Panels for fast sepsis diagnosis

When sepsis strikes, every hour counts. But traditional antimicrobial susceptibility testing can take up to 72 hours and doesn't always identify the genes that make bacteria resistant to treatment. Clinical microbiologist Dr Cathal Collins from Ireland's Cavan General Hospital discusses how new testing panels from **GenMark** are changing the game for sepsis diagnosis.

Why is it important to diagnose the cause of sepsis early?

Dr Cathal Collins: We are always endeavouring with regard to sepsis to shorten the time between the clinical diagnosis and the diagnosis of the cause, as we know this can impact on patient outcome. Knowledge of the causative organism aids antimicrobial decision-making, provides support for a clinically-made diagnosis or provides a clue regarding the sepsis source if it is not clinically apparent. If organism identification has infection control or public health consequences, the earlier appropriate control measures are instigated, the more successful these measures are likely to be.

What are the advantages of identifying antibiotic resistance genes over normal methods of antimicrobial susceptibility testing?

The methods employed to detect antibiotic resistance genes tend to provide information much more rapidly than phenotypic ones. Early knowledge of certain resistance genes can identify agents that should probably be avoided in treating the patient. Detecting the presence of resistance mechanisms can also sometimes be difficult with phenotypic methods alone. Finally, identification of antibiotic resistance genes gives infection control practitioners more detailed information than what phenotypic methods can do.

What effects does this have on patient care?

Whenever possible, the organism identity and its susceptibility profile should be determined as soon as possible, so that targeted antimicrobial therapy can be provided. Antimicrobial resistance is a major concern these days and our chances of being wrong with empiric antimicrobial prescribing decisions are increasing all the time in pretty much all parts of the world. We know that the sooner appropriate antimicrobial therapy is administered in sepsis, particularly in the critically ill, the better the outcome for the patient.

What has your experience been of using GenMark's ePlex blood culture identification panels to identify resistance genes?

I can say that ePlex has significantly changed the way we deal with blood cultures. The medical laboratory scientists are happy with its ease of use and hands-on time per test, and we can provide clinicians more detailed information much sooner – within a couple of hours of a positive blood culture, rather than days. I love that I no longer have to wait on overnight cultures to determine if that Gram-positive coccus that looks like a *Staphylococcus spp* on the Gram stain is an MSSA/MRSA or not. This sort of information allows targeted therapy and helps to avoid the unnecessary addition of antimicrobials. In fact, the performance of the ePlex is such that we are now considering not routinely performing any subcultures from peripheral blood cultures where staphylococci are suspected on the Gram stain, and the ePlex has indicated that neither *S. aureus* or *S. lugdunensis* are present.

Can you tell us about a case study?

We had a patient recently who was diagnosed with a hepatic abscess and had a blood-culture flagging positive with Gram-negative bacilli and Gram-positive diplococci within six hours of collection. Within a couple of hours of the Gram result, the ePlex panel had detected the presence of *Escherichia coli* with an extended-spectrum beta-lactamase (ESBL) resistance gene (CTX-M) and an *Enterococcus faecium* with a vancomycin resistance gene (vanA). The patient's antibacterial regimen was changed from piperacillin-tazobactam and gentamicin to linezolid and meropenem shortly after. Standardised culture-based susceptibility results only became available two days later and confirmed the presence of an ESBL-producing piperacillin-tazobactam-resistant *E. coli* and a vancomycin-resistant *Enterococcus faecium*.

What effects have you seen on patient outcomes in general at Cavan General Hospital since these panels came into play?

We're a small hospital with about 220 acute-care beds and have only been using these panels routinely for our blood cultures since January, so we don't have any overall objective information on this yet. Anecdotally, though, we have had several cases where organism identification and/or the detection of resistance markers in blood from the Gram-stain positive blood culture has resulted in the administration of targeted antimicrobial therapy around 24 hours sooner than would have been the case when relying solely on culture-based methodologies. This can only be good for patient outcomes. ■

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