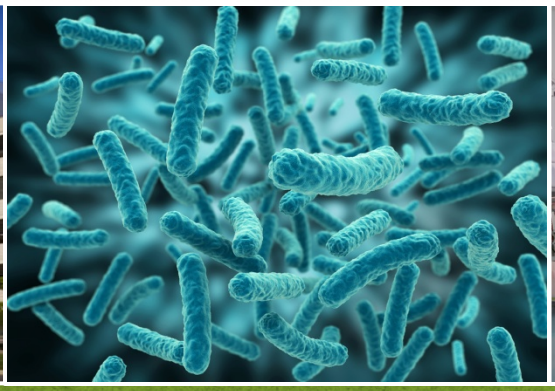
ANTIMICROBIAL RESISTANT ORGANISMS (ARO) SURVEILLANCE

SUMMARY REPORT FOR DATA FROM JANUARY 1, 2009 TO DECEMBER 31, 2014

Updated July 2015




PROTECTING CANADIANS FROM ILLNESS

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Antimicrobial Resistant Organisms (ARO) Surveillance

Updated July 2015

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INTRODUCTION

This report entitled *Antimicrobial Resistant Organisms (ARO) Surveillance Summary Report for data from January 1, 2009 to December 31, 2014* was produced by the Centre for Communicable Diseases and Infection Control of the Public Health Agency of Canada (Agency). The report provides a review of available ARO data in Canada.

The Centre for Communicable Diseases and Infection Control (CCDIC) coordinates the data collection and is responsible for the data management, analysis and report production related to this summary report. CCDIC supports the use of these data to inform public health and policy action. In addition, CCDIC supports the Agency's ongoing commitment to improving data quality, defining and setting surveillance standards.

The Agency collects national data on various healthcare-associated infections, including AROs through the Canadian Nosocomial Infection Surveillance Program (CNISP), a collaborative effort of CCDIC, the National Microbiology Laboratory (NML) and sentinel hospitals across Canada who participate as members of the Canadian Hospital Epidemiology Committee (CHEC), a subcommittee of the Association of Medical Microbiology and Infectious Disease (AMMI) Canada. Their ongoing contributions to national ARO surveillance are gratefully acknowledged.

As of December 2014, CNISP conducted surveillance in 62 major hospitals in Canada (Appendix A). Of these, 33 are acute tertiary care hospitals (i.e., major hospitals that offer a range of specialist services such as burn units, transplant units, trauma centres, specialized cardiac surgery etc. to which patients are referred from smaller hospitals) and eight are pediatric, stand-alone hospitals. The remaining 21 hospitals are general urban acute-care hospitals that provide overall medical and surgical services but do not have specialised sub-specialities (Appendix A). Surveillance of AROs at participating hospitals is considered to be within the mandate of hospital infection prevention and control programs and does not constitute human research. The ability for a hospital to participate in CNISP ARO surveillance is based on the site capacity for data collection and access to hospital laboratory services.

CNISP surveillance provides key information that informs the development of federal, provincial and territorial infection prevention and control programs and policies. When carried out in a uniform manner, surveillance provides a measure of the burden of illness, establishes benchmark rates for internal and external comparison, identifies potential risk factors, and allows assessment of specific interventions. Surveillance for AROs is considered an important measure of the quality of patient care.

This report provides case counts and rates based on data from January 1, 2009 to December 31, 2014. The report includes rates for healthcare-associated *Clostridium difficile* infection (HA-CDI), methicillin-resistant *Staphylococcus aureus* (MRSA) including healthcare- and community-associated MRSA and MRSA bacteremias, vancomycin-resistant Enterococci (VRE), carbapenemase-producing organisms (CPO), carbapenem-resistant Enterobacteriaceae (CRE) and carbapenem-resistant *Acinetobacter* (CRA). Although HA-CDI is not considered an ARO, it is associated with antimicrobial use and therefore included in this report. All hospitals are expected to participate in all ARO surveillance activities although hospitals may request to opt out during a given calendar year of surveillance, dependent on their operational capacity to participate.

Where possible, rates are provided by region and include Western (British Columbia, Alberta, Saskatchewan and Manitoba), Central (Ontario and Quebec), and Eastern Regions (Nova Scotia, New Brunswick, Prince Edward Island and Newfoundland and Labrador). The territories do not currently submit data to the Agency.

