

The war on drug resistance

The global antimicrobial-resistance epidemic is of concern to all healthcare workers, especially when it comes to sepsis. **GenMark**, a leading provider of diagnostic solutions designed to improve patient care, is launching a new campaign to improve the way diagnostics are implemented, especially when it comes to microbial detection. Max Maurin, professor of clinical microbiology at Grenoble University Hospital, and Tristan Timbrook, an antimicrobial stewardship pharmacist, speak to *Practical Patient Care* about the path forward.

The importance of stewardship programmes in patient care settings is something that many are trying to promote, especially when it comes to highlighting the value of rapid pathogen and antibiotic resistance gene detection (ARGD) in improving sepsis outcomes. More and more people are dying of microbial resistance, and new strategies are needed for rapid identification to enhance patient care and improve antimicrobial stewardship.

The importance of rapid detection

“The emergence of multidrug resistance (MDR) in common human pathogens has dramatically increased the risk of treatment failure related to the administration of inappropriate empirical therapy,” says Max Maurin, professor of clinical microbiology at Grenoble University Hospital. “In order to reduce this risk, the antimicrobial spectrum of empirical treatment has been gradually expanded, but this has contributed to the rapid emergence of new resistances.”

Tristan Timbrook, an antimicrobial stewardship pharmacist, agrees with his peer.

“For every hour that a sepsis patient goes without effective antimicrobial therapy, mortality increases by 8%,” he explains. “Conventional microbiology techniques typically require days to provide actionable results. Therefore, in patients with sepsis and bacteraemia or septicaemia, the rapid identification of pathogens and antibiotic resistance genes can have profound value and impact on patient clinical outcomes by ensuring timely prescribing of effective antimicrobial therapy.” Time to effective and optimal therapy can “translate into improved clinical outcomes including decreased mortality, length of stay, avoidance of adverse drug effects and healthcare financial expenditures.”

The benefits of rapid resistance gene detection have been noted. Acquired resistances to antimicrobials are usually determined by phenotypic methods – such as the antibiogram – which currently provide final results two days or more after clinical sample collection for isolation of the pathogen, says Maurin. But rapid molecular diagnostic technologies can improve patient outcomes in septicaemia through detection of resistance genes and organisms, and the use of resistance detection may help to decrease unnecessary broad-spectrum antibiotics, decreasing resistance and infections.

Tailored therapy

In comparing ARGD to antibiotic susceptibility testing (AST) alone, ARGD adds value to AST because it allows more rapid determination of effective therapy than any currently FDA-approved

phenotypic techniques. Resistance gene detection can complement AST in ways not readily apparent, and can reflect resistance genes that may not be phenotypically identified by AST.

What more can be done by hospital infection control and prevention (ICP) with routine antibiotic resistance gene results? “With routine antibiotic resistance gene results, hospital ICP can improve the ability to isolate patients,” says Timbrook. “These also allow for the faster removal of contact precautions in patients without the need as contact precautions, while important and helpful, have been shown to be burdensome to patient care.”

Maurin agrees: “rapid detection of microorganisms with multidrug or high-level resistances to antibiotics in infected patients and/or carriers is of tremendous importance to limit their spread in hospital settings.”

The future of bloodstream infection diagnostics will likely not be solely phenotypic or genotypic methods, according to Timbrook, but more likely a “combination thereof, similar to HIV testing, as they provide complementary information.”

Technologies in practice

It is worth noting that studies have demonstrated antimicrobial stewardship programmes are essential in achieving these outcomes by facilitating appropriate and timely use of rapid diagnostic results. Unfortunately, survey data has suggested that – at most – only 30% of hospitals use these potentially life-saving diagnostic technologies in patients with septicaemia.

Increasing antimicrobial resistance is currently a global public health threat and the continued problem of resistance is unavoidable. However, with antibiotic use being a principal driver of increasing antibiotic resistance, rapid diagnostics facilitated by antimicrobial stewardship programmes can improve the use of targeted narrow spectrum antibiotics to avoid unnecessary selection for antibiotic resistance. Adoption of these new rapid technologies, used in conjunction with antimicrobial stewardship programmes and clinician education for awareness on antimicrobial resistance issues, will no doubt help to turn the tide in antimicrobial resistance.

Ultimately, the barriers to improving sepsis patient outcomes are numerous, and a return to a more favourable situation will require sustained efforts to eliminate such MDR populations, especially in hospital settings. ■

Further information

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