Special Report

September 2008

Prevention and Control of Hospital-acquired Infections

Office of the Auditor General of Ontario

Office of the Auditor General of Ontario

To the Honourable Speaker
of the Legislative Assembly

I am pleased to transmit my Special Report on the Prevention and Control of Hospital-acquired Infections, in accordance with the provisions of Section 12(1) of the *Auditor General Act*.

Jim McCarter
Auditor General

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Ce document est également disponible en français.

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Background

Hospital-acquired infections (HAIs) (also called "nosocomial infections" or "health-care-associated infections") are infections that a patient acquires while in hospital being treated for some other condition. They have a significant impact on both patients and the province's health system.

For patients, the impact of such infections can range from longer hospital stays to more serious conditions that may require surgery or result in negative long-term health effects. In severe cases, HAIs can cause death. For the health-care system, such infections increase treatment costs and result in longer wait times for a hospital bed for other patients.

There is no information available on the total number of HAIs that occur in Ontario each year. But a 2003 Canadian study did estimate that there are 220,000 cases of HAI in Canadian hospitals each year, resulting in at least 8,000 deaths annually. More recently, the Canadian Institute for Health Information noted that one in 10 adults and one in 12 children will contract an infection while in a Canadian hospital. In the United States, the Centers for Disease Control and Prevention estimate that each year, there are 1.7 million HAIs in American hospitals and 99,000 deaths linked to them.

Some HAIs are infectious diseases that can spread throughout a hospital. Figure 1 provides some background information on four serious HAIs. Each of them can be transmitted through contact (touching an infected person or a surface where the bacteria live). Therefore, handwashing and cleaning and disinfecting surfaces that patients and hospital staff come into contact with (including patients' rooms and medical equipment) are critical in preventing the spread of these infections.

HAIs such as methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant enterococci (VRE) are resistant to certain antibiotics. The incidence of MRSA has approximately doubled, while that of VRE has more than tripled, between 1999 and 2006, according to data reported by the Canadian Nocosomial Infection Surveillance Program. Increases in antibiotic-resistant organisms are of concern because they suggest that antibiotics are becoming increasingly ineffective against certain diseases.

Recent information from the Canadian Nocosomial Infection Surveillance Program indicates that certain of the HAIs from Figure 1 may be somewhat more prevalent in Ontario and that rates of VRE in particular are increasing in all regions of Canada. As Figure 2 shows, the incidence of *C. difficile* may be slightly higher in Ontario than in Canada as a whole, and the incidence of MRSA and

Figure 1: Four Hospital-acquired Infectious Organisms and/or Diseases

Prepared by the Office of the Auditor General of Ontario

Cause	How Patient Initially Infected	Examples of Possible Effects	Transmission	Possible Treatments	Other Concerns
Clostridium difficile (C. difficile) bacteria	• patient takes antiobiotics that reduce the normal levels of good bacteria in intestines and colon • this allows *C. difficile* bacteria to grow and produce toxins	• diarrhea • more serious intestinal conditions (e.g., colitis) that may require surgery • death in extreme cases	• contact[1]	• mild cases: may not require treatment • severe cases: antibiotics	• can lead to outbreaks because many people in hospitals take antibiotics • *C. difficile* spores are difficult to destroy because they are resistant to a number of chemicals • alcohol-based hand cleansers may not be as effective as soap and water
Febrile Respiratory Illness (FRI) (e.g., colds, influenza, pneumonia)	• patient inhales droplets containing disease-causing organisms • patient touches droplets and then touches mouth, nose, or eyes • immunization prior to exposure is an important preventative measure	• fever greater than 38°C • new or worsening cough • shortness of breath • death in extreme cases	• "droplet"[2] • contact[1]	• antibiotics when applicable	• droplets can live on surfaces for hours but are easy to kill with disinfectants and good hand hygiene
Methicillin-resistant *Staphylococcus aureus* (MRSA)	• *Staphylococcus aureus (S. aureus)* bacteria living on the skin, nose, or in the lower intestine may cause an infection and resist a common class of antibiotics (people may carry the bacteria without having symptoms)	• skin infections that can quickly turn into deep abscesses that require surgical draining • infections in bones, joints, surgical wounds, the bloodstream, heart valves, and the lungs • death in extreme cases	• contact[1]	• mild cases: may not require treatment • severe cases: other antibiotics	• although infections caused by MRSA may not be more serious than infections caused by *S. aureus* bacteria, there are fewer antibiotics available to treat MRSA-caused infections • bacteria can live on surfaces for months

Cause	How Patient Initially Infected	Examples of Possible Effects	Transmission	Possible Treatments	Other Concerns
Vancomycin-resistant enterococci (VRE)	• enterococci bacteria in lower intestine and/or possibly other areas (e.g., urine, blood, skin) may cause an infection and resist Vancomycin antibiotic (people may carry the bacteria without having symptoms)	• fever, swelling, redness, and/or pus • death in extreme cases	• contact[1]	• other antibiotics	• bacteria can live on surfaces for 5 days to weeks and on hands for several hours • bacteria are relatively easy to kill with disinfectants (provided the bacteria are in contact with the disinfectant for a long enough period) and good hand hygiene

1. Contact can be from person-to-person touching and touching of contaminated surfaces on which spores, droplets, and bacteria are living. A person who acquires the infection through contact will not necessarily become ill (e.g., a person may become infected with *C. difficile* bacteria from a patient but have enough good bacteria to fight the *C. difficile* bacteria).
2. "Droplet" transmission involves the infected person coughing or sneezing and causing droplets to come into direct contact with another person.

Figure 2: Incidence of *C. difficile*, MRSA, and VRE

Source of data: Canadian Nosocomial Infection Surveillance Program, based on about 50 hospitals in nine provinces

		# of Cases/1,000 Admissions		# of Cases/10,000 Patient Days	
Infectious Disease	Period Covered	Canada	ON or ON+QU	Canada	ON or ON+QU
C. difficile	Jan. 1–Apr. 30, 2007	4.74	5.53[1]	7.27	8.24[1]
MRSA	Jan. 1–Dec. 31, 2006	8.04	9.86[2]	10.16	11.47[2]
VRE	Jan. 1–Dec. 31, 2005	1.32	1.4[2]	1.55	–[3]

1. Ontario
2. Ontario and Quebec combined
3. not available

VRE may be slightly higher in Ontario and Quebec combined than in Canada as a whole.

As Figure 1 explains, a concern with *C. difficile* is the risk of outbreaks because many people in hospitals take antibiotics. Indeed, there have been a number of *C. difficile* outbreaks in Ontario hospitals. Because hospitals were not required at the time of our audit to report their number of *C. difficile* cases or the related patient outcome, there was no province-wide information on the prevalence of outbreaks. However, in the last few years, one Ontario hospital has reported over 75 deaths related to *C. difficile*, and several other Ontario hospitals have also reported significant *C. difficile* outbreaks.

In addition to HAIs such as those in Figure 1 that can be spread from one patient to others, other HAIs are generally restricted to individual patients who are undergoing particular medical procedures. Figure 3 provides some background information on three such HAIs.

Figure 3: Three Types of Hospital-acquired Infections
Prepared by the Office of the Auditor General of Ontario

Type	Associated Medical Procedure	Possible Causes	Examples of Treatment	Other Concerns
central-line infections	• a central (intravenous) line is placed in the patient's body, ending at or near the heart or one of the major blood vessels in the body	• patient's own skin bacteria travel down the line into the blood • bacteria from health-care worker's hands contaminate the line and travel into the blood • fluid in the line is contaminated at source and enters the blood	• antibiotics	• severe cases can result in organ dysfunction and even death
surgical-site infections	• surgical incision	• patient's own skin bacteria at incision site is picked up by scalpel and carried into deeper tissue • poor ventilation enables floating bacteria in air to settle into wound caused by surgical incision • bacteria on inadequately sterilized surgical instruments enter the wound	• cleaning the wound with sterile water • draining the wound • antibiotics	• surgical-site infections can result in patients staying longer in hospital and being readmitted to hospital • severe cases can result in death
ventilator-associated pneumonia	• a ventilator, with a tracheostomy or endotracheal tube to the lung, is used to help the patient breathe	• patient's own upper-airway bacteria are aspirated via the tube into the lung • respiratory tubes between the ventilator and the endotracheal tube are contaminated while in use and bacteria travel into the lung • respiratory equipment is inadequately sterilized	• antibiotics	• ventilator-associated pneumonia is the leading cause of death from HAIs

Audit Objective and Scope

The objective of our audit was to assess whether selected hospitals followed effective policies and procedures for the prevention and control of HAIs.

Our audit work included a preliminary visit to a hospital to become familiar with infection-prevention-and-control activities in hospitals. We conducted our audit work at three other hospitals of different sizes that provide services to a variety of communities: North York General Hospital (with two sites in Toronto), The Ottawa Hospital (with three sites in Ottawa), and Windsor Regional Hospital (with two sites in Windsor). In conducting our audit, we reviewed relevant files and administrative policies and procedures, interviewed appropriate hospital and ministry staff, and reviewed relevant research, including best practices for the prevention and control of HAIs in other jurisdictions. We also discussed the prevention and control of HAIs with the regional infection control networks and the Local Health Integration Networks (LHINs) associated with the three hospitals. As well, we engaged independent consultants, with expert knowledge of HAIs, to assist us.

We based our audit work largely on the best practices for infection prevention and control that

the Provincial infectious Diseases Advisory Committee (PIDAC) has developed. PIDAC is a multidisciplinary scientific advisory body that provides evidence-based advice regarding multiple aspects of infectious disease identification, prevention, and control to Ontario's Chief Medical Officer of Health. The best-practice documents that PIDAC has produced reflect recommendations made by various organizations, including the Canadian Public Health Agency and the Canadian Standards Association, as well as other best practices. We also discussed the management of infection-prevention-and-control services directly with members of PIDAC.

Our audit focused on *C. difficile*, FRI , MRSA, VRE, central-line infections, surgical-site infections, and ventilator-associated pneumonia. We selected MRSA and VRE because they are antibiotic-resistant organisms, which are a serious threat to the treatment of infectious diseases, and have developed rapidly over the last few decades. We selected the other HAIs primarily because of their prevalence in hospitals.

Our audit followed the professional standards of the Canadian Institute of Chartered Accountants for assessing value for money and compliance. We set an objective for what we wanted to achieve in the audit and developed audit criteria that covered the key systems, policies, and procedures that should be in place and operating effectively. We discussed these criteria with senior management at the hospitals we visited and at the Ministry, who agreed to them. Finally, we designed and conducted tests and procedures to address our audit objective and criteria.

