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

Annual surveillance report of healthcare-associated infections in BC health care facilities

Fiscal Year 2016/17
(April 1, 2016 to March 31, 2017)

Prepared by:

Provincial Infection Control Network of British Columbia (PICNet)

October 2017

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The Provincial Infection Control Network of British Columbia (PICNet) is a provincially supported professional collaborative that provides guidance and advice on healthcare-associated infection prevention and control in British Columbia. Under the aegis and accountability framework of the Provincial Health Services Authority, PICNet connects healthcare professionals from across the province to develop and create guidelines and tools, with a focus on surveillance, education, and evidence-based practice.

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Acknowledgements

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Surveillance Steering Committee

PICNet's Surveillance Steering Committee consists of representatives from each health authority and related organization, and provides guidance to PICNet's surveillance programs and assists the PICNet Management Office in implementation within the participating health authorities. Following committee members contributed to and reviewed this report:

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Abbreviations

BC	British Columbia
CA	Community-associated
CI	Confidence interval
CDI	*Clostridium difficile* infection
FHA	Fraser Health Authority
FQ	Fiscal quarter
FY	Fiscal year
HA	Health authority
HAI	Healthcare-associated infection
HCA	Healthcare-associated
HCC	Hand cleaning compliance
ICP	Infection control practitioner
IHA	Interior Health Authority
MRSA	Methicillin-resistant *Staphylococcus aureus*
NHA	Northern Health Authority
PHC	Providence Health Care
PHSA	Provincial Health Services Authority
PICNet	Provincial Infection Control Network of British Columbia
PHHWG	Provincial Hand Hygiene Working Group of British Columbia
SSC	PICNet's Surveillance Steering Committee
VCHA	Vancouver Coastal Health Authority
VIHA	Island Health Authority

Executive Summary

Provincial surveillance programs for healthcare-associated infections (HAI) in British Columbia were established to monitor the occurrence and trends of *Clostridium difficile* infection (CDI), methicillin-resistant *Staphylococcus aureus* (MRSA), and carbapenemase-producing organisms (CPO) in acute care facilities, as well as hand cleaning compliance (HCC) among health care providers. The table below summarizes key surveillance results in the fiscal year 2016/17, and compares them to previous years.

Highlights of surveillance results in BC healthcare facilities, 2016/17

Indicators	2016/17	2015/16	Five-year trend (2012/13–2016/17)
Provincial rate of new CDI associated with the reporting facility per 10,000 inpatient days and 95% confidence interval	4.1 (3.9-4.4)	4.9 (4.6-5.1)	⬇
Provincial rate of new MRSA associated with the reporting facility per 10,000 inpatient days and 95% confidence interval	4.9 (4.7-5.2)	4.9 (4.7-5.2)	▭
Total number of new cases of CPO identified	86	95	N/A[1]
Provincial hand cleaning compliance in acute care facilities	82.5%	83.2%	⬆
Provincial hand cleaning compliance in residential care facilities	85.0%	83.6%	N/A[2]

Notes: ⬆⬇ statistically significant; ▭ no significant change; N/A: not applicable

1. Provincial surveillance of CPO started from July 2014
2. Reporting of compliance data in residential care facilities started from fiscal year 2014/15

Key findings in 2016/17

- **CDI**: The provincial annual rate of new CDI associated with the reporting facility decreased significantly in 2016/17 compared with 2015/16. There was a significant downward trend in the provincial rate of CDI from 2012/13 to 2016/17, with the lowest rate in 2016/17.
- **MRSA**: The provincial annual rates of MRSA associated with the reporting facility did not change significantly from 2012/13 to 2016/17. However, the rate of MRSA associated with a previous encounter with the reporting facility increased significantly during this time period, while the rate of MRSA associated with current admission to the reporting facility decreased significantly.
- **CPO**: Of the 86 new cases of CPO identified in acute care facilities, 57 cases (66.3%) reported a healthcare exposure outside Canada in the past twelve months.
- **HCC**: Compliance in both acute care facilities and residential care facilities surpassed 80% of target performance for the third consecutive year. Compliance in acute care facilities has plateaued in the last three years.

Variations in surveillance methods among health authorities exist. The rates of CDI, MRSA, and HCC in this report are not risk-adjusted, therefore direct comparison between health authorities or healthcare facilities is not recommended.

Introduction

Healthcare-associated infections (HAIs) are infections or colonizations that people acquire during or shortly after receiving care for other medical conditions. They can be acquired anywhere health care is delivered, including pre-hospital care settings, acute care facilities, outpatient clinics, residential care facilities, and rehabilitation centers.

HAIs can significantly affect patient safety and quality of care. They are one of the most common complications of medical care (1), causing increased morbidity and mortality, prolonged hospital stay, and extra costs. As a collaborative effort to prevent and control HAIs in acute care facilities in British Columbia (BC), the Provincial Infection Control Network of British Columbia (PICNet), the health authorities (HAs), and related agencies in BC have worked together to establish provincial surveillance programs to monitor the occurrence of some important HAIs, including *Clostridium difficile* infection (CDI), methicillin-resistant *Staphylococcus aureus* (MRSA), and carbapenamase-producing organisms (CPOs). Details of provincial surveillance protocols for CDI, MRSA, and CPO, including case definitions and classification, are posted on PICNet's website (https://www.picnet.ca/surveillance/). Given the proven effectiveness of hand hygiene in preventing transmission of HAIs (2,3), hand cleaning compliance (HCC) among healthcare providers working in BC healthcare facilities is audited regularly, and the audit results are submitted to PICNet quarterly.

This report summarizes the surveillance data of CDI, MRSA, CPO, and HCC in the fiscal year 2016/17 (April 1, 2016–March 31, 2017) and compares them to the previous fiscal year of 2015/16. The overall trend over the last five years, from 2012/13 to 2016/17, is also presented. It is important to note that the classification of CDI and MRSA as either healthcare-associated (HCA), community-associated (CA), or of unknown origin is based on the patient's healthcare encounter history. Classifying a case of CDI or MRSA as HCA does not necessarily indicate that the patient acquired the bacteria during hospitalization or from medical care. Approximately 2% of the general population are colonized with MRSA (4) and more than 8% of admitted patients are carriers of toxinogenic *C. difficile* without symptoms (5,6). In addition, the rates of CDI, MRSA, and HCC are not risk-adjusted. They are provided to show the progress of infection prevention and control and overall trends over time within each HA, rather than for comparison between HAs or between health care facilities.

Clostridium difficile infection (CDI)

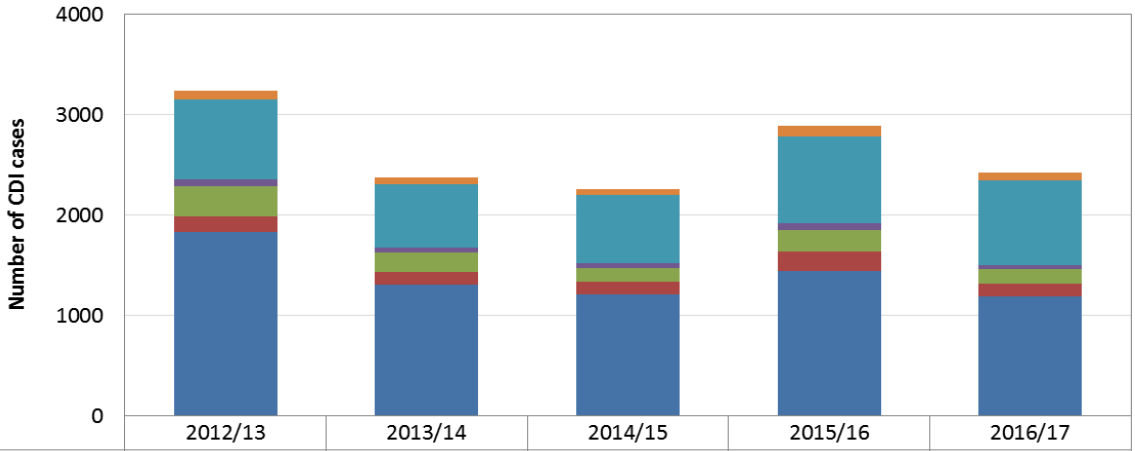
CDI is the most common cause of infectious diarrhea in healthcare settings (7). Since the fiscal year 2009/10 (April 2009), a provincial surveillance program has been in place to monitor the occurrence of CDI in acute care facilities. The following tables and graphs present CDI cases identified in FY 2016/17, including new cases and relapses of CDI among inpatients, and the overall trend from 2012/13 to 2016/17.

Overview of CDI cases identified in 2016/17

A total of 2,423 cases of CDI were identified among inpatients in BC acute care facilities in 2016/17. Of these, 1,503 cases (62.0%) were classified as HCA, 846 (34.9%) were CA, and 74 (3.1%) were of unknown origin. Among 1,503 HCA CDI cases, 1,190 (49.1% of total CDI cases) were new CDI associated with the reporting facility, 126 (5.2%) were new CDI associated with another facility, 145 (6.0%) were relapses of CDI associated with the reporting facility, and 42 cases (1.7%) were relapses of CDI associated with another facility (Figure 1).

Compared with the previous year 2015/16, the numbers of both total CDI cases and new CDI associated with the reporting facility in 2016/17 decreased by 17.5% and 16.2%, respectively. The decrease followed an increase of CDI in 2015/16 (Figure 1). The number of new CDI associated with the reporting facility in 2016/17 was the lowest in the last five years. The proportion of new CDI associated with the reporting facility among total CDI also decreased from 56.5% in 2012/13 to 49.1% in 2016/17, while the proportion CA CDI increased from 24.5% to 34.9% during the same period.

