

Health and Alberta Health Services — Infection Prevention and Control at Alberta Hospitals

SUMMARY

Infection prevention and control is one of the central aspects of healthcare delivery and is critical for managing patient safety risk in a hospital setting. Such concepts as proper hand washing and cleaning of medical devices appear basic, yet they are fundamental for preventing the spread of infections. The increasing proliferation of microorganisms resistant to antibiotic medications is a threat to the health of Albertans. Infection prevention and control (IPC) has an important role to play in managing this threat.

What we examined

Our audit had two objectives:

- determine whether the Department of Health has adequate systems to demonstrate successful implementation of the 2008 Alberta Infection Prevention and Control Strategy, and the 2008 Alberta Hand Hygiene Strategy
- determine whether Alberta Health Services (AHS) has adequate systems to demonstrate the success it has in managing health risk in hospitals through the following IPC activities:
 - hand hygiene practices
 - cleaning, disinfection and sterilization of multiple-use medical devices
 - management of patients with antibiotic-resistant organisms (AROs)

What we found

There has been a stronger focus on IPC at hospitals over the last several years and AHS, with the department's support, has introduced important provincial IPC systems that fill critical gaps in all three areas we selected for our audit.

During our hospital visits we did not observe instances where there was an immediate and significant risk to patient safety. Although there have been many improvements in hospital IPC during recent years, we found weaknesses in management systems to ensure implementation of the provincial IPC strategy and the hand hygiene strategy, as well as weaknesses in AHS systems to manage IPC risk within hospitals.

The main theme of our three recommendations to AHS is the following:

- availability of the hospital IPC data has improved
- AHS does not yet have adequate systems at the organizational level to use this data to focus management attention on areas of high risk and evaluate existing hospital IPC practices to support evidence-informed service delivery

What needs to be done

We made one recommendation to the Department of Health and three to Alberta Health Services.

<p>Recommendation 1: Oversight and accountability for infection prevention and control</p> <p>We recommend that the Department of Health:</p> <ul style="list-style-type: none"> • determine clear implementation responsibilities of each partner identified under the infection prevention and control strategy and the hand hygiene strategy • improve its systems to monitor implementation progress and publicly report on the success of both strategies
<p>Recommendation 2: Cleaning, disinfection and sterilization of medical devices</p> <p>We recommend that Alberta Health Services establish clear oversight and accountability for medical device reprocessing within and across zones to ensure consistent processes and accountability for reprocessing activities in Alberta.</p>
<p>Recommendation 3: Prevention and control of antibiotic-resistant organisms</p> <p>We recommend that Alberta Health Services improve its systems to manage risk posed by antibiotic-resistant organisms at hospitals by:</p> <ul style="list-style-type: none"> • developing an evidence-informed approach for evaluating and aligning antibiotic-resistant organism policies and procedures in hospitals • developing an approach to provide antibiotic stewardship in hospitals across the province
<p>Recommendation 4: Hand hygiene practices</p> <p>We recommend that Alberta Health Services improve its systems for hand hygiene by:</p> <ul style="list-style-type: none"> • clarifying responsibility and accountability for improving hand hygiene compliance across hospitals • using available data, on a risk-focused basis, to identify hospital units with poor compliance, and take appropriate remedial action strengthening the infection prevention and control orientation and training provided to hospital healthcare workers

Why this is important to Albertans

Healthcare-acquired infections affect hospital patients and often lead to serious complications. Infections acquired while in a hospital have more significant negative outcomes than infections acquired in the community, result in longer hospitalizations and represent an added cost to the healthcare system. Many healthcare-associated infections are preventable.

AUDIT OBJECTIVES, SCOPE AND APPROACH

This audit had the following two objectives:

- determine whether the department has adequate systems to demonstrate successful implementation of the 2008 Alberta Infection Prevention and Control Strategy and the 2008 Alberta Hand Hygiene Strategy
- determine whether AHS has adequate systems to demonstrate the success it has in managing health risk in hospitals through the following IPC activities:
 - hand hygiene practices
 - cleaning, disinfection and sterilization of multiple-use medical devices
 - management of patients with antibiotic-resistant organisms

Scope and approach

The scope of our work included the following:

- management systems within the Department of Health and AHS to prevent and control infections in hospital settings—IPC activities in continuing care and the community were outside scope for this audit
- systems and processes that were in place after January 2011
- a detailed assessment of AHS systems in the following three areas:
 - hand hygiene
 - cleaning, disinfection and sterilization of multiple-use medical devices
 - management of patients with antibiotic-resistant organisms
- a sample of 35 nursing units at 11 hospitals across the province

Although our sample included facilities operated by contracted service providers, our work was designed to conclude on AHS's systems to ensure consistent and adequate IPC service delivery in the province. Our assessment included certain elements of cleaning patient rooms and units as part of AHS's process to manage patients with AROs. However, we did not examine AHS management systems to manage environmental cleaning in hospitals.

We conducted our field work from December 2012 to March 2013. Our audit was conducted in accordance with the *Auditor General Act* and the standards for assurance engagements set by the Canadian Institute of Chartered Accountants.

BACKGROUND

Prevention and control of infections in hospitals is critical for achieving positive health outcomes for hospitalized patients. Although it is not possible to prevent all hospital-acquired infections, effective infection prevention and control can help substantially reduce the number of serious complications and deaths of hospital patients, and improve the use of healthcare resources.¹

An important distinction has to be made between infections acquired prior to hospital admission and those acquired by patients while in or at the hospital.² Unlike infections acquired in the community outside of healthcare settings, many hospital-acquired infections are preventable if healthcare workers, patients and visitors follow proper IPC practices. Based on data from some of the hospital studies in the United States, from 50 to 70 per cent of certain hospital-associated infections are preventable.³

Infections are common in the community (e.g., upper respiratory tract infections, pneumonia, skin and soft tissue infections, urinary tract infections and digestive tract infections). However, hospital patients are particularly vulnerable because of the increasingly complex interventions they require and the impact their underlying health condition(s) and side effects of treatment may have in weakening their immune system. An infection in a hospitalized patient may result in significant health complications and, in some cases, death. For example, one of many possible negative outcomes is sepsis—a condition resulting

¹ David P. Calfree. *Crisis in Hospital-Acquired, Healthcare-Associated Infections*, Volume 63, pages 359-371 <http://www.annualreviews.org/doi/abs/10.1146/annurev-med-081210-144458?prevSearch=%253Cb%253EFull%2BText%253C%252Fb%253E%253A%2Bcrisis%2Bhospital-acquired&searchHistoryKey=> (February 2012)

² Although individual patient cases may be different, for surveillance purposes standardized definitions of hospital-acquired vs. community-acquired microorganism are typically based on when the microorganism was identified. For example, the Canadian Nosocomial Infection Surveillance Program protocol for Methicillin-resistant *Staphylococcus aureus* defines cases as hospital-acquired if they were identified over 48 hours after hospital admission.

³ *Ibid.*

from the body's response to severe infection. According to the Canadian Institute of Health Information,⁴ patients diagnosed with sepsis after being admitted to hospital were 56 per cent more likely to die than patients diagnosed with sepsis before their admission.

Why IPC is important

IPC is an important factor in both the quality and the cost of healthcare.

Quality

Hospital-acquired infections are linked to increased morbidity and a significant number of deaths in Canada. According to sources used by the Community and Hospital Infection Control Association – Canada, an estimated 220,000 infections are acquired in healthcare facilities across Canada annually and 8,000 deaths are linked to these infections.⁵ For comparison, there are more deaths associated with healthcare-acquired infections than with diabetes (6,923 deaths in 2009⁶), Alzheimer's disease (6,281 deaths in 2009), or influenza and pneumonia (5,826 deaths in 2009). There are over three times more deaths associated with healthcare-acquired infections than with motor vehicle accidents (2,227 in 2010⁷) and about 14 times more than with homicides (574 in 2009⁸).

Cost

Infections can be costly. According to U.S. studies, about five per cent of persons admitted to a hospital develop an infection during hospitalization.⁹ An estimated average cost of an infection can vary from about \$1,000 (e.g., catheter-associated urinary tract infection) to \$35,000 (e.g., surgical site infection). Individual cases that require surgery and hospitalization can be considerably more expensive. In Alberta, the Department of Health estimates that the cost of caring for a patient with a hospital-acquired infection ranges from \$2,000 to \$20,000.¹⁰ According to the Canadian Institute of Health Information,¹¹ the median length of hospital stay in Canada for a patient with sepsis is nine days longer than for the average patient admitted with other conditions. Close to half (45 per cent) of all patients with sepsis are admitted to the intensive care unit during their stay.

Patients who develop infections due to antibiotic-resistant organisms have significantly higher rates of mortality and longer hospitalizations.¹² Studies from the U.S. show that about 16 per cent of all healthcare-associated infections are caused by antibiotic-resistant organisms. Patients with infections

⁴ Canadian Institute of Health Information. Canadian hospitals aim to reduce mortality rates, but severe infections remain a challenge, http://www.cihi.ca/cihi-ext-portal/internet/en/document/health+system+performance/quality+of+care+and+outcomes/hsmr/release_10dec09 (December 10, 2009)

⁵ Community and Hospital Infection Control Association-Canada. Public Reporting and Inter-hospital Comparison of Health Care-Acquired Infections, page 1. <http://www.chica.org/pdf/AMMIposition.pdf> (May 2006)

⁶ Statistics Canada. Leading causes of death, total population, by age group and sex, Canada. Table 102-0561. <http://www5.statcan.gc.ca/cansim/pick-choisir?lang=eng&searchTypeByValue=1&id=1020561>

⁷ Transport Canada. Canadian Motor Vehicle Traffic Collision Statistics: 2010, Collision and Casualties 1991-2010 table. <http://www.tc.gc.ca/eng/roadsafety/tp-1317.htm>

⁸ Statistics Canada. Leading causes of death, total population, by age group and sex, Canada. Table 102-0561. <http://www5.statcan.gc.ca/cansim/pick-choisir?lang=eng&searchTypeByValue=1&id=1020561>

⁹ Klevens, et al. Estimating Health Care-Associated Infections and Deaths in U.S. Hospitals, 2002, Public Health Reports, March-April 2007, pages 160-166 http://www.cdc.gov/HAI/pdfs/hai/infections_deaths.pdf