The 2014 case definitions and eligibility criteria for these surveillance programs are provided in Appendix B. Case definitions and eligibility criteria are reviewed each year prior to the start of the surveillance year by the CNISP working group responsible for overseeing each ARO surveillance activity. CNISP working groups are comprised of members of CHEC and Agency technical experts from CCDIC and NML. Case definitions and eligibility criteria may vary from one surveillance year to another as the surveillance protocols are reviewed and updated by the applicable CNISP working group.

This report supersedes the data in previous ARO reports. The most current report should be considered the most accurate. Data from 2014 are considered preliminary. Results are subject to change as updated data are made available by the participating hospitals.

For questions or more information on these rates or for a copy of the most recent Agency surveillance report, please contact the Centre for Communicable Diseases and Infection Control, Public Health Agency of Canada by sending an email to ccdic-clmti@phac-aspc.gc.ca.

RESULTS

1. Healthcare-Associated *Clostridium difficile* Infection (HA-CDI)

Table 1.1 Number of HA-CDI cases and incidence rates per 1,000 patient admissions

Rate per 1,000 patient admissions by region									
	Western		***Central***		***Eastern***		***National***		***No. of reporting hospitals***
	No.cases	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	
2009	907	4.93	1,401	4.98	175	2.54	2,483	4.65	49
2010	1,282	4.56	1,589	5.13	155	2.04	3,026	4.54	52
2011	1,241	4.57	2,075	5.87	101	2.20	3,417	5.09	54
2012	1,282	4.76	1,997	5.31	203	2.55	3,482	4.80	54
2013	1,198	3.66	1,732	4.56	230	2.81	3,160	4.00	54
2014	1,095	2.96	1,512	3.89	240	2.53	2,847	3.33	60

Note: 2014 data are preliminary.

Table 1.2 Number of HA-CDI cases and incidence rates per 10,000 patient days

Rate per 10,000 patient days by region									
	Western		***Central***		***Eastern***		***National***		***No. of reporting hospitals***
	No.cases	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	
2009	907	6.68	1,401	5.91	175	3.23	2,483	5.81	49
2010	1,282	6.82	1,589	6.67	155	2.27	3,026	6.12	52
2011	1,241	5.77	2,075	7.86	101	2.88	3,417	6.65	54
2012	1,282	5.71	1,997	7.14	203	2.80	3,482	6.04	54
2013	1,198	4.84	1,732	6.11	230	3.07	3,160	5.22	54
2014	1,095	4.00	1,512	5.13	240	2.74	2,847	4.34	60

Note: 2014 data are preliminary.

Table 1.3 Attributable mortality rate 30 days after date of first positive CDI test

	Number of deaths*	Mortality rate (%)
2009	13	2.3
2010	26	5.4
2011	36	6.4
2012	49	4.7
2013	21	3.1
2014	26	4.0

**Deaths directly and indirectly related to HA-CDI 30 days after the date of the first positive CDI culture. Mortality data are collected during the two-month period (March and April of each year) for adults (age 18 years and older) and year around for children (aged 1 year to less than 18 years old).*
Note: 2014 data are preliminary.

2. Methicillin-Resistant *Staphylococcus aureus* (MRSA)

Table 2.1 Number of MRSA infections and incidence rates per 1,000 patient admissions

Rate per 1,000 patient admissions by region									
	Western		*Central*		*Eastern*		*National*		*No. of reporting hospitals*
	No.cases	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	
2009	962	3.39	852	2.54	219	2.64	2,033	2.90	50
2010	898	2.64	846	2.13	247	2.97	1,991	2.43	52
2011	891	2.63	720	1.79	246	2.63	1,857	2.23	52
2012	844	2.42	703	1.83	240	2.63	1,787	2.17	51
2013	901	2.49	742	1.80	212	2.15	1,855	2.12	53
2014	914	2.24	795	1.89	219	2.19	1,928	2.08	58

Note: 2014 data are preliminary.

Table 2.2 Number of MRSA infections and incidence rates per 10,000 patient days

Rate per 10,000 patient days by region									
	Western		*Central*		*Eastern*		*National*		*No. of reporting hospitals*
	No.cases	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	
2009	962	4.85	852	3.23	219	2.90	2,033	3.78	50
2010	898	3.87	846	3.05	247	3.24	1,991	3.40	52
2011	891	3.56	720	2.26	246	2.83	1,857	2.84	52
2012	844	3.30	703	2.35	240	2.87	1,787	2.80	51
2013	901	3.41	742	2.49	212	2.34	1,855	2.84	53
2014	914	3.17	795	2.66	219	2.33	1,928	2.83	58

Note: 2014 data are preliminary.