Figure 1. Number of cases of CDI identified in BC acute care facilities by case classification, 2012/13–2016/17



	2012/13	2013/14	2014/15	2015/16	2016/17
Total CDI cases	3246	2376	2260	2893	2423
Unknown	96	63	62	108	74
CA	794	636	674	866	846
HCA with another facility - relapses	71	46	47	72	42
HCA with reporting facility - relapses	297	201	139	212	145
HCA with another facility - new cases	153	121	132	192	126
HCA with reporting facility - new cases	1835	1309	1206	1443	1190

CA: Community-associated; HCA: healthcare-associated

Rate of new CDI associated with the reporting facility in 2016/17

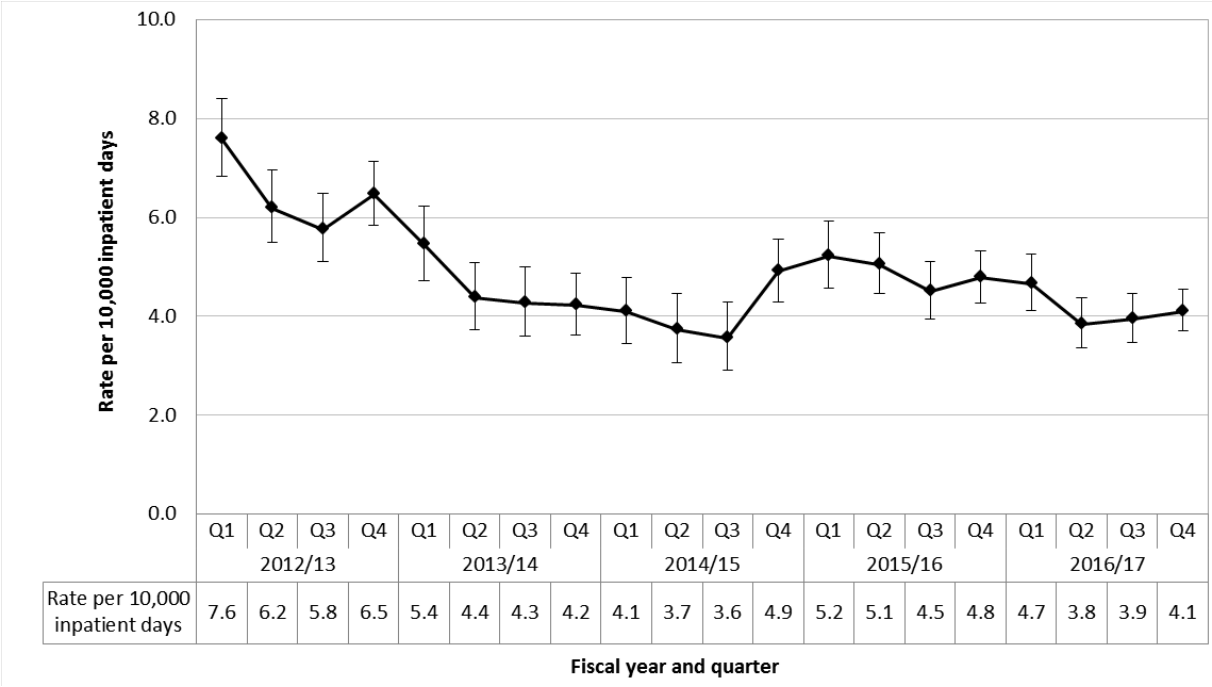
The provincial annual rate of new CDI associated with the reporting facility in 2016/17 was 4.1 per 10,000 inpatient days, with a 95% confidence interval (CI) of 3.9–4.4. The rate of CDI varied by fiscal quarter, however the differences in provincial rates between quarters were not statistically significant (Table 1). The rate in Q1 of 2016/17 remained high and reflects the continued increase in rate seen since Q4 FY2014/15 (Figure 2).

Detailed annual rates of CDI for each acute care facility are presented in Appendix D.

Table 1. Rate of new CDI associated with the reporting facility per 10,000 inpatient days and 95% confidence interval by fiscal quarter and health authority, 2016/17

Quarter	Q1	Q2	Q3	Q4	Annual
IHA	5.4 (4.1-7.1)	4.3 (3.2-5.8)	4.3 (3.2-5.8)	3.9 (3.1-5.0)	4.4 (3.8-5.0)
FHA	5.1 (4.2-6.1)	3.7 (3.0-4.5)	3.7 (3.0-4.6)	4.3 (3.6-5.0)	4.2 (3.8-4.6)
VCHA	5.4 (4.3-6.7)	4.5 (3.6-5.8)	4.3 (3.4-5.5)	4.8 (3.9-5.8)	4.7 (4.2-5.3)
VIHA	3.1 (2.2-4.3)	3.2 (2.3-4.3)	3.5 (2.6-4.7)	3.7 (2.9-4.7)	3.4 (2.9-3.9)
NHA	3.2 (1.9-5.4)	2.0 (1.0-3.7)	2.8 (1.7-4.9)	1.9 (1.1-3.3)	2.4 (1.8-3.2)
PHSA	4.0 (1.7-9.4)	8.8 (4.9-15.8)	9.1 (5.1-16.2)	9.1 (5.1-16.2)	7.7 (5.6-10.6)
Province	4.7 (4.2-5.2)	3.8 (3.4-4.3)	3.9 (3.5-4.4)	4.1 (3.7-4.5)	4.1 (3.9-4.4)

Figure 2. Provincial rate of new CDI associated with the reporting facility by fiscal quarter and year, 2012/13–2016/17



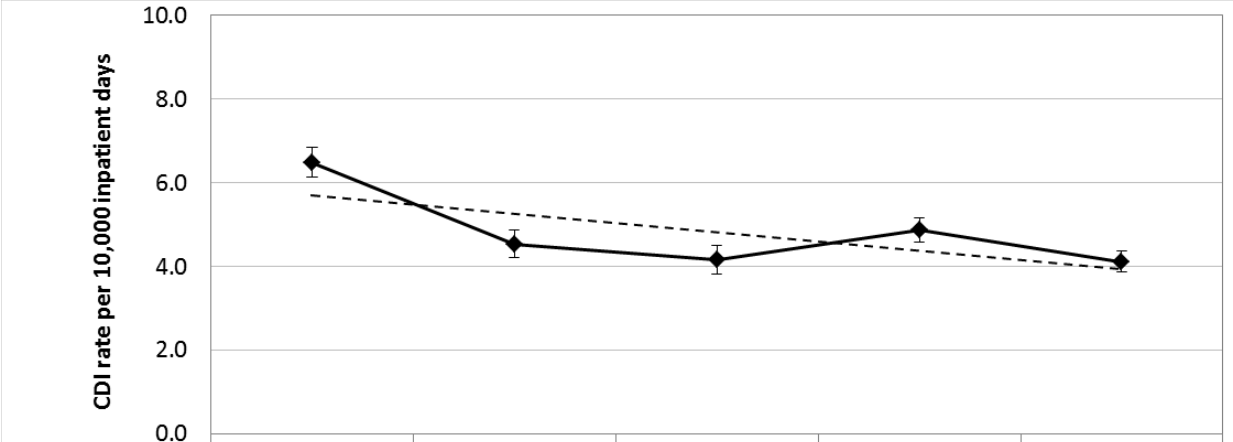
Note: Vertical bars represent the 95% confidence interval of the rates.

Trends of new CDI associated with the reporting facility

The provincial annual rate of CDI associated with the reporting facility was statistically significantly lower in 2016/17 than the previous year of 2015/16, but was not significantly lower than the rates in 2013/14 and 2014/15 (Figure 2).

There has been a significant downward trend in the provincial CDI rate in the last five years, with the lowest rate in 2016/17. The provincial annual rate decreased by 36.6% during this period, from 6.5 per 10,000 inpatient days in 2012/13 to 4.1 per 10,000 inpatient days in 2016/17 (Figure 3).

Figure 3. Provincial annual rate of new CDI associated with the reporting facility, 2012/13–2016/17



	2012/13	2013/14	2014/15	2015/16	2016/17
Rate per 10,000 inpatient days	6.5	4.5	4.2	4.9	4.1
Number of cases	1835	1309	1206	1443	1190

Note: Vertical bars represent the 95% confidence interval of the rates and the dashed line represents the linear trend of rates

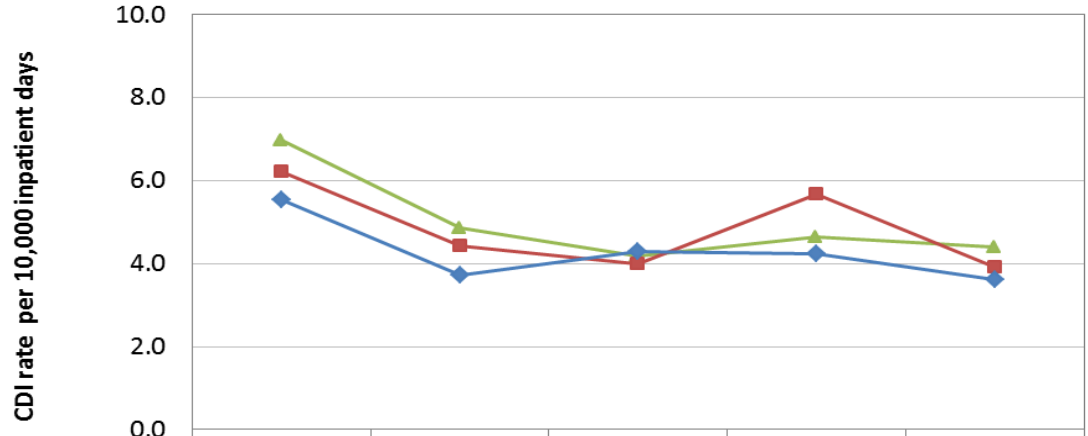
To further analyze the trend of CDI, the rates were aggregated by facility type[1] (i.e. tertiary/referral hospital, regional hospital, and community hospital); facility size based on the number of acute care beds (i.e. 1–50 beds, 51–150 beds, 151–250 beds, and >250 beds); and health authority.

The downward trend was statistically significant for each facility type (Figure 4); however, the CDI rate in tertiary/referral hospitals and community hospitals in 2016/17 was not significantly different from the rates from 2013/14 to 2015/16. The CDI rate in regional hospitals in 2016/17 decreased significantly from 2015/16, but was not significantly different from the rates in 2013/14 and 2014/15. The CDI rate in both regional hospitals and community hospitals in 2016/17 was the lowest over the last five years.

[1] The classification of hospital types in this report is based on the healthcare services provided and the population served by the hospital, including:

- Tertiary/referral hospital refers to a major hospital that provides a wide range of acute in-patient and out-patient specialist services together with the necessary support systems for the patients across the health authority, and in some cases, across the province. Patients will often be referred from smaller hospitals for major operations, consultations with specialists and sub-specialists, and when sophisticated intensive care facilities are required.
- Regional hospitals typically provide health care services to the patients in its region, with large numbers of beds for intensive care and long-term care, providing specialist and sub-specialist services, such as surgery, plastic surgery, childbirth, bioassay laboratories, and so forth.
- Community hospitals offer an appropriate range of integrated health and social care designed to meet the needs of the local people. Medical care is predominantly provided by general practitioners working with consultant medical colleagues.