¹⁰ Alberta Health. Infection prevention and control. <http://www.health.alberta.ca/health-info/prevent-infections.html>

¹¹ Canadian Institute of Health Information. Canadian hospitals aim to reduce mortality rates, but severe infections remain a challenge. http://www.cihi.ca/cihi-ext-portal/internet/en/document/health+system+performance/quality+of+care+and+outcomes/hsmr/release_10dec09 (December 10, 2009)

¹² Cosgrove. The Relationship between Antimicrobial Resistance and Patient Outcomes: Mortality, Length of Hospital Stay, and Health Care Costs. http://cid.oxfordjournals.org/content/42/Supplement_2/S82.full.pdf+html

due to antibiotic-resistant organisms have higher costs (by about \$6,000 to \$30,000) than patients with infections that respond well to antibiotics.¹³

IPC in Alberta

IPC has received considerable attention in Alberta, after a major incident at Vegreville's St. Joseph's Hospital in 2007. The hospital's use of inadequately sterilized medical equipment and the outbreak of Methicillin-resistant *Staphylococcus aureus* resulted in a shutdown of its central sterilization facility and closure of the hospital to new admissions. A subsequent review of the former health region's IPC practices by the Health Quality Council of Alberta in July 2007 resulted in a number of recommendations to the hospital, but also to other health regions and the Department of Health.¹⁴ The department also conducted a provincial review of IPC policies and practices and the resulting document, Provincial Review of Infection Prevention and Control, was completed in August 2007.¹⁵

The department's 2007 IPC review identified five directions for moving forward, which included specific actions to improve IPC services in the province. The review noted that while there were components of an IPC system in place, there was little coordination and integration among the different providers of healthcare in the province in such areas as policies, practices, standards, compliance monitoring and training.

Among other things, the 2007 IPC review called for a collaborative and coordinated approach to IPC by all involved parties. This resulted in the development of the IPC strategy and the hand hygiene strategy introduced by the department in 2008, together with four standards for IPC.¹⁶

Strategies

- Alberta Infection Prevention and Control Strategy
- Alberta Hand Hygiene Strategy

Standards

- Accountability and Reporting Standards
- Standards for Cleaning, Disinfection and Sterilization of Reusable Medical Devices for Healthcare Facilities and Settings
- Standards for Single-use Medical Devices (Critical and Semi-critical medical devices)
- Standards for Prevention and Management of Methicillin-resistant *Staphylococcus aureus* (MRSA)

An overview of both strategies and the four IPC standards is presented in Appendix A.

Each strategic direction under the IPC strategy has objectives and proposed actions for the Department of Health, AHS and healthcare professional regulatory bodies. Each strategic direction under the hand hygiene strategy has objectives and proposed actions for provincial, regional, local and federal partners. Both strategies call for detailed action plans to support their implementation.

¹³ Chicago Journals, The Society for Healthcare Epidemiology of America. See <http://www.jstor.org/stable/pdfplus/10.1086/591861.pdf>

¹⁴ Health Quality Council of Alberta. Review of the Infection Prevention and Control and CSR Sterilization Issues in East Central Health Region. <http://publications.hqca.ca/preview/87> (July 2007)

¹⁵ Alberta Health and Wellness. Provincial Review of Infection Prevention and Control. <http://www.health.alberta.ca/documents/IPC-Review-2007.pdf> (August 2007)

¹⁶ Alberta Health website. Infection prevention and control (IPC) publications. <http://www.health.alberta.ca/newsroom/pub-infection-prevention.html>

Critical activities for preventing and controlling infections at hospitals

Preventing transmission is the key to avoiding infection.¹⁷ Although there are many dimensions to effective IPC, our review of IPC literature suggests that three areas are among the most critical for preventing and controlling hospital-acquired infections:

- hand hygiene practices
- cleaning, disinfection and sterilization of multiple-use medical devices
- preventing and managing the spread of infection in hospitals, including antibiotic-resistant organisms and other significant infection such as *Clostridium difficile* bacteria

Failure to appropriately and effectively manage any one of these areas represents a significant risk to the health of Albertans and to the use of public resources. In our audit we paid particularly close attention to the department's and AHS's systems to manage these three areas.

FINDINGS AND RECOMMENDATIONS

Department's oversight and accountability for IPC

Background

Both the IPC strategy and the hand hygiene strategy were to be implemented and evaluated over a 10-year period starting in 2008. Each strategy called for the development of detailed action plans. The IPC strategy set out six strategic directions and assigned specific actions for each of three parties identified as having important roles in this process: the Department of Health, AHS and health professional regulatory bodies. The hand hygiene strategy set out five strategic directions and provided a general list of multiple provincial, municipal, federal and other organizations as partners in implementing the strategy.

The department introduced four IPC standards in 2008 and updated three of these standards in 2011–2012.

In examining processes for implementing the two strategies, we focused on the following areas:

- roles and responsibilities of the department and AHS in relation to strategy development and implementation
- systems to support strategy implementation with action plans that clearly define implementation expectations, measures of progress and timelines
- systems to monitor and report implementation progress for both strategies

RECOMMENDATION 1: OVERSIGHT AND ACCOUNTABILITY FOR INFECTION PREVENTION AND CONTROL

We recommend that the Department of Health:

- determine clear implementation responsibilities of each partner identified under the infection prevention and control strategy and the hand hygiene strategy
- improve its systems to monitor implementation progress and publicly report on the success of both strategies

¹⁷ David P. Calfree. Annual Reviews website, Volume 63, pages 359-371. <http://www.annualreviews.org/doi/abs/10.1146/annurev-med-081210-144458?prevSearch=%253Cb%253EFull%2BText%253C%252Fb%253E%253A%2Bcrisis%2Bhospital-acquired&searchHistoryKey> (February 2012)

Criteria: the standards for our audit

For the IPC strategy and the hand hygiene strategy, the department should have systems to:

- set or approve measures and targets for individual objectives under each strategy
- perform tasks it is responsible for under specific action items for each strategy
- monitor overall implementation of the strategies
- report publicly on the success of both strategies and on IPC activities in the province

Our audit findings**KEY FINDINGS**

- Given the recent restructuring in the provincial healthcare system, AHS may now be better positioned to assume responsibility for developing and implementing strategies, with oversight from the department.
- Implementation expectations of individual partners under the IPC strategy and the hand hygiene strategy are not clear.
- The department does not have adequate systems to monitor and report implementation progress for both strategies.
- The department's strategies do not adequately fulfill the need for province-wide action to manage the spread of antibiotic-resistant organisms and the associated health risk.

IPC strategy and hand hygiene strategy in light of structural changes in the healthcare system

The department has not formally updated either strategy since 2008. The healthcare system in Alberta has changed significantly over the last five years and the creation of AHS in 2009 had important implications for implementing individual actions under both strategies. Our interviews with management and staff at the department and AHS, and our review of documentation, show that the strategic directions and most of the individual actions and initiatives under both strategies remain valid and relevant. However, for the IPC strategy there may be a need to review and update the allocation of individual actions between the department and AHS. Also, it may be necessary to determine which partners should be responsible for individual actions under the hand hygiene strategy.

Historically, the department led development and coordinated implementation of key initiatives under both the IPC strategy and the hand hygiene strategy. After amalgamation of nine health authorities into a single provincial healthcare service delivery organization, this may be a good time to assess whether AHS should take the lead role on some of this work in order for the department to focus its resources on providing policy direction and oversight.

AHS has a well-defined provincial IPC management structure with a critical mass of 144 full-time equivalent staff and experts dedicated to IPC. By contrast, the department's IPC strategy and policy work is done by about five staff, most of whom are not IPC specialists and have other responsibilities. The Office of the Chief Medical Officer of Health plays an important role, particularly in IPC surveillance. Other department functions become involved on matters such as compliance monitoring and health workforce issues, but their main focus is not on developing and implementing IPC strategies and initiatives. AHS has more resources, technical expertise and closer operational involvement to be better positioned to lead work on actions and initiatives under both strategies (e.g., develop and maintain IPC standards, IPC competencies and certification requirements for healthcare workers, and IPC surveillance system).

IPC strategy

The department does not have an adequate system to determine implementation expectations, targets, responsibilities and timelines. The department has provided us with an implementation plan for the IPC strategy dated September 2011 (for the period 2011–2013), which was described to us as a rolling three-year plan. This was the first implementation plan since the introduction of the IPC strategy in 2008. This plan has not been renewed since 2011; it does not set implementation targets and expectations, assign responsibilities or set timelines for specific actions and initiatives. This implementation plan discusses various general activities, described in broad terms, and does not outline what actions will be taken, when, by what entity and with what resources.

The department does not have an adequate system to monitor and report on the implementation of the IPC strategy, which is now halfway through its 10-year cycle. In 2012 the department engaged an external consultant to conduct a mid-point evaluation of strategy implementation. This evaluation was based on interviews with representatives of several key parties identified in the strategy and reviews of relevant documentation. The conclusion offered in the evaluation report was that progress had been achieved on seven of the 11 objectives and work was still needed on the remaining four. The evaluation report didn't provide detail on progress of specific initiatives under the strategy, which would be difficult to do in absence of the initial detailed implementation plans. Although this evaluation provides useful information on IPC developments in the province since 2008, it does not constitute an adequate system to monitor and report progress on strategy implementation.

Hand hygiene strategy

The department does not have an adequate process to ensure that work on specific actions under the hand hygiene strategy is on track. The department does not have an adequate system to determine implementation expectations, targets and timelines, and has not developed an implementation plan for the hand hygiene strategy since its introduction in 2008. The department does not have an adequate system to monitor nor has it reported on progress in implementing the hand hygiene strategy.

The hand hygiene strategy is not clear as to which entity is responsible for what actions under the strategy. The strategy identifies over 20 key partners (both specific and general types of organizations) ranging from specific provincial and federal government departments to industry, the not-for-profit sector and even local recreational organizations. With so many entities involved and a lack of clear expectations, we couldn't determine how the various organizations were to be involved, which actions they were responsible for, what their targets and expectations were, who provided the resources and how their progress was assessed.

