

Evading the Invaders: Combating the Super Bugs



With the over usage of antibiotics in 1960s and 1970s, bacteria have developed resistance to antibiotics as a means to ensure their survival. Antibiotic resistance has emerged as an important variable influencing patient mortality and overall resource utilization in the hospital and community settings. Healthcare systems worldwide are faced with increasingly rapid emergence and spread of multiple antibiotic-resistant bacteria. Both antibiotic-resistant gram-negative bacilli and gram-positive bacteria are reported as important causes of hospital- and community-acquired infections. In many circumstances, particularly with Methicillin Resistant Staphylococcus aureus (MRSA) and gram-negative bacteria producing extended-spectrum beta lactamases (ESBLs) with resistance to multiple antibiotics, few antimicrobial agents remain for the effective treatment of seriously ill patients.

To combat the escalating problem of antibiotic resistance, many strategies have been developed that involve all experts in the field of antibiotic resistance such as infectious diseases specialists, infection control practitioners, and microbiologists. These strategies aim at optimizing the treatment of infected patients and minimizing the emergence and spread of antibiotic resistance. The microbiology laboratory plays an important role in detection and testing of these multiple resistant bacteria.

While still low compared to other regions of North America, the MRSA detection rate in Calgary Health Region has been double in last few years. To screen and isolate any patients who are MRSA carriers or pick up MRSA during their stay, it is crucial to have the patients' MRSA status known and confirmed as soon as possible. The Microbiology Laboratory usually takes from 48 to 96 hours to report a MRSA by the traditional method of Mannitol Salt agar with oxacillin. In 2006, CLS Microbiology initiated a study of new chromogenic agar (Denim Blue Agar with cefoxitin) with Oxoid Canada. This DBA method enables us to decrease the MRSA detection time to 24 to 48 hours.

In 2004-2005, there was an outbreak of multi-resistant *Pseudomonas aeruginosa* that harbours metallo-beta lactamases (MBL PA), the first outbreak in North America. CLS Microbiology moved quickly to develop a simple routine screen as well as molecular confirmation testing for this bacteria that helped control the outbreak. In 2006, we continued to improve these methods and became a reference centre for MBL testing. While the microbiology labs worldwide have been testing for routine ESBL since early 1990, not many attempt to test for AmpC-type ESBL due to inherent technical difficulties with this type of organisms. AmpC organisms will require a different therapy regime for treatment compared with other routine ESBLs. If combined with other resistance mechanisms, such as altered permeability of cell membrane, these organisms would be resistant to carbapenems that are among drugs of choice to treat ESBLs. Recognizing this implication, CLS microbiology successfully evaluated the Phenylboronic Acid (PBA) method last year. As a result, this was implemented as routine screen for AmpCs in late 2006.

