PICNet
PROVINCIAL INFECTION CONTROL NETWORK OF BRITISH COLUMBIA
A program of the Provincial Health Services Authority

PHSA Laboratories
Public Health Microbiology & Reference Laboratory

Healthcare-associated infections surveillance report

Carbapenemase-Producing Organisms (CPOs) Update

November 2018

Highlights for Q1 2018/19 (Apr 1, 2018 – June 28, 2018)

- 75 carbapenemase resistance genes were newly identified from 68 isolates – 7 isolates harbored 2 different genes
- The NDM resistance gene accounted for the majority of genes identified (68.0%)
- Surveillance information was reported for 46 new cases of CPO, including 1 new case from a community healthcare setting
- Nearly 70% of new cases (32/46) reported healthcare encounters outside Canada

What are carbapenemase-producing organisms (CPOs)?
Carbapenems are a class of antibiotics usually reserved to treat serious infections, and often considered one of the antimicrobial treatments of last resort. Over the last decade, some bacteria have developed resistance to carbapenems by producing an enzyme (carbapenemase) that breaks down the structure of these antibiotics and makes them ineffective for treatment. These antibiotic-resistant bacteria are called carbapenemase-producing organisms (CPOs). The most common carbapenemase resistance genes include NDM, KPC, OXA-48, etc.

Why are CPOs considered important?
CPOs are an important emerging threat to healthcare settings and the community. First, these organisms are often resistant to multiple classes of antimicrobials, substantially limiting treatment options. Second, infections caused by these organisms are associated with high mortality rates, up to 50% in some studies. Third, many carbapenem resistance genes can be transmitted from one species of bacteria to another, potentially facilitating widespread resistance. Fourth, since *Enterobacteriacae* are a common cause of infections, carbapenem resistance in these organisms could have far-reaching impact. Finally, outbreaks of CPOs are more difficult and costly to contain.

How are CPOs spread?
People can carry CPOs without having any symptoms of illness (this is called colonization), but they can still pass the germs to other people. CPOs usually spread person-to-person through direct contact with infected or colonized people, or by contaminated surfaces. This can happen in both community and healthcare settings. Without proper precautions, CPOs can spread easily from person-to-person in hospitals, especially in countries where CPOs are endemic.

How can the spread of CPOs be prevented?
Good hand hygiene by both healthcare providers and patients, such as washing hands often with soap and water or using an alcohol-based hand sanitizer, is a simple and effective way to prevent the spread of CPOs. The public should avoid unnecessary access to health care in endemic countries. In healthcare settings, identifying CPO cases and placing colonized or infected patients on contact precautions, using medical devices and antimicrobials wisely, and carefully cleaning and disinfecting rooms as well as medical equipment can significantly reduce the risk of CPO transmission.

How can CPOs be treated?

If a person is colonized with CPO, they do not need to be treated with antibiotics. If a person has an infection with CPO, the antibiotics that will work against it are limited, but some options are still available. In addition, some infections may be treatable with other therapies, such as draining the infection.

Tracking CPOs in BC

The first CPO case in British Columbia (BC) was identified in 2008 from a traveller returning from an endemic country where the patient had received medical procedures. Since then, the health authorities (HA), BC Center for Disease Control's Public Health Laboratory (PHL), and the Provincial Infection Control Network of BC (PICNet) have been working collaboratively to identify and monitor CPOs in the province.

A mandatory CPO surveillance program was established in BC in July 2014. CPO-suspect isolates are required to be submitted to PHL for molecular testing and genotyping analysis and CPO cases identified for the first time or identified with a new carbapenemase gene among BC acute care facilities are to be reported to PICNet, who is responsible for publicly reporting the data. CPO was further designated a reportable condition in BC by the Provincial Health Officer on December 22, 2016. Under the revised provincial surveillance protocol for CPO, endorsed by the Provincial Communicable Diseases Policy Advisory Committee of BC, all newly identified cases of CPOs in any health care setting (both acute care and community care) are to be reported to PICNet from December 19, 2017.