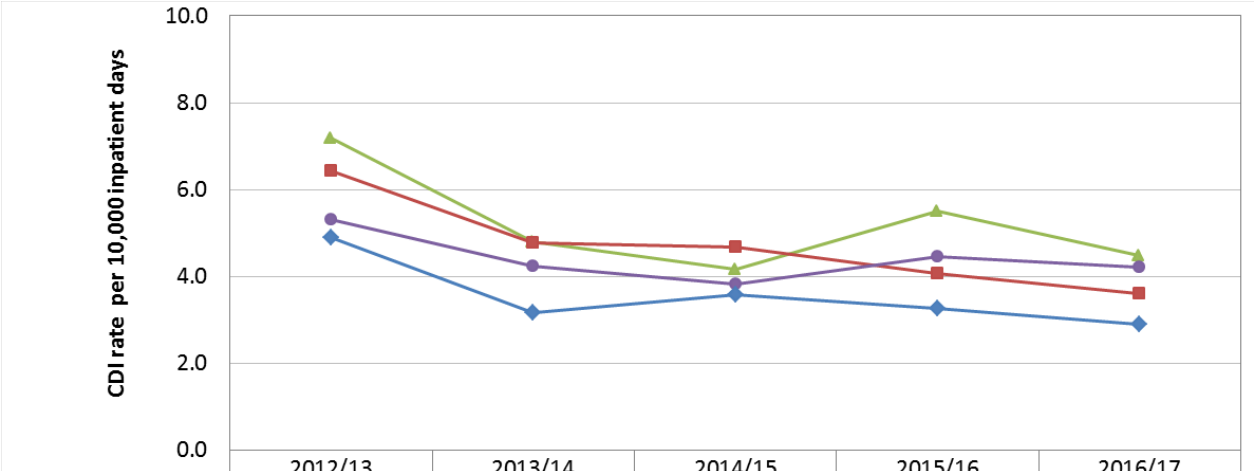
Figure 4. Annual rate of new CDI associated with the reporting facility by facility type, 2012/13–2016/17



	2012/13	2013/14	2014/15	2015/16	2016/17
Tertiary hospital	7.0	4.9	4.2	4.6	4.4
Regional hospital	6.2	4.4	4.0	5.7	3.9
Community hospital	5.5	3.7	4.3	4.2	3.6

Grouping facilities by size shows a significant downward trend in CDI rates in each group. However, apart from facilities with more than 250 beds, in which the CDI rate in 2016/17 decreased significantly compared with 2015/16, there was no statistically significant difference in the rate between 2016/17 and 2015/16 by facility size. Facilities with 50 or fewer beds and those with 150–250 beds had the lowest CDI rates in 2016/17 (Figure 5).

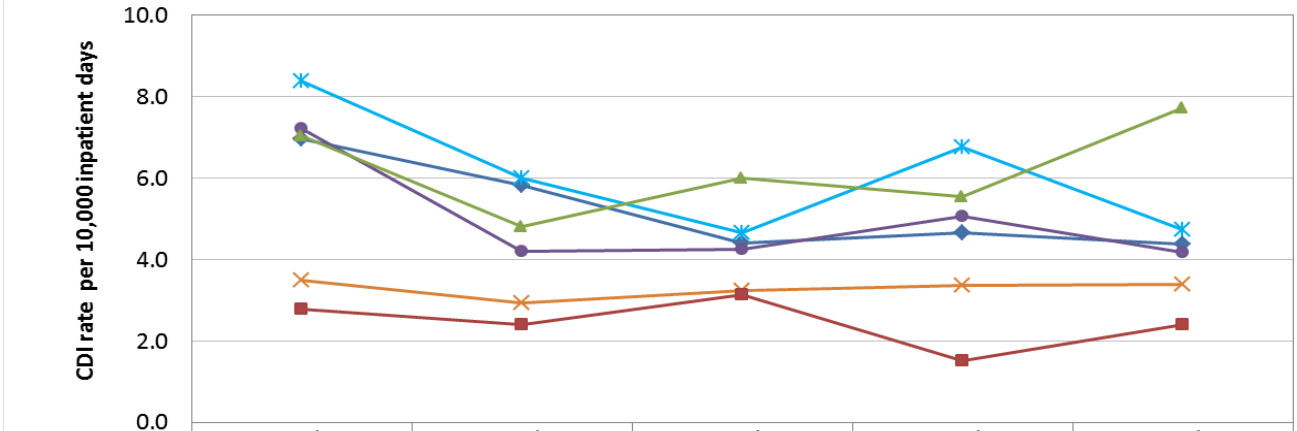
Figure 5. Annual rate of new CDI associated with the reporting facility by facility size, 2012/13–2016/17



	2012/13	2013/14	2014/15	2015/16	2016/17
>250 beds	7.2	4.8	4.2	5.5	4.5
151-250 beds	6.4	4.8	4.7	4.1	3.6
51-150 beds	5.3	4.2	3.8	4.5	4.2
1-50 beds	4.9	3.2	3.6	3.3	2.9

The downward trend was statistically significant among three HAs (IHA, FHA, and VCHA) (see data limitations in Appendix A). There was no significant trend in the other three HAs (VIHA, NHA, and PHSA) (Figure 6).

Figure 6. Annual rate of new CDI associated with the reporting facility by health authority, 2012/13–2016/17

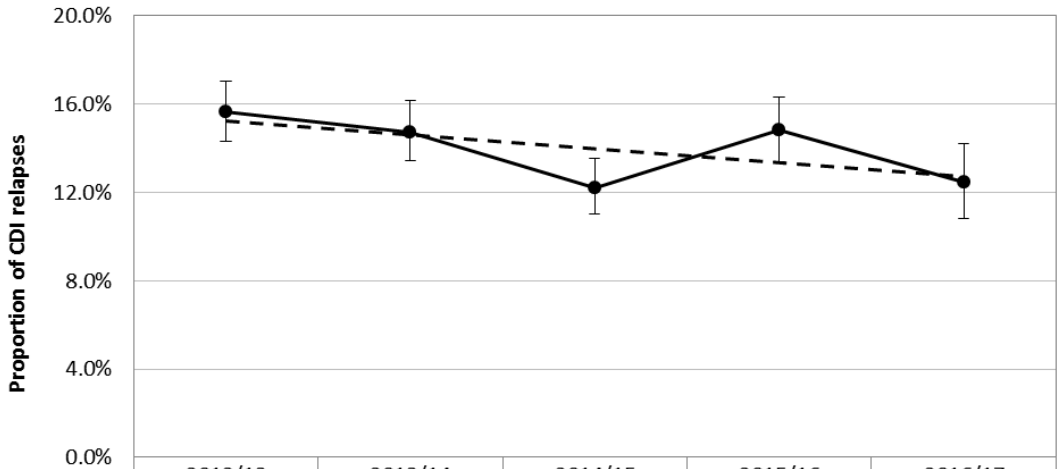


	2012/13	2013/14	2014/15	2015/16	2016/17
IHA	7.0	5.8	4.4	4.7	4.4
FHA	7.2	4.2	4.3	5.1	4.2
VCHA	8.4	6.0	4.7	6.8	4.7
VIHA	3.5	2.9	3.3	3.4	3.4
NHA	2.8	2.4	3.1	1.5	2.4
PHSA	7.0	4.8	6.0	5.5	7.7

Relapse of healthcare-associated CDI

Relapses of CDI were identified among HCA cases based on the patient's CDI history. Of all 1,503 HCA CDI cases reported in 2016/17, 187 cases were relapses (12.4%, 95% CI: 10.8%–14.2%). The proportion of relapses in 2016/17 was not significantly different from any one of the previous years, though there is a statistically significant downward trend in the proportion of relapses among HCA CDI from 2012/13 to 2016/17 (Figure 7).

Figure 7. Proportion of relapses among healthcare-associated CDI cases, 2012/13–2016/17



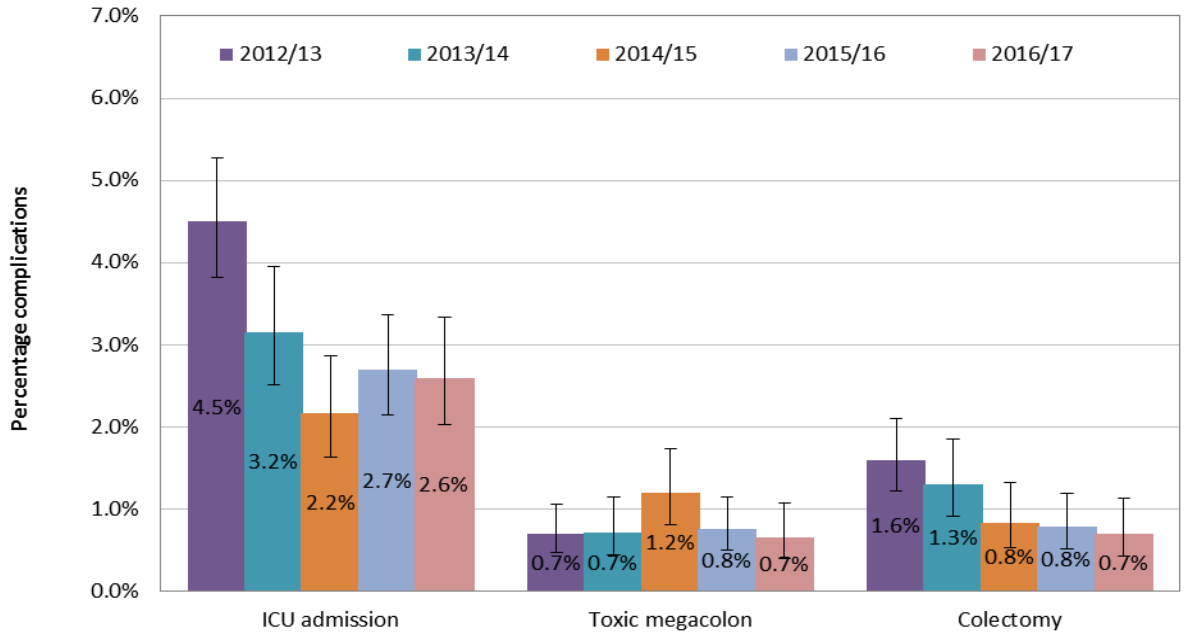
Note: Vertical bars on the line represent the 95% confidence interval of the percentages, and the dashed line represents the linear trendline of the percentages

	2012/13	2013/14	2014/15	2015/16	2016/17
Relapse of CDI	15.6%	14.7%	12.2%	14.8%	12.4%

Complications within 30 days of diagnosis

CDI cases were followed up 30 days after diagnosis or up to the point of patient discharge or transfer (whichever comes first) to assess if the patients were admitted to an intensive care unit (ICU), developed toxic megacolon, or required partial or entire colectomy due to CDI. Among the 2,362 CDI cases in 2016/17[2], 63 (2.7%) were admitted to ICU, 16 (0.7%) developed toxic megacolon, and 17 (0.7%) required partial or entire colectomy. Compared to previous years (Figure 8), the percentage of ICU admissions, toxic megacolon, and colectomy was relatively stable in the last four years.

