Province Wide Surveillance

Surveillance for the identification of healthcare-associated infections is an essential component of AHS' response to the hazard these infections pose to Albertans. Infections under surveillance are selected based on those that have a significant cost to the healthcare system or significant impact on patient morbidity or mortality. IPC Surveillance definitions and processes to determine the presence of an infection are different than the clinical assessment for patient diagnosis and treatment.

Provincial performance and monitoring measures

AHS has 17 performance metrics aligned with the AHS *2020-22 Health Plan and 2021-22 Business Plan* to monitor the performance of the health system. AHS also has several monitoring measures. AHS IPC provides the data for the monitoring measures on the provincial hospital-acquired *C. difficile* infection rate and the provincial hand hygiene compliance. In 2022/2023, the hospital-acquired *C.difficile* infection rate was 2.8 per 10,000 patient-days, which was below the Canadian Nosocomial Infection Surveillance Program benchmark of 3.2 per 10,000 patient-days. Hand hygiene compliance is reported in the Hand Hygiene section.

Provincial IPC surveillance program

AHS IPC has an integrated provincial surveillance program. IPC committees and working group develop and approve surveillance protocols and these are applied consistently throughout AHS and Covenant Health. There are 10 provincial IPC surveillance protocols related to outcome measures (Table 2).

Table 2: Provincial IPC surveillance protocols related to outcome measures

Category	Protocol
Antibiotic-resistant organisms	Laboratory-confirmed carbapenemase-producing organisms in acute care settings Laboratory-confirmed methicillin-resistant *S. aureus* colonizations and infections in acute care settings Laboratory-confirmed vancomycin-resistant enterococcus infections in acute care settings
Bloodstream infections	Laboratory-confirmed bloodstream infections with antibiotic-resistant organisms including carbapenemase-producing organisms, extended-spectrum beta-lactamase-producing organisms, methicillin-resistant *S. aureus*, and vancomycin-resistant enterococcus in all admitted patients and central line-associated bloodstream infections in adult and pediatric intensive care units
Clostridium difficile infection	Laboratory-confirmed with clinical signs and symptoms in an acute care setting Laboratory-confirmed in a continuing care setting
COVID-19	Laboratory-confirmed infection with the virus that causes COVID-19 in the 14 days prior to being admitted or while admitted in acute care settings
Surgical site infections	Eligible cardiovascular procedures including coronary artery bypass graft or cardiac procedures that involve valve replacement, septum repair, and reconstruction procedures Eligible orthopedic procedures including total hip or total knee replacement Eligible vascular procedures including peripheral vascular bypass procedures

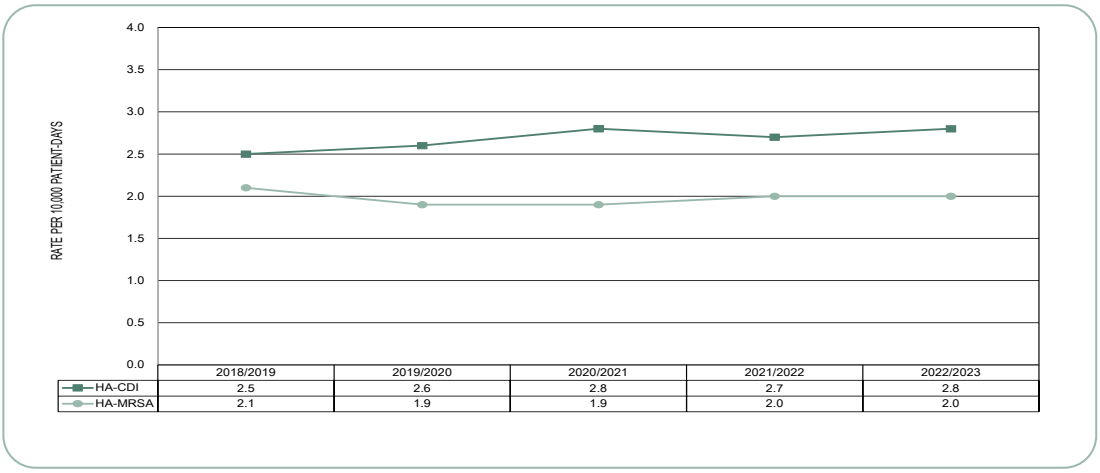
All protocols are posted on the *Surveillance & Reporting* webpage on the external *AHS IPC* website and on the internal Covenant Health IPC website. All protocols are updated on an annual basis. These protocols align with national and international surveillance protocols, allowing comparison between Alberta's health system and other jurisdictions in Canada.

