

ANTIBIOTIC-RESISTANT BACTERIA IN CANADA

New data have demonstrated that MRSA and other virulent organisms are much more prevalent in Canadian hospitals than previously believed. Multi-drug resistant pathogens are invading hospitals as well as the community throughout Canada. These include: methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococci (VRE) and extended-spectrum beta lactamases (ESBL).

MRSA IN CANADA

- *Staphylococcus aureus* (*S. aureus*) is an especially prevalent bacterium due to its surface proteins, which allow the organism to bind to tissues and foreign bodies coated with collagen, fibronectin, and fibrinogen. This permits the bacteria to adhere to devices such as sutures, catheters, and prosthetic valves. Other medically important staphylococci include *S. epidermidis* and *S. saprophyticus*.
- At any time, multiplying *S. aureus* can overwhelm local defense mechanisms and invade the lymphatic system or the bloodstream – a serious complication that allows the bacteria to invade other tissues including the heart (endocarditis), lungs (pneumonia) or bone (osteomyelitis).

- Methicillin-resistant *S. aureus* (MRSA) is the term used to describe organisms that are resistant to commonly used antibiotics. Methicillin was an antibiotic used many years ago to treat patients with *Staphylococcus aureus* infections. It is now no longer used except as a means of identifying this particular type of antibiotic resistance.
- Another trend recently identified is the rise of community-acquired MRSA (CAMRSA) which has been seen among athletes, soldiers, prisoners, aboriginals and IV drug users.

VRE IN CANADA

- Enterococcus is a bacterium that can be found in the intestines of healthy mammals such as humans and farm animals. However, this gram-positive bacterium can also lead to serious illness and is commonly identified as one of the prime sources of nosocomial (or hospital-acquired) infections.
- Vancomycin-Resistant Enterococcus (VRE) is a mutant strain of Enterococcus that originally developed in individuals who were exposed to the antibiotic vancomycin. It was first identified in France in the late 1980's.



- Vancomycin is a powerful antibiotic that is often used as a last resort. It is generally limited to use against bacteria that are already resistant to other antibiotics.
- VRE infections are especially aggressive and have been associated with mortality rates approaching 60-70%.
- The first hospital outbreak of an ESBL-containing (SHV-2) Gram-negative organism was reported in Germany in 1983. (Knothe H, Shah P, Krcmery V, Antal M, Mitsuhashi S. Transferable resistance to cefotaxime, ceftazidime, ceftazidime, cefamandole and cefuroxime in clinical isolates of *Klebsiella pneumoniae* and *Serratia marcescens*. Infection 1983; 11:315-7.)

ESBLs IN CANADA

- Extended-spectrum beta-lactamases (ESBLs) are a group of Gram-negative bacteria, such as *E.coli* and *Klebsiella* species. ESBLs produce enzymes that break down antibiotics, rendering them useless. Traditional first-line treatment drugs (eg. cephalosporins) are no longer effective if the infection is caused by ESBL-producing bacteria. There are few Canadian studies of this growing category of resistant bacteria, but it is of increasing concern to microbiologists and infectious diseases specialists.
- ESBLs are passed from person to person directly or indirectly, via faecal contamination of hands and objects and then introduced to patients. Currently this is being found most often in hospitals and long term care setting. The problem is usually first identified, however, when an individual presents to hospital and a specimen of urine, blood or wound is submitted to the microbiology lab for culture. (Kingston General Hospital, Infection control – reference)