Figure 8. CDI-associated complications within 30 days of diagnosis, 2012/13–2016/17



Note: Vertical bars on the line represent the 95% confidence interval of the percentage

[2] PHSA stopped collecting data on CDI-associated complications from FY 2013/14 and their CDI cases were excluded from this analysis. Variations may exist among HAs in defining complications due to CDI, particularly criteria for ICU admission.

Methicillin-resistant *staphylococcus aureus* (MRSA)

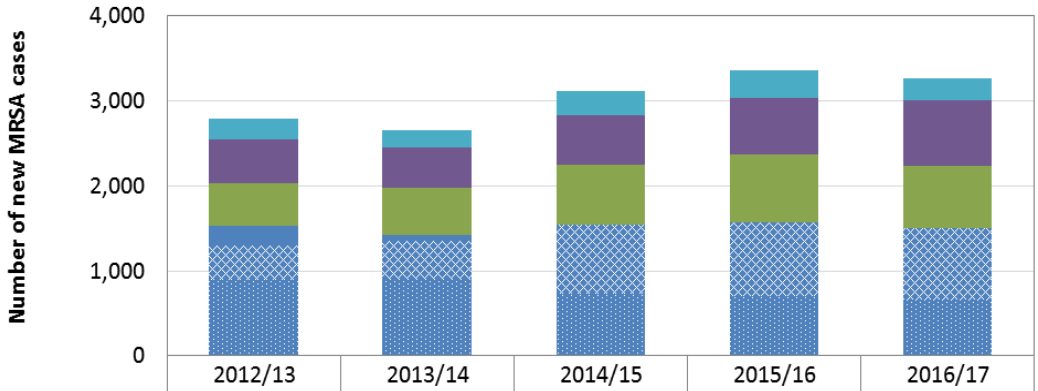
MRSA is still a major threat to patient safety and quality of care in healthcare settings. It can cause severe problems such as bloodstream infections, pneumonia, and surgical site infections — even sepsis and death (8). To monitor the trend of MRSA in acute care facilities across BC, a standard provincial surveillance protocol was implemented in fiscal year 2010/11. The following data summarize the newly identified cases of MRSA among inpatients in the fiscal year 2016/17, with a focus on MRSA cases associated with the reporting facility, and the trend of HCA MRSA from 2012/13 to 2016/17.

Overview of MRSA cases

A total of 3,271 cases of MRSA were newly identified among inpatients in BC acute care facilities during 2016/17. Of these, 1,512 (46.2%) were classified as HCA with the reporting facility, 729 (22.3%) were HCA with another facility, 765 (23.4%) were CA, and 265 (8.1%) were of unknown origin. Among the 1,515 cases of MRSA associated with the reporting facility, 665 cases (20.3% of total MRSA cases) were further classified as associated with current admission to the reporting facility and 847 cases (25.9%) were associated with a previous encounter with the reporting facility in the last twelve months (Figure 9).

Compared with previous years, the number of MRSA associated with the reporting facility in the last five years was relatively stable. However, the proportion of MRSA associated with a previous encounter increased from 19.8% of all MRSA cases in 2012/13 to 25.9% in 2016/17, while the proportion of MRSA associated with current admission decreased from 35.1% to 20.3% during the same time period. At the same time, the number of CA MRSA cases increased in BC acute care facilities (Figure 9).

Figure 9. Number of newly identified MRSA cases in BC acute care facilities, 2012/13–2016/17



	2012/13	2013/14	2014/15	2015/16	2016/17
Total MRSA	2,789	2,665	3,124	3,358	3,271
Unknown	241	209	294	322	265
CA	506	477	579	657	765
HCA with another facility	507	553	702	810	729
HCA with reporting facility, unspecified	231	61	0	0	0
HCA with a previous encouter with reporting facility	404	454	809	857	847
HCA with current admission to reporting facility	899	911	740	712	665

HCA: healthcare-associated; CA: community-associated

Rate of MRSA associated with the reporting facility in 2016/17

The provincial annual rate of MRSA associated with the reporting facility in 2016/17 was 4.9 per 10,000 inpatient days (95% CI: 4.7–5.2). The rate of MRSA associated with a current admission to the reporting facility (2.2 per 10,000 inpatient days) was lower than the rate of MRSA associated with a previous encounter with the reporting facility (2.8 per 10,000 inpatient days) (Table 2). The difference between the two rates was statistically significant. This difference was observed in four out of six HAs (IHA, FHA, VIHA, and NHA), whereas VCHA reported a higher rate of MRSA associated with current admission to the reporting facility than that associated with a previous encounter with the reporting facility. In PHSA, the difference between the rate of MRSA associated with current admission to the reporting facility and that associated with a previous encounter with the reporting facility was not statistically significant. Note that the classification of MRSA associated with a previous encounter with the reporting facility was based on whether the patient had an encounter with the reporting facility in the last twelve months. Given that this is a long duration for look-back, cases reported as MRSA associated with a previous encounter could have been acquired from other sources, such as in the community, where MRSA is widely spread (4).

The annual rate of MRSA for each acute care facility in 2016/17 is presented in Appendix D.

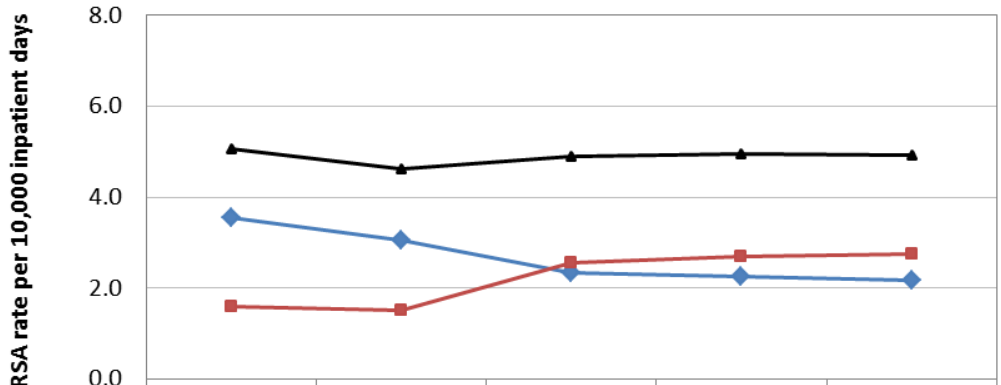
Table 2. Rate of MRSA associated with the reporting facility per 10,000 inpatient days and 95% confidence interval by health authority, 2016/17

Health authority	MRSA associated with current admission to the reporting facility	MRSA associated with a previous encounter with the reporting facility	Total
IHA	1.2 (0.9-1.5)	1.8 (1.5-2.3)	3.0 (2.6-3.6)
FHA	2.7 (2.4-3.0)	4.1 (3.7-4.5)	6.7 (6.3-7.3)
VCHA	3.6 (3.2-4.1)	2.0 (1.7-2.4)	5.6 (5.1-6.3)
VIHA	0.9 (0.7-1.1)	2.0 (1.7-2.4)	2.9 (2.5-3.4)
NHA	1.5 (1.0-2.1)	2.9 (2.2-3.8)	4.4 (3.5-5.4)
PHSA	1.4 (0.8-2.5)	1.4 (0.8-2.5)	2.9 (1.9-4.3)
Province	2.2 (2.0-2.3)	2.8 (2.6-2.9)	4.9 (4.7-5.2)

Trend of new MRSA associated with the reporting facility

Compared with previous years, there was little change in the provincial annual rate of new MRSA associated with the reporting facility in the last three years (Figure 10). The MRSA rate in 2016/17 was also not statistically significantly different from 2012/13 and 2013/14. However, the rate of MRSA associated with current admission to the reporting facility decreased significantly from 2012/13 to 2016/17, while the rate of MRSA associated with a previous encounter with the reporting facility increased significantly during the same time period (Figure 10). The divergent trends in MRSA rates may indicate that current HAI prevention and control strategies, which have mostly focused on acute care facilities, are effective in reducing MRSA transmission in acute care facilities, but may have little impact outside the hospital setting, as would be expected.

Figure 10. Annual rate of new MRSA associated with the reporting facility, 2012/13–2016/17

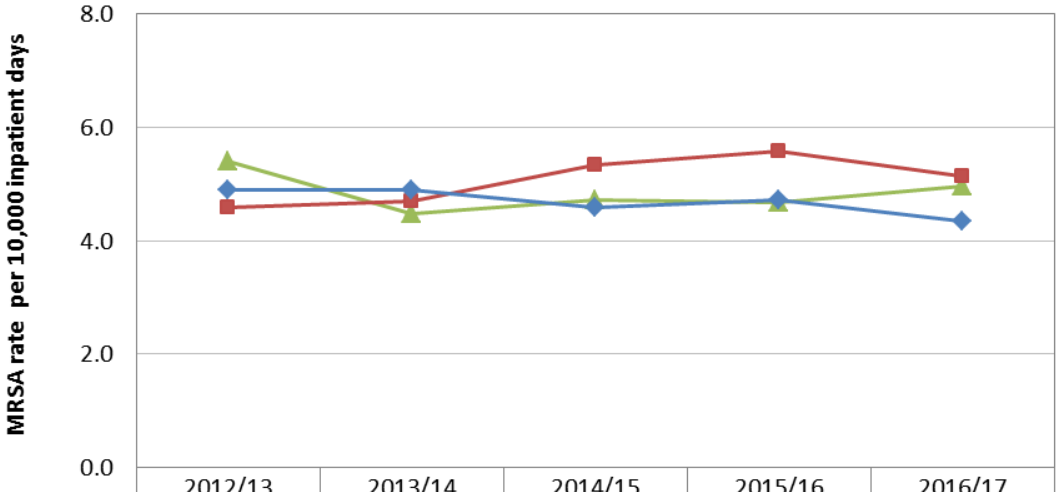


	2012/13	2013/14	2014/15	2015/16	2016/17
Total MRSA associated with the reporting facility	5.1	4.6	4.9	4.9	4.9
MRSA associated with current admission	3.5	3.1	2.3	2.2	2.2
MRSA associated with a previous encounter	1.6	1.5	2.6	2.7	2.8

Further analyses show that although the annual rates of MRSA associated with the reporting facility were relatively stable for each facility type, facility size, and health authority in the last three years, there were variations in the trend of MRSA between 2012/13 and 2016/17 among different facility groups and health authorities.

By facility type, the trend of MRSA in tertiary/referral hospitals and community hospitals was not statistically significant, but there was a significant upward trend of MRSA in regional hospitals (Figure 11).

