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SmartNotes

Antibiotic susceptibility testing's vital role in COVID-era antimicrobial stewardship

Antibiotic use changed considerably during the first wave of SARS-CoV-2 as the pandemic changed processes and priorities almost overnight.

We won't know the true impact of this shift on antimicrobial resistance (AMR) for some time. But as the medical science community adapts to the ongoing threat of SARS-CoV-2, we need robust stewardship programmes that take account of these changing pathways and utilize all the tools at our disposal.

The story so far

In the first few months of 2020, clinicians reported seeing the overall usage of antibiotics decrease[1], but per patient prescriptions rise.[2]

As hospitals faced being overwhelmed by SARS-CoV-2 patients, priorities, understandably, changed. Access to antibiotic susceptibility testing (AST), a key tenet of robust antimicrobial stewardship was limited by time constraints and infection control measures.

As a result, the use of broad-spectrum antibiotics in hospitalized COVID patients in the absence of bacterial screening became almost routine in the early days of the pandemic[3], prompting many to warn of the impact on AMR.

Romney Humphries, Medical Director of the Microbiology Laboratory at Vanderbilt University Medical Center, in Nashville, USA, said: "This is an unprecedented time and there are many risk factors that could have a negative impact on AMR rates, both at a local level as well as nationally and globally.

"Some of the challenges we've encountered include a fairly widespread use of antimicrobials for patients confirmed to have COVID-19, including treatment for presumptive or confirmed secondary bacterial infections. Testing for these patients, especially at the beginning of the pandemic, was minimal due to infection control risk and, as a result, very broad-spectrum antimicrobials have been used in the absence of any microbiology data."

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At the same time, non-SARS-CoV-2 services, including primary care and dentistry, saw a marked decrease in patient numbers. Fear of infection among the public dissuaded people from seeking care, having a knock-on effect on medication use, and the suspension of elective procedures led to a significant reduction in the prophylactic use of antibiotics.[4]

There is now emerging data to support a clear association between elevated concentrations of procalcitonin and increasing COVID-19 disease severity, and antibiotic prescriptions in this patient group remains high.[2] The pandemic and the AMR crisis, then, therefore seem inherently linked for the foreseeable future.

Experts are now calling for hospitals to move away from using broad-spectrum antibiotics in confirmed COVID cases where there is no evidence of bacterial infection.[5],[6]

Driven by the evidence

Having lived through the first peak of COVID-19 infections and armed with a mounting body of evidence on how to best manage SARS-CoV-2, the healthcare community is refocusing on the impending pandemic of AMR.

The United Nations has warned that antimicrobial-resistant infections kill an estimated 700,000 people a year. Unabated, it said, AMR could cause 10 million deaths a year by 2050, and push up to 24 million people into extreme poverty by 2030.[7] These figures, published last year, do not take the impact of prescription patterns during the pandemic into account, but they still have the potential to eclipse the impact of SARS-CoV-2.

As of July 2020, antimicrobials, most commonly broad-spectrum antibiotics, were being administered to around 75% of hospitalized COVID-19 patients.[6] In part, this was driven by experience from previous influenza pandemics, which recorded secondary bacterial pneumonia as a major cause of mortality, affecting around 35-50% of patients.

Data now show this is not the case in COVID-19. A recent meta-analysis suggested just 8% of those hospitalized with the disease experienced bacterial or fungal co-infections, although rates of co-infection ranged from 0–27% across the nine studies. [8]

Maximizing the medical toolkit

Of course, it is important to recognize that antibiotics are an important and vital tool in the fight against SARS-CoV-2. Many risk factors that increase the likelihood of hospitalization or poor outcomes from COVID-19, such as advanced age, nursing home residence, and comorbidities, for example, also predispose people to antimicrobial resistant infections.[7]

That's why the medical community is striving to deliver antimicrobial stewardship that fits within new COVID-19 patient care pathways. Clinicians understand that antibiotic use must remain informed and measured to protect the provision of future healthcare – and are working harder than ever to ensure the right patient gets the right treatment at the right time.

According to a publication from the Clinical and Laboratory Standards Institute (CLSI), there is an "urgent need" for rapid diagnostics that can determine if a patient has an infection, distinguish viral and bacterial sources, and identify the etiologic agent and its susceptibility profile.[6]