Table 2.3 Number of MRSA colonizations and incidence rates per 1,000 patient admissions

Rate per 1,000 patient admissions by region									
	Western		*Central*		*Eastern*		*National*		*No. of reporting hospitals*
	No.cases	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	
2009	1,118	3.94	3,090	9.24	311	4.36	4,519	6.55	48
2010	1,222	3.59	3,765	9.48	381	4.58	5,368	6.54	52
2011	1,634	4.82	3,619	9.57	439	4.70	5,692	7.02	50
2012	1,582	4.54	3,516	9.14	320	3.89	5,418	6.64	50
2013	1,498	4.14	3,039	7.36	338	3.42	4,875	5.58	53
2014	2,026	4.96	2,803	6.67	326	3.26	5,155	5.55	58

Note: 2014 data are preliminary.

Table 2.4 Number of MRSA colonizations and incidence rates per 10,000 patient days

Rate per 10,000 patient days by region									
	Western		*Central*		*Eastern*		*National*		*No. of reporting hospitals*
	No.cases	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	
2009	1,118	5.64	3,090	11.78	311	4.46	4,519	8.52	48
2010	1,222	5.27	3,765	13.55	381	4.99	5,368	9.16	52
2011	1,634	6.53	3,619	12.14	439	5.05	5,692	8.96	50
2012	1,582	6.18	3,516	11.77	320	4.23	5,418	8.60	50
2013	1,498	5.67	3,039	10.19	338	3.74	4,875	7.47	53
2014	2,026	7.03	2,803	9.37	326	3.47	5,155	7.57	58

Note: 2014 data are preliminary.

Table 2.5 Number of healthcare-associated MRSA infections and incidence rates per 1,000 patient admissions*

Rate per 1,000 patient admissions by region									
	Western		*Central*		*Eastern*		*National*		*No. of reporting hospitals*
	No.cases	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	
2009	607	2.14	575	1.72	196	2.36	1,378	1.96	50
2010	562	1.65	563	1.42	202	2.43	1,327	1.62	52
2011	558	1.65	486	1.21	217	2.32	1,261	1.51	52
2012	517	1.48	382	0.99	213	2.33	1,112	1.35	51
2013	555	1.53	404	0.98	184	1.86	1,143	1.31	53
2014	516	1.26	463	1.10	178	1.78	1,157	1.25	58

* *HA-MRSA: includes all cases identified within the CNISP hospitals and any other healthcare setting (clinics, long-term care facility) as per the case definition in Appendix B.*
Note: 2014 data are preliminary.

Table 2.6 Number of healthcare-associated MRSA infections and incidence rates per 10,000 patient days*

Rate per 10,000 patient days by region									
	Western		*Central*		*Eastern*		*National*		*No. of reporting hospitals*
	No.cases	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	
2009	607	3.06	575	2.18	196	2.60	1,378	2.56	50
2010	562	2.42	563	2.03	202	2.65	1,327	2.26	52
2011	558	2.23	486	1.53	217	2.50	1,261	1.93	52
2012	517	2.02	382	1.28	213	2.55	1,112	1.74	51
2013	555	2.10	404	1.36	184	2.03	1,143	1.75	53
2014	516	1.79	463	1.55	178	1.90	1,157	1.70	58

***** *HA-MRSA: includes all cases identified within the CNISP hospitals and any other healthcare setting (clinics, long-term care facility) as per the case definition in Appendix B.*
Note: 2014 data are preliminary.

Table 2.7 Number of community-associated MRSA infections and incidence rates per 1,000 patient admissions

Rate per 1,000 patient admissions by region									
	Western		*Central*		*Eastern*		*National*		*No. of reporting hospitals*
	No.cases	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	
2009	270	0.95	180	0.54	6	0.07	456	0.65	50
2010	299	0.88	175	0.44	26	0.31	500	0.61	52
2011	303	0.89	150	0.37	15	0.16	468	0.56	52
2012	309	0.89	216	0.56	14	0.15	539	0.65	51
2013	323	0.89	208	0.50	23	0.23	554	0.63	53
2014	381	0.93	241	0.57	31	0.31	653	0.70	58

Note: 2014 data are preliminary.