We did not rely on the Ministry's internal audit service team to reduce the extent of our audit work because it had not recently conducted any audit work on infection prevention and control in hospitals. None of the hospitals we visited had an internal audit function.

SPECIAL REPORT MOTION

On June 11, 2008, the Standing Committee on Public Accounts passed the following motion:

> That, following the Auditor General's completion of his value-for-money audit of the prevention and control of hospital-acquired infections, including *C. difficile* in the selected hospitals, if, in the Auditor General's opinion, his recommendations could have a significant and timely impact on public health, the Standing Committee on Public Accounts of the Legislative Assembly of Ontario calls on the Auditor General to consider using the discretion outlined in section 12(1) of the *Auditor General Act* to release that chapter of his Annual Report in a special report to the Speaker; and that, prior to the tabling of this report with the Committee, the Auditor General may inform the Deputy Ministry of Health of his opinions, observations, or recommendations.

Section 12 of the *Auditor General Act* requires that the Auditor General report on the results of all audit work for the year in an Annual Report to the Legislature, which is normally tabled in late November or early December. However, section 12 also allows the Auditor General to make a special report to the Legislature at any time on any matter that, in the opinion of the Auditor General, should not be deferred until the Annual Report. It was last used in June 1998, when the Office released a special report on *Year 2000: The Millennium Bug* in advance of the November tabling of our *1998 Annual Report*. However, the motion of the Standing Committee on Public Accounts, which undoubtedly reflects the significant public interest in *C. difficile* and other HAIs, led us to release this report on the *Prevention and Control of Hospital-acquired Infections* as a special report under section 12(1) of

the *Auditor General Act*, rather than including it in our upcoming Annual Report.

SCOPE LIMITATION

On November 1, 2004, sections of the *Quality of Care Information Protection Act, 2004* (Act) and related regulations came into force. Certain of these sections prohibit the disclosure of information prepared for or by a designated quality-of-care committee unless the committee considers the disclosure necessary to maintain or improve the quality of health care. Similarly, anyone to whom such a committee discloses information may share the information only if it is considered necessary to maintain or improve the quality of health care. We understand that this legislation was designed to encourage health professionals to share information to improve patient care without fear that the information would be used against them.

The Act prevails over all other Ontario statutes, including the *Auditor General Act*, unless specifically exempted from doing so in another statute. All of the hospitals that we visited had designated a quality-of-care committee under the Act. The hospitals prepared for these committees information on issues concerning quality of care and patient safety, which could include HAI issues. The Act prohibited us from accessing such information.

We have expressed our concerns over the scope limitation imposed by the Act in previous Annual Reports. We continue to be concerned about the impact of the Act on our current and future audit work because it does affect our ability to determine whether important systems, which can affect patient safety and treatment, are functioning as intended.

Summary

The hospitals we visited were aware of the importance of preventing and controlling hospital-acquired infections (HAIs) and had formal processes in place to prevent and control them. We found that some of these processes were working well. All the hospitals promoted good hand hygiene and the judicious use of antibiotics. They also placed signs on the doors of rooms with infectious patients to alert hospital staff and visitors, and had a schedule of cleaning duties assigned to specific hospital staff. However, as the following observations indicate, there is still room for improvement in a number of areas:

- The Ministry has introduced several encouraging initiatives to help prevent and control infectious diseases in hospitals but will not have information on the number of cases of most types of HAIs or the resulting patient outcomes until fall 2008 at the earliest. Also, at the time of our audit, the information that the hospitals we visited had on HAIs was not comparable because the hospitals differed in how they defined and counted HAIs.
- The three hospitals had different procedures to ensure that patients were screened for febrile respiratory illnesses (FRIs) such as influenza. For example, one hospital did not have a process to audit whether it had screened patients admitted directly to wards for FRIs. Such patients accounted for about 55% of total hospital admissions. At another hospital, there was no indication in 37% of a sample of patient charts that FRI screening had occurred. At the third hospital, about 30% of the patients with FRI symptoms from late 2006 to early 2007 had not been screened at all.
- Each hospital had different processes in place to review whether it had identified

patients with a high risk of having methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant enterococci (VRE) and had taken a sample from them to obtain laboratory confirmation of whether or not they were infected. Results of the reviews indicated that hospital policies were not always followed. One hospital began a one-year trial in January 2008 of screening all inpatients. In addition, one hospital acknowledged that not properly screening patients may have had an impact on the transmission of MRSA and VRE, of which the hospital typically had 18 to 20 outbreaks every year.

- MRSA, VRE, and *C. difficile* are most commonly spread via the hands of health-care workers. Therefore, hand hygiene, either through the use of alcohol-based hand rub or soap and water, is critical. By the end of the Ministry's hand hygiene pilot program, handwashing compliance ranged from only 40% to 75% at the 10 participating hospitals, one of which we visited. Physician compliance increased only from 18% at the start of the pilot to 28% by the end. Nurse compliance rose only from 44% to 60%.
- None of the hospitals visited had established systems to periodically monitor staff use of personal protective equipment, such as gloves, gowns, and masks. One hospital that did conduct periodic reviews from October 2006 to April 2007 noted that its staff in a relatively high-risk unit did not always use, or used incorrectly, personal protective equipment. The other two hospitals reviewed only the use of gloves by hospital staff.
- Hospitals had different policies on when to isolate patients with infectious diseases in private rooms. For example, two hospitals immediately isolated all patients who were transferred directly from institutions outside of Canada. They did so because MRSA and VRE rates are generally higher outside of Canada. The other hospital waited for laboratory confirmation before isolating such patients but acknowledged that it could take up to four days after the laboratory received the sample to get laboratory confirmation.
- Two of the hospitals indicated that they cleaned rooms occupied by *C. difficile* patients twice a day, in accordance with recommendations from the Provincial Infectious Diseases Advisory Committee (PIDAC). However, the hospitals could not determine if the cleaning actually occurred because neither hospital tracked when the rooms were actually cleaned. The third hospital cleaned rooms occupied by *C. difficile* patients only once per day.
- The judicious use of antibiotics has been shown to reduce the incidence of *C. difficile* and MRSA. All the hospitals promoted the judicious use of antibiotics. However, their monitoring of the effectiveness of this practice involved a labour-intensive manual inspection of patient charts because none had an information system that would enable it to analyze drug utilization patterns by physician or the reasons underlying specific drug use.
- Each hospital defined HAIs differently and performed surveillance activities differently. For instance, hospitals varied in how they tracked surgical-site infections, particularly when the infection occurred after a patient was discharged. This can cause a large variation in infection rates. For example, one hospital's internally reported Caesarian-section (C-section) infection rate tripled when post-discharge infections were included.
- A best practice followed by one of the hospitals we visited was to track surgical-site infection rates by surgeon and provide each surgeon with the information. This enabled the surgeon to determine the impact of any

new practices and follows recommendations from Safer Healthcare Now!. Neither of the other two hospitals provided all surgeons with their surgical-site infection rates.

- None of the hospitals had processes in place to audit whether staff disinfected or sterilized medical equipment in accordance with manufacturers' instructions or hospital policy. We found two cases, each at different hospitals, where an instrument in our sample was sterilized for a shorter time period than recommended. Upon our bringing this to the hospitals' attention, one hospital indicated that it notified the surgeon who had used the instrument and the patient operated on of the error. The other hospital was unable to determine which patient the instrument was used on.

We received excellent co-operation from the hospitals we visited. We also would like to thank hospital management and staff for their input and open discussions throughout the audit process.

We sent this report to the hospitals we visited, their respective Local Health Integration Networks (LHINs), and the Ministry, and invited them to provide an overall response. To be succinct and avoid repetition, we summarized the overall responses we received from the hospitals below, followed by the LHINs' and Ministry's overall response. We also summarized the hospitals' responses to specific recommendations following each recommendation and also included the LHINs' and the Ministry's responses if applicable.

SUMMARY OF HOSPITALS' NETWORKS' OVERALL RESPONSE

The hospitals generally agreed with our recommendations but indicated that, in some cases, limited financial and human resources may have an impact on their implementation.

One hospital's overall comments along these lines were as follows: the report highlights important systemic weaknesses that affect patient safety and infection risk in hospitals, such as the lack of robust information systems and not enough private rooms to isolate infectious patients; it is important for hospitals to have adequate personnel resources with expertise and training; and there have been rapid changes in infection control standards, as well as new auditing and reporting requirements, and these have placed an enormous burden on infection control and patient safety programs. The hospital felt that the Ministry's recent approval and distribution of PIDAC's best-practices document on the personnel requirements to meet these new demands will greatly assist hospitals and LHINs in prioritizing their budget requirements.

LOCAL HEALTH INTEGRATION NETWORKS' OVERALL RESPONSE

The following is the joint overall response from the three Local Health Integration Networks (LHINs) associated with the audited hospitals.

The LHINs believe that the report's insight and recommendations provide excellent advice that will benefit patients, providers, and taxpayers.

The LHINs will, with the support of the Ministry, work to formalize the role of each local Regional Infection Control Network, including establishing clear advisory relationships with the LHINs. Although the focus of this report is clearly on hospital-acquired infections, we believe that the principles behind each recommendation would apply to other health-care providers such as long-term-care homes and community care access centres. All health service providers have a role to play and are impacted by the prevention and control of infections. The role of PIDAC guidelines will be key in formulating local policies and practices.

The LHINs support public reporting as proposed in this report. As well, the LHINs are pleased to complement the Ministry's reporting process so that both the public and providers are well informed.

The mandate of the LHINs clearly includes some of the recommendations in this report; however, there are some recommendations that would be best addressed provincially and/or nationally. The provincial public health agency, as well as the medical officers of health and their public health unit staff, should have an integral role in prevention, surveillance, and outbreak resolution of hospital-acquired infections.

OVERALL MINISTRY RESPONSE

Patient safety is a key priority for the government. Since the 2003/04 fiscal year, the government has invested an additional $11.1 billion in health-care services, including an additional $3.6 billion for hospitals. Since the SARS outbreak, the initial focus of the ministry strategy for hospital-acquired infections has been on building capacity to increase patient safety and control the spread of infectious diseases.

Since 2004, the Ministry has established the Provincial Infectious Diseases Advisory Committee (PIDAC); implemented a provincial Hand Hygiene Program; created 14 Regional Infection Control Networks (RICNs); funded 136 additional hospital infection-prevention-and-control practitioner positions in Ontario hospitals; provided ongoing education to hospital staff in collaboration with the RICNs, PIDAC, and the Ontario Hospital Association; established the Ontario Agency for Health Protection and Promotion; and established a consistent hospital infectious-disease response with Public Health Unit medical officers of health, who are accountable for outbreak management.