There are several initiatives related to hand hygiene in which the department plays a key role. For programs funded by the department through grant agreements, the department receives periodic reporting that includes primarily financial data and general overview of activities performed. The most prominent example is the Do Bugs Need Drugs Program. The program involves education on the importance of hand hygiene, targeting a variety of audiences including healthcare professionals. This program was first introduced in 1999 in one of the former health regions. The program was extended to all of Alberta in 2005 and subsequently adopted in British Columbia. In 2013–2014 the department transferred the program's funding to AHS's budget.

The department developed the Clean Your Hands campaign in February 2010 as a workplace-based program within the Government of Alberta to increase awareness of hand hygiene practices and the spread of germs in Government of Alberta workplaces. The campaign included printing and distributing educational decals, which were to be placed in prominent locations in the workplace. Each decal

provided information on the importance of hand washing and a link to a website. The department expanded the campaign to non-government workplaces in 2011, making free decal kits and other information on hand hygiene available to any Alberta workplace. Known as the Institute for Hand Cleaning Knowledge, this campaign has its own website.¹⁸

Examples of actions and initiatives under the IPC strategy and the hand hygiene strategy

During our audit we observed that the department and AHS had taken a number of important steps to improve IPC service delivery (see Appendix B). However, without knowing the initial implementation expectations under the IPC and hand hygiene strategies, it was often not clear how these activities aligned with actions targeted by the strategies, or whether the level of activity was adequate. For example, we found the following:

- The department was to “implement mechanisms for monitoring compliance with provincial IPC standards.” As our findings under other recommendations show, there are weaknesses in compliance monitoring systems and no system to monitor compliance with the Methicillin-resistant *Staphylococcus aureus*¹⁹ Standards and Guidelines.
- The department was to “facilitate the development and certification requirements for all IPC professionals.” With funding support from the department, AHS aspires to provide its IPC specialists with certification in infection prevention and control.²⁰ However, at the time of our audit this was not a requirement for AHS and other healthcare service providers.
- AHS was to “achieve and sustain required staffing levels and resources for IPC.” IPC staffing requirements have not been clearly set (e.g., maximum number of beds per IPC specialist in acute care, continuing care). AHS aspires to achieve certain IPC staffing ratios based on guidelines from other jurisdictions, but these are not formally approved by the department either as requirements or guidelines.
- Health professional regulatory bodies had various actions to perform under the IPC strategy, including such actions as adopting IPC standards, monitoring compliance among their members and monitoring continuing competence of members regarding IPC. During our audit, we interviewed nurses and physicians at hospitals across Alberta, as well as their respective professional regulatory bodies. We did not find evidence that the department has adequately engaged these entities in implementing actions assigned to them under the IPC strategy.
- The department was to “develop strategies to enhance patient and worker safety, in collaboration with relevant government entities and other organizations.” While there is ongoing evolution of the already existing programs for IPC and occupational health and safety, it wasn’t clear whether any subsequent improvements achieved were a result of a conscious effort to implement the strategy.
- The department was to “implement the hand hygiene strategy across all sectors to improve accessibility to hand hygiene facilities.” Many actions under both strategies are worded broadly. Without clear action plans with implementation expectations that include targets, responsibilities and timelines, it is not possible to provide a meaningful assessment of progress.

Public reporting on success of the IPC strategy and the hand hygiene strategy

The department and AHS publicly report some high level IPC information for the province, such as provincial rates of certain infections and hand hygiene compliance rates. Internally, the department obtains important IPC information through AHS’s annual IPC reports, periodic IPC surveillance reports and ad hoc reporting of incidents to the Office of the Chief Medical Officer of Health. However, this

¹⁸ Alberta Health, Institute of Hand Cleaning Knowledge, website <http://www.health.alberta.ca/health-info/ihck/>

¹⁹ Methicillin-resistant *Staphylococcus aureus* (MRSA) is one of several antibiotic-resistant organisms that are often linked to hospital-acquired infections.

²⁰ Certification Board of Infection Control and Epidemiology Inc. <http://www.cbic.org/>

public and internal reporting does not provide an assessment of progress made in implementing the IPC and hand hygiene strategies.

Approach for managing the spread of antibiotic-resistant organisms (AROs) in the province

We also noted that the entire area of health risk associated with the spread of antibiotic-resistant organisms is not adequately dealt with in the IPC and hand hygiene strategies and the department has not identified a clear approach for managing the spread of AROs in the province. Antibiotic resistance is rapidly becoming one of the most critical risk areas related to IPC in Canada and internationally. Globally, the prudent response has been to focus on antibiotic stewardship to control and prevent the number and virulence of AROs. In Alberta, the need for antibiotic stewardship is widely recognized among healthcare professionals, but no evidence-informed approaches exist in Alberta to set direction, develop action plans, implement systems and monitor and provide feedback on the success of an overall ARO stewardship plan. As part of its process to periodically review and revitalize its strategies for IPC, the department needs to focus on antibiotic stewardship within the province.

Implications and risks if recommendation not implemented

Without systems to set implementation accountabilities and monitor progress, the department cannot fully assess effectiveness of the IPC and hand hygiene strategies. The initial detailed action plans and subsequent progress reports are needed to determine whether IPC activities performed by various parties fully meet the implementation expectations for both strategies, what items remain outstanding, who is responsible and when the work will be finished.

Cleaning and disinfection of multiple-use medical devices

Background

Reusable medical devices, including endoscopes and various surgical instruments, are intended for multiple uses and with different patients. With each use, these devices can become contaminated with microorganisms. To protect the next patient from possible infection, the devices must be reprocessed—following a prescribed multistep process to clean and disinfect or sterilize the device. Medical device reprocessing (MDR) is done in a separate area of the hospital by staff specifically trained for and dedicated to the MDR function.

MDR in Alberta attracted considerable attention in March 2007 when the Vegreville General Hospital had to stop admitting new patients and shut down its reprocessing area. This was based in part on evidence that inadequately sterilized medical equipment was potentially exposing patients to blood-borne pathogens.²¹

In the wake of this incident, the department introduced provincial standards for MDR in 2008.²² The standards set overall expectations and basic requirements and refer to detailed standards provided by the Canadian Standards Association. However, the provincial standards are not a substitute for the detailed procedures and protocols needed to ensure effective operation of individual reprocessing sites.

The need to keep reusable medical equipment clean and disinfected or sterile is obvious. Medical devices vary in complexity and their cleaning, disinfection and sterilization may require the use of different procedures, use of specialized chemicals, or exposure to high temperature and pressure. Clear and consistent standards and practices are necessary to ensure hospital workers perform reprocessing correctly.

²¹ Health Quality Council of Alberta. Review of the Infection Prevention and Control and CSR Sterilization Issues in East Central Health Region. <http://publications.hqca.ca/preview/87> (July 2007)

²² See Appendix A for description of the strategies and standards.

Between 2010 and 2012, AHS's IPC division conducted on-site reviews of reprocessing practices at all AHS acute care facilities, including hospitals managed by Covenant Health. This was the first province-wide assessment of MDR. The reviews assessed compliance with MDR standards and identified areas needing improvement.

The department's June 2012 revision of the MDR standards set minimum qualifications for MDR personnel. The standards require all personnel working in MDR, and those who sterilize reusable medical devices, to be certified through one of two recognized certification programs by April 1, 2015.²³

RECOMMENDATION 2: CLEANING, DISINFECTION AND STERILIZATION OF MEDICAL DEVICES

We recommend that Alberta Health Services establish clear oversight and accountability for medical device reprocessing within and across zones to ensure consistent processes and accountability for reprocessing activities in Alberta.

Criteria: the standards for our audit

AHS should have adequate systems to ensure best practices for the cleaning, disinfection and sterilization of medical devices within Alberta hospitals, including systems to:

- establish policies and procedures for MDR, including education and training requirements for reprocessing staff
- ensure hospitals have facilities, equipment and supplies for proper MDR
- monitor compliance with MDR policies and procedures, and take appropriate, timely action to resolve any deficiencies

Our audit findings

KEY FINDINGS

- AHS took a positive and important step by introducing systematic reviews of MDR compliance at hospitals across the province.
- AHS does not have adequate systems to coordinate and oversee the work of individual reprocessing sites to ensure consistent processes and accountability for reprocessing of medical devices across the province, including timely action on identified MDR deficiencies.

MDR compliance reviews

AHS's MDR reviews conducted from 2010 to 2012 were the first systematic assessment of reprocessing practices across acute care facilities in Alberta. This was a significant step toward implementing a provincial system to monitor and ensure compliance with provincial MDR standards.

Given the value it obtained from these reviews, AHS management indicated that it intends to repeat these reviews periodically, and planning for the next review cycle was already underway. At the time of our audit, AHS was refining its review methodology.

Corporate oversight and accountability for MDR services in the province

AHS does not have a system to ensure adequate and consistent processes and accountability for medical device reprocessing across hospitals in the province. While some reprocessing sites at individual hospitals coordinate with each other, there is no corporate function, spanning all five zones, with responsibility for overseeing reprocessing across the province. For example, IPC and Environmental Services are AHS central corporate functions integrated directly into the management structure of

²³ As per Section 10.1 of the provincial standards, these are either the CSA Certification for Medical Device Reprocessing Technicians or the International Association of Healthcare Central Service Material Management Certification of Certified Registered Central Service Technicians.

individual hospitals. These functions set province-wide policies and procedures, offer expertise and specialized resources, and support consistent service delivery. MDR does not have the benefit of such a function. Reprocessing sites in individual hospitals, particularly smaller rural facilities, often operate in isolation from one another.

Although the provincial IPC function within AHS led the 2010–2012 review of reprocessing facilities, it is important to note that this function has no operational involvement in, and is not responsible for, MDR services. Management of MDR, and resolution of any deficiencies, falls solely under the responsibility of individual hospitals within each zone of AHS.

AHS's response to deficiencies identified during 2010–2012 MDR reviews

Individual reprocessing sites have acted on deficiencies identified in AHS's 2010–2012 MDR reviews. However, AHS does not have an adequate corporate system to ensure consistent, appropriate and timely action on deficiencies across sites.