The provincial IPC surveillance platform enables the collection and reporting of surveillance data for outcome measures. Vendor-supported platforms – AHS Clean Hands, Covenant Health HandyAudit, and AHS Medical Device Reprocessing Reviews – enable the collection and reporting of surveillance data for process measures, which are described elsewhere in this report. Education and training for staff are provided before platform access is granted to promote accuracy and validity of the data.

Review of surveillance trends for 2022/23

The data demonstrate that hospital-acquired *C. difficile* infections and hospital-acquired methicillin-resistant *S. aureus* colonization infections remained stable throughout 2022/2023 (Figure 3).

Figure 3: Provincial hospital-acquired rates for *C. difficile* infection and methicillin-resistant *S. aureus* colonization/infection, 2018/19 to 2022/23

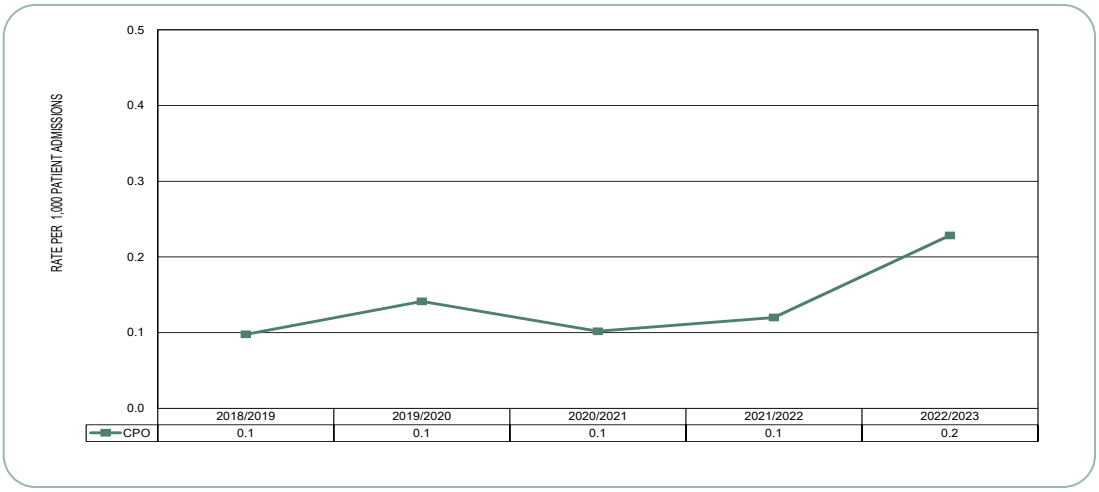


HA-CDI = hospital-acquired *C. difficile*

HA-MRSA = hospital-acquired methicillin-resistant *S. aureus*

The overall rate of colonizations and infections with a carbapenemase producing organism almost doubled in 2022/2023 (Figure 4). While the rates are still very low, the number of cases increased. As the data is only available at the of end of the fiscal year, there is a plan to investigate the increased number of cases and rates for carbapenemase producing organisms in more detail. This will include reviewing both the protocol and risk factors for colonization, as well as standardizing the approach to clearing patients with carbapenemase producing organisms as part of the protocol.

Figure 4: Provincial rate of carbapenemase producing organisms, 2018/19 to 2022/23



CPO = carbapenemase producing organisms

The associated impact of standardized admission screening on vancomycin-resistant enterococci bloodstream infections

Based on recommendations from the Canadian Consensus Development Conference on Surveillance and Screening for Antimicrobial Resistant Organisms, new vancomycin-resistant enterococci screening protocols were implemented for all acute care facilities in Alberta, which eliminated routine admission screening and focused on high-risk patient care units.