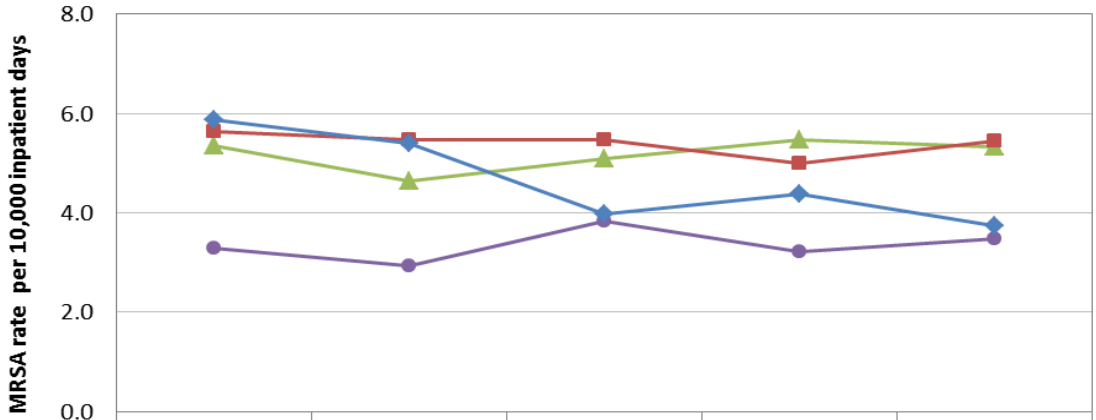
Figure 11. Annual rate of new MRSA associated with the reporting facility by facility type, 2012/13–2016/17



	2012/13	2013/14	2014/15	2015/16	2016/17
Tertiary hospital	5.4	4.5	4.7	4.7	5.0
Regional hospital	4.6	4.7	5.3	5.6	5.1
Community hospital	4.9	4.9	4.6	4.7	4.3

The rate of MRSA varied by facility size. There were no significant trends in each group of facility size, except for facilities with 50 or fewer beds, where a downward trend was statistically significant from 2012/13 to 2016/17 (Figure 12).

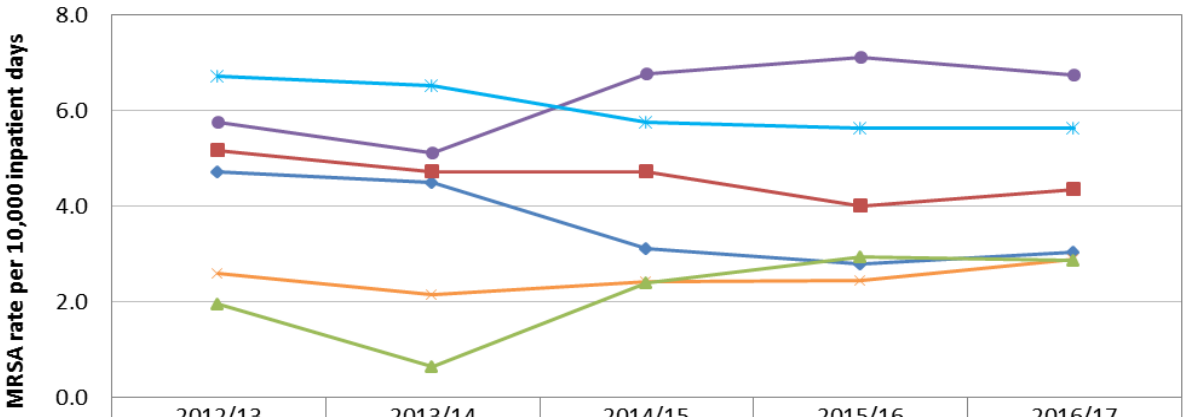
Figure 12. Annual rate of new MRSA associated with the reporting facility by facility size, 2012/13–2016/17



	2012/13	2013/14	2014/15	2015/16	2016/17
>250 beds	5.4	4.6	5.1	5.5	5.3
151-250 beds	5.6	5.5	5.5	5.0	5.4
51-150 beds	3.3	2.9	3.8	3.2	3.5
1-50 beds	5.9	5.4	4.0	4.4	3.7

The rate of MRSA also varied significantly by health authority (see data limitations in Appendix A). The overall trend of MRSA from 2012/13 to 2016/17 was not statistically significant in VIHA and NHA, significantly downward in IHA and VCHA, and significantly upward in FHA and PHSA, respectively (Figure 13).

Figure 13. Annual rate of new MRSA associated with the reporting facility by health authority, 2012/13–2016/17



	2012/13	2013/14	2014/15	2015/16	2016/17
IHA	4.7	4.5	3.1	2.8	3.0
FHA	5.8	5.1	6.8	7.1	6.7
VCHA	6.7	6.5	5.7	5.6	5.6
VIHA	2.6	2.2	2.4	2.5	2.9
NHA	5.2	4.7	4.7	4.0	4.4
PHSA	2.0	0.6	2.4	2.9	2.9

Carbapenemase-producing organisms (CPO)

CPO are emerging pathogens that have limited antibiotic treatment options, and consequently poor clinical outcomes: up to 50% of severe infections result in death (9). In response to recent global increases of CPO and an outbreak in a BC hospital in February 2014, a mandatory provincial surveillance program on CPO was introduced to BC acute care facilities in July 2014. CPO were further made a reportable disease in BC in December 2016. Health Authority's Infection Prevention and Control programs and PICNet is discussing with Public Health how to add CPO cases identified in the community to current surveillance programs.

The following data provide an update on new CPO cases identified from patients visiting BC acute care facilities during fiscal year 2016/17. The numbers of new CPO cases identified in 2015/16 are also presented for reference. CPO cases identified in the community were not included. The rate of CPO was not calculated in this report because CPO is still rare in most BC healthcare facilities, and current CPO screening is targeted towards high-risk patients, including inpatients, hemodialysis patients, and other patients who are deemed at high risk of acquiring CPO by each individual HA. The number of patients being screened (denominator) is hard to track in a manner that allows the precise calculation of a provincial rate for CPO.

New cases of CPO identified in 2016/17

A total of 86 new cases of CPO were identified from 77 patients who visited BC acute care facilities during 2016/17. Of the 77 patients, 69 patients were identified with a single carbapenemase gene, seven patients with two different carbapenemase genes, and one patient with three different carbapenemase genes, with each carbapenemase gene being counted as a new case of CPO.

Similar to 2015/16, the gene NDM continued to be the predominant carbapenemase gene identified in 2016/17, accounting for 68.6% of CPO cases, followed by OXA-48 (17.4%), KPC (10.5%). The genes VIM (2 cases) and SME (1 case) were also identified in 2016/17 (Table 3).

Table 3. Number of new cases of CPO identified in BC acute care facilities by carbapenemase gene, 2015/16–2016/17

Gene	2015/16		2016/17	
	Number of new CPO cases	Percent	Number of new CPO cases	Percent
NDM	50	52.6%	59	68.6%
OXA-48	21	22.1%	15	17.4%
KPC	14	14.7%	9	10.5%
VIM	0	0	2	2.3%
SME	1	1.1%	1	1.2%
Other genes	9	9.5%	0	0
Total	**95**	**100.0%**	**86**	**100.0%**

Among the 86 new cases of CPO, 61 (70.9%) were identified in FHA, 21 cases (24.4%) were in VCHA, and 2 cases (2.3%) were in IHA (Table 4). PHSA reported the first CPO cases among their patients in 2016/17. VIHA did not identify any CPO cases during 2016/17. No CPO cases have been identified in NHA by the end of 2016/17.

Table 4. Number of new cases of CPO identified in BC acute care facilities by health authority, 2015/16 and 2016/17

Health authority	2015/16		2016/17	
	Number of new CPO cases	Percent	Number of new CPO cases	Percent
IHA	1	1.1%	2	2.3%
FHA	69	72.6%	61	70.9%
VCHA	23	24.2%	21	24.4%
VIHA	2	2.1%	0	0.0%
NHA	0	0	0	0.0%
PHSA	0	0	2	2.4%
Total	**95**	**100.0%**	**86**	**100.0%**

Risk factors for CPO acquisition

New CPO cases were investigated for risk factors that may have contributed to CPO acquisition in the past twelve months, including healthcare encounters outside Canada (e.g. overnight hospitalization, certain medical or surgical procedures), close contact with a CPO patient or their environment, transfer from a unit which was under investigation for CPO transmission, and CPO transmission within the reporting facility. Of the 86 new cases of CPO, 57 (66.3%) reported a healthcare exposure outside Canada in the past twelve months, and 13 cases (15.1%) were identified with at least one other risk factor. No known risk factors were identified in 16 cases (18.6%), meaning that a possible source of their CPO transmission could not be identified.

Hand cleaning compliance (HCC)

Hand cleaning, i.e., washing hands with soap and water or sanitizing with alcohol-based hand rub, has long been considered an effective and simple way of preventing HAIs and limiting the transmission of pathogens (2,3). Healthcare providers working in BC acute care facilities are audited regularly to evaluate compliance with the hand hygiene policy, and the audit results have been reported to PICNet on a quarterly basis since 2010. From the fiscal year 2014/15, HCC in HA-owned or operated residential care facilities were also submitted to PICNet for public reporting. The following data present the percent compliance from acute care facilities and HA-owned or operated residential care facilities during 2016/17 and compare these rates to previous years.

Overall hand cleaning compliance in 2016/17

The provincial annual compliance in 2016/17 was 82.5% for acute care facilities and 85.0% for residential care facilities, respectively (Table 5). Both surpassed the target performance of 80% set by the Provincial Hand Hygiene Working Group (PHHWG).

Detailed compliance for acute care facilities with more than 200 observations is presented in Appendix D.