For the 11 hospitals we visited, AHS's MDR reviews identified an average of 44 deficiencies per hospital (over 480 in total). The majority of deficiencies had to do with the lack of, or inadequate, reprocessing policies and procedures. Other areas requiring improvement were education and competency testing of MDR staff, documentation of reprocessing activity, and reprocessing area design and infrastructure.

Timeliness of response to deficiencies

At the time of our audit, AHS records indicated the following:

- About 12 per cent of all deficiencies (mostly medium risk) have not yet been resolved. Most of these deficiencies had to do with inadequate design and layout of the reprocessing areas.
- AHS's MDR review reports outlining deficiencies were provided to most sites more than five months after the review took place. Management recognizes feedback should be more timely in future MDR reviews.
- About 18 per cent of deficiencies were remediated on average eight months past their target completion dates. This was partially due to reporting delays noted in the previous point.

MDR policies and operating procedures

In response to MDR reviews, individual reprocessing sites developed policies, operating procedures and staff training documentation. However, AHS does not have an adequate system to ensure that these newly developed requirements are consistent and adequate across all reprocessing sites.

Supervisors of the reprocessing sites we visited developed or updated their policies, procedures and training to resolve deficiencies noted in the MDR reviews. For the most part, they were left to do this on their own, often duplicating their efforts and, with smaller rural sites, often unable to benefit from the expertise and specialized resources available at larger hospitals. AHS has no oversight mechanism to ensure the resulting policies and procedures are consistent and appropriate across the province. While some reprocessing sites coordinate informally with each other, this does not apply to all sites and does not constitute an adequate system.

Proper labeling of reprocessed devices

For the hospitals in our sample, the MDR reviews found six high risk deficiencies in total. Most of these related to failures to clearly label reprocessed devices to differentiate them from dirty ones, particularly endoscopes. AHS's records indicate three of these high risk deficiencies were fixed immediately, but the

other three took between nine and 70 days to resolve. We observed proper labeling practices in all the endoscope reprocessing areas we visited.

Documentation of MDR activity

Although we observed some level of documentation of reprocessing activities at the sites we visited, there was wide variation in what activities were documented and how. Several medium risk deficiencies identified in AHS's MDR reviews related to incomplete documentation of device reprocessing activity.

Good documentation is vital in investigating a suspected link between an infection and a medical device. It helps management know where, when and by whom the device was reprocessed, whether it was reprocessed with other devices and importantly, which patients had contact with the device.

MDR infrastructure

There is a significant gap in this area, but AHS already has systems to identify infrastructure needs across the province, including infrastructure for MDR. The progress in this area will primarily depend on availability of capital funding for MDR upgrades and renovations, which have to be prioritized in relation to other health infrastructure requirements.

Of the unresolved deficiencies at the hospitals we visited, the majority related to inadequate design and layout of the reprocessing areas. For about half of these deficiencies, reprocessing sites did not provide target implementation dates. In many cases, significant renovations and upgrades would be required. For example, some reprocessing sites, particularly at older hospitals, were not designed to accommodate a one-way work flow to ensure dirty equipment doesn't enter and contaminate clean areas. Examples of deficiencies that do not require major renovations include the need to replace work surfaces made of porous materials that are hard to clean and may harbour bacteria.

Implications and risks if recommendation not implemented

Proper reprocessing of medical devices is critical for patient safety. Without a strong provincial system to direct, coordinate, support and oversee individual reprocessing sites, AHS cannot ensure consistent and appropriate reprocessing of medical devices at Alberta hospitals.

Managing the spread of antibiotic-resistant organisms in hospitals

Background

Although antibiotic-resistant organisms (AROs) have always existed, they have become an increasingly serious problem. Both appropriate and inappropriate use of antibiotics selects out bacterial strains that are variably resistant to the effects of these medications. These bacterial variants, in turn, may spread globally and gradually become the dominant population. The successful introduction and use of antibiotic "miracle drugs" over the last 70 years has led to gradual emergence of increasingly resistant populations of microbes. This natural consequence of antibiotic use and misuse threatens to have significant impact on health and healthcare delivery.

However, effective IPC strategies and judicious use of antibiotics may help slow the development of new forms of AROs and may even help control the spread of infection during outbreaks.

Getting an ARO may have two potential outcomes:

- Colonization—The majority of individuals who acquire an ARO will carry the microbe but relatively few will develop an infection. That is, they are carriers or “colonized.” In time, carriage of the ARO may end as it is overgrown by the natural community of microbes and the individual ceases to be a carrier.
- Infection—A minority of individuals who acquire an ARO will develop an infection with it. Hospitalized patients are at increased risk of developing infection due to underlying illness, medical procedures or surgery and the impaired immunity resulting from illness or its treatment.

ARO surveillance

Prior to 2011, IPC surveillance in Alberta was fragmented among former health regions without an integrated provincial system. Alberta’s first province-wide surveillance system, called ProvSurv, provides critical capacity for real-time analysis of IPC surveillance data across Alberta hospitals. It also provides frontline IPC specialists with an indispensable tool for managing individual patient cases across hospitals, as well as ongoing monitoring and analysis of ARO trends at their assigned hospitals and units. Data on the following infections are currently being entered and tracked through separate modules within the ProvSurv system.²⁴

- Methicillin-resistant *Staphylococcus aureus* (MRSA)
- Vancomycin-resistant *Enterococcus* (VRE)
- Carbapenem-resistant *Enterobacteriaceae* (CRE)
- *Clostridium difficile* (*C difficile*)

For more information on these microorganisms see Appendix C.

ProvSurv is also used to monitor central venous catheter infections and surgical site infections for hip and knee replacements, the frequency of which are also reported quarterly as key performance indicators in AHS’s public reports. The system can also be expanded to include other types of infections that may be added to the provincial surveillance program in the future.

ARO management at Alberta hospitals

Generally, management of ARO risk at hospitals involves the following:

- Identifying and properly managing hospital patients with ARO, preventing transmission of ARO to other patients and healthcare workers, as well as identifying and managing outbreaks of ARO in hospitals.
- Minimizing the emergence of new and more resistant ARO strains through antibiotic stewardship processes and initiatives aimed at ensuring appropriate use of antibiotics in hospitals.

Identifying and managing hospital patients with ARO

In theory, if routine practices like hand washing were properly followed by hospital staff and patients, the risk of ARO transmission within a hospital would be low. However, as mentioned elsewhere in this report, compliance with routine practices remains an issue in acute care settings across the country. Hospitals use ARO screening and isolate patients with ARO to manage the risk of transmission.

There is an ongoing discussion in the healthcare profession on the best approach to identify and manage patients with ARO. For example, while it is generally agreed that every patient admitted to a hospital should be assessed for the risk of carrying an ARO (usually using a brief questionnaire and a

²⁴ ProvSurv also collects data on ARO colonization, but only infection rates are tracked and reported.

search for previous ARO diagnoses in the hospital database), there is not agreement among IPC experts on which patients should receive laboratory testing and when. Performing lab testing for ARO on every patient admitted to a hospital would be expensive and time-consuming. While there may not be a single approach to deciding which patients should be laboratory tested for ARO, it is generally agreed that healthcare organizations should ensure their adopted ARO screening approach is:

- evidence-informed and risk-focused
- aligned with provincial surveillance priorities to support consistent ARO data capture across hospitals

Similarly, the practice of placing patients with ARO on isolation precautions presents both positive and negative aspects. While it helps to reduce the risk of ARO transmission, it may also result in adverse consequences and negative experience for the patient, as they are likely to receive less direct contact with nurses and doctors. Proper isolation also requires availability of individual patient rooms. Isolation also requires additional staff time and equipment—both significant resource considerations. Isolation protocols adopted by healthcare organizations need to be evidence-informed and balance the benefits of isolation against possible negative outcomes and costs.

There is not yet consensus on the best approach to manage risk of AROs in Canadian hospitals. To inform the Alberta approach, the department, AHS and the Institute for Health Economics are collaborating to host a consensus conference in Alberta in June 2014, bringing together global experts to identify solutions for issues related to screening and control of AROs.

Environmental cleaning

Proper cleaning of patient rooms, units and various other areas within hospitals is critical to manage the spread of AROs, particularly at the time of an outbreak. Most hospital cleaning protocols require patient rooms and other critical areas to be cleaned on a daily basis. During outbreaks, high-touch areas on the affected units may have to be cleaned twice a day (e.g., door handles, light switches, counters and computer keyboards). The cleaning solution used must be appropriate to both wash away any dirt, and kill microorganisms. Various equipment used on patients, such as intravenous pumps and poles, stretchers, wheelchairs, furniture and patient chart binders, should also be cleaned using proper cleaners and procedures.

Antibiotic stewardship in hospitals

Excessive and inappropriate use of antibiotics has long been recognized as one of the key contributing factors to the rise and spread of AROs. The concept of antibiotic stewardship was formally used in a 1997 document published by Health Canada and the Canadian Infectious Diseases Society, which called for introduction of stewardship programs at Canadian hospitals to reduce overuse and misuse of antibiotics.²⁵

RECOMMENDATION 3: PREVENTION AND CONTROL OF ANTIBIOTIC-RESISTANT ORGANISMS

We recommend that Alberta Health Services improve its systems to manage risk posed by antibiotic-resistant organisms at hospitals, by:

- developing an evidence-informed approach for evaluating and aligning antibiotic-resistant organism policies and procedures in hospitals
- developing an approach to provide antibiotic stewardship in hospitals across the province

²⁵ Health Canada and the Canadian Infectious Diseases Society. Controlling antimicrobial resistance: An integrated action plan for Canadians (1997).

Criteria: the standards for our audit

AHS should have adequate systems to prevent and control the spread of antibiotic-resistant organisms in hospitals, including systems to:

- establish policies and procedures for managing ARO risk at hospitals
- carry out provincial surveillance activities and monitor effectiveness of practices aimed at ARO management in hospitals

Our audit findings**KEY FINDINGS**

- Implementation of the province-wide IPC surveillance program in 2011 was a positive and important step forward.
- AHS does not have a system for an evidence-informed evaluation and alignment of legacy policies and procedures in hospitals to ensure ARO risk is managed consistently across the province.
- Policies and procedures for cleaning of shared patient equipment on hospital units are inconsistent. In some cases the responsibility for cleaning such equipment is unclear. Cleaning of shared patient equipment on the units is generally not well documented.
- An approach to provide antibiotic stewardship across hospitals in the province has not been developed.