Table 2.8 Number of community-associated MRSA infections and incidence rates per 10,000 patient days

Rate per 10,000 patient days by region									
	Western		*Central*		*Eastern*		*National*		*No. of reporting hospitals*
	No.cases	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	
2009	270	1.36	180	0.68	6	0.08	456	0.85	50
2010	299	1.29	175	0.63	26	0.34	500	0.85	52
2011	303	1.21	150	0.47	15	0.17	468	0.71	52
2012	309	1.21	216	0.72	14	0.17	539	0.84	51
2013	323	1.22	208	0.70	23	0.25	554	0.85	53
2014	381	1.32	241	0.81	31	0.26	653	0.96	58

Note: 2014 data are preliminary.

Table 2.9 Number of MRSA bacteremia infections and incidence rates per 1,000 patient admissions

Rate per 1,000 patient admissions by region									
	Western		*Central*		*Eastern*		*National*		*No. of reporting hospitals*
	No.cases	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	
2009	112	0.39	232	0.69	43	0.52	387	0.55	50
2010	113	0.33	174	0.44	45	0.54	332	0.40	52
2011	139	0.41	185	0.46	46	0.49	370	0.44	52
2012	116	0.33	164	0.43	45	0.49	325	0.39	51
2013	130	0.36	197	0.48	43	0.44	370	0.42	53
2014	147	0.36	236	0.56	41	0.41	424	0.46	58

Note: 2014 data are preliminary.

Table 2.10 Number of MRSA bacteremia infections and incidence rates per 10,000 patient days

Rate per 10,000 patient days by region									
	Western		*Central*		*Eastern*		*National*		*No. of reporting hospitals*
	No.cases	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	
2009	112	0.56	232	0.88	43	0.57	387	0.72	50
2010	113	0.49	174	0.63	45	0.59	332	0.57	52
2011	139	0.56	185	0.58	46	0.53	370	0.56	52
2012	116	0.45	164	0.55	45	0.54	325	0.51	51
2013	130	0.49	197	0.66	43	0.48	370	0.57	53
2014	147	0.51	236	0.79	41	0.44	424	0.62	58

Note: 2014 data are preliminary.

Table 2.11 All-cause mortality rate 30 days after date of positive culture per 100 MRSA bacteremia cases

	Number of deaths*	**All-cause mortality rate per 100 MRSA-BSI cases**
2009	94	24.4
2010	74	22.4
2011	102	27.8
2012	71	22.0
2013	92	24.9
2014	86	25.1

**All-cause mortality rate based on the number of cases with associated 30-day outcome data.*
Note: 2014 data are preliminary.

3. Vancomycin-Resistant Enterococci (VRE)

Table 3.1 Number of VRE infections and incidence rates per 1,000 patient admissions

Rate per 1,000 patient admissions by region									
	Western		*Central*		*Eastern*		*National*		*No. of reporting hospitals*
	No.cases	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	
2009	107	0.38	60	0.18	2	0.02	169	0.24	50
2010	214	0.63	67	0.17	0	0	281	0.34	52
2011	229	0.68	146	0.36	4	0.04	379	0.45	52
2012	223	0.64	168	0.43	3	0.03	394	0.47	53
2013	154	0.52	161	0.37	7	0.08	322	0.39	48
2014	149	0.45	144	0.32	1	0.01	294	0.33	54

Note: 2014 data are preliminary.

Table 3.2 Number of VRE infections and incidence rates per 10,000 patient days

Rate per 10,000 patient days by region									
	Western		*Central*		*Eastern*		*National*		*No. of reporting hospitals*
	No.cases	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	
2009	107	0.54	60	0.23	2	0.03	169	0.31	50
2010	214	0.92	67	0.24	0	0	281	0.48	52
2011	229	0.92	146	0.46	4	0.05	379	0.58	52
2012	223	0.87	168	0.55	3	0.04	394	0.61	53
2013	154	0.72	161	0.51	7	0.08	322	0.52	48
2014	149	0.65	144	0.44	1	0.01	294	0.45	54

Note: 2014 data are preliminary.

As of January 2011, some CNISP hospitals no longer collect data on VRE colonizations. The number of hospitals that continue to collect data on VRE colonizations has continued to decline every year. As a result, data on VRE colonizations are not presented in the current report pending data cleaning and verification.