The government is also requiring that all Ontario hospitals report on eight patient-safety indicators, starting with *C. difficile*-associated disease (CDAD). The government is committed to expanding the number of publicly reported indicators in the future. The government has also appointed Dr. Michael Baker as the Executive Lead—Patient Safety.

On September 5, 2008, the Ministry published the latest PIDAC document—*Best Practices for Infection Prevention and Control Programs in Ontario*—which is applicable in all health-care settings. The recommendations represent best practices in infection prevention and control. The Ministry is aware that it will take time to implement the recommendations in all health-care settings. In keeping with recognized governance best practices, hospital boards and staff are key to the prevention, management, and control of infectious disease.

The Ministry will continue to work with the health-care system to improve patient safety.

Detailed Audit Observations

ACCOUNTABILITY FOR PATIENT CARE

Several parties share responsibility for the patient-care issues HAIs pose, under several pieces of legislation. For example:

- The *Public Hospitals Act* and its regulations provide the framework within which hospitals operate. It also sets out the responsibilities of hospital boards (which generally govern the hospital) and their medical committees with respect to the quality of patient care provided by the hospital. The Minister of Health and Long-Term Care is responsible for administering and enforcing this Act and its regulations.

- While each hospital is responsible for determining its own priorities in addressing patient needs in the communities it serves, under the *Ministry of Health and Long-Term Care Act*, the Minister of Health and Long-Term Care's duties and functions include governing the care, treatment, and services and facilities that hospitals provide.
- Under the *Local Health System Integration Act, 2006*, Local Health Integration Networks (LHINs) are responsible for prioritizing and planning health services and funding hospitals. There are 14 LHINs, which are accountable to the Ministry. As of April 1, 2007, hospitals are directly accountable to their respective LHIN, rather than to the Ministry, for most matters.

The Ministry provides approximately 85% of total hospital funding, some of which can be used only for specified purposes. Other funding sources may include, for example, semi-private and private accommodation charges and funds from donations. In the 2007/08 fiscal year, the total operating cost of the over 150 hospital corporations in Ontario was approximately $20 billion. Since infection-prevention-and-control activities should be thoroughly integrated throughout hospital operations, it can be difficult to isolate the costs of infection prevention and control. None of the hospitals we visited tracked the total cost of preventing and controlling HAIs, nor the total cost incurred tracking patients who acquired infections.

INITIATIVES AND BEST PRACTICES FOR PREVENTING AND CONTROLLING HOSPITAL-ACQUIRED INFECTIONS

Ministry Initiatives

A number of initiatives for preventing and controlling infections arose from the outbreak of severe acute respiratory syndrome (SARS) in Ontario and other parts of the world in 2003. Key among these were the Ministry's establishment of a Provincial Infectious Diseases Advisory Committee (PIDAC) and Regional Infection Control Networks (RICNs) and its funding of an increase in the number of infection-control practitioners (ICPs). As well, the Ministry has incorporated into its Wait Time Strategy a requirement that hospitals gather data on certain HAIs and will require public reporting on the incidence of certain HAIs. Below is more detail on these initiatives.

PIDAC was established as part of Operation Health Protection, a three-year plan that the Ministry issued to revitalize the public-health system in Ontario, following recommendations from reports written in response to SARS. PIDAC's work on preventing and controlling infections includes:

- issuing a number of best-practice documents that incorporate applicable standards from entities such as the Canadian Standards Association and the Public Health Agency of Canada, as well as recommendations from medical literature (see the Appendix for a list of such documents); and
- in conjunction with the Ministry, developing educational material to enhance infection-control training for front-line staff (see the Appendix for examples).

In addition, the Ministry developed the Hand Hygiene Improvement Program (see the Appendix for details).

At the time of our audit, 14 RICNs were being established in Ontario (one in each LHIN). RICNs are to co-ordinate prevention and control activities and promote standardization in health-care facilities across Ontario. They are concerned with the activities of all health-care providers in their region, including hospitals.

ICPs are trained individuals responsible for a hospital's infection-prevention-and-control activities. Between the 2004/05 and 2007/08 fiscal years, the Ministry provided hospitals with $10.9 million to hire more ICPs.

In May 2008, the Ministry announced plans for all hospitals to introduce public reporting on eight patient safety indicators. Public reporting is to begin on the following HAIs as follows:

- *C. difficile* on September 30, 2008;
- MRSA and VRE on December 31, 2008; and
- ventilator-associated pneumonia, central-line infections, surgical-site infections in the hip and knee, and hand hygiene compliance among health-care workers on April 30, 2009.

In its 2007/08 fiscal-year Wait Time Strategy funding agreement with about 80 participating hospitals, the Ministry required that these hospitals "work towards submitting data" on surgical-site infections, central-line infections, and ventilator-associated pneumonia to a national campaign called Safe Healthcare Now!. The campaign aims to improve patient safety by integrating best practices into the delivery of patient care.

Best Practices

PIDAC has stated that an estimated 30% to 50% of health-care-associated infections are preventable. Some of its key best practices, as outlined in the documents listed in the Appendix, are shown in Figure 4. PIDAC has also stated that an infection-prevention-and-control program that is effective in preventing health-care-associated infections can substantially reduce health-care costs. More importantly, such a program can also substantially reduce the morbidity (disease) and mortality (death) associated with these infections.

Accreditation Canada

Accreditation Canada examines the quality of health services at hospitals with the aim of helping hospitals improve the quality of service they provide to patients. It has incorporated certain aspects of hospitals' infection-prevention-and-control policies into its accreditation process. At the time of our audit, it was planning to add other best practices for upcoming hospital accreditation.

SCREENING

Screening generally enables hospitals to identify patients who have an infectious organism or disease. It is an important step in keeping an infectious organism or disease from spreading and is one basis for hospitals to implement certain of the measures and precautions PIDAC has noted in its best-practice documents. In addition to preventing the transmission of infectious organisms or diseases to hospital staff, visitors, and other hospital patients (thereby prolonging their stay), effective screening can save hospitals from incurring additional costs. Both a 1999 study at a Toronto hospital and a 2002 study at a hospital in the Netherlands found screening patients for MRSA saved the hospitals money

Figure 4: Selected Best Practices from PIDAC for Preventing and Controlling HAIs
Source of data: PIDAC publications

Screening: to identify patients with MRSA, VRE, and FRI
Routine patient practices and infection-specific precautions: proper hand hygiene; proper cleaning of patient rooms and associated medical equipment; use of personal protective equipment—such as gloves, long-sleeved gowns, and face masks—when appropriate; placement of patients in private rooms when appropriate
Antibiotic use: the judicious use of antibiotics to reduce patient susceptibility to certain infectious diseases and help prevent infectious diseases that are antibiotic-resistant
Surveillance: tracking and analyzing infection data in order to take timely corrective action
Reprocessing of medical equipment: cleaning and then disinfecting or sterilizing surgical equipment, in accordance with current recognized standards for preventing the transmission of infectious diseases

because it helped prevent the infectious organism from spreading.

Screening generally involves considering various factors to determine which patients have a higher risk of having certain organisms or diseases and then taking a sample from those patients. Samples taken are forwarded to the laboratory to confirm whether the patients have the organism or disease. In some cases, a hospital will extend screening to either every patient admitted or all patients meeting certain criteria (for example, every patient in a certain hospital unit). This is called "universal screening."

PIDAC recommends the following with respect to screening:

- Hospitals should assess all patients for symptoms of FRI, such as a cough, shortness of breath, and a fever. Hospitals are encouraged to take an "active" approach to this screening. That is, hospital staff should ask patients about possible symptoms and if they have traveled to an area with a health advisory (such as Asia) in the last two weeks. Another approach is "passive" screening, where hospitals post signs requesting that patients who have FRI symptoms wash their hands, put on a mask, and notify hospital staff of their symptoms. One example where hospitals may do passive screening is for outpatients arriving for a Computed Tomography (CT) scan, Magnetic Resonance Imaging (MRI), or other type of diagnostic-imaging test.
- Hospitals should actively screen all patients admitted to hospital for their risk of having MRSA or VRE. For these infectious organisms/diseases, questions hospital staff should ask patients include if they have previously had MRSA or VRE; if they have been admitted to or have spent more than 12 continuous hours as a patient in any health-care facility in the past 12 months; and if they have been recently exposed to a unit/area of a health-care facility with a MRSA or VRE outbreak. A "yes" to any of these questions makes a patient high-risk, and hospitals should take a sample from such patients to determine if they actually have MRSA or VRE. PIDAC also suggests taking samples from other patients on the basis of other risk factors, such as being in the intensive-care unit, having a compromised immune system, or living in a communal setting such as a shelter or halfway home.
- Hospitals should regularly conduct audits to evaluate their patient-screening practices as part of a continuous program for managing and improving quality.

Febrile Respiratory Illness

All of the hospitals we visited use a combination of active and passive screening for febrile respiratory illness (FRI). For example, this may involve hospital staff actively screening patients arriving at the emergency department or directly admitted to the hospital, while passively screening outpatients.

One hospital's emergency department information system will not further process emergency patients until FRI-screening data has been entered. However, while the hospital screens all emergency patients who are in that department's information system, the hospital did not have a process to audit whether patients admitted directly to a hospital ward had been screened. Patients admitted directly to a hospital ward accounted for about 55% of hospital admissions.

The other two hospitals that we visited performed periodic audits to determine if patients were appropriately screened for FRI. These audits found the following:

- At one hospital, there was no indication in 37% of a sample of admitted-patient charts that the hospital had screened the patients for FRI. Of the patients who were screened, only two of the four patients displaying FRI

symptoms were placed on "precautions." That is, signs were posted to notify health-care workers to take mandatory precautions—such as wearing gowns, gloves, and masks—if they were within one metre of the patient. However, the precautions for one of these patients were discontinued by mistake when the patient was transferred from the emergency department to an inpatient bed. This hospital also audited its FRI-screening practices every week in a unit where it considered immune-system-compromised patients to be at high risk of acquiring FRI. We noted from our own summary of the data from this unit that its compliance with FRI-screening policies increased from 84% in late 2007 to 100% in early 2008.

