

Fast molecular diagnostics for tight turnaround times

Turnaround times for diagnostic tests can be an obstacle to effectively controlling healthcare associated infections (HAI), such as methicillin-resistant *Staphylococcus aureus* (MRSA) and carbapenemase producing Enterobacteriaceae (CPE), with delayed results leading to ward closures and cancelled operations. Fast molecular diagnostic technology provides a streamlined solution and offers the possibility of decentralised laboratory services to further improve turnaround times. **Julian Bendle**, Manager of the Department of Clinical Microbiology and Infection Control for the Aneurin Bevan University Health Board, describes changes to the department's approach to MRSA and CPE testing.



The Aneurin Bevan University Health Board serves a wide geographical area, covering the counties of Newport, Torfaen, Monmouthshire, Caerphilly, Blaenau Gwent and South Powys. The Board's microbiology services are based at the Royal Gwent Hospital in Newport, with a team of 45 BMSs and 17 MLAs processing around 450,000 samples every year. Bacteriology makes up 80 per cent of the workload and, in January 2015, members of the Trauma and Orthopaedics Department approached the microbiology team to discuss turnaround times (TATs) firstly for MRSA, then for CPE screens.



Above. The GeneXpert, situated in the Royal Gwent Hospital in Newport

Under the laboratory's previous culture protocols, MRSA samples required incubation for at least 18 hours before positive colony growth could be confirmed. Consequently, a patient had often been transferred to a ward by the time a positive result was returned, and this unavoidable delay was leading to compromised wards and subsequent cancelled operations. The slow availability of screening results was also impeding the admission of patients requiring urgent operations, and the problem was further exacerbated at weekends, when infection control cover was limited.

Finding a solution

The last few years have seen accelerated development of molecular diagnostics. New PCR-based technologies are transforming the testing process, and enabling fast, on-demand testing using stand-alone instruments. After researching various options and trialling a number of platforms, the department purchased a GeneXpert® system (Cepheid), which offers a TAT of approximately one hour for MRSA testing (Xpert® MRSA NxG). The microbiology services can now provide results within two hours of receiving a sample and, although the underlying technology is very sophisticated, performing the test is straightforward. The system ensures consistently high quality results and allows the department to pick up strains that would be missed using its

in-house media, as well as enabling better random access testing coverage at weekends.

Expanding the scope

The microbiology team subsequently turned its attention to validating carbapenem resistance testing (Xpert® Carba-R) on the same system, following a CPE outbreak in March 2017 introduced by a patient who had been transferred from another hospital. All the patients on the ward had to be screened and several environmental swabs were submitted, which greatly increased the laboratory workload. This incident highlighted how fast testing could significantly help the infection control team, reducing the department's TAT to two hours and improving the overall service.

News travels

A key aim of any hospital is efficient management of patient flow and reduced waiting times. This fresh approach to testing has placed the department under the spotlight, highlighting how it is working to improve TATs and helping to direct patient

care pathways. The resulting improvements in patient management have generated interest in molecular diagnostics from other departments; colleagues across the board can see the many benefits that it brings, and have been surprised by how easy it is to perform the tests using the self-contained platform.

Developing and decentralising testing

The new testing protocol is not simply limited to MRSA and CPE, however, and the microbiology team is currently validating the Xpert® Xpress Flu/RSV assay, with the possibility of introducing additional molecular tests to further improve the service in the future. The availability of these small footprint systems like the GeneXpert is also making decentralised testing a possibility. Plans to build a new hospital – The Grange University Hospital in Cwmbran – will create an ideal opportunity to use an additional system to provide on-site satellite testing. This will be far more convenient than sending samples to the main microbiology laboratory in Newport,

enabling quicker TATs. With sufficient training, Band 4 practitioners can easily be brought up to speed on the intuitive system, while a biomedical scientist from the microbiology laboratory can oversee maintenance and quality control.

In summary

The introduction of advanced molecular diagnostics has had widespread benefits for the hospital, improving patient management and flow. Faster TATs for MRSA and CPE testing have undoubtedly prevented compromised wards and cancelled operations, and the GeneXpert platform can accommodate a broad range of tests, including Flu A/B, RSV and CT/NG. The size and ease-of-use of the latest generation of molecular diagnostics platforms also enables decentralised testing across multiple departments and hospital sites, supporting the efficient and effective patient care at the heart of the Aneurin Bevan University Health Board.

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