AHS has made important progress, particularly in the area of provincial ARO surveillance. However, we identified a number of weaknesses in AHS's systems to manage ARO risk at hospitals.

Provincial IPC surveillance system

AHS's implementation of the integrated provincial IPC surveillance system (ProvSurv) across all hospitals in the province in 2011 was a significant improvement not only in ARO surveillance, but in provincial IPC overall.

Although ProvSurv provides a strong foundation for provincial ARO surveillance, its reliability depends on the quality and completeness of information provided by ARO screening processes at the hospital and unit level across the province. As outlined below, many of these policies and procedures are based on legacy processes inherited by AHS from the former regional health authorities.

ARO policies, procedures and compliance with them

AHS progress in developing and standardizing ARO policies and procedures has been mixed. With the implementation of ProvSurv in 2011, AHS has significantly improved and standardized a provincial process for ARO surveillance reporting. However, AHS does not have a system to assess effectiveness and efficiency of existing ARO policies and procedures within hospitals, many of which are inconsistent and based largely on legacy processes inherited from the former regional health authorities. We are not advocating identical ARO policies and procedures at all sites because the level of patient safety risk may differ by size and location of a hospital and type of inpatient programs offered. The main issue we raise here is that AHS does not have a system for evidence-informed evaluation of existing hospital policies and procedures, and their alignment with the level of ARO risk involved.

Assessment of patients for ARO risk

While most hospitals in our sample had risk assessment questionnaire forms and required admission staff to check a hospital database for a patient's previous ARO records, we found the following:

- There is variation across hospitals in protocols and questionnaire forms used to assess patients for ARO. Most of these forms and protocols are legacy processes inherited by AHS from regional health authorities.
- AHS does not have a system to validate effectiveness and appropriateness of these various protocols. Without consistent and validated patient risk assessment protocols across the province, it is difficult to know whether some hospitals are better at reducing their ARO rates and in-hospital ARO transmissions, or whether their existing screening processes just don't identify these problems.
- AHS does not monitor the number of ARO screening tests done at each hospital. Analysis of this data could help AHS assess effectiveness of existing ARO risk assessment protocols at different hospitals and adjust them to ensure the testing is rigorous enough to ensure ARO risk is dealt with appropriately and consistently. For example, our review of AHS's ARO screening data suggests considerable variation in the volume and intensity of ARO lab testing done at different hospitals. However, AHS does not systematically extract and analyze this data to ensure that any variation in volume and intensity of ARO lab testing across hospitals is appropriate.
- Assessment of patients for ARO risk, and any lab testing that may be subsequently required, does not consistently happen as close as possible to the time of the admission (admissions usually take place through a hospital emergency department).
- AHS also does not have data on the cost of individual ARO tests or ARO testing in hospitals overall in order to better understand and manage financial requirements of ARO screening in the province.

Process to flag patients with AROs in hospital admission systems

Patients flagged as ARO-positive at one hospital may not be recognized as such when they are admitted to another hospital.

AHS's hospital admission systems are generally not linked with each other, with only limited interconnectivity across the province. As a result, ARO risk flags created by one hospital often do not follow patients when they are later admitted to other hospitals. The admitting hospital may unknowingly place an ARO patient that would otherwise be isolated into the general patient population. The problem may not be discovered until long after the admission, if at all, by which time the ARO may have spread to other patients.

Isolation precautions for patients with ARO

AHS has taken an important positive step by standardizing definitions for isolation precautions, as well as corresponding procedures for managing isolated patients. We observed that while patients were on isolation precautions, these standard definitions and procedures were applied consistently across the province with only few exceptions. In other words, once the decision has been made to isolate a patient, isolation precautions are consistent across the province.

We found inconsistencies across hospitals in how decisions to isolate patients are made and how isolation precautions are subsequently lifted. However, we are not advocating one ARO isolation approach over the other. Some variation may be appropriate if the level of patient safety risk differs. The main issue we raise is that AHS does not have a system for evidence-informed evaluation of existing isolation approaches and their alignment with the level of risk involved. Examples of inconsistencies include the following:

- Some hospitals and units isolate higher risk patients at the time of admission without waiting for the test results to arrive from the lab. Other hospitals test higher risk patients for ARO and place them into general patient population, isolating later only if lab results come back as ARO-positive, which could be several days later.
- We also observed differences in protocols for lifting isolation precautions. At some hospitals, only the assigned IPC specialists can order isolation precautions be lifted for individual patients, while at others the decision can be made by the unit nursing staff.

Following are some of the other observations we made during our hospital visits. These provide examples of good practices that we observed as well as opportunities for improvement:

- Standardized precaution signs were posted on rooms of isolated patients.
- In almost all cases, isolation carts containing the required supplies and personal protective equipment were situated outside of patients' rooms.
- On some units we observed that isolation carts were at times shared between two separate rooms with patients isolated for different AROs. This is inconsistent with AHS hospital procedures and increases the risk of cross-contamination.
- Management at hospitals indicated that due to space shortage some units have to cohort two or more patients with the same ARO into a single room. However, there may be more than one type of the same ARO. For example, placing two patients with different types of MRSA in a single room could result in cross-colonization. Some hospitals require laboratory analysis to determine types of MRSA prior to cohorting patients, while others do not follow this practice.
- While staff on most of the units mentioned that they educate patients with ARO on how to minimize the risk of transmission, few units document this process. We observed a good practice where some units have ARO fact sheets and instructions to provide to patients and their families.

Responding to and reporting ARO outbreaks

It is important to note that the process of identifying and assessing a spike or cluster in ARO cases is different from declaring and managing an outbreak.

Overall, systems used by hospital IPC specialists to identify unusual spikes in ARO activity on individual units are well designed and consistent across the province. These are the processes of the AHS's central IPC function and are operationally built around the central ProvSurv functionality.

Local hospital practices for declaring ARO outbreaks and protocols for responding to ARO problems vary considerably across hospitals, and are mainly based on legacy processes inherited by AHS. Our main issue is not inconsistency itself, but that AHS does not have a system to assess these varying processes to ensure that hospital ARO outbreak protocols are appropriate for the level of risk involved. For example, we found that some hospitals define several tiers or levels of outbreak response, while others do not. The level of available documentation and records for previous outbreaks vary considerably across hospitals. Further, AHS does not systematically analyze outbreaks after the fact to determine what went wrong and what worked best to fix the problem, and does not systematically prepare post-outbreak assessment reports in order to disseminate this knowledge to prevent and better manage similar problems at other hospitals.

ARO incident reporting

AHS does not have a system to capture information on failures in hospital processes for ARO screening and transmission prevention. A system that records ARO incidents that were near-misses, as well as those with negative outcomes, is a key feature of an effective IPC system because it indicates the nature and extent of failures in such primary controls as patient ARO risk assessment, lab testing of higher risk patients and isolating patients when appropriate.

Although AHS has a general incident reporting mechanism, it is not currently used for reporting of ARO incidents. AHS's Reporting and Learning System is a central online incident reporting mechanism for incidents and near-misses (e.g., medication errors, falls) that create safety risks to patients, healthcare workers or the public. However, there is no clear expectation that healthcare workers use the system for reporting ARO-related problems.

Nurses and physicians we interviewed indicated that if there was a problem related to AROs, they would discuss it with staff members in the relevant functional areas. Only a few individuals we interviewed could recall the reporting and learning system being used for reporting ARO-related incidents. Many of the physicians we interviewed either were not aware of the system or relied on nursing staff to formally report incidents.

Systems to ensure proper cleaning of patient rooms and shared equipment on hospital units

Cleaning of patient rooms and common areas in hospitals is the responsibility of Environmental Services, a centralized function within AHS. We found that expectations for cleaning of patient rooms and common areas are in place and are generally consistent.

However, we found a number of weaknesses in systems for cleaning of non-critical²⁶ shared patient equipment on hospital units (e.g., wheelchairs, IV poles, carts):

- Responsibility for cleaning of shared patient equipment on the units is not always clear. At some of the hospitals we visited it was not clear whether cleaning of particular pieces of equipment is the responsibility of the local unit staff or the environmental services staff. In the absence of corresponding cleaning policies, we had to rely on responses from hospital staff, who often sounded uncertain.
- Hospitals we visited generally lacked formal procedures for cleaning shared patient equipment and documentation of the cleaning activity. Without it, the units could not demonstrate that the cleaning method and frequency were appropriate.
- We had similar findings regarding cleaning of frequently touched areas not used by patients (e.g., computer keyboards, phones, patient chart binders and other equipment used primarily by healthcare workers).

We noted that the environmental services function has a centralized provincial system to train cleaning staff and a system to periodically inspect quality of cleaning. Although we did not audit the implementation of this training and compliance monitoring, it is important for ensuring that consistent and adequate cleaning is done at hospitals across the province.

²⁶ Non-critical patient equipment is defined as “a Medical Device which either touches only intact skin but not mucous membranes, or does not directly touch the Client.” Alberta Health Single-use medical devices as applied to semi-critical and critical medical devices. See <http://www.health.alberta.ca/documents/IPC-Medical-Device-Single-Use-2011.pdf> (2012)

Antibiotic stewardship in hospitals

Finally, we note that an approach to develop antibiotic stewardship across hospitals in the province has not been developed. Beginning in 2013, Accreditation Canada has added an antibiotic stewardship program to the list of required organizational practices for providers of inpatient acute care services.²⁷ AHS is well-positioned to implement some of the processes that were identified as important elements of antibiotic stewardship in hospitals.²⁸ See Appendix D for a summary of objectives of antibiotic stewardship in hospitals and examples of key systems and initiatives. Although some of the existing programs, such as the Do Bugs Need Drugs program, play an important role, their primary focus is general education and promotion, and they do not constitute a hospital antibiotic stewardship program. The following factors are critical for the success of hospital antibiotic stewardship:

- IPC resources and expertise—As one of the largest healthcare service delivery organizations in the country, AHS has a critical mass of IPC resources and some of the country’s top IPC expertise.
- Access to pharmacy prescription data—AHS and the department have access to data for almost all antibiotic prescriptions in the province. Systems to share, analyze and use this data are critical to improving antibiotic use practices in hospitals.
- Access to laboratory data—AHS has either direct control over, or access to, all of its inpatient laboratory data. There are several lab service providers in the province and strong systems to extract, analyze and use this data are key to identifying patterns of antibiotic resistance and helping prescribers make more informed decisions.
- Support from and involvement of physicians and pharmacists—Participation of these two professional groups will be important for the success of antibiotic stewardship initiatives.

