



## Rapid diagnosis and the routine microbiology laboratory

This issue of *Microbiology Australia* discusses many of the exciting technological advances occurring in laboratories that give us quicker and better quality results. Many of these have been developed to meet new demands for quicker diagnosis of common infections, or relate to uncommon infections with dire individual or public health consequences.

It is clear that these tests or the technology they use will have extensive and exciting future applications in routine microbiological diagnosis. As a profession, it is our job to move forward in the quality of the service we offer. Certainly those of us who act as consumers of laboratory services as well as providers are usually happy and impressed when results get back to us unexpectedly quickly, even if it is only to confirm our suspected diagnosis and allow us to be more confident about the management of the patient. Pathology services also want to produce results as quickly as possible as most believe that it improves the service to our health service clients and their patients. As we advance into another new era of routine laboratory diagnostics, it is worth pausing to consider what we are achieving and how much we want to pay for it.

There are a number of legitimate reasons why rapid result turnaround may be beneficial, particularly for those that are involved in the emergency management of patients. It is hard to argue that knowing a patient's blood gases rapidly when they are in respiratory failure does not assist patient management.

As microbiologists, the issues are not quite as clear, as most decisions about management of infectious diseases are



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still based on a clinical diagnosis and empirical decision making, with the laboratory results following 24-48 hours later.

What difference would it make if results are available at 1 hour rather than 48 hours? There are a few obvious reasons that are often proposed:

- Better decisions about antibiotic therapy. Early information about the infecting agent should mean better choices about antibiotics to avoid unnecessarily broad-spectrum antibiotics and to flag unexpected resistance. Also an early viral diagnosis may avoid inappropriate use of antibacterial agents<sup>1</sup>.
- An early and confident microbiological diagnosis may avoid unnecessary investigation, both by excluding non-

infectious causes and by guiding investigations once a specific infective agent has been identified.

- Earlier discharge of patients, in situations where an infective diagnosis provides enough certainty for a person to be managed at home.
- Identification of infections posing a risk to contact within or outside hospitals, allowing earlier intervention to stop spread.
- Provision of better information to the patient, better prognostication, and early opportunities for patient education. These clearly contribute to the quality of care provided to the patient.

Pathology services themselves may benefit from turning around tests and results more quickly. It allows less specimen and paper handling in the laboratory and can improve efficiencies. It also enhances the laboratory's reputation and image with clients, which not only makes us feel good but can be useful in the competitive private market.

There is now a natural tendency to try and get results out quicker. It is difficult to argue with this desire if it is easy and cost-effective. Of course, we first need to ensure that rapid tests offer a satisfactory quality of results. For example, there is considerable interest in rapid point of care testing for influenza and there are certainly potential roles for these tests in both individual patient diagnosis and in outbreak management. However, none of the rapid tests currently available is as sensitive as laboratory-based tests, therefore, where accurate diagnosis is important, lab based tests should prevail.



Decisions about adopting rapid tests become particularly difficult where there is an additional cost involved, either because the new test is more expensive or because it has to be done in addition to a conventional test. Microbiologists should then ask the difficult questions about the effect on patient management. Unfortunately, the truth is that, for the vast majority of the routine work that microbiology laboratories perform, there is actually precious little hard evidence of its impact on health costs. That is not to say that it does not have an impact, we just do not know.

The first question is whether producing quicker results provides useful information to inform decision making. For example, there are recent data that early diagnosis of influenza reduces antibiotic prescribing in children and reduces admission rates<sup>1</sup>. But does rapidly identifying a cause of urinary

tract infection or sepsis usefully modify therapeutic decisions? It only does that if empirical decisions are wrong in a significant proportion of cases.

Also, if we can provide antibiotic susceptibility results in 6 hours rather than 48 hours, will it provide us with enough unexpected results to make it worthwhile? Clearly one can think of situations in which there are potential benefits. For example, molecular tests for *Mycobacterium tuberculosis* susceptibility may allow earlier identification of resistant strains and allow modification of therapy. However, that is an uncommon situation, and mostly we deal with routine and predictable urinary tract, soft tissue and respiratory tract infections.

There is a hope that early identification of microorganisms and their susceptibilities will lead to better antibiotic choices.

Doctors usually make empirical decisions about antibiotic therapy and, in the majority of cases, it will be successful. If they get laboratory results that suggest they could use a narrower spectrum antibiotic, will they actually review the patient and write a new prescription?

None of this negates the potential value of rapid tests in both improving service to the clients and improving laboratory efficiencies. It is more a plea for us to gather more information about the impact of laboratory results on patient outcomes and the associated health costs. That would allow us to make much better informed decisions about what we should invest in.

### Reference

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