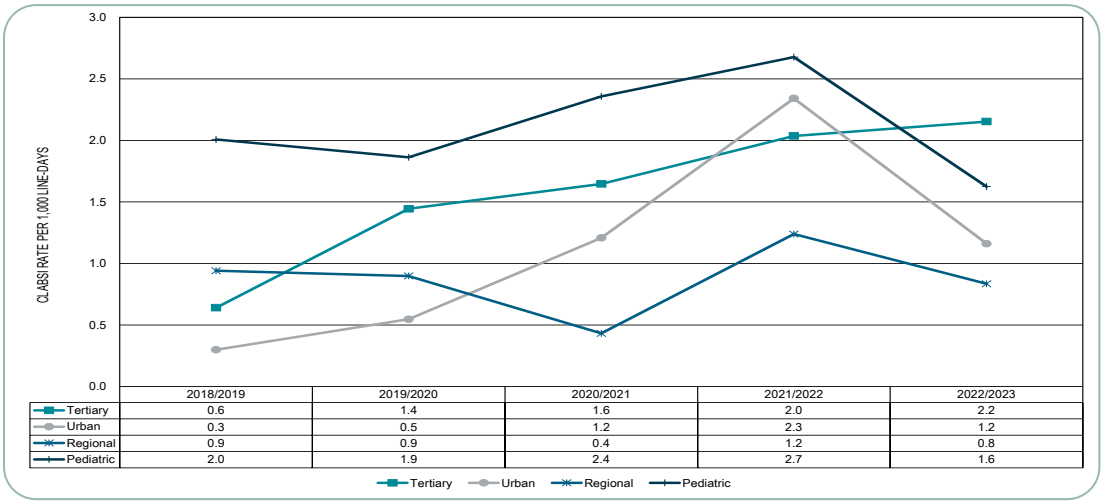
It is possible that after routine vancomycin-resistant enterococci screening and isolation was discontinued, more patients would be identified with a bloodstream infection with vancomycin-resistant enterococci. Previous studies evaluating the effectiveness of screening and contact isolation practice on vancomycin-resistant enterococci infection have produced mixed results, and as a result, infection control practices to prevent the spread of vancomycin-resistant enterococci are varied in Canada. The purpose of this study, performed from January 01, 2013 to March 31, 2020, was to determine whether discontinuing routine screening for vancomycin-resistant enterococci in Alberta acute care facilities had an impact on the rate of hospital-acquired vancomycin-resistant enterococci bloodstream infections.

This study suggests there was no increase to the rate of hospital-acquired vancomycin-resistant enterococci bloodstream infections in those sites or units that discontinued screening for vancomycin-resistant enterococci, regardless of patient risk group.

The study provides further evidence and confidence to existing policy changes in Alberta that have eliminated routine screening and isolation for vancomycin-resistant enterococci patients. In the Alberta context and during the time period that was studied eliminating screening and isolation for vancomycin-resistant enterococci in hospitalized patient populations did not result in an increase in bloodstream infections caused by vancomycin-resistant enterococci.

Central line-associated bloodstream infections continued to rise in the tertiary intensive care units over the past several years, while these infections fell in other intensive care unit settings (Figure 5). Intensive care units faced challenges during the pandemic with increased occupancy, crowding, operating in unconventional areas, and use of new and redeployed staff. IPC and intensive care units raised capacity-related concerns for patient safety; however, very few options were available for resolution during the pandemic. IPC has participated in the national review of central line care practices through the Public Health Agency of Canada, as the national surveillance system endeavors to understand the increased central line-associated bloodstream infection rates seen across the country. IPC has engaged the Critical Care Strategic Clinical Network to address these trends.

Figure 5: Central line-associated bloodstream infection rate by facility type, 2018/2019 to 2022/2023