Implications and risks if recommendation not implemented

Antibiotic-resistant organisms in hospitals pose serious, and in some cases life-threatening, health risks to patients and healthcare workers. Infections caused by AROs also consume significant hospital resources in terms of staff time, supplies, isolation space, laboratory testing and pharmaceuticals. Strong systems to identify and manage patients with AROs can help AHS improve quality of patient care and reduce hospital costs overall.

Hand hygiene

Background

Proper hand hygiene is the most important element of an effective IPC system. When done correctly, hand hygiene is the single most effective way to prevent the spread of communicable diseases and infections. Hand hygiene may be done with soap and running water, or an alcohol-based hand sanitizer. Hand sanitizers are preferred if hands are not visibly dirty or when caring for someone with a non-contagious illness. However, hand sanitizers are not effective in killing spores of organisms such as *Clostridium difficile*²⁹ which require hand washing with soap and water.

It may sound strange, but proper hand washing requires formal instruction and demonstration.³⁰ For example, a five-second rubbing with a drop of soap between the palms likely leaves large areas of the hands contaminated with potentially harmful microorganisms. Proper technique is important because incorrect hand washing can give a false sense of security to healthcare workers and their patients.

²⁷ Accreditation Canada. *Required Organizational Practices Handbook*. [http://www.accreditation.ca/uploadedFiles/ROP-Handbook-en\(1\).pdf](http://www.accreditation.ca/uploadedFiles/ROP-Handbook-en(1).pdf) (2013)

²⁸ Health Canada and the Canadian Infectious Diseases Society. *Controlling antimicrobial resistance: An integrated action plan for Canadians* (1997)

²⁹ A bacteria that can cause symptoms ranging from diarrhea to life-threatening inflammation of the colon.

³⁰ Alberta Health Services. *Hand Hygiene - Level 1 (PS-02-01)* <http://www.albertahealthservices.ca/6426.asp> (October 2011)

In AHS and elsewhere in Canada key situations when hand hygiene is required are referred to as “Your 4 Moments for Hand Hygiene”:³¹

1. *Before contact with a patient or patient’s environment*—including putting on personal protective equipment (PPE), entering a patient’s room and providing patient care
2. *Before a clean or sterile procedure*—including wound care, handling intravenous devices and handling medications or food
3. *After exposure (or risk of exposure) to blood and/or body fluids*—including instances when hands are visibly soiled or gloves are removed
4. *After contact with a patient or patient’s environment*—including removing PPE, leaving a patient’s environment and handling patient care equipment

Hand hygiene compliance

Although links between hand hygiene and infections have been established as early as 1847,³² rates of compliance with proper hand hygiene practices tend to be low for healthcare workers in Canada.

AHS’s introduction of annual hand hygiene reviews in 2011 was Alberta’s first province-wide, systematic mechanism to measure and report on hand hygiene compliance for hospital healthcare workers. The reviews provide specific, detailed hand hygiene compliance data for all hospitals, including individual units in the hospitals and different categories of healthcare workers in the units.

AHS’s 2010–2011 compliance review found an overall hand hygiene compliance rate of 50 per cent, with significant variation among zones. The following year, compliance had increased to 58 per cent.³³ Average hand hygiene compliance rates in 2012 by category of healthcare professional were: nurses – 63 per cent; physicians – 43 per cent; other providers – 50 per cent. By hospital unit, the highest average compliance rate was in neonatal intensive care at 79 per cent, with pediatrics second at 70 per cent. The lowest average compliance was in women’s health at 48 per cent, with mental health, brain injury and addictions second lowest at 49 per cent.

Average rates of hand hygiene compliance before patient contact (47 per cent) and before performing clean/sterile procedures (46 per cent) were considerably lower than after patient contact (60 per cent) and after contact with blood/body fluids (68 per cent). This suggests workers may be more aware of hand hygiene risks if they perceive their own health may be at risk.

Although these compliance rates only present a point-in-time snapshot and the healthcare workers knew they were being observed, the data helps identify areas where hand hygiene rates are low and patient safety risk is high. Comparing annual reviews over time also provides a useful measure of overall progress.

How Alberta compares to other Canadian jurisdictions

A 2008 Canadian Institute of Health Information study found only 30 to 60 per cent of the staff at Ontario acute care hospitals followed proper hand washing practices.³⁴ In 2013, Ontario reported a provincial

³¹ “Your 4 Moments for Hand Hygiene” was introduced by the Ontario Ministry of Health and Long-term Care as part of its 2008 Just Clean Your Hands Campaign. See <http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/JustCleanYourHands/Pages/Just-Clean-Your-Hands.aspx>.

³² T.Noakes, J.Borrenson. Semmelweis and the aetiology of puerperal sepsis 160 years on: an historical review. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2870773/>

³³ A 58 per cent compliance rate does not mean 42 per cent of healthcare workers failed to perform hand hygiene. It means healthcare workers did not perform hand hygiene in 42 per cent of the situations where it was required.

³⁴ Canadian Institute of Health Information. Patient Safety in Ontario Acute Care Hospitals. https://secure.cihi.ca/free_products/PSAF_AIB_2008_10_23_e.pdf (October 2008)

rate before contact with the patient or patient’s environment of 80.5 per cent,³⁵ while British Columbia reported an observed hand hygiene compliance rate of 65 per cent before contact with the patient and an overall hand hygiene rate of 70 per cent.³⁶

Healthcare worker’s perspective

Healthcare workers have a strong desire to do the right thing for their patients, but face several challenges in the area of hand hygiene:

- The most formidable obstacle for hand hygiene compliance is likely personal reluctance to change established practices and habits. For example, most of us know we should wash our hands before eating, yet we don’t always do so. Sustainable improvement in hand hygiene among healthcare workers is a gradual process. A key driver of success has been change from within the medical profession, particularly through peer pressure from other healthcare professionals. Continuous education and training are also important. However, increased awareness and availability of sinks and sanitizers only make a difference if individuals choose to use them. Establishing clear expectations, personal accountabilities and mechanisms to monitor compliance are also critical in ensuring proper hand hygiene practices are followed.
- Proper hand hygiene is often not top-of-mind because the impact of not properly washing one’s hands is often not immediately apparent. Because it is difficult to establish the source of a subsequent infection, adverse outcomes suffered by patients as a result of poor hand hygiene may not be recognized by healthcare workers.
- Hand washing takes time. With healthcare workers having to move between patient rooms and switch tasks frequently, hand washing time adds up. During our hospital visits we were told that, depending on a unit’s workflow design, nurses may have to wash their hands over 200 times per shift to comply with current guidelines. If a proper hand wash takes 20 seconds, this would total more than an hour per shift based on current workflow practices. In some cases, workflow redesign could potentially reduce required hand hygiene frequency.
- Frequent hand washing and alcohol-based hand sanitizers are hard on the skin. Although hand lotions can help, this remains a concern voiced by some healthcare workers. While alcohol-based hand sanitizer used at the hospitals we visited has a moisturizing component, some healthcare workers don’t like the residue it leaves on their hands.

RECOMMENDATION 4: HAND HYGIENE PRACTICES

We recommend that Alberta Health Services improve its systems for hand hygiene by:

- clarifying responsibility and accountability for improving hand hygiene compliance across hospitals
- using available data, on a risk-focused basis, to identify hospital units with poor compliance and take appropriate remedial action
- strengthening the infection prevention and control orientation and training provided to hospital healthcare workers

³⁵ Ontario Ministry of Health and Long Term Care Patient Safety Indicators. <http://www.hqontario.ca/public-reporting/patient-safety>

³⁶ Provincial Infection Control Network of British Columbia. Hand cleaning compliance in BC acute care facilities. Fiscal year 2012/13. http://www.picnetbc.ca/uploads/files/surveillance/BC_HandCleaningCompliance_2012_2013%20Annual.pdf (2013)

Criteria: the standards for our audit

AHS should have systems to ensure best practices in hand hygiene within Alberta hospitals, including systems to:

- establish hand hygiene policies, procedures and ensure education and training on hand hygiene practices are available to healthcare workers
- monitor compliance with hand hygiene requirements by hospital healthcare workers and take action to improve hand hygiene compliance in areas of poor compliance and highest risk to patients, healthcare workers and the public
- ensure hospitals have adequate hand hygiene facilities, equipment and supplies

Our audit findings**KEY FINDINGS**

- There has been increased management focus on IPC in general, and hand hygiene in particular, over the last several years.
- AHS's province-wide hand hygiene compliance reviews are an important step forward. Compliance data is now available for each hospital unit and healthcare worker category. However, AHS does not have a system to use hand hygiene compliance data effectively to drive improvement at hospital units with low hand hygiene compliance rates and highest risk.
- AHS does not have a strong corporate process to set expectations for improving hand hygiene compliance at the unit and hospital level, assign responsibility for achieving results, and hold management accountable from the hospital unit to the senior corporate level.
- AHS has an extensive suite of IPC education and training resources, but does not have adequate systems to deliver it to healthcare workers, in particular:
 - systems to focus resources and training in areas of lowest hand hygiene compliance and highest patient safety risk
 - physicians working in hospitals receive no standard orientation or training on IPC policies, procedures and practices

Focus on hand hygiene

Since its formation in 2009, AHS has placed strong emphasis on improving its IPC systems and hand hygiene in particular. Frontline hospital workers we interviewed consistently indicated there has been a stronger organizational focus on hand hygiene in recent years.

Monitoring hand hygiene compliance

We found AHS's hand hygiene compliance review process is generally well designed and reviews are done consistently. However, AHS does not have a system to use hand hygiene compliance data effectively to drive improvement at hospital units with low hand hygiene compliance rates and highest risk. We did not find a strong corporate process within AHS to set expectations for improvement at the unit and hospital level, assign responsibility for achieving results, and hold management accountable from the unit to the senior corporate level.