Table 5. Hand cleaning compliance by health authority, 2016/17

Health authority	Acute care facility		Residential care facility	
	Total observations	Percent compliance	Total observations	Percent compliance
IHA	31,338	78.7%	10,008	76.8%
FHA	105,769	85.9%	16,347	87.4%
VCHA	27,119	78.5%	11,109	88.6%
VIHA	22,985	77.6%	6,598	87.6%
NHA	15,760	78.3%	6,176	82.4%
PHSA*	4,600	93.8%	N/A	N/A
Province	**207,571**	**82.5%**	**50,238**	**85.0%**

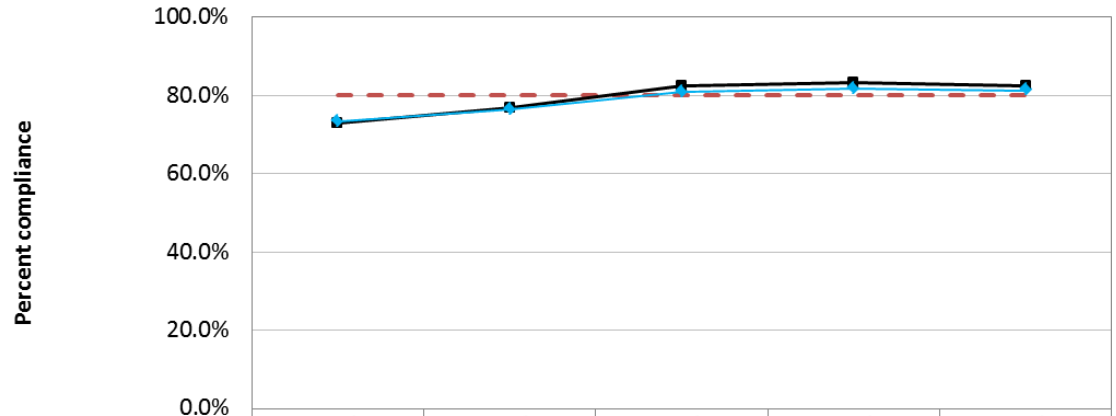
* The data for PHSA include observations in BC Cancer Agency. There are no residential care facilities in PHSA

To reduce the impact of variations in the number of opportunities observed among HAs, the provincial compliance for acute care facilities was weighted by acute care inpatient days. The weighted provincial compliance for acute care facilities in 2016/17 was 81.3%, which is still over the 80% of target performance.

Hand cleaning compliance in acute care facilities

The provincial compliance for acute care facilities, whether un-weighted or weighted, has surpassed 80% for the last three years (Figure 14). The compliance has plateaued from 2014/15 after significant improvement during 2012/13–2014/15.

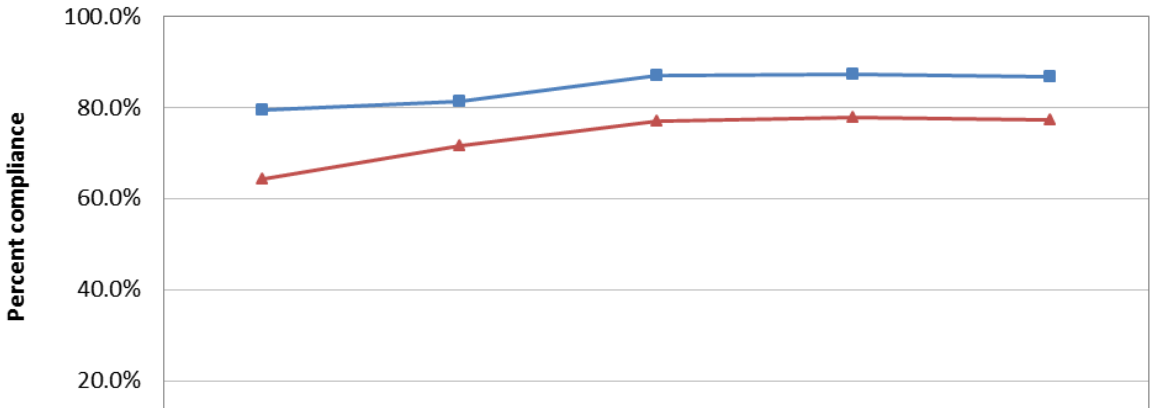
Figure 14. Provincial annual hand cleaning compliance, 2012/13–2016/17



	2012/13	2013/14	2014/15	2015/16	2016/17
Target compliance	80.0%	80.0%	80.0%	80.0%	80.0%
Compliance, unweighted	72.9%	76.8%	82.6%	83.2%	82.5%
Compliance,weighted	73.3%	76.4%	80.9%	81.7%	81.3%

Hand cleaning compliance for acute care facilities was further broken down by moment of contact and by healthcare provider group. Compliance has improved continuously from 2012/13 to 2014/15 and leveled off afterwards for both before and after contact with a patient or patient's immediate environment (Figure 15). The compliance before contact was significantly lower than compliance after contact every year during 2012/13 to 2016/17 (Figure 14).

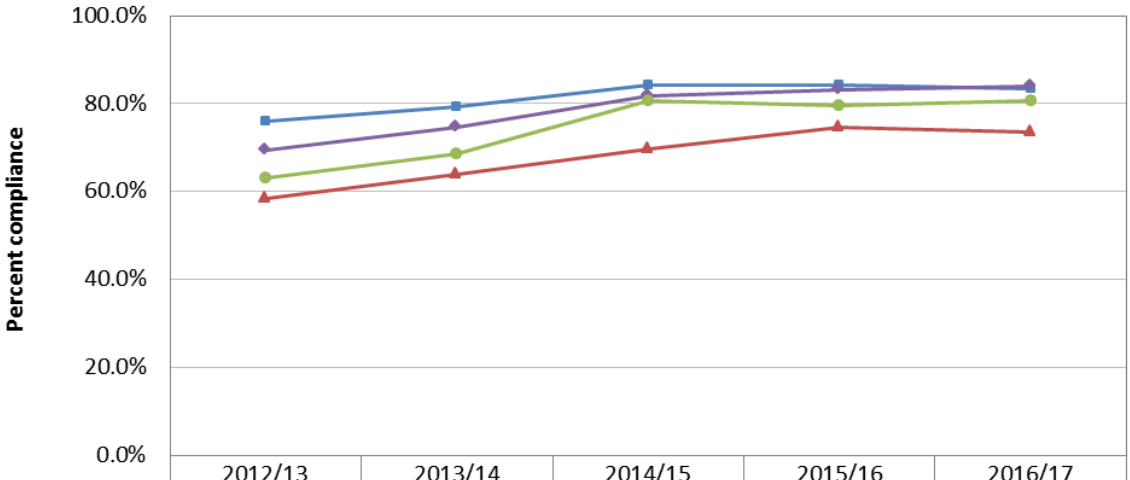
Figure 15. Provincial hand cleaning compliance in acute care facilities by moment of contact, 2012/13–2016/17



	2012/13	2013/14	2014/15	2015/16	2016/17
After contact	79.5%	81.5%	87.0%	87.3%	86.7%
Before contact	64.2%	71.7%	77.0%	77.8%	77.3%

Hand cleaning compliance also improved among all health care providers during 2012/13 to 2016/17. Nursing staff consistently had the highest hand cleaning compliance among all healthcare providers before 2016/17 and clinical support services had the highest compliance in 2016/17. Compliance among physicians was the lowest every year and was lower than 80% of target compliance (Figure 16).

Figure 16. Provincial hand cleaning compliance in acute care facilities by health care provider group, 2012/13–2016/17



	2012/13	2013/14	2014/15	2015/16	2016/17
Nursing staff	76.0%	79.3%	84.1%	84.3%	83.4%
Physician	58.3%	64.0%	69.7%	74.6%	73.4%
Clinical support services	69.3%	74.6%	81.9%	83.1%	83.9%
Other	63.2%	68.5%	80.6%	79.7%	80.8%

Hand cleaning compliance in acute care facilities varied significantly by health authority (see data limitations in Appendix A) and the compliance has plateaued in most health authorities in the last three years after significant improvement from 2012/13 to 2014/15 (Table 6).

Table 6. Hand cleaning compliance in acute care facilities by health authority, 2012/13–2016/17

Health authority	2012/13	2013/14	2014/15	2015/16	2016/17
IHA	69.2%	74.9%	75.4%	77.9%	78.7%
FHA	71.7%	79.2%	84.7%	87.4%	85.9%
VCHA	71.5%	76.4%	78.7%	78.8%	78.5%
VIHA	82.3%	71.4%	81.5%	78.3%	77.6%
NHA	69.7%	74.1%	76.3%	75.9%	78.3%
PHSA	78.8%	87.8%	88.2%	90.8%	93.8%
Province	**72.9%**	**76.8%**	**82.6%**	**83.2%**	**82.5%**

Hand cleaning compliance in residential care facilities

Hand cleaning compliance in HA-owned/operated residential care facilities was predominantly assessed by self-auditing, except for facilities in IHA and Providence Health Care (PHC), where audits were conducted by infection control practitioners or co-op medical students. The compliance varied significantly by health authority and higher compliance was reported among the health authorities with self-auditing (Table 7).

Table 7. Hand cleaning compliance in health authority-owned/operated residential care facilities by health authority, 2014/15–2016/17

Health authority*	2014/15	2015/16	2016/17
IHA	71.4%	77.7%	76.8%
FHA	84.2%	85.3%	87.4%
VCHA	76.7%	85.5%	88.6%
VIHA	90.5%	89.6%	87.6%
NHA	77.0%	82.0%	82.4%
Province	**80.1%**	**83.6%**	**85.0%**

* There are no residential care facilities owned or operated by PHSA.

Conclusion

The provincial surveillance programs for HAI were established to monitor the occurrence and trends of HAI in acute care facilities, as well as hand cleaning compliance among health care providers. Over the last five years from 2012/13 to 2016/17, there has been a general decreasing trend in provincial CDI rates, with the rate in 2016/17 being the lowest in the last five years. The provincial rate of MRSA associated with current admission to the reporting facility has also decreased significantly in the last five years. However, increasing spread of CDI and MRSA in the community (4,5,6) poses a great challenge for infection prevention and control programs, which focus on healthcare facilities.

Cases of CPO are still rare in most acute care facilities in BC. Exposure to the healthcare system in CPO-endemic regions is a major risk factor associated with CPO acquisition in BC. This may also contribute to the variations in CPO cases identified among HAs.

Although the provincial hand cleaning compliance has surpassed 80% of target performance for the third consecutive year, compliance is not evenly achieved among all healthcare providers and moments of contact. There remains work to do to make real, sustainable improvements for hand hygiene in BC healthcare facilities.

Appendices

Appendix A. Methods

Surveillance populations

All patients who were admitted to an acute care facility in BC were included in surveillance for CDI, MRSA, and CPO. This included patients admitted to the emergency department awaiting placement (e.g. patients admitted to a service who are waiting for a bed), patients in alternative level of care beds, and patients in labour and delivery beds. Outpatient visits to acute care facilities, patients in extended care, and short-time admissions to emergency departments were excluded, with an exception in CPO surveillance, which includes hemodialysis patients visiting renal clinics in acute care facilities, and other patients that were deemed high risk for CPO. Patients under one year of age were excluded from CDI surveillance because asymptomatic carriage of *C. difficile* is very frequent, and *C. difficile*-associated diarrheal illness is exceedingly rare before twelve months of age (10,11).

For hand cleaning compliance, auditing takes place among all healthcare providers working at both acute care facilities and residential care facilities. The healthcare providers in acute care facilities are grouped into four categories by HA when reporting audit results: 1) nursing staff, including nurses, midwives, care aides, nursing students, etc.; 2) physicians, including medical doctors, residents, and medical students; 3) clinical support services, such as occupational therapists, physiotherapists, respiratory therapists, speech therapists, social workers, dieticians, psychologists, audiologists, porters, pastoral care, radiologists, laboratory and electrocardiogram technicians, etc.; and 4) others, such as housekeeping, food services, clerk, volunteer, security, etc.

