GUEST EDITORIAL

Optimising blood cultures: The interplay between diagnostic and antimicrobial stewardship

Antimicrobial resistance (AMR), and especially bacterial resistance to antibiotics, threaten our ability to provide a modern health service, posing a high risk of morbidity and mortality for common infections. Following publication by the Global Research on Antimicrobial Resistance (GRAM) project, we now have a far more accurate assessment of mortality from AMR than the oft-quoted estimate of 10 million excess deaths by 2050.[1] In 2019, 4.95 million people worldwide died with an antimicrobial-resistant infection, and 1.27 million of those – more than HIV and malaria combined – died as a direct result of resistance.[2]

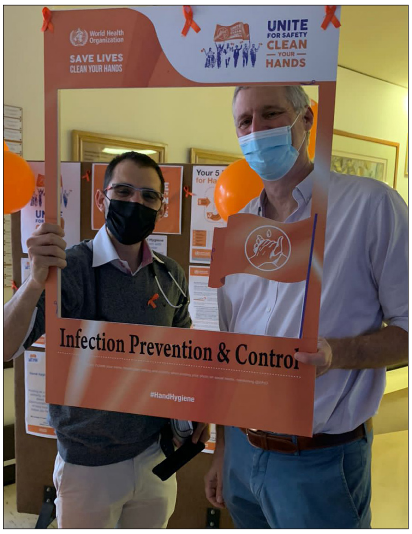
The estimate was derived from statistical modelling of over 470 million pieces of data. However, it is widely recognised that data from low- and middle-income countries are missing and that the true number of deaths is much greater. Missing data talks to a lack of laboratory infrastructure and access to laboratories that are set up to perform microbiological tests in low-resource settings. However, access is not the only issue. 'Diagnostic stewardship' – the optimal use of diagnostic tests to enhance infection management – requires intent. Even in high-income countries such as the UK, where access to laboratories is not an issue, intent is often lacking; fewer than one-fifth of patients hospitalised for COVID-19 underwent a diagnostic test for bacterial coinfection, yet 61 - 100% of admitted patients received an antibiotic.[3-5]

Bloodstream infections are an important contributor to global mortality, with an overall crude mortality rate of 15 - 30%.[6,7] Blood cultures play an important role in optimising the use of antimicrobials by defining the pathogen responsible for infection, particularly when patients present with undifferentiated febrile syndromes where a focus of infection is not apparent. Furthermore, once cultured, antimicrobial susceptibility testing can be performed, enabling de-escalation of antimicrobial choice, from a broad-spectrum empirical antimicrobial to a narrow-spectrum choice. De-escalation reduces the risk of selection of antimicrobial-resistant pathogens and that of infection with *Clostridiodes difficile*, hence limiting collateral damage.

In this issue of CME, Papavarnavas *et al.*[8] provide a timely update to the guidelines for optimal use of blood cultures published in 2010.[9] Over the past decade, definitions of sepsis have altered[10] and advances in understanding of the use of blood cultures have been made. A common question that remains is whether blood cultures influence patient management. The answer is yes, including in our local context, where blood cultures taken from patients attending two emergency departments in Cape Town hospitals, as part of an observational cohort study, demonstrated that positive blood culture results influenced patient management in 95% of cases, when a pathogen was isolated. The pathogen was resistant to the empirical antibiotic choice in a quarter of cases.[11]

Importantly, Boyles *et al.*[11] also demonstrated that the amount of blood drawn can significantly affect sensitivity. For adult blood culture bottles, culturing <8 mL of blood was predictive of a negative result. Poor technique also enables contamination of the blood culture bottles with skin commensals, so the addition to these updated guidelines of a video describing the correct step-by-step procedure for taking an optimal blood culture is to be welcomed. Contamination of blood cultures comes at a cost, not only to infection management but to the health service as well. A study from Western Cape Province analysed direct item and laboratory expenses in relation to contaminated cultures.[12] It found that associated with a 2.2 - 4.5% monthly contamination rate reported at the National Health Laboratory Service laboratory at Groote Schuur Hospital, Cape Town, was a total cost of ZAR1 017 576 over 3 years. Tertiary-level hospitals were responsible for almost half of contaminated culture bottles.

Optimising blood cultures is a critical part of diagnostic stewardship, which in turn optimises antimicrobial stewardship and the management of infection. Knowing when and how to use blood cultures in daily practice and, critically, getting the technique right, are imperative if this valuable tool is to prove its worth.



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