- The other hospital periodically reviewed the charts of patients with FRI symptoms to determine if its FRI-screening forms were being properly completed (that is, the patient's symptoms were consistent with the information on the form). The hospital found that, from late 2006 to early 2007, only 40% of patients with FRI symptoms had properly completed screening forms. Furthermore, 30% of the patients with FRI symptoms were not screened at all. For a few days in January 2008, this hospital conducted another FRI-screening audit on all newly admitted patients. The audit found that compliance with the FRI-screening policy was 58% and 76%, respectively, at the hospital's two sites. To improve compliance, the hospital provided its staff with educational sessions on the importance of FRI screening and the expectations for staff. A subsequent two-week audit in February 2008 noted that compliance improved to 100% and 84%, respectively, at the two sites. A 10-day audit in March 2008, which excluded the site and other areas where compliance was previously high, found a 72% compliance rate.

Methicillin-resistant *Staphylococcus aureus* (MRSA) and Vancomycin-resistant Enterococci (VRE)

All of the hospitals we visited identified patients with a high risk for methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant enterococci (VRE) in accordance with the PIDAC criteria. At the three hospitals, the policy was for staff to screen patients in the emergency room or in the unit admitting the patient, or both. In general, hospitals expected samples to be taken within 24 hours of identifying a patient as being at a high risk of having MRSA or VRE.

While there is little authoritative guidance on when universal screening is appropriate, one hospital's policy was to perform universal sample-testing in some, but not all, units. This hospital said it had a low number of patients with MRSA or VRE in the units where it did not perform sample-testing, and therefore universal screening was not cost-effective.

Another hospital commented that it had considered, but not implemented, universal sample-testing. It said its reasons for not universally screening all patients were cost, PIDAC's not specifically recommending that this be done, and a lack of private rooms for isolating the patients found to have MRSA or VRE.

The third hospital noted that screening only high-risk patients would generally fail to identify individuals who had acquired MRSA or VRE outside of a health-care setting. This hospital thought that not screening every patient may have played a significant role in the transmission of MRSA and VRE, of which it had about 18 to 20 outbreaks every year. From April to August 2007, the hospital implemented a policy of taking samples from all patients in four units.

In January 2008, one hospital began, for a one-year trial period, a policy of universally screening all patients admitted.

We noted that Denmark and the Netherlands perform a stricter screening of high-risk MRSA patients. It includes ensuring that the hospital has identified and taken samples from every high-risk patient and immediately placing the patient in isolation. If the test results are negative, hospitals discontinue the isolation precautions unless the patient has additional risk factors, such as skin lesions. This has resulted in these countries having very low MRSA rates (they have cited rates of "less than 1%").

Some hospitals in the United States universally screen all patients for MRSA. The United Kingdom concurs that such universal screening for MRSA is the most appropriate approach, but it recommends, as an initial approach, identifying patients at high risk for having MRSA and taking samples from them (this is the same as PIDAC's recommendation). Scotland is in the process of conducting a one-year universal-screening pilot project at selected hospitals to determine its clinical benefits and cost-effectiveness. If the pilot is successful, Scotland expects to implement universal screening at all of its hospitals by 2010.

All of the hospitals we visited performed periodic audits of MRSA and VRE screening and found various degrees of compliance, as follows.

- Staff at one hospital reviewed the files of admitted patients on selected units to ensure that patients were screened and laboratory samples taken in a timely manner (generally within 24 hours). However, they tracked the results for only one day per month. And, because staff did not define compliance in the same way, the results for the different units could not be compared with each other.
- Another hospital did not perform audits of its VRE and MRSA screening in 2007 but did commence periodic audits in January 2008, during the time of our fieldwork at the hospital. The initial rates of compliance with hospital policy at the hospital's two sites were 0% and 70%, respectively. Subsequent audits in February and March 2008 showed that compliance had improved to 100% and 75%, respectively. However, these audits did not include how long a patient waited before a sample was taken for testing.
- The third hospital found that, for one week in spring 2007, samples were taken within the hospital's prescribed 24-hour target period for only 60% of high-risk patients.

RECOMMENDATION 1

To ensure that patients with infectious diseases are identified quickly enough to prevent the disease from spreading to others, hospitals should routinely monitor whether their screening processes are in accordance with the recommendations made by the Provincial Infectious Diseases Advisory Committee (PIDAC).

The Ministry of Health and Long-Term Care, in conjunction with PIDAC, should assess the results of the universal-screening projects under way in Ontario and other jurisdictions and recommend screening practices based on the results of these projects.

SUMMARY OF HOSPITALS' RESPONSES

The hospitals were generally in agreement with this recommendation. One hospital commented that it was following this recommendation. Another hospital indicated that it had taken a number of steps to address this recommendation, including implementing weekly audits to help ensure that patients are properly screened for infectious diseases. The third hospital indicated that it is now providing weekly unit-specific data to all units on their compliance with MRSA and VRE admission screening. As well, this hospital highlighted the need for electronic systems to accurately monitor whether

patients with FRI, MRSA, and VRE are being screened in a timely fashion.

MINISTRY RESPONSE

The Ministry supports the recommendation that hospitals should routinely monitor their screening processes. PIDAC has advised the Ministry that it also supports such monitoring. A screening program targeted to identify patients with risk factors for Antibiotic Resistant Organisms (AROs) has been shown to reduce the number of AROs in hospital settings and is recommended by PIDAC's best-practice guidelines. PIDAC has indicated to the Ministry that there is currently limited evidence to support universal screening (that is, screening of all patients regardless of risk factors) for AROs, and therefore did not include this in its best-practice documents. However, the Ministry and PIDAC will explore assessing the results of universal-screening projects currently under way.

ROUTINE PATIENT PRACTICES AND INFECTION-SPECIFIC PRECAUTIONS

There are a number of practices that, if always used by hospitals with all patients during all care, can help prevent and control the transmission of micro-organisms that cause infectious diseases. Health Canada and the Public Health Agency of Canada call these "routine practices." According to PIDAC, only the consistent use of routine practices, particularly washing hands before and after contact with a patient and the patient's environment, will prevent the spread of infectious diseases. PIDAC has also noted that additional precautions are necessary to prevent and control certain infectious diseases such as MRSA, VRE, and *C. difficile*. Health Canada says additional precautions should be implemented immediately when a patient has or is suspected of having an infectious disease.

PIDAC says the following with respect to these practices and precautions:

- *Hand hygiene*—Before and after contact with each patient and the patient's environment, staff must wash their hands with an alcohol-based rub (60% to 90% alcohol) or soap and water. An alcohol-based rub is generally preferred when hands are not visibly soiled. Soap and water, however, may be more effective than alcohol-based rub in removing *C. difficile* spores. All health-care settings must develop and implement a hand hygiene program that includes ongoing monitoring and observation of hand hygiene practices.
- *Use of personal protective equipment*—When entering the room of a patient infected with *C. difficile*, health-care workers must wear gloves and gowns. When entering the room of a patient with MRSA or VRE, they must wear gloves and should wear gowns. They must remove their gloves and gowns before exiting the patient room. Health-care facilities should monitor compliance with the recommended use of personal protective equipment (this is also recommended by Health Canada).
- *Use of private rooms*—Hospitals should place patients with MRSA or VRE and patients suspected of having *C. difficile* in a private room with its own toilet. If all the hospital's private rooms are occupied, infection-prevention-and-control staff should be consulted to arrange for patients to share a room with similarly infected patients (this is known as "cohorting" patients).
- *Cleaning of patient rooms*—Hospitals should take special precautions in cleaning the rooms of patients with MRSA or VRE and suspected of having *C. difficile*. This is because these diseases' organisms have been found on health-care surfaces, including door handles, faucets, patient charts, and medical equipment such as blood-pressure cuffs (we understand that

PIDAC expects to release a best-practice document on environmental cleaning in early 2009). Disease-specific recommendations include the following:

- If the patient has or is suspected of having *C. difficile*, hospitals should clean all horizontal surfaces in the patient's room and all items within reach of patients twice daily with a hospital-grade disinfectant. Staff should pay particular attention to cleaning frequently touched areas such as bed side-rails, telephones, and toilets. Hospitals should develop and use a checklist twice daily to monitor the cleaning. Hospitals must communicate clearly with cleaning staff to ensure that they do the twice-daily cleaning.
- If the patient has VRE, hospitals may develop and use a cleaning-monitoring checklist upon the patient's discharge or transfer.

Similarly, Health Canada recommends that hospitals clean patient rooms according to a predetermined schedule that assigns hospital staff to specific tasks for keeping surfaces clean and dust-free. As well, hospitals should conduct periodic audits of environmental-cleaning protocols.

Hand Hygiene

Hand hygiene is the most important activity for controlling the spread of infectious diseases. In this regard, the President of the Canadian Healthcare Association recently said, "The key to reducing infections is not about major discoveries, it is about handwashing." Hospital staff must clean their hands even if they wear gloves because leaks in the gloves or improper glove removal can cause their hands to become contaminated.

Many studies have shown poor hand hygiene compliance by health-care workers. A March 2006 Ontario study examined hand hygiene compliance at seven Ontario hospitals that had a total of 11 hospital sites. The study reported a rate of overall adherence to good hand hygiene practices of only 32%. The study noted that hand hygiene adherence was higher when staff were using infection-specific precautions to care for patients (for example, isolating them) or were performing activities requiring gloves and gowns. The Ministry piloted a Hand Hygiene Program in selected units at 10 hospitals in Ontario from March to August 2007. It noted that handwashing compliance at the beginning of the pilot ranged from 24% to 62%. By the end of the pilot, it ranged from 40% to 75%. These increases, while modest, are reasonably similar to results noted in other jurisdictions. Hand hygiene compliance also varied by type of health-care worker. For example, physician compliance started at 18% overall and increased to 28% by the end of the pilot. Compliance rates for nurses started at 44% and were at 60% by the end of the pilot.

Various studies have noted that impediments to handwashing include:

- lack of time owing to, for example, staff shortages and high workloads;
- inaccessibility of sinks;
- inadequate handwashing supplies (for example, soap and towels);
- concern over the harmful effects on hands caused by frequent washing;
- belief that washing is not necessary if gloves are used; and
- skepticism about the value of washing hands that are not visibly dirty.