There are several AHS management structures involved in hand hygiene compliance.

Central IPC function

The IPC function does not have corporate responsibility and accountability for improving hand hygiene compliance on hospital units. AHS's hand hygiene reviews are managed by the central IPC function. IPC provides the results to management and staff at hospitals and individual nursing units—the level at which improvement needs to take place. Local IPC specialists are expected to provide expertise and support required by hospital administration and individual nursing units.

Hospital management across zones

We did not find a provincial mechanism to ensure consistent expectations and adequate action at the unit and hospital level across zones. AHS is organized geographically into five zones: Edmonton, Calgary, North, Central and South. Individual hospital units report to their hospital management, who in turn report to zone management. Zone management reports to AHS's senior executive management. The authority and responsibility for hand hygiene improvement ultimately rests with individual hospitals, starting with management at the individual unit and program level.

Cross-functional IPC committees

Cross-functional IPC committees at the provincial and zone levels, as well as hand hygiene committees at the zone level, have been tasked with preparing hand hygiene action plans for each zone. These action plans are AHS's primary mechanism for responding to the low levels of compliance identified in the reviews. However, we noted significant deficiencies in this process:

- The cross-functional IPC committees do not have authority to hold individual units and hospitals accountable for meeting hand hygiene compliance targets. Our review of committee meeting minutes and other documents found they play an important role in information sharing, discussing challenges and coordinating work across functions, but they are not a central function through which hospital program areas and units are held accountable for improving their hand hygiene compliance.
- Progress in developing hand hygiene action plans has generally been slow. At the time of our audit, some zone hand hygiene plans were not complete and compliance benchmarks for most zones were not established.
- Activities in zone action plans tend to focus on education and promotion, and do not describe concrete actions for hospital units and programs with low compliance rates, or how failures to meet minimum targets will be dealt with.
- Some action plans mention overall compliance targets ranging from 75 to 90 per cent, depending on the zone. Such targets do not consider the varying levels of patient safety risk on different hospital units. For example, post-surgery patients tend to be more vulnerable, so hand hygiene compliance targets and actions may need to be more aggressive on those units.

In its quarterly performance reports, AHS reports publicly on hand hygiene compliance rates for selected hospitals and the province as a whole.³⁷ Hand hygiene rates by site reveal wide variation between hospitals across the province. In 2012, some hospitals had well over 60 per cent compliance in situations before patient contact, while others were barely over 30 per cent.³⁸

³⁷ Alberta Health Services Q4 Performance Report 2012/13, page 88. <http://www.albertahealthservices.ca/Publications/ahs-pub-pr-2013-06-performance-report.pdf>

³⁸ AHS's review process does not include hospitals managed by Covenant Health, which represent about 10 per cent of the acute care beds in the province. Covenant performs its own hand hygiene reviews using similar methods. AHS receives Covenant's compliance results and IPC functions of both organizations work closely with each other.

At the service delivery level, we did not see evidence of a coordinated, risk-focused process during our hospital unit visits. Individual units varied considerably in their response to their compliance results. Improvements tended to be driven by the initiative of individual unit managers, staff and their assigned IPC specialists. Some hospitals and units took concrete action to get additional training, post their compliance rate on the unit for staff and visitors to see, recognize and reward proper hand hygiene, and closely monitor compliance to drive improvement. Others adopted more passive approaches such as telling their staff that information on hand hygiene is available on AHS's website, or putting more posters on the walls.

Hand hygiene policies, procedures and training

AHS has developed standardized hand hygiene policies, procedures and education materials for hospital staff across the province. However, we found weaknesses in AHS's systems to ensure healthcare workers receive adequate training, including:

- limited focus on IPC during the initial training and orientation provided to newly hired staff
- no adequate systems to ensure IPC training is included in annual refresher training for its current staff
- no adequate systems to provide IPC orientation training to physicians working in hospitals

Education and training materials

AHS has developed and introduced a variety of training and educational resources on IPC in general and hand hygiene in particular. Most of these resources are available to healthcare workers and the public on the AHS website.³⁹ Posters reminding healthcare workers, patients and visitors to wash their hands were present at all the hospitals and nursing units we visited.

Orientation training for new staff members

The time dedicated to IPC during orientation training for new hires is about three minutes. In this amount of time, only basic IPC information, pamphlets and weblinks can be provided. It does not allow hands-on demonstrations or practice in proper hand washing or use of personal protective equipment. AHS's central education and training function does not manage or track any additional IPC training that may be provided across sites.

We did not see a consistent and systematic effort to have IPC specialists deliver hands-on education and demonstrations. Almost all healthcare workers we interviewed indicated such training is particularly effective and has a more lasting impact than online tutorials alone. One of the effective training methods is the "glow germ" demonstration using a substance that glows under UV light to show how and where germs can spread if proper hand hygiene is not followed. For example, it shows healthcare workers why they should wash their hands before putting gloves on—an unwashed hand reaching into a box of gloves can contaminate the entire box and place patients at increased risk of infection.

Annual training refreshers

Annual IPC training refreshers are not mandatory and individual units have considerable discretion on any additional training their staff takes. AHS does not centrally track IPC refresher training provided across the province.

Physician orientation and training

The majority of physicians who work at hospitals are not AHS employees and do not receive orientation and training similar to AHS's new hires. This may explain why hospital physicians we interviewed tended to be less aware of AHS's policies, procedures and training resources than other healthcare workers.

³⁹ For resources available on hand hygiene, see <http://www.albertahealthservices.ca/6426.asp>

Remedial training

AHS does not systematically focus the available hand hygiene education and training resources on areas of highest risk. There is no consistent process to identify units with poor compliance to ensure their personnel receive additional training or hands-on demonstrations. Such efforts are driven mainly by the individual units and IPC staff, rather than a systematic organization-wide process. AHS has several online interactive educational resources that could be made mandatory on units with low hand hygiene rates. Some training modules on AHS's website⁴⁰ include a final quiz that can be used to confirm completion of training. We found many frontline personnel were not aware of this training and only one nursing unit in our sample required its staff to complete it.

Hand hygiene equipment and supplies

Overall, acute care facilities across the province are working toward gradual improvement in availability and access to alcohol-based hand sanitizer and dedicated sinks for hand washing. Although infrastructure challenges remain, their resolution is subject to availability of funding for capital projects, particularly when it comes to plumbing upgrades. However, decisions about the use and placement of sanitizer dispensers are generally within the direct control of hospital staff.

Alcohol-based hand sanitizer stations are not always placed at the point of care as required by Accreditation Standards.⁴¹ During our visits we observed that wall-mounted sanitizer dispensers were present throughout hospitals, including hallways on nursing units. However, not all hospitals had hand sanitizers placed conveniently at the point of care inside patient rooms. Although some nursing units informed us fire regulations or the patient's condition prevented wall-mounted sanitizers at bedside, other units used alternatives such as portable sanitizers.

Availability of hand hygiene sinks on hospital units remains an issue, although the situation is improving and AHS has a process to incorporate IPC needs into new hospital construction and renovation projects. Older hospitals, on the other hand, were clearly not built to modern IPC standards and in most cases it is simply not practical to initiate renovations to install plumbing for extra hand hygiene sinks in patient rooms. IPC specialists we interviewed indicated that there has been gradual improvement in the process to incorporate their input and IPC requirements in the design of new facilities and major renovation projects. Hand hygiene infrastructure limitations do not preclude proper hand hygiene, but make it more onerous and time consuming for healthcare workers to comply with hand washing requirements.

Good practices observed

We observed several good practices at individual hospitals and units we visited. Although not universally applicable, we considered them deserving of management's further support and encouragement:

- Some units posted their hand hygiene compliance rates on a wall at the nursing station or in the staff meeting room. This raises awareness and encourages proper hand hygiene by unit staff. Larger posters in more visible areas, such as the entrance to the unit, could make this practice even more effective not only with unit staff but everyone who visits the unit.
- Many hospitals and units have initiated their own reviews of hand hygiene practices on a monthly and even bi-weekly basis, with observations usually done by local nurses. Some sites make efficient use of nurses on modified work duty who would otherwise not be able to work due to an injury. Results are shared among the unit's staff, who identify problems and propose solutions. Such initiatives

⁴⁰ Training modules: <http://www.albertahealthservices.ca/employee/modules/cleanyourhands/index.html>

⁴¹ Accreditation Canada. IPC Standards, Section 6.4 (January 1, 2012)

complement province-wide reviews by enabling local staff to take ownership and initiative in improving performance.

- On two units we visited, the staff placed tape on the floor across the doorway of a patient's room or several feet into the room to mark the point beyond which hands must be washed. Healthcare workers can come to the line and talk to a patient or nurse inside the room without having to wash hands, thus saving time without creating a risk to patients or themselves. Unit hand hygiene compliance has reportedly increased since this was introduced.
- Physicians we interviewed indicated some of their peers have taken on the role of hand hygiene champions to raise awareness and increase the generally low compliance rates among doctors. At one hospital, one of the postgraduate trainees (residents) was the designated hand hygiene champion.

During rounds it was his/her responsibility to remind his/her peers to follow proper hand hygiene if they did not. All physicians in this group also had pins clearly visible on their coats saying it was okay to ask them if they had washed their hands. We consistently heard the following:

- Hand hygiene champions from within the physician group tend to be most effective in changing hand hygiene behaviour because they lead by example. The champions create positive peer pressure that is more likely than influences outside of the physician group to shift habits and improve hand hygiene rates among doctors.
- Seeing hard data on hand hygiene compliance is important to most physicians and is more effective than simple reminders when it comes to increasing awareness and facilitating positive change.
- Periodic training on hand hygiene for all healthcare workers, including physicians, is important for breaking bad hand hygiene habits and forming good ones.

Implications and risks if recommendation not implemented

Proper hand hygiene is the single most effective way to prevent the spread of communicable diseases and infections. Without adequate systems to set hand hygiene expectations and targets, provide training and ensure compliance among healthcare workers, hospital patients face higher risk of a serious infection.