Summary of CPO cases for Q1 2018/19

CPOs have been identified among patients in both acute care and community care settings, but remain uncommon in the majority of hospitals and communities. This quarterly report summarizes CPOs newly identified at PHL and surveillance information of new cases reported to PICNet during fiscal quarter 1 of 2018/19 (Q1, Apr 1, 2018 – June 28, 2018).

From the isolates submitted to PHL during Q1, seventy-five carbapenemase resistance genes were newly identified among 68 isolates[1], including seven isolates harboring two different genes – each gene identified for the first time in a given patient is considered as a new case of CPO.

Of the seventy-five genes newly identified, NDM was the prominent gene, accounting for 68.0%, followed by OXA-48 genes (16.0%), KPC (6.7%), SME (1.3%), and other OXA-type genes (4.3%) (Figure 1).

Surveillance information was collected and reported to PICNet for 46 new cases of CPO (Table 1). Of them, thirty-seven cases (80.4% of all reported cases) were identified in acute care facilities in Fraser Health. Vancouver Coastal Health reported six cases (13.0%), and Interior Health reported two cases (4.3%). One case was reported from a community healthcare setting.

The surveillance information collected includes risk factors that may have contributed to CPO acquisition in the prior twelve months, including healthcare encounters outside Canada (e.g. overnight hospitalization, medical or surgical procedures, etc.), close contact with a known CPO patient or the patient's environment, and transfer from or stay in a care unit which was under investigation for CPO transmission. Thirty-two cases (69.6% of reported cases) stated healthcare exposure outside Canada, and ten (21.7%) were associated with other risk factors[2]. Six cases (13.0%) reported no known risk factors, meaning that the source of their CPO acquisition could not be identified.

[1] Two isolates identified with MCR-1 gene during Q1 were not included.

[2] These risk categories are not mutually exclusive – patients reporting healthcare exposure outside Canada may also have other risk factors identified.

Figure 1. Distribution of carbapenemase resistance genes newly identified in BC, April 1 – June 28, 2018 (n = 75)

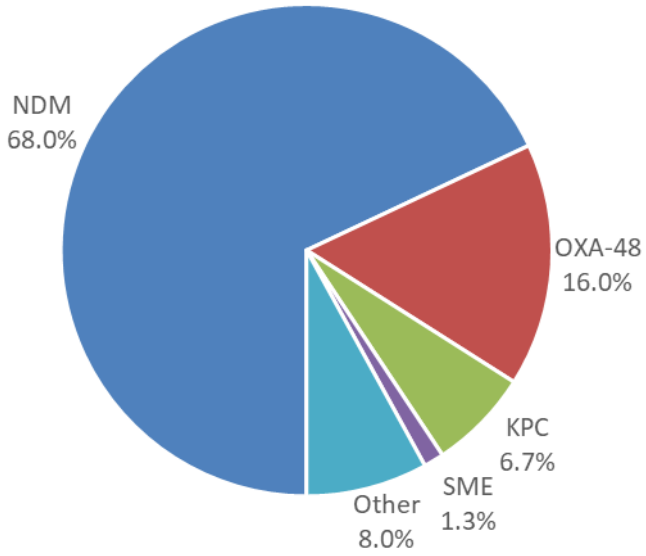

Table 1. Number of new cases of CPO reported in BC by healthcare setting, April 1– June 28, 2018 (n = 46)

Healthcare setting	NDM	OXA-48	KPC	Other	Total
Acute care settings	35	7	1	2	45
Interior Health	2	0	0	0	2
Fraser Health	30	7	0	0	37
Vancouver Coastal Health	3	0	1	2	6
Island Health	0	0	0	0	0
Northern Health	0	0	0	0	0
Provincial Health Services Authority	0	0	0	0	0
Community healthcare settings	1	0	0	0	1
Subtotal in Q1 2018/19	**36**	**7**	**1**	**2**	**46**
Total in 2018/19	**36**	**7**	**1**	**2**	**46**

* based on the date of specimen collection from which a carbapenamase resistant gene was first identified or a new gene was identified from the patient.

For more information about CPOs and the provincial surveillance program, please visit the PICNet website at https://www.picnet.ca/surveillance/cpo.