The Hospital Report Research Collaborative is a joint initiative of the Ontario Hospital Association and the Ministry that surveys Ontario hospitals annually to assess their performance. It noted in its 2007 *Acute Care Hospital Report* that only 23% of hospitals that had hand hygiene policies had implemented a formal mechanism for auditing hand hygiene. However, the three hospitals that we visited all performed some hand hygiene audits,

and one participated as a pilot site in the Ministry's Hand Hygiene Program. Details on the hospitals' hand hygiene audits are as follows:

- One hospital had not conducted any hand hygiene audits in 2007 but did conduct periodic audits in January and February 2008 in three hospital units. The hospital indicated that the January 2008 compliance rates were higher than expected because staff knew that they were being watched. Therefore, the February 2008 audit process was more discreet. The February results indicated that hand hygiene compliance was 27% for nurses and 29% for physicians. This hospital indicated that it was in the process of educating staff on the importance of hand hygiene (which it had also done in 2005). Subsequent to our audit, we were advised that hand hygiene compliance had increased to as high as 71%.
- Another hospital found that, from March to August 2007, with staff education and support, hand hygiene compliance on the two units monitored increased from 48% to 64% for nurses and increased from 0% to 30% for doctors. The hospital decided to pilot hand hygiene audits on nine other units for August to September 2007. It found an overall compliance rate of 34%. With a view to increasing compliance, in November 2007 the hospital evaluated the accessibility of its alcohol-hand-rub dispensers. It determined that it needed to relocate and/or install a number of dispensers to improve their accessibility. The total estimated cost was about $750,000. In August 2008, the hospital indicated that it was implementing a hospital-wide hand hygiene program, which included installing alcohol-hand-rub dispensers in all hospital units.
- The third hospital had not conducted any hand hygiene audits in 2007. A two-week review in late February 2008 in selected hospital units indicated that compliance was 92%. The hospital also conducted audits to determine if staff and visitors used the alcohol hand rubs at hospital entrances. This audit, conducted from March to mid-April 2008, found average compliance rates of 74% for staff and 94% for visitors.

Because the hospitals used different processes to measure hand hygiene compliance, their compliance rates are not comparable.

We were informed that, from April to June 2008, the Ministry, in conjunction with the OHA, held training sessions for all hospitals on how to implement the Ministry's Hand Hygiene Program.

In May 2008, the Ministry announced that all Ontario hospitals would be required to publicly report health-care workers' hand hygiene compliance. The requirement takes effect April 30, 2009. The Ministry has appointed the physician-in-chief at the University Health Network to oversee the government's patient safety agenda. This includes establishing more specific details for the monitoring and reporting of hand hygiene.

Use of Personal Protective Equipment

Two of the hospitals we visited also audited the use of gloves during their hand hygiene audits but had no separate results for the use of gloves. In addition, they did not conduct specific audits on the use of other personal protective equipment such as gowns and masks.

The third hospital audited one unit, with higher-risk patients, periodically from October 2006 to April 2007. The audit included examining whether hospital staff used personal protective equipment in accordance with hospital policy. The hospital found that staff did not always use personal protective equipment or sometimes used it incorrectly. For example, some staff did not routinely change gloves between dirty and clean procedures, did not tie their gowns, and did not place their masks to cover the nose. The hospital indicated that the unit

would be taking corrective action and that it would do a follow-up audit. This hospital did not conduct audits of the use of personal protective equipment in any other units of the hospital.

Use of Private Rooms

Since one of PIDAC's infection-specific precautions is isolating infectious patients in private rooms, having enough private rooms can be an issue. The American Institute of Architects' 2006 Guidelines for Design and Construction of Health Care Facilities recommend that 100% of the rooms in surgical, medical, and postpartum nursing units be private. At the hospitals we visited, 25% to 36% of total hospital beds were in private rooms. One hospital commented that a lack of private rooms and high patient occupancy rates severely restrict the ability of hospitals to control the spread of infectious organisms and can affect the emergency department, where infectious patients often wait for a private bed.

Failing being able to place patients in private rooms, PIDAC recommends cohorting patients with similar infectious diseases. Two of the three hospitals we visited, which indicated that they would like to have more private rooms, practised cohorting. However, neither of these hospitals tracked the number of times that cohorting was necessary. As well, none of the hospitals tracked the number of times that infectious patients had to share a room with patients who did not have a similar infectious disease. However, one hospital indicated that it isolated infectious patients in semi-private rooms by closing the second bed. The hospital estimated that almost 30 beds were closed during June 2008—for about 105 bed-days—to accommodate patients requiring isolation.

PIDAC leaves the decision of when to place a patient with an infectious disease in a private room up to each hospital. Health Canada's direction to immediately initiate infection-specific precautions also leaves the implementation details up to hospital policy, and such policies can vary. For example, a patient may be isolated when the hospital assesses the patient to be high-risk, when the doctor diagnoses the patient with the disease, or when the laboratory information confirms the patient has the disease. All the hospitals we visited had policies to isolate *C. difficile* patients as soon as they had symptoms of the disease. Some other policies on isolating patients varied, as follows:

- Two hospitals had a policy to isolate patients who were transferred directly from institutions outside of Canada. This is because MRSA and VRE rates are generally higher outside of Canada. The other hospital waited for laboratory confirmation before isolating such patients.
- Two of the three hospitals had clear policies to isolate, upon their arrival at the hospital, those patients who had previously had MRSA or VRE. The third hospital indicated that it was also its practice to isolate these patients and revised its policies on MRSA and VRE screening in April 2008 to clarify this.

One of the hospitals we visited had noted in 2005 that MRSA rates appeared to be higher in patients arriving from one long-term-care home. The hospital implemented a policy to place these patients in private rooms and initiate contact precautions upon their arrival at hospital. It also tested all these patients to determine if they had MRSA. Examination of data over a six-month period indicated that 34% of the patients transferred from this particular long-term-care home had MRSA. By implementing this practice, the hospital identified over twice as many patients with MRSA coming from this home than it otherwise would have.

As patients may not be isolated until after the laboratory confirms MRSA and VRE, we inquired about the length of time it takes to obtain this confirmation. We found that the time it took for the laboratory to confirm that patients had MRSA

or VRE varied. In particular, the amount of time between when the laboratory received a MRSA sample and when the test results were available ranged from 24 to 72 hours. For VRE, it ranged from 48 to 96 hours. Two of the hospitals used a faster laboratory test for MRSA, called "polymerase chain reaction" (PCR), for either all or certain high-risk patients. According to PIDAC, this test may be more sensitive and effective at detecting MRSA. Turnaround times for this test ranged from approximately nine hours to within 24 hours at the two hospitals. However, the hospitals still needed to conduct the slower regular test because the PCR test had a high false-positive rate (estimated at 1.5% overall or 30%–40% of positive tests). The third hospital told us it decided against using PCR testing primarily because of the additional cost and high false-positive rate.

Cleaning of Patient Rooms

PIDAC's best practices for the cleaning of patient rooms identify special requirements for cleaning the rooms of VRE and *C. difficile* patients. This is because the general routine cleaning and disinfection methods that are adequate for dealing with MRSA may not be adequate to remove VRE or *C. difficile* from contaminated surfaces. According to PIDAC, studies have shown VRE either contaminating the cleaning cloth or remaining on the surface when:

- the cleaning cloth is dipped back into the cleaning solution after use and reused on another surface; or
- there is insufficient contact time between the disinfectant solution and the surface being cleaned.

C. difficile produces spores that a number of chemicals are unable to destroy. Even with the right chemicals, applying force to create friction is necessary to remove the spores.

All of the hospitals visited maintained a schedule of cleaning duties assigned to specific staff. For patients who had infectious diseases, such as VRE or *C. difficile*, the hospitals placed signs on the doors indicating that additional precautions, such as wearing gloves and a gown, must be taken by anyone entering the room. If a patient shared a room, the hospitals placed the sign on the curtain around the patient's bed.

Two of the hospitals we visited had guidance in their hospital policy regarding how to clean rooms where people must take precautions before entering. The other hospital used checklists for cleaning all precaution rooms. We asked to review a sample of checklists to determine if staff completed the cleaning procedures. We found that one of the hospital's sites did not keep the checklists, and the other site could locate only four of the checklists we requested. One of the four was blank.

Two of the hospitals informed us that they cleaned rooms with *C. difficile* patients twice a day. One of these hospitals introduced this practice in January 2008. However, it was not possible to determine if the cleaning actually occurred since neither hospital documented when the rooms were cleaned. The third hospital informed us that rooms with *C. difficile* patients were cleaned only once per day. The hospital indicated that this was because it had instead chosen to concentrate its cleaning on multiple-bed rooms to help prevent the transmission of diseases.

All of the hospitals we visited had a process in place for visually inspecting the cleanliness of patient rooms and other areas. One hospital indicated that it visually inspected selected patient rooms after the patients were discharged. However, it could not locate the results of this review for 2007. The other two hospitals did periodic visual inspections of patient rooms and/or other areas in the hospital. They found that these areas were appropriately cleaned.

We noted that some other jurisdictions use independent assessors to judge the visual cleanliness of hospital rooms. For example, independent cleanliness audits of hospitals have been occurring in the United Kingdom since 2000. An overall yearly cleanliness score, as well as a cleanliness score by hospital, is posted on the government's National Health Service website. British Columbia had independent third parties audit hospitals for cleanliness in 2005 and 2006. It also developed a provincial housekeeping system to audit hospital cleanliness in a consistent way throughout the province.

RECOMMENDATION 2

In order to better prevent the transmission of hospital-acquired infections:

- hospitals should monitor whether prevention best practices (such as hand hygiene and the use of personal protective equipment) and infection-specific precautions are conducted in accordance with the recommendations made by the Provincial Infectious Diseases Advisory Committee (such as twice-daily cleaning of *C. difficile* patient rooms); and
- the Ministry of Health and Long-Term Care should:
  - in conjunction with hospitals and Local Health Integration Networks, consider including, as part of its public-reporting requirements, hand hygiene compliance rates by type of health-care staff (for example, for nurses and physicians); and
  - because many hospitals have a shortage of single-bed rooms, develop and implement—in conjunction with hospitals—guidance for hospitals to consistently isolate patients who have, or are at high risk of having, infectious diseases.

SUMMARY OF HOSPITALS' RESPONSES

The hospitals generally concurred with this recommendation. One hospital indicated that it had taken various actions to address the recommendation, including implementing a hand hygiene compliance monitoring process and checklists for cleaning staff. Another hospital highlighted that, although the best practices recommended by PIDAC are extremely useful and will positively change the standard of practice, additional human and financial resources were needed to fully implement them. This hospital commented that PIDAC's September 2008 document—*Best Practices for Infection Prevention and Control Programs in Ontario*—should have a positive impact on the hospital's ability to implement this recommendation. The hospital also noted, however, that hand hygiene audits and additional environmental cleaning were very labour-intensive undertakings and would be difficult to sustain without additional support and resources. As well, this hospital felt that there was a need for PIDAC and the Ministry to determine the resources needed to fully implement the PIDAC best practices. The third hospital noted that there is a need for provincial standards for housekeeping resources and believed that the timely development and approval by the Ministry of PIDAC's best-practices guideline addressing environmental standards in hospitals should be a priority. This hospital also said that a visual inspection of the patient's environment will not detect microbial contamination, and therefore new technologies for monitoring cleanliness in hospitals should be evaluated, with a focus on surfaces that are often touched by hospital staff, patients, and others. This hospital further noted that the

Ministry's educational materials on the basics of infection control were developed for nurses, therapists, and other such hospital staff. This hospital feels that similar educational materials are needed for both support staff (such as housekeeping staff) and physicians.