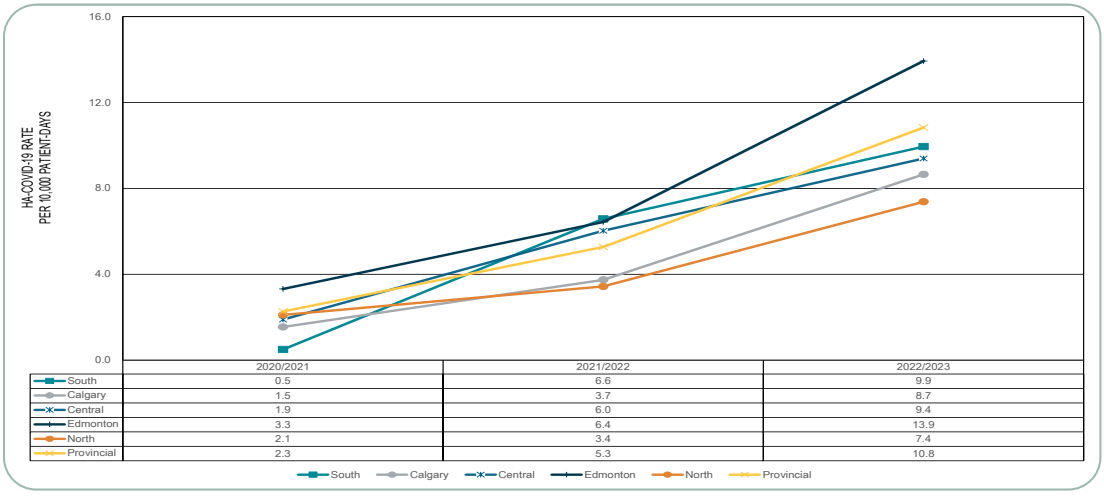


	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023
Tertiary	0.6	1.4	1.6	2.0	2.2
Urban	0.3	0.5	1.2	2.3	1.2
Regional	0.9	0.9	0.4	1.2	0.8
Pediatric	2.0	1.9	2.4	2.7	1.6

CLABSI = Central line-associated bloodstream infection

With the introduction of the omicron COVID-19 strain and the discontinuation of COVID-19 testing in the community, hospitals across the country started to see more hospital-acquired COVID-19. This trend was also observed in Alberta, with Edmonton Zone reporting the highest rate in the province (Figure 6). Note: At the end of 2022, reporting on hospital-acquired COVID-19 stopped as the AHS IPC program explored options for capturing data on other hospital-acquired viral respiratory infections as part of the transition from pandemic to endemic.

Figure 6: Hospital-acquired COVID-19 cases by zone



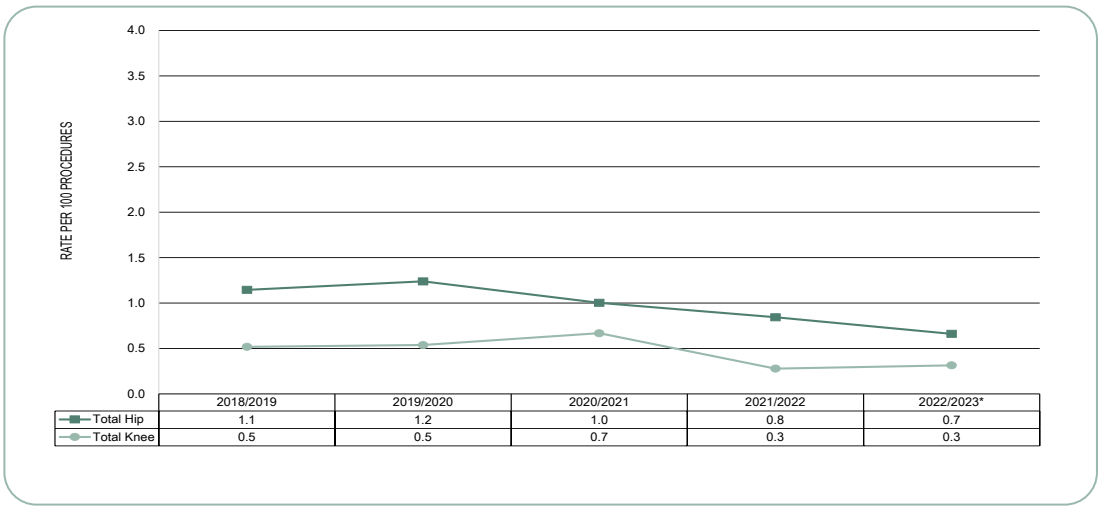
	2020/2021	2021/2022	2022/2023
South	0.5	6.6	9.9
Calgary	1.5	3.7	8.7
Central	1.9	6.0	9.4
Edmonton	3.3	6.4	13.9
North	2.1	3.4	7.4
Provincial	2.3	5.3	10.8

Provincial surveillance occurs for surgical site infections following selected cardiovascular, orthopedic, and vascular procedures. During the pandemic, these surveillance activities continued intermittently. Further casefinding and case review were performed to calculate the surgical site infection rates for the fiscal year when capacity permitted. In 2022/2023, active surveillance following cardiovascular, orthopedic, and vascular procedures resumed.

