

ANTIMICROBIAL RESISTANCE IN HOSPITALS

Hospitals were the birthplace of antimicrobial resistance (AMR) and continue to be a source of evolution and propagation. The existence of AMR is fostered by a combination of acutely ill patients, high levels of broad-spectrum antimicrobial usage, numerous indwelling devices, high staff traffic between patients, and use of rooms with more than one patient. The impact of AMR on patients is important, as it causes increased morbidity and mortality, and impacts the healthcare system through increased costs and prolonged hospital stays, contributing to bed shortages. The constant evolution of AMR together with little new antimicrobial development raises the spectre of currently treatable infections becoming untreatable, and a return to the limited treatment options of the pre-antibiotic era.

Why is Antimicrobial Resistance in Hospitals a Problem?

- The Office of Technology Assessment conservatively estimated the minimum cost associated with AMR in hospitals to be \$1.3 billion annually (1992 dollars) in the United States.
- Patients at high risk of developing hospital-acquired AMR infections are those who have multiple comorbidities, have been on broad spectrum antibiotics, and have been in hospital for a prolonged stay.
- The most commonly tracked AMR organisms in hospital surveillance programs are methicillin resistant *Staphylococcus aureus* (MRSA), vancomycin resistant *enterococcus* (VRE), *Clostridium difficile* and extended-spectrum beta-lactamase (ESBL) producing gram negative bacilli (e.g. *Escherichia coli*, *Klebsiella pneumoniae*).
- MRSA can present in numerous ways including severe skin and soft tissue infections, surgical site infections, osteomyelitis, septic arthritis, bloodstream infections, pneumonia, endocarditis and urinary tract infections.
- VRE tends to cause urinary tract infections, bloodstream infections, and surgical site infections.
- The number of deaths in the United States, of MRSA alone, is more than those from emphysema, HIV/AIDS, Parkinson's disease, or homicide.
- A report by the European Centre for Disease Control and European Medicines Agency found that as of March 2008, there were only 15 potential investigational antimicrobials with new mechanisms of action and only 5 had progressed to phase III or higher level trials.



What can be done?

Everyone has a role to play in preventing the propagation of antimicrobial resistance in hospitals.

- **Hand Hygiene:** The easiest and most important method that everyone can practise in healthcare settings is appropriate hand hygiene using alcohol-based hand products. When hands are visibly soiled, soap and water should be used instead. This should be practised by all healthcare workers and hospital visitors before and after patient contact, before and after contact with the patient environment, after contact with body fluids, and before an aseptic procedure.
- **Active Surveillance:** For selected organisms, hospitals should use active surveillance to monitor AMR organism rates in high risk patients. This surveillance information should be conducted, analyzed, and interpreted by the infection and prevention control department. The results should then be shared at a minimum with all healthcare workers and higher-level management to help identify what interventions are appropriate.
- **Contact Precautions:** Hospitals should place all patients with known AMR organism colonization or infection on contact precautions, as recommended by Canadian Guidelines, to help limit spread of the organisms unknowingly to other patients. These precautions should be adhered to fully by all healthcare workers and visitors.
- **Environmental Cleaning:** Environmental cleaning should be a high priority for hospitals, as AMR organisms can persist on environmental surfaces. Key components include appropriate number of cleaning staff, appropriate frequency of cleaning, appropriate training for cleaning staff, and cleaning agents that are sporicidal for *Clostridium difficile*.
- **Antibiotic Stewardship Programs:** Hospitals should invest in antibiotic stewardship programs to promote appropriate use of antimicrobials. This involves optimization of antibiotic choice, dose, route and duration of therapy for optimal patient care and to minimize the evolution of AMR.

Additional Resources

Community and Hospital Infection Control Association (CHICA) Canada
www.chica.org/

Association for Professionals in Infection Control and Epidemiology (APIC)
www.apic.org//AM/Template.cfm?Section=Home1

Association of Medical Microbiology and Infectious Disease (AMMI) Canada
www.ammi.ca/index.php

Infectious Diseases Society of America (IDSA)
www.idsociety.org/

The Society for Healthcare Epidemiology of America (SHEA)
www.shea-online.org/

Just Clean Your Hands for Hospitals
<http://www.oahpp.ca/services/jcyh>