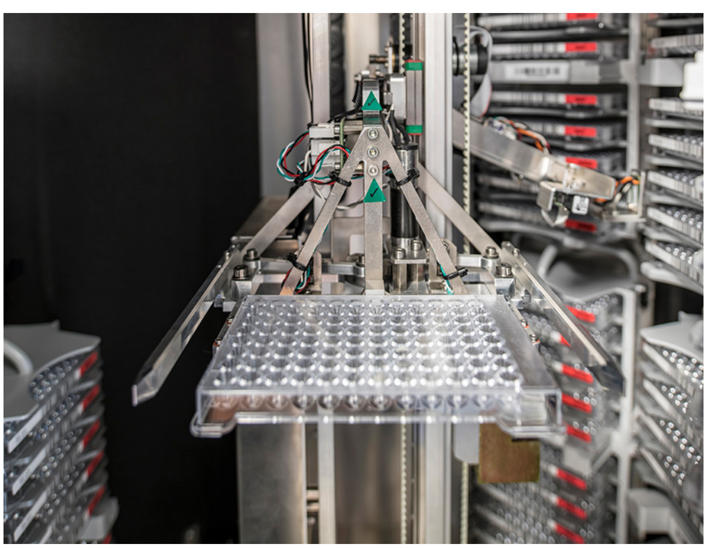
By quickly identifying the suspected pathogen and determining how susceptible it is to treatment, labs can guide right first-time clinical decisions in fast-paced environments. Not only can this significantly improve individual outcomes, the approach also avoids unnecessary antibiotic use, thereby contributing to stewardship efforts.

Partnership working

Thermo Fisher Scientific, as a partner in these efforts, understands that innovation in testing must match innovation in new antibiotic development, medical technology development and patient pathway optimization if we are to meet the challenge of AMR in the COVID era.

The Thermo Scientific™ Sensititre™ System for AST provides modular, customizable antibiotic susceptibility testing to meet the unique demands of each laboratory, regardless of sizes and volumes.

The product line includes a full range of standard and custom minimum inhibitory concentration (MIC) plates that supports laboratories in the reduction of offline testing while meeting CLSI and EUCAST breakpoint requirement and established FDA criteria.



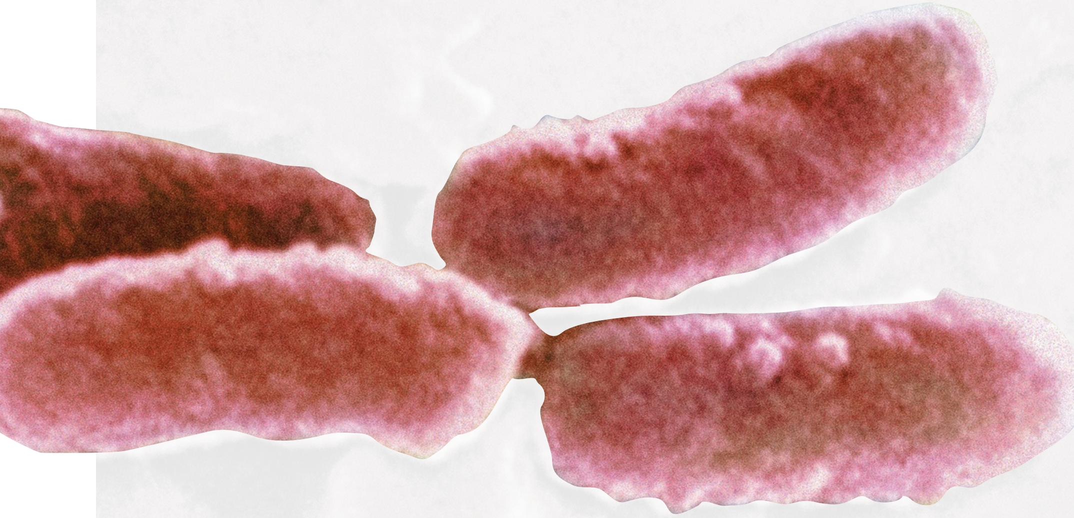
Flexible instrumentation option

All instrumentation options support expert interpretation via the connected and touchscreen enabled Thermo Scientific™ Sensititre™ SWIN™ Software System.

- The fully-automated Thermo Scientific™ Sensititre™ ARIS HiQ™ System for AST: benchtop incubating and reading system with a 100-plate capacity for a combination of up to 300 possible tests
- The fully-automated Thermo Scientific™ Sensititre AIM™ Automated Inoculation Delivery System: quick and accurate dosing of most 96-well plate formats[9]
- The manual Thermo Scientific™ Sensititre™ Vizion™ Digital MIC Viewing System: Produce digitally generated plate images for efficient and accurate reading/recording
- The semi-automated Thermo Scientific™ Sensititre™ OptiRead™ Automated Fluorometric Plate Reading System: fast and accurate plate reading

The Sensititre portfolio enables laboratories to create the ultimate testing program unique to their needs by:

- maximizing confidence, reproducibility, and accuracy with true MIC results
- tailoring formats to formulary requirements with one of the largest and most up-to-date selections of FDA-cleared antimicrobials[10]
- consolidate susceptibility testing into a single solution



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[10] Review date of June 2021

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LT2545A
July 2021

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