

Management of Carbapenem-resistant *Enterobacteriaceae* (CRE) in health care settings

Dr. Mary Vearncombe

Chair, Provincial Infectious Diseases Advisory
Committee on infection Prevention and Control
(PIDAC-IPC)

August 2011



Objectives:

- To provide an overview of the revised RP/AP and Annex A best practice documents
- To address the management of CRE in Ontario healthcare settings with a focus on:
 - Screening
 - Specimen collection
 - Management of CRE patients

The issue

- CRE are resistant to many classes of antibiotics
 - Carbapenems, all penicillins and cephalosporins, and usually aminoglycosides and fluoroquinolones
- Treatment of CRE infections is difficult and involves the use of antibiotics with significant adverse events
 - e.g. colistin
- The case fatality rate for serious infections may be as high as 50%
- CRE have been transmitted within some Ontario hospitals

Why was a revision needed?

- A small number of patients with CRE had been reported in Ontario hospitals
- Most of these had links to facilities with recognized epidemic or endemic CRE
- However, transmission of CRE was beginning to be reported within Ontario hospitals
- Front-line professionals were asking for recommendations on management of patients with CRE

What did PIDAC-IPC do?

- A review of the scientific literature was conducted
- A meeting of experts was held in February 2011 to identify the current knowledge and gaps in that knowledge
- It was determined that additional guidance was needed, so:
 - Routine Practices and Additional Precautions best practice document was updated to include CRE
 - Annex A was expanded to include information on CRE acquisition, transmission, screening and management
- These revised documents are now available on the PHO website

What are CRE?

- Carbapenem-resistant *Enterobacteriaceae* are *Enterobacteriaceae* that are resistant to carbapenem antimicrobials through the production of carbapenemase
- To date, carbapenemases have been found most commonly in *E. coli* and *Klebsiella* spp – but have also been found in other Gram-negative species
- Carbapenemases are a class of enzymes that inactivate carbapenem antibiotics
- The genetic information to produce carbapenemases is often located on a mobile genetic element , e.g. plasmid, transposon
 - Can transfer this resistance to other strains and species
 - Usually also confers resistance to other classes of antimicrobials

Classes of carbapenemase

- Several different classes exist
- Each class has a three-letter acronym
 - KPC = *Klebsiella pneumoniae* carbapenemase
 - NDM = New Delhi metallo- β -lactamase
 - VIM = Verona integron-encoded metallo- β -lactamase
- Enzymes other than NDM have almost exclusively been found in hospitals
- NDM has been found in both hospitals and the community

Acquisition of CRE

- Risk factors for infection and colonization with CRE will be similar to those of other Gram-negative bacteria
- To date, the major risk factor appears to be receipt of health care in setting that have CRE
 - Hospitals along the eastern US seaboard -particularly New York City (KPC)
 - Greece (KPC)
 - Israel (KPC) and
 - The Indian subcontinent (NDM-1) – people coming from the Indian subcontinent with or without exposure to healthcare are also at risk

Transmission of CRE

- Transmission is via direct and indirect contact
- Site of colonization is the lower gastrointestinal tract
 - Urinary tract is a common secondary site of colonization/infection
- Although the environment has rarely been implicated in outbreaks, sinks and other environmental surfaces have been implicated in transmission of *Klebsiella* and *Pseudomonas* spp.
- Acquisition of resistance may also occur by transmission of the mobile genetic element carrying the carbapenemase between different bacterial strains and species

Screening Patients/Residents for CRE

- An effective, consistent approach to surveillance is important in preventing the spread of CRE
- All hospitals should institute a screening program and targeted surveillance for CRE
- Admission screening and pre-emptive Contact Precautions are indicated for individuals with risk factors for CRE
- Patients with known CRE carriage should have their records flagged, be placed on Contact Precautions, and re-screened on re-admission

Screening Specimens for CRE

- All infection prevention programs should review with their microbiology laboratory whether they have had any cases of CRE in the past 6-12 months and determine if their laboratory is able to detect and report all patients colonized/infected with CRE
- Primary screening specimens are stool or rectal swabs
- Urine specimens and swabs from open wounds may also be indicated
- In critical care areas, sputum or ETT specimens and swabs from exit sites may be indicated

CRE Decolonization and Duration of Precautions

- There are no data to support CRE decolonization and it is not recommended
- Duration of bowel colonization with CRE is unknown but is likely of long duration
- Most colonized patients/residents are asymptomatic

Management of patients/residents with CRE

- Contact Precautions – for duration of acute care hospitalization
- CRE colonized patients who are re-admitted should be placed on Contact Precautions and re-screened
- If a single patient/resident with CRE is identified, consider conducting a full prevalence screen of the unit/ward; at a minimum, all roommates should be screened
 - Minimum 2 sets of specimens, with 1 set taken at least 7 days after last exposure
- If there is evidence of transmission, expert advice should be sought
- Environmental services : routine cleaning
- In a CRE outbreak, protocols should be in place to screen patients in close proximity to the CRE positive patient or who have risk factors for CRE acquisition

The Challenge

- Information on CRE will continue to evolve as additional surveillance data becomes available
- The infection prevention steps taken now will assist Ontario hospitals in managing this effectively
- PIDAC-IPC will update Annex A as new scientific evidence becomes available