4. Carbapenem-Resistant Gram Negative Bacilli (CRGN)

4.1 Carbapenemase-Producing Organisms (CPO)

Table 4.1.1 Number of CPO cases* and incidence rates per 1,000 patient admissions

Rate per 1,000 patient admissions by region									
	Western		*Central*		*Eastern*		*National*		*No. of reporting hospitals*
	No.cases	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	
2010	10	0.08	25	0.10	0	0	35	0.08	33
2011	4	0.03	61	0.20	0	0	65	0.12	37
2012	12	0.09	46	0.13	1	0.01	59	0.10	38
2013	24	0.10	41	0.09	1	0.01	66	0.09	45
2014	12	0.03	54	0.12	0	0	66	0.07	58

**Includes both CPO infections and colonizations. These rates represent the number of organisms identified which may exceed the number of patients as multiple organisms may be reported for the same patient.*
Note: Data collection began in 2010.
Note: 2014 data are preliminary.

Table 4.1.2 Number of CPO cases* and incidence rates per 10,000 patient days

Rate per 10,000 patient days by region									
	Western		*Central*		*Eastern*		*National*		*No. of reporting hospitals*
	No.cases	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	
2010	10	0.10	25	0.16	0	0	35	0.10	33
2011	4	0.04	61	0.27	0	0	65	0.16	37
2012	12	0.11	46	0.17	1	0.01	59	0.13	38
2013	24	0.13	41	0.13	1	0.01	66	0.11	45
2014	12	0.05	54	0.17	0	0	66	0.10	58

**Includes both CPO infections and colonizations. These rates represent the number of organisms identified which may exceed the number of patients as multiple organisms may be reported for the same patient.*
Note: Data collection began in 2010.
Note: 2014 data are preliminary.

Table 4.1.3 All-cause and attributable mortality rate 30 days after date of positive culture per 100 CPO cases*

	No. of deaths/No. of CPO cases with outcome data	All-cause mortality rate per 100 CPO cases	Number of attributable deaths	Attributable mortality rate per 100 CPO cases
2010	3/18	16.7	1	5.6
2011	7/60	11.7	0	0
2012	6/42	14.3	2	4.8
2013	6/64	9.4	0	0
2014†	9/62	14.5	n/a	n/a

**CPO was the primary or contributing cause of death 30 days after diagnosis. Mortality rates based on CPO cases where outcome data available. This may be less than the number of CPO cases reported.*
†Attributable mortality was not collected in 2014
Note: Data collection began in 2010.
Note: 2014 data are preliminary.

4.2 Carbapenem-Resistant Enterobacteriaceae (CRE)

Table 4.2.1 Number of CRE cases* and incidence rates per 1,000 patient admissions

Rate per 1,000 patient admissions by region									
	Western		***Central†***		***Eastern***		***National***		***No. of reporting hospitals***
	No.cases	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	
2010	19	0.16	42	0.17	2	0.01	63	0.14	33
2011	26	0.20	106	0.35	0	0	132	0.25	37
2012	38	0.29	69	0.19	3	0.01	110	0.19	38
2013	44	0.18	116	0.27	1	<0.01	161	0.21	45
2014	16	0.04	131	0.29	0	0	147	0.16	58

**Includes both CRE infections and colonizations. These rates represent the number of organisms identified which may exceed the number of patients as multiple organisms may be reported for the same patient.*

†The greater number of CRE cases seen in the Central region is largely attributed to one hospital.
Note: Data collection began in 2010.
Note: 2014 data are preliminary.

Table 4.2.2 Number of CRE cases* and incidence rates per 10,000 patient days

Rate per 10,000 patient days by region									
	Western		***Central†***		***Eastern***		***National***		***No. of reporting hospitals***
	No.cases	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	**No.cases**	**Rate**	
2010	19	0.19	42	0.27	2	0.01	63	0.19	33
2011	26	0.24	106	0.48	0	0	132	0.32	37
2012	38	0.34	69	0.26	3	0.01	110	0.24	38
2013	44	0.24	116	0.37	1	<0.01	161	0.28	45
2014	16	0.06	131	0.42	0	0	147	0.22	58

**Includes both CRE infections and colonizations. These rates represent the number of organisms identified which may exceed the number of patients as multiple organisms may be reported for the same patient.*

†The greater number of CRE cases seen in the Central region is largely attributed to one hospital.
Note: Data collection began in 2010.
Note: 2014 data are preliminary.