Data collection and reporting

CDI and MRSA

Provincial surveillance data for CDI and MRSA were collected according to the provincial surveillance protocols, which were developed by PICNet's Surveillance Steering Committee (SSC) and are reviewed annually. CDI cases include new infections as well as relapses from previous infections. MRSA surveillance focuses on incidence cases, which are newly identified colonizations or infections with MRSA among inpatients. All CDI and MRSA cases were laboratory confirmed, and classified as either healthcare-associated (HCA), community-associated (CA), or unknown, based on the patient's healthcare encounter in the last four weeks (for CDI) or twelve months (for MRSA) before identification. For detailed case definition and classification for CDI and MRSA, please visit PICNet website: https://www.picnet.ca/surveillance. Information on individual cases of CDI and MRSA were collected daily by infection control practitioners (ICPs) and managed by the respective health authority. After the end of each fiscal quarter, CDI and MRSA cases were aggregated by facility and classification using templates for data submission. These data were then submitted to PICNet. Total inpatient days (denominators) were collected from the patient information systems by the respective HA.

CPO

The provincial surveillance protocol for CPO was developed by the provincial CPO Working Group in May 2014. Since July 18, 2014, the microbiology laboratories in BC healthcare facilities are required to submit all isolates suspected of harbouring a carbapenemase gene to the Public Health Laboratory at the BC Center for Disease Control for confirmatory testing and genotyping analysis. If an isolate is recovered from a patient in an acute care facility and identified with a carbapenemase gene for the first time or with a new carbapenemase gene, regardless of the organism/species identified, it is considered to be a new case of CPO, and reported to PICNet. The ICPs collect surveillance information regarding the new

case and submit this information to PICNet via their health authority. PICNet further links the new cases to the laboratory testing data and patient information collected by the laboratory for the provincial surveillance report.

Hand Cleaning Compliance

The methodology for the provincial hand hygiene audits was adapted by the Provincial Hand Hygiene Working Group (PHHWG) from the World Health Organization's guidelines for hand hygiene, which describe direct observation as the gold standard methodology for assessing hand hygiene (12). During the auditing process, trained auditors directly observe a sample of healthcare workers in acute care facilities across BC. The auditors record the number of hand cleaning events they observe (i.e., when healthcare workers clean their hands), as well as the number of hand cleaning opportunities (i.e., when healthcare workers should clean their hands). This includes opportunities before contact with a patient or the patient's immediate environment (such as around the patient's bedside) and after contact with a patient or the patient's immediate environment. The minimum requirement is 200 observations per quarterly audit cycle for each facility with 25 or more beds. For facilities with fewer than 25 beds, the audit data are aggregated into the overall health authority data. The audit data are collected and managed by each HA, then aggregated by facility and submitted to PICNet at the end of each quarter.

Data analysis

The quarterly data were verified before data analysis. After the end of each fiscal year, all quarterly submitted data were reviewed with the health authorities and updated if there were any changes.

The CDI and MRSA surveillance data were merged by PICNet into respective databases and then grouped by HA, facility size and type. The rate of HCA CDI or MRSA was calculated using the total number of new cases of HCA CDI or MRSA associated with the reporting facility as numerators divided by the total inpatient days during the same period as denominators, then multiplying by 10,000 to calculate a rate per 10,000 inpatient days. The 95% confidence intervals (CI) of the rates were calculated by the Wilson score method and were used to determine whether the difference between the rates was statistically significant. If the ranges of 95% CI did not overlap, the difference in the two rates was considered statistically significant.

The HCC percentage was the number of compliant opportunities over the total opportunities observed, and further grouped by moment before contact and after contact, and by healthcare worker group. To reduce the impact of variations in the opportunities observed by HA, total inpatient days in each HA was used to weight opportunities observed during the same period and the weighted provincial compliance was calculated for each auditing quarter.

Trend analysis was limited to annual rates of CDI, MRSA, and HCC in the last five years from 2012/13 to 2016/17, with a statistically significant level of $p < 0.05$ using Cochrane-Armitage test for linear trend.

CPO were presented by the number of cases in this report. The rate was not calculated because CPO is still rare in most BC facilities, and therefore only high-risk patients are screened for CPO (including inpatients, hemodialysis patients, and other patients who are deemed at high risk for CPO transmission by each individual HA). The numbers of patients who were screened (denominator) were not collected in a manner that allows the precise calculation of a provincial rate for CPO.

Data limitations

Although standard provincial surveillance protocols have been developed and reviewed annually to reflect the advances of scientific research and surveillance practice, there are noted variations in how the case definitions and inclusion/exclusion criteria were applied by the HAs and healthcare facilities. For example, in defining a CDI case, FHA and PHSA began to apply the frequency of documented

diarrheal episodes stringently with chart review since 2012, while other HAs continued to define CDI based on positive laboratory testing from diarrhea specimens. In addition, as of 2012, IHA and FHA require resolution of diarrhea from a previous CDI episode for a period of >24 hours (IHA) or >72 hours (FHA) before applying the period of two to eight weeks for defining a relapse of CDI. No health authorities reported significant changes in the application of the protocol after 2012.

Variation also exists among the HAs in how MRSA case definition and classification is applied. A twelve-month look-back period for healthcare encounter history and >48 hours (or two calendar days, with the day of admission counted as the first day) after admission to classify MRSA associated with the reporting facility is employed by all HAs except PHC and FHA, which use more >72 hours after admission.

Laboratory practice and methodology may vary among the microbiology laboratories, and may change over time. From 2008 to 2012, more sensitive and faster testing for detecting *C. difficile* was gradually introduced into the microbiology laboratories across the province, which may result in more specimens being identified positive with *C. difficile* by the laboratory, and thus more CDI cases diagnosed. There is no evidence that the microbiology practice has changed significantly for MRSA after provincial surveillance started.

Infection prevention and control practices vary across HAs and healthcare facilities, which can also affect identification of MRSA and CDI. For example, facilities that conduct more intense screening of patients (such as universal admission screening, periodic screening of certain units and/or high-risk patients) may identify more MRSA cases than those which screen patients in specific situations only. Intensive testing of diarrheal specimens may result in more CDI reported.

The patient's encounter history with healthcare has been used to determine whether the case of CDI and MRSA was healthcare-associated. Various "look-back" periods were employed by HAs in the first year(s), and were consolidated to four weeks for CDI from FY 2010/11 and twelve months for MRSA from FY 2012/13. The facilities in PHSA and PHC are unable to check the patient healthcare history outside their health authority, and thus did not report cases that were associated with another facility.

In hand hygiene audits, auditing might be performed by auditors who work in the same unit or small facility as the healthcare workers they are observing (self-auditing); conversely, it might be performed by external auditors such as infection control practitioners (ICPs), dedicated auditors, medical students, or members of the healthcare quality department of the hospital or HA. Observer and selection bias are inevitable (13). Self-auditing tends to report higher compliance than dedicated auditors. The audits in facilities in IHA, PHC, and PHSA were conducted by ICPs or co-op medical students. FHA, VCHA (except PHC), VIHA, and NHA employed ICPs, or dedicated auditors for auditing large acute care facilities, whereas the compliance in the remaining acute care facilities and all residential care facilities were assessed by self-auditing. Auditors also varied over time. VIHA recruited dedicated auditors to conduct auditing in some large facilities from 2013/14 onwards. In addition, direct observation induces a phenomenon referred to as the Hawthorne Effect, i.e. the tendency of individuals to change their behavior when they know they are being watched (14, 15).

Finally, patient populations may differ from facility to facility, and over time. The rates in this report were not adjusted by any risk factors, and therefore direct comparison of the rates of CDI and MRSA, or the HCC percentage, between HAs or healthcare facilities is not recommended.

Appendix B. Acute care facilities participating in the provincial surveillance program in 2016/17

Summary of acute care facilities participating in the provincial surveillance program, fiscal year 2016/17

Health authority	IHA	FHA[a]	VCHA[b]	VIHA	NHA	PHSA[c]	Total
Total number of facilities	**22**	**13**	**11**	**13**	**18**	**2**	**79**
By facility type							
Community hospital	16	6	6	9	9	0	46
Regional hospital	4	4	3	2	8	0	21
Tertiary/referral hospitals	2	3	2	2	1	2	12
By facility size[d]							
1–50 beds	16	2	5	5	17	0	45
51–150 beds	3	3	2	5	0	2	15
151 - 250 beds	2	4	1	0	1	0	8
>250 beds	1	4	3	3	0	0	11
Acute care beds[d]	**1,310**	**2,845**	**2,089**	**1,590**	**555**	**249**	**8,638**
Total acute care admissions[e]	**75,664**	**144,750**	**88,108**	**79,391**	**28,811**	**28,164**	**444,888**
Total inpatient days[e]	**477,720**	**1,069,276**	**633,188**	**615,018**	**199,738**	**83,903**	**3,078,843**

Notes:

a. The data from Matsqui Sumas Abbotsford Hospital and Abbotsford Regional Hospital in FHA were merged together for surveillance purpose
b. Includes acute care facilities of Providence Health Care (PHC)
c. Excludes BC Cancer Agency, which was included for hand cleaning compliance audits only.
d. Based on the counts of acute care beds in quarter 4 of 2016/17. The number of beds may vary by quarter due to temporary closure of acute care beds by facilities.
e. The patients less than one year old were excluded from CDI surveillance

Appendix C. Start and end date for quarters in 2016/17

Start and end date of quarters in 2016/17

Quarter code	Fiscal quarter		Calendar quarter	
	Start date	End date	Start date	End date
Q1	01-Apr-2016	19-Jun-2016	01-Apr-2016	30-Jun-2016
Q2	20-Jun-2016	11-Sep-2016	01-Jul-2016	30-Sep-2016
Q3	12-Sep-2016	05-Dec-2016	01-Oct-2016	31-Dec-2016
Q4	06-Dec-2016	31-Mar-2017	01-Jan-2017	31-Mar-2017

Appendix D. Annual rate of new CDI and MRSA associated with the reporting facility and hand cleaning compliance by acute care facility, 2016/17

