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

July 2019

Highlights for Q4 2018/19 (December 14, 2018 – March 31, 2019)

- 70 carbapenemase resistance genes were newly identified from 64 isolates – 6 isolates harboured 2 different genes
- The NDM resistance gene accounted for the majority of genes identified (42/70, 60.0%)
- Surveillance information was reported for 60 new cases of CPO, including 1 new case from a community healthcare setting
- 34 of the reported cases (56.7% of reported cases) had 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 carbapenemases 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 Enterobacteriaceae 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), the Provincial Infection Control Network of BC (PICNet), and the BC Ministry of Health have been working collaboratively to identify and monitor CPOs in the province.

A mandatory CPO surveillance program was established in BC's acute care facilities in July 2014. CPO-suspect isolates are required to be submitted to PHL for molecular testing and genotyping analysis. If the CPO is identified for the first time or identified with a gene encoding a new carbapenemase among inpatients, it is considered a new case of CPO and is 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 CPO in any health care setting (both acute care and community care) are to be reported to PICNet as of December 19, 2017.

Summary of CPO cases for Q4 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 for new cases reported to PICNet during fiscal quarter 4 of 2018/19 (Q4, December 14, 2018 – March 31, 2019).

Of the isolates submitted to PHL during Q4, 70 carbapenem resistance genes were newly identified from 64 isolates, including six isolates harbouring genes encoding two different carbapenemases – each gene identified for the first time in a given patient is considered a new case of CPO.

Of the 70 genes newly identified, NDM was predominant, accounting for 60.0%, followed by OXA-48-encoding genes (25.7%), KPC (8.6%), other genes (4.3%), and SME (1.4%) (Figure 1).

Surveillance information was collected and reported to PICNet for 60 new cases of CPO (Table 1). Of them, 48 cases (80.0% of reported cases) were identified in acute care facilities in Fraser Health, 10 cases (16.7%) were identified in Vancouver Coastal Health, 1 case was identified in Interior Health (1.7%). The remaining one case (1.7%) was reported from a community healthcare setting.

The surveillance information collected includes risk factors that may have contributed to CPO acquisition in the prior 12 months, including healthcare encounters outside Canada (e.g. overnight hospitalization, medical or surgical procedures.); 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. Among the reported cases, 34 cases (56.7%) reported healthcare exposure outside Canada and 17 cases (28.3%) were associated with other risk factors listed in the provincial surveillance protocol[1]. Fifteen cases (25.0%) reported no risk factors listed in the provincial surveillance protocol.

[1] These risk categories are not mutually exclusive – patients reporting healthcare exposure outside Canada may also be identified with other risk factors listed in the provincial surveillance protocol.

Figure 1. Distribution of carbapenemase genes newly identified in BC, Q4 2018/19 (December 13, 2018 – March 31, 2019)

(n = 70)

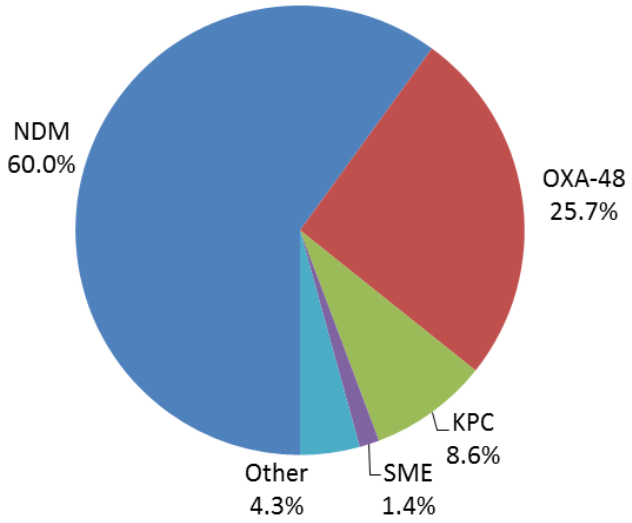

Table 1. Number of new cases of CPO reported in BC by healthcare setting, Q4 2018/19 (December 13, 2018 – March 31, 2019)*** (n = 60)**

Healthcare setting	NDM	OXA-48	KPC	VIM	Other	Total
Acute care settings	37	16	4	0	2	59
Interior Health	*1*	*0*	*0*	*0*	*0*	*1*
Fraser Health	*30*	*15*	*1*	*0*	*2*	*48*
Vancouver Coastal Health	*6*	*1*	*3*	*0*	*0*	*10*
Island Health	*0*	*0*	*0*	*0*	*0*	*0*
Northern Health	*0*	*0*	*0*	*0*	*0*	*0*
Provincial Health Services Authority	*0*	*0*	*0*	*0*	*0*	*0*
Community healthcare settings	0	1	0	0	0	1
Subtotal in Q3 2018/19	**37**	**17**	**4**	**0**	**2**	**60**
Total in 2018/19	**132**	**42**	**18**	**1**	**6**	**199**

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