4.3 Carbapenem-Resistant *Acinetobacter* (CRA)

Table 4.3.1 Number of CRA cases* and incidence rates per 1,000 patient admissions

Rate per 1,000 patient admissions			
	National		***No. of reporting hospitals***
	No.cases	**Rate**	
2010	9	0.02	33
2011	2	<0.01	37
2012	9	0.02	38
2013	42	0.05	45
2014	7	0.01	58

**Includes both CRA infections and colonizations. These rates represent the number of organisms identified which may exceed the number of patients as multiple organisms may be reported for the same patient.*
Note: Due to the small number of cases reported, regional CRA rates are not presented. The greater number of CRA cases seen in 2013 is largely attributed to an outbreak in one hospital.
Note: Data collection began in 2010.
Note: 2014 data are preliminary.

Table 4.3.2 Number of CRA cases*and incidence rates per 10,000 patient days

Rate per 10,000 patient days			
	National		***No. of reporting hospitals***
	No.cases	**Rate**	
2010	9	0.03	33
2011	2	<0.01	37
2012	9	0.02	38
2013	42	0.07	45
2014	7	0.01	58

**Includes both CRA infections and colonizations. These rates represent the number of organisms identified which may exceed the number of patients as multiple organisms may be reported for the same patient.*
Note: Due to the small number of cases reported, regional CRA rates are not presented. The greater number of CRA cases seen in 2013 is largely attributed to an outbreak in one hospital.
Note: Data collection began in 2010.
Note: 2014 data are preliminary.

Appendix A: Hospitals participating in the *Canadian Nosocomial Infection Surveillance Program*, as of December 2014

Participating hospitals from the Western region

Vancouver General Hospital, Vancouver, BC
Richmond General Hospital, Richmond, BC
Lion's Gate Hospital, Vancouver, BC
Powell River Hospital, Powell River, BC
St Mary's Hospital, Sechelt, BC
Squamish Hospital, Squamish, BC
Children's and Women's Health Centre, Vancouver, BC
Royal Jubilee, Victoria, BC
Nanaimo Regional General Hospital, Nanaimo, BC
Victoria General Hospital, Victoria, BC
Kelowna Hospital, Kelowna, BC
University of Northern BC, Prince George, BC
Peter Lougheed Hospital, Calgary, AB
Rockyview General, Calgary, AB
Foothills Hospital, Calgary, AB
South Health Campus, Calgary, AB
Alberta Children's Hospital, Calgary, AB
University of Alberta Hospital, Edmonton, AB
Stollery Children's Hospital, Edmonton, AB
Royal University Hospital, Saskatoon, SK
St. Paul's Hospital, Saskatoon, SK
Health Sciences Centre, Winnipeg, MB
University of Manitoba, Pediatric Infectious Diseases, Winnipeg, MB

Participating hospitals from the Central region

Children's Hospital of Western Ontario, London, ON
Victoria Hospital, London, ON
University Hospital, London, ON
Toronto Western Hospital, Toronto, ON
Toronto General Hospital, Toronto, ON
Princess Margaret Hospital, Toronto, ON
North York General Hospital, Toronto, ON
The Hospital for Sick Children, Toronto, ON
Mount Sinai Hospital, Toronto, ON
Sunnybrook Health Sciences Centre, Toronto, ON
Kingston General Hospital, Kingston, ON
Hamilton Health Sciences Centre, McMaster, Hamilton, ON
Hamilton Health Sciences Centre, Henderson Site, Hamilton, ON
Hamilton Health Sciences Centre, General Site, Hamilton, ON
St Joseph's Healthcare, Hamilton, ON
The Ottawa Hospital, Civic Campus, Ottawa, ON
The Ottawa Hospital, General Site, Ottawa, ON
The Ottawa Hospital, Heart Institute, Ottawa, ON
Children's Hospital of Eastern Ontario, Ottawa, ON
Sudbury Regional Hospital, Sudbury, ON
Jewish General Hospital, Montréal, QC

Montréal Children's Hospital, Montréal, QC
Maisonneuve-Rosemont Hospital, Montréal, QC
Montréal General Hospital, Montréal, QC
Royal Victoria Hospital, Montréal, QC
Montréal Neurological Hospital, Montréal, QC
Montréal Chest Institute, Montréal, QC
Hôtel-Dieu de Québec de CHUQ, Québec, QC

Participating hospitals from the Eastern region

The Moncton Hospital, Moncton, NB
Queen Elizabeth Hospital, Charlottetown, PEI
QE II Health Centre, Halifax, NS
IWK Health Centre, Halifax, NS
Health Care Corp. of St. John's, General Hospital and Miller Centre Sites, St. John's , NL
Health Care Corp. of St. John's Janeway Site, St. John's, NL
Health Care Corp. of St. John's St Clare Site, St. John's, NL
Burin Peninsula Health Centre, Burin, NL
Carbonear General Hospital, Carbonear, NL
Dr. G.B. Cross Memorial Hospital, Clarenville, NL
Western Memorial Hospital, NL

We acknowledge the contribution of the Agency staff within the Centre for Communicable Diseases and Infection Control and the National Microbiology Laboratory, Winnipeg along with the physicians, epidemiologists, infection control practitioners and laboratory staff at each participating hospital.

