded as 'objective' and 'true'; we rarely consider the impact of false positives and false negatives in day-to-day practice.

So, what is the prevalence of elevated CRP in primary care patients with acute lower RTI? In one study, of adults with acute cough,[13] CRP was ≤20 mg/L in 69% of participants; 20 to 99 mg/L in 24%; and ≥100 mg/L in 7%. In another study, also of adults with acute cough,[14] CRP was ≤20 mg/L in 70% of participants; 21 to 50 mg/L in 16%; 51 to 99 mg/L in 9%; and ≥100 in 5% (B Stuart, personal communication, 2020). Finally, even in a trial of patients with acute exacerbation of COPD in whom CRP might be expected to be higher,[15] CRP was <20 mg/L in 76%; 20 to 40 mg/L in 12%; and >40 mg/L in 12%. Thus, the effectiveness of CRP could be mediated through behaviour change in response primarily to the CRP result favouring a 'no-prescribing' decision eight to nine times out of 10. It is therefore more important than ever to understand how CRP, and other point-of-care tests, work particularly in low disease prevalence settings like primary care.

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CONCLUSION

In an emerging landscape where billions of dollars are being invested to develop test technology,[16] and both patients and clinicians now consider results of upper respiratory tract swabbing to be an accurate reflection of their COVID-19 status, key research questions remain unanswered. What is the diagnostic and prognostic significance of the detection of bacteria and viruses from the upper respiratory tract? Do these tests provide diagnostic/prognostic value over and above symptoms and signs? How do they work to improve antibiotic prescribing, antibiotic consumption, and patient outcomes? And if they do work, are they clinically and cost-effective, and safe?

These questions are familiar to clinicians and medical scientists; they reflect the phase I to IV evidence base required before new medicines can be prescribed. Respiratory tract testing has now become mainstream and the widespread use of point-of-care microbial RTI tests is on the horizon. We believe these should be investigated in the same way as new medicines, ensuring appropriate use of public funds and enabling patients and clinicians to understand if the tests are useful tools, or costly distractions.

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Provenance
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Competing interests
BioMérieux provided point-of-care test machines for a recent study.[8] The study purchased the testing kits and returned the machines to BioMérieux at the end of the study.

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