Surveillance following cardiovascular procedures are performed at the Foothills Medical Centre and the Mazankowski Alberta Heart Institute. While active surveillance for these infections resumed in 2022/2023, only one fiscal quarter of reportable data were available at the time of this report. Trends are in alignment with previously reported rates.

Surveillance following orthopedic procedures are performed at facilities across the province. Surgical site infection rates following orthopedic procedures decreased over the last five years, with rates following total knee procedures typically lower than rates following total hip procedures (Figure 7).

Figure 7: Complex surgical site infection rate following total hip replacement and total knee replacement, 2018/2019 to 2022/2023*



	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023*
Total Hip	1.1	1.2	1.0	0.8	0.7
Total Knee	0.5	0.5	0.7	0.3	0.3

* Preliminary rate includes data from April 2022 to December 2022

Surveillance following peripheral vascular bypass procedures is performed at the Peter Lougheed Centre and the Grey Nuns Community Hospital. Over the last two years, quarterly rates have fluctuated at the two sites, ranging from 0.0 to 8.6 per 100 procedures.

Local IPC surveillance programs

Local surveillance protocols are also accommodated in the provincial surveillance platform. These surveillance initiatives are based on needs identified at the local level. For example, sites can target a specific surgical procedure of local importance.

Using machine learning to perform surveillance on surgical site infections

Cardiac implantable electronic device surgical site infections have outpaced the increase in implantation of these devices. While traditional surveillance of these infections by IPC would likely be the most accurate, this is not practical in many centers where resources are constrained. A cohort of all patients with cardiac implantable electronic device implantation in Calgary, Alberta was used, and traditional surveillance was done for infections. Traditional surveillance was considered the "gold standard". Six approaches to identifying these infections using administrative data and two machine learning models were evaluated. Findings suggest that administrative data can be used to effectively identify infections. While machine learning performed the most optimally, in centers with limited analytic capabilities a simpler algorithm of pre-selected codes also has excellent yield. This can be valuable for centers without traditional surveillance to follow trends in surgical site infections over time and identify when rates are increasing, leading to enhanced interventions for prevention.

Provincial IPC research priority setting

The IPC Research Priority Setting Planning Committee was established to oversee the design, execution, and analysis of the research priority setting project in accordance with established Delphi and consensus methods. In 2021/2022, the first phase of the Delphi process was completed with 300 individual research questions synthesized into 159 questions that were then categorized into either evaluation, surveillance, or quality improvement questions (96/159, 60.4 per cent) or research questions (63/159, 39.6 per cent).

In 2022/2023, a survey was distributed throughout AHS including Health Advisory Councils, IPC, Integrated Provincial Teams, Provincial Advisory Councils, including the Patient and Family Advisory Council and Wisdom Council, and Strategic Clinical Networks. The survey was also distributed to national IPC-related networks including the Association of Medical Microbiology and Infectious Disease Canada, Canadian Nosocomial Infection Surveillance Program, and Infection Prevention and Control Canada, in both English and French. The survey asked participants to rank the importance of the 63-research questions identified in the first phase of the Delphi process. Through the survey, 21-research questions were identified as being important. These questions were related to behaviour change among staff, impact of the patient's hospital environment, effectiveness of various IPC interventions, evidence for and evaluation of IPC guidelines, IPC surveillance and monitoring practices, and overall IPC program effectiveness. The final phase of the priority setting activity included a facilitated virtual consensus meeting with AHS IPC staff and physicians, healthcare providers, researchers, and patients from Alberta to select the top 10 research questions. Results from the consensus meeting are being analyzed and the top 10 research questions finalized. Once finalized, AHS IPC will create a Research Advisory Council to develop infrastructure and build partnerships locally and nationally to propel the IPC research priorities forward.