Appendix B: 2014 Surveillance Case Definitions and Eligibility Criteria

1. Healthcare-associated *Clostridium Difficile* Infection (HA-CDI)

To be included in the surveillance, a HA-CDI patient must be:

- **ONE** year of age and older
- Admitted to the hospital[a]

Exclusion criteria:

- Emergency, clinic, or other outpatient cases
- Patients who were discharged in the previous 4 weeks and return to the ER or outpatient clinic with a new onset of CDI, but are not readmitted, are NOT included.

A patient is identified as a CDI case if:

- have diarrhea* or fever, abdominal pain and/or ileus, **AND** a laboratory confirmation of a positive toxin assay or positive PCR for *C. difficile*.

OR

- have a diagnosis of pseudomembranes on sigmoidoscopy or colonoscopy or histological/pathological diagnosis of CDI.

OR

- diagnosed with toxic megacolon (**ADULT PATIENTS ONLY**)

*Diarrhea is defined as one of the following:

- 6 or more watery stools in a 36 hour period
- 3 or more unformed stools in a 24 hour period for at least 1 day and this is new or unusual for the patient (ADULT PATIENTS ONLY)

NOTE: If the information about the frequency and consistency of diarrhea is NOT available, a toxin-positive stool or positive PCR will be considered as a case.

Healthcare-associated CDI = A CDI infection is considered **"**healthcare-associated from your facility**"** if it meets the following criteria:

- Patient's CDI symptoms occur in your hospital ≥ 72 hours after admission

OR

- CDI is seen in a patient who had been hospitalized at your hospital and discharged within

[a] Long-term care and awaiting-placement patients on acute-care wards are to be included.

Patients admitted to your hospital but who remain in the ER once admitted are included.

Patients who are discharged after the date of the positive culture but before the results are available are included.

the **previous 4 weeks**

NOTE: Only patients with HA-CDI, at your facility are included in this surveillance. Do not include patients who are admitted to your facility but who acquired while in another acute-care or long-term facility.

Only **"primary"** episodes are included in the surveillance, and they are defined as either:

- first episode of CDI ever experienced,

OR

- a new episode of CDI which occurs > 8 weeks after the first toxin-positive assay[b].

[b] This was the cut-off value used to distinguish a relapse case from a new episode of CDI, because patients with CDI do not undergo repeat testing till negative test as a "test of cure" following treatment.

2. Methicillin-Resistant *Staphylococcus aureus* (MRSA)

MRSA surveillance inclusion criteria

MRSA case definition:

- isolation of *Staphylococcus aureus* from any body site

AND

- resistance of isolate to oxacillin

AND

- patient must be admitted to the hospital

AND

- is a "newly identified MRSA case" at a CHEC facility at the time of hospital admission or identified during hospitalization.

This includes:

- MRSA cases identified for the first time during this hospital admission
- Cases that have been previously identified at other non-CHEC sites (since we want newly identified MRSA cases at CHEC sites)
- Cases that have already been identified at your site but are new cases. This can only be identified if the previously identified case has another strain.

MRSA surveillance exclusion criteria:

- MRSA cases previously identified at other CHEC sites
- Emergency, clinic, or other outpatient cases
- Cases re-admitted with MRSA (unless it is a different strain)

Healthcare-associated (HA) case definition:

Once the patient has been identified with MRSA, they will be classified as HA based on the following criteria and the best clinical judgement of the practitioner:

- Exposure to any healthcare setting (including long-term care facilities or clinics) in the previous 12 months[c]

OR

- Has been hospitalized for greater than 48 hours

Newborn healthcare-associated (HA) case definition:

A MRSA case in a newborn may be considered as HA if:

- The newborn was hospitalized for greater than 48 hours
- The mother was not known to be a case on admission and there is no epidemiological

[c] Consideration should be given to the frequency and nature of exposure to a healthcare setting. For example, pediatric patients with clinic visits in the previous 12 months may or may not be considered as HA

reason to suspect that the mother was colonized prior to admission, even if the newborn is < 48 hours of age.