With respect to how hand hygiene compliance rates should be publicly reported, one hospital noted that reporting should specify not only the type of health-care worker but also the circumstances of compliance. For example, there may be poor hand hygiene compliance by health-care staff before patient contact or before performing an aseptic procedure, but good compliance after patient contact. Hand hygiene compliance should be measured separately for these different circumstances to capture these differences, to enable useful comparisons, and to prevent the reporting of non-specific rates that are artificially high or low. This hospital also noted that, to decrease the risk of infections, guidelines for the construction or renovation of hospitals should require 100% private rooms with their own bathrooms.

LOCAL HEALTH INTEGRATION NETWORKS' RESPONSE

The LHINs support the monitoring of performance measures for hand hygiene compliance by type of staff. As well, the LHINs agree that isolation guidelines are necessary for hospitals and suggest that long-term-care homes should also be included.

MINISTRY RESPONSE

The Ministry has made patient safety a priority for the government and has invested in many programs to build capacity to increase patient safety and control the spread of infectious disease. This includes the PIDAC Routine Practice and Additional Precautions fact sheets, hand hygiene information sheets, and other documents, which are intended to facilitate hospital compliance with best practices and educate health-care workers. Checklists for auditing these practices are available in several PIDAC documents. Included with such checklists is an observation tool to monitor hand hygiene practices. The tool also provides hospitals with the ability to create various hygiene reports. The Ministry and the Ontario Hospital Association have provided extensive education to hospitals on the PIDAC documents and on the Hand Hygiene Program. The Ministry will continue to provide education to stakeholders on these topics.

PIDAC is currently working on a best-practice document for environmental cleaning that is expected to be available in 2009. Current PIDAC documents refer to best practices for environmental cleaning.

The Ministry, as part of public reporting for hand hygiene, will investigate reporting compliance rates by type of health-care staff. The Ministry supports this level of reporting within hospitals.

PIDAC guidelines relating to the use of single rooms are designed to assist hospitals to provide the safest care possible, taking into account patient needs and existing resources. Hospital staff should, working with their Infection Control Practitioner, use clinical judgment in making these decisions. The Ministry supports hospitals' use of current PIDAC guidelines. As well, the Ministry recently approved updated guidelines for the construction of new hospitals, called Generic Output Specifications. These will support the ability of new hospitals to stop the spread of infectious diseases.

ANTIBIOTIC USE

Hospitals use antibiotics to prevent and treat patient infections. However, infectious bacteria are developing resistance to antibiotics, and this is increasing the risk that antibiotics will no longer effectively treat certain infections in the future. In fact, certain bacteria that cause HAIs have become resistant to the preferred antibiotic for treatment.

Research indicates that there is an association between a person's increased use of antibiotics and the resistance of infections to certain antibiotics. In addition, individuals are at increased risk for acquiring certain infections, such as *C. difficile* and MRSA, if they are taking antibiotics. As mentioned in Figure 1, *C. difficile* infection usually occurs when the use of antibiotics reduces the normal levels of good bacteria found in the intestines and colon of a patient. This reduction in good bacteria allows the *C. difficile* bacteria to grow and produce toxins that make the patient sick. Because of this risk, the US Food and Drug Administration revised the safety labels for certain antibiotics in June 2007. The labels now warn physicians and patients that taking the antibiotic poses a risk of *C. difficile* and that nearly all antibiotics have been associated with an increased risk of *C. difficile*.

The fact that there have been a number of *C. difficile* outbreaks in Ontario has reinforced the need for judicious use of antibiotics. Notable outbreaks include one in 2006 at the Sault Area Hospital and another in March 2007 at the Trillium Health Centre. The Office of the Chief Coroner's investigation into 18 deaths that *C. difficile* directly or indirectly caused at the Sault Area Hospital between April and November 2006 noted that the use of antibiotics was likely one of the factors contributing to the outbreak. It recommended that health-care practitioners prescribe antibiotics only where clear indications exist and after careful consideration of the antibiotics' risks and benefits. Similarly, a March 2007 review by the Trillium Health Centre noted that the judicious use of antibiotics is key in reducing *C. difficile* rates.

Along these same lines, a 2007 study at a Quebec hospital showed that there was a significant reduction in the incidence of *C. difficile* after the hospital introduced a program to promote judicious antibiotic use during an outbreak. In particular, it found that from the 2003/04 to the 2005/06 fiscal year, while total antibiotic consumption decreased by 23%, the incidence of *C. difficile* decreased by 60%.

According to the Society for Healthcare Epidemiology of America and the Infectious Disease Society of America, up to 50% of antibiotic use is inappropriate. The ideal is to have all patients treated with the most effective and least costly antibiotic only for the time needed to prevent or cure the infection.

PIDAC has recommended the following to limit the increase and spread of antibiotic-resistant infections:

- Hospitals should implement policies and procedures to promote judicious antibiotic use. That is, they should develop an "antibiotic stewardship program." One policy should be that hospitals have a drug formulary that lists the antibiotics physicians can prescribe. Some hospitals may also have further restrictions on use, such as requiring the approval of an infectious-disease specialist before certain antibiotics can be used.
- Hospitals should review actual antibiotic use to assess its appropriateness. (Health Canada and the Society for Healthcare Epidemiology of America have made similar suggestions).

Promoting Judicious Antibiotic Use

All three of the hospitals we visited had procedures in place to promote the judicious use of antibiotics, which would help reduce the inappropriate

prescribing of antibiotics. We found the following at all the hospitals:

- There was an antibiotic drug formulary and a process to ensure that hospitals obtained an infectious-disease specialist's approval for using certain antibiotics.
- Laboratory results sent to physicians were accompanied by a list of the antibiotics that were most effective in combatting the specific infection identified.
- The use of certain antibiotics was restricted to specific patient-related conditions.

Two of the hospitals had pre-printed antibiotic order forms for physicians to use in certain situations. The forms listed specific antibiotics and included instructions for dose and length of use. While the third hospital did not use order forms, it informed us that it was considering them.

Each hospital determined on its own which antibiotics to restrict and what the restrictions should be. Therefore, there were differences among the hospitals as to which antibiotics were restricted. As well, one hospital was unable to provide us with a complete listing of its restricted antibiotics.

Reviewing Actual Use of Antibiotics

While all the hospitals we visited monitored antibiotic usage to some extent, none of them had an information system that would enable them to analyze drug utilization patterns by physician or the reasons underlying specific drug use. Therefore, any review of antibiotic use requires labour-intensive manual inspection of patient charts. One hospital indicated that it was planning to implement a new pharmacy information system in fall 2008. The system is expected to, amongst other things, facilitate more efficient, effective, and timely review of the appropriateness of antibiotics used.

One hospital monitored the use of certain antibiotics through a monthly review. The review determined whether the use of the antibiotics was appropriate and whether a medical specialist—for example, an infectious disease specialist—approved the antibiotic if required to do so. The hospital did not summarize the results of these reviews annually. Our review of its antibiotics committee's minutes indicated that most were used appropriately. However, some antibiotics were not used in accordance with the hospital's restrictions or their appropriateness was questionable—even though, according to the hospital, hospital pharmacists monitored individual patient use of antibiotics on a day-to-day basis. The hospital indicated that it held educational sessions and discussed inappropriate antibiotic use with certain surgeons, which had resulted in a decrease in the use of the one antibiotic the hospital was concerned about.

Another hospital started examining antibiotic use in April 2007. A February 2008 hospital analysis noted that there were "definite trends associated with increasing antibiotic use during the winter months and the incidence of VRE and *C. difficile*." The analysis also noted that there were four antibiotics that appeared to have high usage. At the time of our audit, the hospital was planning to investigate these issues further.

The third hospital indicated that it reviews selected antibiotics on a quarterly basis. However, it did not document the results of these reviews. Hospital staff commented that they noted excessive use of two restricted-use antibiotics in late 2007 and that, after discussions among its infectious disease specialists, the use of these antibiotics dropped.

To facilitate the appropriate use of antibiotics, one hospital was developing, and another had recently finalized, an antibiotic handbook for medical staff. The handbook is to help staff determine the best antibiotic to use in certain situations. The third hospital told us it was planning to adopt a similar handbook developed by another hospital.

The Ministry indicated that it funded a survey of hospital antibiotic use in spring 2008. The survey was done by the Institute for Safe Medication Practices

Canada, a non-profit organization. We understand the survey included questions on which antibiotics a hospital restricts, what kind of antibiotic stewardship program the hospital has, and what the hospital thinks works best to control antibiotic use. The Ministry anticipated receiving the results of the survey at a future date yet to be determined. The results should show the Ministry the approaches hospitals are currently using to control antibiotic use. They should also help identify best practices, which can be shared with hospitals, for the judicious use of antibiotics.

RECOMMENDATION 3

To help prevent antibiotic-resistant organisms and reduce the susceptibility of patients to certain hospital-acquired infections, hospitals should:

- in conjunction with the appropriate medical groups, establish practices for consistently identifying which antibiotics they should restrict the use of and consider implementing the best practices for the judicious use of antibiotics as noted by the Institute for Safe Medication Practices Canada (once available);
- consider implementing electronic drug-dispensing systems to track actual antibiotic use and monitor whether physician-prescribing practices are appropriate; and
- in conjunction with the LHINs and the Ministry of Health and Long-Term Care, share best practices they may have developed, such as handbooks on judicious antibiotic use.