OVERVIEW OF THE IPC AND HAND HYGIENE STRATEGIES AND THE FOUR IPC STANDARDS

IPC Strategy

The department's 2008 Alberta Infection Prevention and Control Strategy⁴² outlines the overall roles and responsibilities of the department, AHS and Alberta health professional regulatory bodies as follows:

- The department is responsible for setting direction and standards for the healthcare system and overseeing their implementation.
- AHS is responsible for assessing needs, promoting and protecting the health of their population, preventing disease and injury and delivering safe, quality healthcare services. This includes implementation of standards and direction provided by the department.
- Health professional regulatory bodies are responsible for governing their regulated members in a manner that protects and serves the public interest.

The IPC strategy provides the following six strategic directions:

1. Leadership and accountability
2. Provincial standards and monitoring
3. Province-wide surveillance
4. Human resource requirements
5. Physical infrastructure
6. Public awareness and education

Hand Hygiene Strategy

The department's 2008 *Alberta Hand Hygiene Strategy*⁴³ is a 10-year plan designed to improve hand hygiene behaviours in Alberta. It outlines actions needed to improve accessibility to hand hygiene facilities and to improve hand hygiene knowledge beliefs, attitudes and behaviours. This strategy provides the following five strategic directions:

1. Access to hand hygiene facilities and products
2. Provider education and training
3. Child education and training
4. Public and community education and awareness
5. Evaluation and research

⁴² Alberta Health and Wellness. Alberta Infection Prevention and Control Strategy <http://www.health.alberta.ca/documents/IPC-Alberta-Strategy-2008.pdf> (January 2008)

⁴³ Alberta Health and Wellness. Alberta Hand Hygiene Strategy <http://www.health.alberta.ca/documents/IPC-Hand-Hygiene-Strategy-2008.pdf> (January 2008)

IPC standards

The department has approved four IPC standards in Alberta:

- *2011 Standards for Infection Prevention and Control – Accountability and Reporting*⁴⁴
This document outlines IPC accountability relationships and reporting requirements internally within AHS and externally in relation to the department.
- *2012 Standards for Cleaning, Disinfection and Sterilization of Reusable Medical Devices for All Healthcare Facilities and Settings*⁴⁵
These standards set minimum requirements for all healthcare facilities and settings.
- *2008 Standards for Prevention and Management of Methicillin-resistant Staphylococcus aureus*⁴⁶
Methicillin-resistant *Staphylococcus aureus* (MRSA) is one of several antibiotic-resistant organisms that are often linked to hospital-acquired infections. These standards set minimum requirements for managing clients infected or colonized with MRSA for all healthcare facilities and settings. These standards deal with matters such as managing the risk of transmission, patient screening, infection surveillance and outbreak reporting. These standards are supported by the 2007 *Provincial Methicillin-resistant Staphylococcus aureus (MRSA) Infection Prevention and Control Guidelines*,⁴⁷ which provide best practices (not requirements) for managing patients infected with MRSA and for reducing transmission of MRSA.
- *2011 Standards for Single-use Medical Devices: As Applied to Critical and Semi-critical Medical Devices*⁴⁸
These relatively brief standards outline requirements for use and handling of single-use medical devices, as well as generally prohibit reprocessing and reuse of single use medical devices on other patients (with some exceptions).

⁴⁴ Alberta Health and Wellness. Standards for Infection Prevention and Control – Accountability and Reporting. <http://www.health.alberta.ca/documents/IPC-Accountability-Reporting-2011.pdf> (May 12, 2011)

⁴⁵ Alberta Health. Standards for Cleaning, Disinfection and Sterilization of Reusable Medical Devices for Health Care Facilities and Settings. <http://www.health.alberta.ca/documents/IPC-Medical-Device-Cleaning-2012.pdf> (June 2012)

⁴⁶ Alberta Health and Wellness. Standards for Prevention and Management of Methicillin-Resistant *Staphylococcus aureus*. <http://www.health.alberta.ca/documents/IPC-MRSA-Standards-2008.pdf> (January 16, 2008)

⁴⁷ Alberta Health and Wellness. Provincial Methicillin-Resistant *Staphylococcus aureus* (MRSA) Infection Prevention and Control Guidelines. <http://www.health.alberta.ca/documents/IPC-MRSA-Guidelines-2007.pdf> (August 2007)

⁴⁸ Alberta Health and Wellness. Standards for Single-use Medical Devices: As Applied to Critical and Semi-Critical Medical Devices. <http://www.health.alberta.ca/documents/IPC-Medical-Device-Single-Use-2011.pdf> (February 18, 2011)

DEVELOPMENTS IN IPC SERVICE DELIVERY IN ALBERTA

- The department has introduced four provincial standards for IPC (the IPC strategy lists seven initial priorities for development of standards), including the accountability and reporting standards for AHS.
- AHS has created the organizational structures and assigned executive roles, as outlined in the *IPC Accountability and Reporting Standard*,⁴⁹ and starting in 2011 has provided annual IPC compliance reports to the department.
- With input from the department, AHS has implemented the provincial IPC surveillance system and is working on improving processes for data collection, analysis and reporting.
- The department provides the IPC education grant to AHS. As of September 30, 2012 total expenditures for the grant amounted to about \$1.7 million.
- Since 2005 the department funds Do Bugs Need Drugs Program,⁵⁰ a significant part of which is hand hygiene promotion and education.
- In 2010 the department also launched the Clean Your Hands Campaign, a workplace-based program within the Government of Alberta, and has subsequently taken steps to expand the program to non-government workplaces.
- AHS has implemented the annual hand hygiene compliance review process for acute care facilities.
- AHS has performed systematic reviews of medical device reprocessing across acute care sites in the province.
- The creation of AHS as a single entity has resolved some of the issues around coordination, roles and responsibilities among previous health regions, and has provided the surge capacity needed during serious IPC incidents and outbreaks.

⁴⁹ Alberta Health and Wellness. Standards for Infection Prevention and Control – Accountability and Reporting. <http://www.health.alberta.ca/documents/IPC-Accountability-Reporting-2011.pdf> (May 12, 2011)

⁵⁰ Do Bugs Need Drugs. <http://www.dobugsneeddrugs.org/>

ADDITIONAL INFORMATION ON MRSA, VRE, CRE AND *C DIFFICILE*

Methicillin-resistant *Staphylococcus aureus*

MRSA is a bacteria that is usually found in the nose, but can also be present in the respiratory tract, the urinary tract, open wounds and intravenous (vein) catheter sites. MRSA is not more virulent than other strains of *Staphylococcus aureus*, but its resistance to common antibiotics⁵¹ makes it more difficult to treat and therefore more dangerous. Patients with open wounds, invasive devices and weakened immune systems are at greatest risk of infection with MRSA.

Vancomycin-resistant *Enterococcus*

VRE is a strain of *Enterococcus* bacteria that is highly resistant to vancomycin⁵² and is usually found in the gastrointestinal tract. VRE infections occur most commonly in hospital patients with weakened immune systems. Patients previously treated with vancomycin or other antibiotics for long periods of time, have had surgery or have medical devices such as urinary (bladder) catheters, are at higher risk for VRE.

Carbapenem-resistant *Enterobacteriaceae*

Species of *Enterobacteriaceae* are normally present in the human gastrointestinal system. CRE is a strain of *Enterobacteriaceae* that are difficult to treat due to their high level of resistance to antibiotics.⁵³ Healthy people usually do not get CRE infections. In healthcare settings, CRE infections most commonly occur among patients who are receiving treatment for other conditions. Patients whose care requires devices like ventilators (breathing machines), urinary catheters, or intravenous catheters, and patients who are taking long courses of certain antibiotics are most at risk for CRE infections.

Clostridium difficile

This is a bacteria that strictly speaking is not an antibiotic-resistant organism. However, *clostridium difficile* infection can be severe, particularly in hospitalized patients. It results from treatment with antibiotics. These bacteria are common inhabitants of the gastrointestinal tract and their mere presence does not cause illness as their growth is contained by other microbes. However, treatment with antibiotics for any purpose may disrupt the natural microbial population, allowing overgrowth and toxin production by *clostridium difficile*. A diarrheal illness may result, varying from mild to extremely severe and even life-threatening. Patients in hospital are at particular risk since many individuals in hospital will receive a course of antibiotics and many are compromised by their underlying disease and its treatment. *Clostridium difficile* produces spores that contaminate the environment, are difficult to eradicate and may put future hospitalized patients at risk.

⁵¹ In particular, MRSA is resistant to penicillins and cephalosporins, two groups of the most widely prescribed broad-spectrum antibiotics.

⁵² Vancomycin is a naturally occurring antibiotic first isolated in 1953. It was originally used to treat MRSA and it continued for many years to be used as a drug of last resort after treatment with other antibiotics had failed. However, vancomycin-resistant organisms have become increasingly common in recent years.

⁵³ Centers for Disease Control and Prevention. Healthcare-associated Infections, Carbapenem-resistant Enterobacteriaceae <http://www.cdc.gov/hai/organisms/cre/>

SUMMARY OF OBJECTIVES OF ANTIBIOTIC STEWARDSHIP IN HOSPITALS AND EXAMPLES OF KEY SYSTEMS AND INITIATIVES

Following the national consensus conference on antibiotic resistance in 1997, Health Canada and the Canadian Infectious Diseases Society have published the document titled “Controlling Antimicrobial Resistance: An integrated action plan for Canadians.” The document calls for development of antibiotic stewardship initiatives in Canadian hospitals. Overall, the objective of such interventions would be to systematically detect and eliminate:

- unnecessarily redundant multidrug regimens
- antibiotic therapy for the management of nonbacterial syndromes
- use of antibiotics of inadequately or excessively broad spectrum for the specific infection syndromes
- medication regimens that do not adequately treat infections caused by confirmed pathogens

Among other things, the document highlights the following key elements of antibiotic stewardship in hospitals:

- Access to expert resources on antibiotic use, including capacity for case consultations and introduction of antibiotic-use protocols and formulary restrictions for prescribing certain types of antibiotics.
- Systems to monitor, benchmark and report the use of antibiotics within individual hospitals and at the organizational level.
- Systems to provide prescribers with feedback on their own antibiotic use data.
- Systems to analysis and use of lab data. This would include analysis of laboratory data for prevalence of microorganisms in different patient populations and their responsiveness to specific antibiotics. This information can help prescribers make better informed treatment decisions.