CARBAPENEMASE-PRODUCING ENTEROBACTERIACEAE (CPE)

Staff Fact Sheet

WHAT ARE CPE?

Carbapenemase-producing *Enterobacteriaceae* are resistant to carbapenem antimicrobials (e.g., imipenem, meropenem, ertapenem) through the production of carbapenemase enzymes.

Carbapenemases are enzymes that inactivate carbapenem, cephalosporin and penicillin antibiotics. The genetic information to produce carbapenemases is often located on a mobile genetic element (i.e., a genetic element that can move between bacterial strains and species, e.g., plasmid, transposon), which frequently also carries resistance to other classes of antimicrobials, such as fluoroquinolones and aminoglycosides. To date, carbapenemases have been found most commonly in *E. coli* and *Klebsiella* species, but have also been found in other Gram-negative bacteria.

There are several different carbapenemases, each having a three-letter acronym, e.g., KPC = *Klebsiella pneumoniae* carbapenemase; NDM = New Delhi metallo-β-lactamase.

These enzymes evolve rarely, but bacteria carrying them spread easily. Particular classes of carbapenemases are most common in the geographic area where they evolved, but can spread around the world, usually when patients have received health care in another country.

Because CPE are resistant to many classes of antimicrobials, treatment of infections with CPE is difficult and involves the use of antibiotics that have significant adverse events (e.g., colistin). The case fatality rate for serious infections may be as high as 50%.

CURRENT STATUS OF CPE IN ONTARIO

A small number of CPE have recently been reported in hospitals in Ontario. Most patients with CPE have had links to hospitals with recognized epidemic or endemic CPE (e.g., New York City hospitals with KPC *K. pneumoniae*, receipt of health care in the Indian subcontinent). However, transmission of CPE has been reported in Ontario.

HOW ARE CPE SPREAD?

Transmission is via direct and indirect contact. The primary site of colonization is the lower gastrointestinal tract.

RISK FACTORS FOR CPE

Risk factors for infection and colonization with CPE will be similar to those of other resistant Gram-negative bacteria, such as ESBL-producing *E. coli* and *Klebsiella pneumoniae.*

Currently, the major risk factor appears to be receipt of care in health care settings that have CPE, e.g., hospitals along the U.S. eastern seaboard, particularly New York City (KPC), Greece (KPC), Israel (KPC) and the Indian subcontinent (NDM-1). However, CPE outbreaks are being increasingly described in hospitals around the world, including Canada. People coming from the Indian subcontinent, with or without exposure to health care, are also at risk.

PREVENTION & CONTROL OF CPE:

1. Consistent use of Routine Practices with all patients/residents.

2. Screening:

Surveillance is an important measure to prevent and control the spread of CPE. Admission screening and pre-emptive Contact Precautions are indicated for individuals with risk factors for CPE:

- If a patient/resident is identified with CPE, roommates and patients in close proximity will be screened for CPE
- Primary screening specimens for CPE are stool or rectal swabs. Urine specimens and swabs from open wounds may also be indicated. In critical care settings, sputum or endotracheal tube specimens and swabs from exit sites may be requested by Infection Prevention and Control
- Patients with known CPE carriage will have their records flagged, will be placed on Contact Precautions and will be re-screened if readmitted.

3. Initiate **Contact Precautions** for patients/residents with CPE:

- Appropriate client/patient/resident placement
- Gloves for all activities in the patient's room or bed space in acute care, or for direct care of clients/residents in long- term care and ambulatory/clinic settings
- Long-sleeved gown for activities where skin or clothing will come in contact with the patient or their environment in acute care, or for direct care of clients/residents in long- term care and ambulatory/clinic settings
- Dedicated equipment or adequate cleaning and disinfecting of shared equipment, with particular attention to management of urinary catheters and associated equipment

4. Notify the Infection Prevention & Control Professional or delegate to discuss the infection control management of client/patient/resident activities.

5. It is not known how long bowel colonization with CPE persists, but it is likely of long duration. Most colonized patients/residents are asymptomatic. Because of the implications of CPE infection and transmission, current expert recommendations are that patients remain on Contact Precautions for the duration of hospitalization. They should be presumed to be colonized and managed on Contact Precautions if they are readmitted.

6. There are no data to support CPE decolonization and it is not recommended.