SUMMARY OF HOSPITALS' RESPONSES

The hospitals generally agreed with this recommendation. One hospital said that it was working to develop an antibiotic stewardship program to positively affect antibiotic prescribing practices and overall antibiotic usage. This hospital also indicated, however, that it was important to understand that physicians are regulated by professional colleges, which makes it difficult for hospitals to completely control antibiotic prescribing at the individual patient care level. Another hospital said that it had started working on integrating its pharmacy system with its other data systems to assist in monitoring antibiotic use, and had drafted a new formulary and guidelines for the use of antibiotics. The third hospital agreed that there is a need for efficient electronic monitoring systems—able to track total antibiotic use, overall trends, and physician-specific usage—to enable benchmarking and allow hospitals to focus on unexpected variances. As well, the hospital agreed that the appropriateness of the type of antibiotic, its dose, and the duration of its use also needs to be reviewed at a patient-specific level. This hospital said that patient-specific reviews are an important aspect of antibiotic stewardship that should be financially supported by the Ministry. It feels that information from such reviews is likely to have a much greater impact on reducing the risk of *C. difficile* and antimicrobial-resistant organisms than just monitoring global trends identified by electronic systems. However, this hospital noted that it is unaware of Canadian standards for determining appropriateness of use and that there are no benchmarks or comparators against which it could measure the success of its antimicrobial stewardship program. This hospital also supported a formalized mechanism for encouraging innovation and sharing of best practices in improving antibiotic use, while noting that it is often the large teaching hospitals that develop best practices, and their best practices may

not always be applicable to smaller hospitals. The hospital therefore felt that there should be incentives for both large and smaller hospitals to share best practices.

LOCAL HEALTH INTEGRATION NETWORKS' RESPONSE

The LHINs will support and work with the Regional Infection Control Networks to share best practices with all health service providers.

MINISTRY RESPONSE

The Institute for Safe Medication Practices (ISMP) Canada is completing a review of antibiotic use in Ontario hospitals for the Ministry. A full report is anticipated in fall 2008. This report will provide guidance for the health-care system in establishing best practices for the judicious use of antibiotics. Currently, there are a number of best-practice documents and guidelines available from professional organizations throughout Canada relating to judicious antibiotic use. The Ministry will ensure that these best practices are made available to providers. This will include working with the regulatory colleges for the various health professionals.

SURVEILLANCE

PIDAC states that surveillance is defined as the systematic ongoing collection, collation, and analysis of data with timely distribution of the information to those who require it in order to allow action to be taken where necessary. PIDAC notes that there is conclusive evidence to show that the establishment of a surveillance system is associated with reductions in infection rates. Surveillance is particularly useful in monitoring the effectiveness of infection-prevention-and-control programs. Typically, trained infection-prevention-and-control professionals or hospital epidemiologists perform surveillance of HAIs. All the hospitals we visited had infection-control practitioners.

Recommendations with respect to surveillance of HAIs that PIDAC has issued and other organizations have published include the following:

- Hospital surveillance systems should clearly define all "data elements"—that is, the specific items that the system is monitoring and counting. This ensures that the information collected is consistent, accurate, and reproducible.
- Hospitals should establish a mechanism to keep track of the number of laboratory-confirmed cases of *C. difficile*, MRSA, and VRE. They should analyze the information gathered on an ongoing basis to determine their infection rates and identify trends signalling the need for corrective action, such as staff education or changes in practice.
- Core indicators for monitoring HAIs province-wide should be developed and reported on annually. As well, there should be regionally co-ordinated surveillance of the core indicators.

Defining "Hospital-acquired Infection"

PIDAC's *C. difficile* best-practice document (November 2007) defines this infection as being hospital-acquired if:

- the infection was not present on admission—specifically, the onset of symptoms occurred more than 72 hours after admission; or
- the infection was present on admission but relates to a previous admission to the same facility within the last four weeks.

We noted that two hospitals used this definition to track their *C. difficile* cases. Until April 2008, the third hospital was using two weeks as the time frame for acquiring the infection from a previous admission but then changed it in April 2008 to four

weeks to be consistent with PIDAC's definition. As a result, the *C. difficile* infection rates among the three hospitals we visited were not comparable at the time of our audit.

PIDAC does not clearly define which infections are "hospital-acquired" in the case of MRSA and VRE. We noted that, consequently, the hospitals we visited used different definitions for hospital-acquired MRSA and VRE. As a result, the HAI rates the three hospitals prepared were not comparable. For example:

- Two hospitals considered MRSA or VRE as hospital-acquired if the infection occurred more than 72 hours after admission. The third hospital used more than 48 hours after admission as the point at which it counted the infection as hospital-acquired.
- One hospital counted an infection as hospital-acquired if it related to a previous admission in the last two months. Another hospital used the last 12 months as the cut-off time. The third hospital did not have a specific time frame—it relied on the judgment of its infection-control practitioners to determine if a readmitted patient's infection was hospital-acquired.

The Ministry issued a definition for hospital-acquired *C. difficile* in July 2008 that is consistent with PIDAC's definition, to be used in public reporting. We understand that the Ministry will also be issuing definitions for hospital-acquired MRSA and VRE. However, there is very little other specific guidance provided for these two antibiotic-resistant organisms. With respect to other HAIs, in June 2008, subsequent to our audit work at the three hospitals, PIDAC released a best-practice document providing general guidance on surveillance. It defined a health-care-associated infection as an infection that occurs in the period beginning more than 48 to 72 hours after admission to within 10 days following discharge.

Establishing Tracking Mechanisms

The December 2006 *Final Report of the SARS Commission* noted that surveillance standards at individual hospitals in Ontario were insufficient and not mandated. For that reason, it recommended the establishment and mandating of such standards.

The infection-control practitioners at the hospitals we visited were generally responsible for gathering infection-related data. We noted that this was very time-consuming because the hospitals' information systems did not support surveillance activities. For example, at two of the hospitals, the infection-control practitioners reviewed numerous documents (such as laboratory reports) for evidence of infections and compiled the results (as opposed to being able to download the relevant information electronically).

Hospitals may perform prevalence surveys to determine the extent of MRSA and VRE. These surveys involve taking samples from all patients in specific units to obtain laboratory confirmation of infection. With the added number of patients being tested, these surveys generally result in the hospital's infection rate being higher than it would be without the survey data.

All the hospitals we visited had conducted prevalence surveys. Their infection-control practitioners determined their timing and frequency. One hospital also performed prevalence surveys of various units on a rotating basis. This hospital estimated that these surveys were responsible for identifying 10% of its hospital-acquired MRSA cases in 2007.

For certain surgical procedures, the length of stay in hospital is short, and therefore any resulting surgical-site infections often become apparent after the patient is discharged from hospital. If the discharged patient seeks medical attention elsewhere, the hospital that performed the surgery cannot access the related records because hospital information systems are not connected. Therefore,

hospitals generally rely on patients, surgeons, or other organizations (for example, Community Care Access Centres) to inform them if a patient develops a surgical-site infection. Infection rates can appear lower than actual if the hospital is not informed.

All of the hospitals we visited monitored selected surgical-site infections to different extents. We noted that one of the hospitals monitored a wide variety of surgeries for infections. They included all general, orthopaedic, urology, and gynecology surgeries. Another hospital monitored vascular and certain back surgeries for infections. The third hospital monitored hip- and knee-replacement and C-section surgeries for infections.

We noted that the duration and completeness of post-discharge monitoring, as well as the type or intensity of surveillance, varied by hospital. Safer Healthcare Now! recommends tracking infections in patients for up to 30 days after the operation. Two of the hospitals we visited monitored for approximately 30 days after the operation. The third hospital requests that the patient send back a form at any time after he or she is discharged to report signs or symptoms of infection. Infection-control practitioners at two of the hospitals did further analysis to capture instances of surgical-site infections. At one hospital, they reviewed a listing of why patients were admitted to see if the admission related to a prior surgery infection. At the other, they looked at why patients visited the emergency department for the same information.

The surgical-site infection rates varied considerably among the hospitals but were not comparable because of differences in the nature and amount of information hospitals used to determine the rates. For example, one hospital—which monitored both pre- and post-discharge infections relating to C-section surgeries—noted that its C-section infection rate tripled when it included post-discharge surveillance information in the rate.

Analyzing Infection Data and Taking Corrective Action

Reducing Infection Rates

The ultimate goal is to have no HAIs, but the hospitals we visited indicated that there may be no practical way to achieve this. A more achievable goal is to keep HAIs from exceeding a targeted maximum rate or reducing HAIs by a certain amount. The United Kingdom has set such targets—for example, in November 2004, the Secretary of State for Health announced a target of halving MRSA infections by 2008 and reported in 2008 that MRSA rates had fallen by about 49% since the 2003/04 fiscal year.

To set such targets, it is useful for hospitals to compare their rates with the rates at other hospitals. Such comparison can also indicate to a hospital that it needs to work at further rate reduction. PIDAC has noted that hospitals' surveillance methods need to be similar in order for their infection rates to be compared.

One problem in comparing infection-rate data is that much of the available information on HAIs is not based on recent data, not specific to Ontario, and pertinent to only certain types of hospitals, such as teaching hospitals. Another problem in comparing data, which two of the hospitals we visited told us of, is other hospitals' reluctance to share their infection rates.

Ontario has not established province-wide targeted maximum rates for HAIs. However, the hospitals we visited did set such targets on the basis of available benchmarks, but the targets varied from hospital to hospital. For example:

- Two hospitals based their targeted maximum rate for *C. difficile* on 1997 data from the Canadian Nocosomial Infection Surveillance Program (CNISP) (about 50 hospitals in nine provinces, including Ontario, voluntarily report data to CNISP). The third hospital based its targeted maximum rate on the average of actual rates incurred at certain Ontario teaching hospitals in 2003.

- One hospital compared its own data on 2000–02 MRSA infection rates to its current rates to set a targeted maximum rate. Another hospital compared its current rates to average rates CNISP reported in 1999, which included hospital-acquired cases and other cases that patients already had on admission. The third hospital compared its rates to research from 2003 at four Ontario hospitals. We were informed that this hospital was planning on setting its targeted maximum rate on the basis of its own past rates.
- Two hospitals stated that the targeted maximum rate for VRE should be zero. The third hospital used the average of actual rates incurred at certain Ontario teaching hospitals in 2003.

We obtained the 2007 (calendar year) HAI rates that each hospital had determined on the basis of its own policies. Figure 5 compares those rates to each hospital's targeted maximum rate. We noted that hospitals exceeded their targeted maximum rate for certain HAIs. One hospital indicated that it periodically reviewed its targeted maximum rates and adjusted them downwards to encourage continuous improvement. Another hospital commented that it chose a targeted maximum rate of zero for VRE because appropriate benchmarks for this HAI are lacking.