In the case of a newborn transferred from another institution, MRSA may be classified as HA if the organism was not known to be present and there is no epidemiological reason to suspect that acquisition occurred prior to transfer.

Community-associated case definition:

- Has been hospitalized for less than 48 hours
  AND
- Has no previous history of the organism
  AND
- Has no prior hospital or long-term care admission in the past 12 months
  AND
- Has no reported use of medical devices

MRSA infection:

MRSA infection is determined using the January 2014 Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) definitions/criteria for infections, and in accordance with the best judgment of the ICP.

www.cdc.gov/nhsn/pdfs/pscmanual/17pscnosinfdef_current.pdf

3. Vancomycin-Resistant Enterococci (VRE)

VRE infection case definition:

- Isolation of *Enterococcus faecalis or faecium*

AND

- Vancomycin MIC ≥ 8 ug/ml

AND

- Patient is admitted to the hospital

AND

- Is a "newly" identified VRE-infection at a CHEC facility at the time of hospital admission or identified during hospitalization

VRE infection is determined using the January 2014 Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) definitions/criteria for infections, and in accordance with the best judgment of the ICP. These criteria should be met at the time of the culture that yielded VRE, or within 72 hours of the culture.

www.cdc.gov/**nhsn**/pdfs/pscmanual/17pscnosinfdef_current.pdf

Exclusion criteria:

- Previously identified at other CHEC sites (to avoid duplicate reporting to CNISP)
- Identified through emergency, clinic, or other outpatient areas
- Re-admitted with VRE (**UNLESS** it is a different strain)

4. Carbapenemase-Producing Organisms (CPO), Carbapenem-Resistant Enterobacteriaceae (CRE) and Carbapenem-Resistant *Acinetobacter* (CRA)

Any patient admitted to participating CNISP hospitals or a CNISP hospital emergency department or hospital-based outpatient clinic with a hospital laboratory confirmation (and subsequent confirmation by the NML) of carbapenem resistance/carbapenem reduced susceptibility in Enterobacteriaceae and *Acinetobacter spp*., from any body site that meets the following CLSI criteria.[d]

At least ONE of the following:	**Enterobacteriaceae:**	
	MIC (*µg/ml*)	Disk diffusion* (*mm*)
Imipenem	≥ 2	≤ 22
Meropenem	≥ 2	≤ 22
Doripenem	≥ 2	≤ 22
Ertapenem	≥ 1	≤ 21

**Using a 10 µg disk of the appropriate antimicrobial.*

At least ONE of the following:	***Acinetobacter:****	
	MIC (*µg/ml*)	Disk diffusion (*mm*)
Imipenem	≥ 8	≤ 15
Meropenem	≥ 8	≤ 15

** Doripenem susceptibility is no longer done for the Acinetobacter.*

Carbapenems are a class of broad-spectrum antibiotics recommended as first-line therapy for severe infections caused by certain gram negative organisms and as directed therapy for organisms that are resistant to narrower spectrum antibiotics.

Carbapenem resistance can be due to changes in the permeability of the organism to the antibiotic, the up-regulation of efflux systems that "pump" the antibiotic out of the cell, and more recently due to the hyperproduction of enzymes that break down the carbapenems. This latter subset of carbapenem resistant organisms are called carbapenemase-producing organisms or CPOs and are of particular concern because of their ability to transfer resistance easily across different genus and species of bacteria. They are quickly becoming a public health problem not only because of the ability to cause healthcare-associated infections but because of the potential ease of colonizing both inpatient and outpatient populations creating a reservoir of bacterial resistance.

CRE represents a subset of CRGN bacilli comprised of Enterobacteriaceae and CRA represents a subset of CRGN bacilli comprised of *Acinetobacter* identified as resistant to a carbapenem by CLSI guidelines. Mechanism may be either by acquisition of a carbapenemase gene e.g. NDM-1, OXA-48, KPC, VIM, IMP or by other cellular mechanisms such as permeability changes (efflux overpression, porin mutations), chromosomal *B*-lactamase up regulation e.g. *E. coli, K. pneumonia, Citrobacter, Enterobacter, Serratia, Morganell, Proteus, Providencia.*

[d] *Clinical and Laboratory Standards Institute. 2014. Performance standards for antimicrobial susceptibility testing; 24th informational supplement, M100- S24 (Jan., 2014). Clinical and Laboratory Standards, Wayne, PA.*