Health authority and facility	CDI		MRSA		HCC	
	Number of new cases	Rate (95% CI) [a]	Number of new cases	Rate (95% CI) [a]	Total observations	Percent compliance
Interior Health [b]	**198**	**4.4 (3.8-5.0)**	**145**	**3.0 (2.6-3.6)**	**31,338**	**78.7%**
100 Mile District Hospital	0	0	*	3.8 (1.0-13.7)	351	81.5%
Arrow Lakes Hospital	*	10.5 (1.9-59.4)	0	0.0	**	**
Boundary Hospital	*	7.2 (2.5-21.2)	*	5. 1(1.4-18.7)	344	75.9%
Cariboo Memorial Hospital and Health Centre	*	2.2 (0.6-7.9)	*	6.7 (3.1-14.6)	373	82.6%
Creston Valley Hospital	*	1.9 (0.3-10.6)	*	2.0 (0.4-11.4)	302	78.1%
Dr. Helmcken Memorial Hospital & Health Centre	0	0	0	0.0	**	**
East Kootenay Regional Hospital	11	4.6 (2.6-8.2)	*	2.3 (1.0-4.9)	1,880	76.1%
Elk Valley Hospital	*	7.9 (2.7-23.1)	0	0.0	420	72.4%
Golden & District General Hospital	*	4.7 (0.8-26.5)	0	0.0	**	**
Invermere & District Hospital	*	5.2 (0.9-29.2)	0	0.0	**	**
Kelowna General Hospital	71	5.2 (4.1-6.6)	50	3.3 (2.5-4.4)	8,976	75.7%
Kootenay Boundary Regional Hospital	12	5.5 (3.1-9.6)	*	2.4 (1.1-5.2)	1,962	80.2%
Kootenay Lake Hospital	*	5.7 (2.6-12.3)	*	1.9 (0.5-7.0)	946	82.8%
Lillooet Hospital and Health Centre	0	0	0	0	**	**
Nicola Valley Health Centre	0	0	0	0	**	**
Penticton Regional Hospital	21	4.8 (3.2-7.4)	10	2.0 (1.1-3.7)	3,460	76.2%
Princeton General Hospital	*	5.7 (1.0-32.4)	0	0.0	**	**
Queen Victoria Hospital and Health Centre	0	0	0	0	**	**
Royal Inland Hospital	35	3.8 (2.7-5.3)	37	4.1 (3.0-5.7)	5,392	81.1%
Shuswap Lake General Hospital	10	5.9 (3.2-10.8)	15	9.3 (5.6-15.3)	2,188	87.1%
South Okanagan General Hospital	*	5.1 (1.7-14.9)	*	1.6 (0.3-9.63)	406	79.8%
Vernon Jubilee Hospital	16	2.8 (1.7-4.6)	13	2.1 (1.2-3.7)	3,616	79.4%
Fraser Health [b]	**428**	**4.2 (3.8-4.6)**	**721**	**6.7 (6.3-7.3)**	**105,769**	**85.9%**
Abbotsford Regional Hospital/ Matsqui Sumas Abbotsford [c]	40	3.6 (2.6-4.8)	73	6.1 (4.8-7.7)	12,189	86.7%
Burnaby Hospital	61	5.7 (4.4-7.3)	95	8.5 (7.0-10.4)	17,766	88.4%
Chilliwack General Hospital	34	5.9 (4.2-8.3)	22	3.7 (2.5-5.7)	6,242	78.8%
Delta Hospital	*	1.7 (0.6-4.3)	15	6.3 (3.8-10.3)	3,500	85.8%
Eagle Ridge Hospital	26	4.3 (3.0-6.3)	39	6.5 (4.7-8.9)	6,601	85.5%
Fraser Canyon Hospital	*	5.3 (1.5-19.5)	*	5.3 (1.5-19.5)	1,191	95.7%

Health authority and facility	CDI		MRSA		HCC	
	Number of new cases	Rate (95% CI) [a]	Number of new cases	Rate (95% CI) [a]	Total observations	Percent compliance
Langley Memorial Hospital	17	2.5 (1.6-4.0)	35	4.9 (3.5-6.8)	4,404	92.7%
Mission Memorial Hospital	*	4.5 (2.4-8.5)	16	8.0 (4.9-13.0)	5,400	88.0%
Peace Arch Hospital	18	2.6 (1.6-4.1)	32	4.5 (3.2-6.4)	6,116	88.2%
Queen's Park Hospital	*	1.8 (0.8-4.0)	19	5.8 (3.7-9.1)	951	93.3%
Ridge Meadows Hospital	31	3.8 (2.7-5.4)	59	9.9 (7.6-12.7)	7,208	84.9%
Royal Columbian Hospital	58	4.2 (3.3-5.5)	103	6.0 (4.9-7.3)	17,005	87.9%
Surrey Memorial Hospital/ Yale Road Centre	122	4.9 (4.1-5.9)	211	8.0 (7.0-9.1)	17,107	79.9%
Vancouver Coastal Health [b]	**298**	**4.7 (4.2-5.3)**	**357**	**5.6 (5.1-6.3)**	**27,119**	**78.5%**
Bella Coola General Hospital	0	0	0	0.0	313	86.3%
Lions Gate Hospital	40	4.5 (3.3-6.1)	68	7.3 (5.8-9.3)	3,527	76.1%
Mount Saint Joseph Hospital	20	6.5 (4.2-10.0)	*	1.0 (0.3-2.9)	1,047	82.5%
Powell River General Hospital	*	2.6 (0.9-7.6)	0	0.0	498	81.1%
Richmond Hospital	33	4.6 (3.3-6.4)	44	5.8 (4.3-7.8)	3,548	77.6%
RW Large Hospital	0	0	0	0.0	**	**
Sechelt Hospital[d]	*	2.5 (1.0-6.4)	*	3.6 (1.7-7.9)	483	89.0%
Squamish General Hospital	0	0	0	0.0	551	89.8%
St. Paul's Hospital	69	5.0 (4.0-6.4)	69	5.0 (4.0-6.3)	3,293	83.8%
UBC Hospital	*	5.9 (2.7-12.9)	*	2.0 (0.5-7.2)	1,090	77.4%
Vancouver General Hospital	123	4.9 (4.1-5.8)	165	6.7 (5.7-7.8)	12,104	76.7%
Island Health [b]	**182**	**3.4 (2.9-3.9)**	**178**	**2.9 (2.5-3.4)**	**22,985**	**77.6%**
Campbell River & District General Hospital	10	2.9 (1.6-5.4)	19	5.4 (3.5-8.5)	632	89.4%
Cormorant Island Community Health Centre	0	0	0	0.0	**	**
Cowichan District Hospital	10	2.4 (1.3-4.4)	23	4.7 (3.2-7.1)	1,956	76.5%
Lady Minto Gulf Islands Hospital	*	9.1 (3.9-21.2)	*	1.8 (0.3-10.2)	527	84.4%
Nanaimo Regional General Hospital	43	4.1 (3.0-5.5)	49	4.1 (3.1-5.4)	3,983	70.3%
Port Hardy Hospital	0	0	0	0.0	**	**
Port McNeill and District Hospital	0	0	*	5.9 (1.0-33.2)	**	**
Royal Jubilee Hospital	58	4.0 (3.1-5.2)	33	1.9 (1.3-2.7)	5,951	75.6%
Saanich Peninsula Hospital	*	2.5 (1.2-5.5)	*	1.3 (0.4-3.7)	1,180	91.1%
St. Joseph's General Hospital	10	2.7 (1.5-5.0)	12	2.7 (1.5-4.7)	318	89.6%
Tofino General Hospital	0	0	*	22.5 (8.7-57.7)	**	**
Victoria General Hospital	36	3.0 (2.2-4.1)	17	1.3 (0.8-2.1)	7,376	79.1%
West Coast General Hospital	*	2.4 (0.9-6.1)	15	7.6 (4.6-12.6)	875	76.0%

Health authority and facility	CDI		MRSA		HCC	
	Number of new cases	Rate (95% CI) [a]	Number of new cases	Rate (95% CI) [a]	Total observations	Percent compliance
Northern Health [b]	**48**	**2.4 (1.8-3.2)**	**87**	**4.4 (3.5-5.4)**	**15,760**	**78.3%**
Bulkley Valley District Hospital	0	0	*	3.1 (0.8-11.2)	1,023	77.3%
Chetwynd General Hospital	0	0	0	0.0	452	78.8%
Dawson Creek Hospital	*	0.6 (0.1-3.5)	*	2.5 (1.0-6.3)	583	79.1%
Fort Nelson General Hospital	0	0	*	3.3 (0.6-18.6)	955	82.1%
Fort St. John General Hospital	*	1.7 (0.6-4.9)	*	2.2 (0.9-5.8)	1,183	79.0%
G.R. Baker Memorial Hospital	*	0.7 (0.1-3.9)	*	2.7 (1.1-7.0)	900	62.6%
Kitimat General Hospital	*	3.3 (0.9-11.9)	*	6.6 (2.5-16.8)	1,193	86.9%
Lakes District Hospital	*	2.9 (0.5-16.5)	*	2.9 (0.5-16.5)	**	**
Mackenzie and District Hospital	0	0	*	14.3 (3.9-51.9)	**	**
McBride and District Hospital	0	0	*	10.4 (1.8-58.4)	261	80.1%
Mills Memorial Hospital	10	6.1 (3.3-11.2)	*	3.6 (1.7-8.0)	894	81.7%
Northern Haida Gwaii Hospital	0	0	*	9.0 (1.6-50.8)	960	87.6%
Prince Rupert Regional Hospital	0	0	13	14.0 (8.2-23.9)	1,111	79.4%
Queen Charlotte Islands Hospital	0	0	0	0.0	321	92.2%
St. John Hospital	*	3.1 (0.9-11.3)	*	3.1 (0.9-11.3)	**	**
Stuart Lake Hospital	*	7.0 (1.2-39.5)	0	0.0	598	93.0%
University Hospital of Northern BC	27	3.0 (2.1-4.4)	42	4.7 (3.5-6.4)	4,405	73.0%
Wrinch Memorial Hospital	0	0	0	0.0	825	73.5%
Provincial Health Services Authority [b]	**38**	**7.7 (5.6-10.6)**	**24**	**2.9 (1.9-4.3)**	**4,600**[e]	**93.8%**
BC Children's Hospital	38	14.5 (10.5-19.8)	10	3.0 (1.6-5.5)	1,850	94.1%
BC Women's Hospital	0	0	14	2.8 (1.7-4.7)	1,550	94.1%
Total [a]	**1,189**	**4.1 (3.9-4.4)**	**1,515**	**4.9 (4.7-5.2)**	**207,551**	**82.5%**

Notes: * represents the number of cases of CDI or MRSA that was less than ten cases; ** represents the number of observations that was less than 200 opportunities in 2016/17

a. per 10,000 inpatient days

b. The total in each health authority includes the numbers masked by * or ** in their facilities

c. includes data from Matsqui Sumas Abbotsford Hospital

d. formerly known as St. Mary's Hospital

e. includes observations in BC Cancer Agency - Vancouver Center

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