Figure 5: Range of the Three Hospitals' Actual Average and Targeted Tolerable Maximum Rates for Selected HAIs, 2007

Source of data: audited hospitals

	# of Cases/10,000 Patient Days		# of
HAI	Actual Average Rates	Hospitals' Targeted Maximum Rates	Hospitals Exceeding Their Target
C. difficile	3.75–4.6	3.8–9.5	0 of 3
MRSA	3.9–5.8	1.7–4.3	3 of 3
VRE	0.07–5.0	0–1	3 of 3

Note: Each hospital establishes its own data-collection methodology and targets.

All of the hospitals we visited had data on their hospital-wide infection rates over the last few years. They were able to use this information to determine if any trends were occurring. The hospitals told us that, when their HAI rates noticeably exceed their normal rates (for example, in an outbreak), they investigate to determine the best course of action. Such actions might include performing additional cleaning of rooms and equipment.

Surgical-site Infections

The hospitals we visited had different maximum-rate targets for surgical-site infection rates. However, the hospitals all planned to implement Safer Healthcare Now!'s recommendation to reduce their surgical-site infections by 50%. Because the hospitals were in the early stages of implementing the recommendations, they were not yet able to measure any change in their infection rates.

Safer Healthcare Now! recommends that surgeons be provided with data on the surgical-site infections that have occurred after surgeries they have performed. The data can help them determine the impact of any new practices. Two of the three hospitals we visited formally compiled surgical-site infection rates by surgeon. One of them provided each surgeon with this information and discussed any infection-control issues with the surgeon and the Chief of Surgery. The second hospital had no evidence that it provided surgeons with this information but told us that its infection-control committee discussed it. The third hospital told us that, although it collects data on each surgeon's surgical-site infections, it does not formally analyze the data by surgeon. The hospital also indicated, however, that it does informally review infection rates by surgeon, and discusses any issues with the surgeon if warranted.

Determining Impact on Patients

The impact of HAIs on patients can range from mild to serious. Serious cases may require surgery or

result in negative long-term health effects. In the most severe cases, HAIs can cause death. According to PIDAC, patients with MRSA and VRE often have a longer length of stay in hospital. It has also been shown that patients infected with MRSA have a higher incidence of mortality.

In recommending that hospitals analyze their infection data and take corrective action, PIDAC does not specifically direct hospitals to track the impact of HAIs on patients. And Ontario has no province-wide data on the HAI impacts. In fact, we noted little public reporting of patient outcomes from HAIs in most jurisdictions. For instance, a January 2008 report on HAIs in Newfoundland and Labrador concluded that the government did not know how many deaths in the province had resulted from HAIs.

The United Kingdom does some reporting of deaths from MRSA and *C. difficile*.

As well, CNISP examined *C. difficile* data from 34 Canadian hospitals from November 1, 2004, to April 30, 2005. It found the following:

- One percent of patients with *C. difficile* had colectomy surgery.
- Two percent of patients with *C. difficile* were admitted to the intensive-care unit because of *C. difficile*.
- Fifteen percent of patients with *C. difficile* died, with almost 40% of these deaths directly or indirectly related to *C. difficile*.

CNISP was performing a similar study at the time of our audit, based on March and April 2007 data.

One hospital we visited tracked severe outcomes of *C. difficile* infection and another was participating in the CNISP study of March and April 2007 data, which also tracked outcomes. One of these hospitals told us it had no severe *C. difficile* outcomes in 2007. The other hospital had a total of 39 *C. difficile* cases during the two-month period. Nine of them originated at another healthcare facility. One patient required admission to the intensive care unit, one patient required colon surgery (that is, a colectomy), and five patients died either directly or indirectly as a result of *C. difficile*.

The third hospital did not track any *C. difficile* patient outcomes but indicated it planned to.

Some outcome reporting has been done as a result of *C. difficile* outbreaks at some Ontario hospitals. For example, 177 patients were diagnosed with *C. difficile* at Joseph Brant Memorial Hospital between May 1, 2006, and December 31, 2007. Ninety-one patients died and, in 76 of these cases, *C. difficile* caused or contributed to these deaths. As well, the Office of the Chief Coroner investigated 26 deaths at the Sault Area Hospital from April 1, 2006, to November 30, 2006. Those who died had been diagnosed with *C. difficile*, and the Office of the Chief Coroner reported that *C. difficile* caused or contributed to 18 of these deaths.

None of the hospitals that we visited had tracked the impact of MRSA or VRE on patients. But each affected patient's chart would include details relating to the infection.

Reporting Results

Reporting to Public Health Units and Safer Healthcare Now!

We noted that governments in certain other jurisdictions required hospitals to report to them on HAIs. For example, both Quebec and Manitoba require that hospitals submit *C. difficile* data to the province. Hospitals in the United Kingdom must report their MRSA bloodstream infections to the country's Health Protection Agency.

Ontario's *Health Protection and Promotion Act* requires that hospitals report information on certain diseases, such as tuberculosis and influenza, to their local public health unit. Specific identification of *C. difficile* outbreaks was included in these reporting requirements effective September 1, 2008. In July 2008, the Ministry issued guidance on what constituted an outbreak. However, many

other HAIs, such as MRSA and VRE, do not have to be reported.

The Ministry's agreement with hospitals participating in its Wait Time Strategy for the 2007/08 fiscal year states that hospitals must "work towards submitting data" on surgical-site infections, central-line infections, and ventilator-associated pneumonia to Safer Healthcare Now! (SHN) by March 31, 2008. Hospitals were to send SHN their monthly infection rates in these three areas, as well as information on their compliance with SHN's recommended "care bundles." A care bundle is a group of best practices that result in substantially better patient outcomes when completed together than when the individual practices are completed in isolation.

All the hospitals we visited were participating in the Ministry's Wait Time Strategy and were working towards submitting data to SHN. However, one of the hospitals was not planning to submit ventilator-associated pneumonia data. Its reason was it was expecting to participate in a similar program through the Canadian ICU Collaborative. A group of hospital intensive-care-unit physicians started the Canadian ICU Collaborative in February 2003 to share and implement best practices in a number of areas, including ventilator-associated pneumonia. The hospital indicated that the Canadian ICU Collaborative and SHN were working on aligning reporting requirements and were developing a data-sharing process.

The Ministry's agreement for the 2008/09 fiscal year requires that hospitals report data on central-line infections and ventilator-associated pneumonia through the Ministry to SHN. It also requires that hospitals ensure that information on the reduction of surgical-site infections is collected.

One hospital highlighted the need for further clarification of reporting requirements. In particular, while certain information is required to be reported to local public health units and the Ministry, it is not clear which infection control information should be reported directly to the LHINs.

Reporting to the Public

There is also a public-reporting requirement in the Ministry's agreement with hospitals participating in its Wait Time Strategy for the 2008/09 fiscal year. Hospitals must publicly report information on central-line infections, surgical-site infections, and ventilator-associated pneumonia on their websites by April 2009. One of the three hospitals we visited was already publicly reporting its central-line and ventilator-associated pneumonia infection rates on its website.

Two of the hospitals we visited posted "quality indicator" reports on their websites. These reports, posted four times a year, tell the public about hospital performance and quality of care. They include information on the rates of hospital-acquired *C. difficile*, MRSA, and VRE (based on each hospital's own definition of these HAIs). One of the hospitals reported the rates as a percentage of total admissions, while the other reported them per 1,000 patient days. As a result, the information is not comparable.

A number of jurisdictions publicly report HAIs. For example, the United Kingdom began regional reporting of hospital MRSA rates in 2001. It began publicly reporting numbers of *C. difficile* patients aged 65 years and over in 2004. It has been publicly reporting the number of patients aged two to 64 years since 2007.

While we understand that hospitals generally support the reporting of "superbug" data to the public, most are not yet publicly reporting such data.

In May 2008, the Ministry announced plans for all hospitals to introduce public reporting on eight patient safety indicators (see the Ministry Initiatives section earlier in this report). As part of this initiative, in July 2008 the Ministry defined

C. difficile infections and when outbreaks should be reported. The Ministry indicated that information relating to the other patient safety indicators will be released in the future.

Public reporting of these selected HAIs is a positive step. However, given our observations, the Ministry will need to give direction to hospitals to ensure that the reporting of the data is consistent across the province. Only then will it be possible for the public to be assured that these data are comparable and fairly presented.

RECOMMENDATION 4

To enhance the effectiveness of infection-prevention-and-control programs by effective monitoring and reporting of hospital-acquired infections, the Ministry of Health and Long-Term Care, in conjunction with the Local Health Integration Networks and hospitals, should:

- ensure that hospitals identify and track hospital-acquired infections and other reportable patient safety indicators in a consistent and comparable manner, using standard definitions and surveillance methods;
- establish reasonable targeted maximum rates for the more prevalent hospital-acquired infections; and
- look into expanding public reporting to include key patient outcome data.

As well, hospitals should provide each surgeon with his or her surgical-site infection rates and discuss any related infection-control issues with a view to identifying any adjustments to practice the surgeon should make.

SUMMARY OF HOSPITALS' RESPONSES

The hospitals generally concurred with this recommendation.

One hospital indicated that, currently, most infection-control surveillance is manual and that an electronic system that would enable all hospitals to accurately and expeditiously collect information on hospital-acquired infections was needed. Without such a system, this hospital felt that other important parts of infection control (for example, staff education and performing practice audits) may be neglected because of the time needed to manually gather the required information. This hospital also commented that the key components of surveillance should be analyzing and reporting the data in a timely fashion, and in a format that is relevant to the end users and will support change and improvement. The hospital further noted that targeted maximum rates or other standard benchmarks for hospital-acquired infections, against which hospitals can measure their performance, are needed. As well, this hospital agrees with reporting information to its surgeons on their surgical-site infection rates and is already doing so.

Another hospital commented that hospital-acquired infections should be tracked in a consistent manner and that benchmark rates should be made available to encourage positive change. This hospital further commented that, since surveillance and reporting activities are very labour-intensive, additional resources would be needed by hospitals to do them. Without these resources, the hospital felt that there may be problems with the quality of the data generated.

The third hospital indicated that it was adopting ministry and PIDAC definitions for hospital-acquired infections, where available. The hospital also commented that in August 2008, a standard form for tracking surgical-site infections was developed—in co-operation with the hospital's Community Care Access Centre—for use across its Local Health Integration Network. This hospital also indicated that it expected to start providing each surgeon with his or her surgical-site infection rates commencing in fall 2008.

LOCAL HEALTH INTEGRATION NETWORKS' RESPONSE

Complementing their support for Recommendation 2 on including hand hygiene rates by type of health-care worker in the public reporting initiatives, the LHINs also support public presentation of key safety information, such as hospital-acquired infections, along with performance measures and patient outcomes.

MINISTRY RESPONSE

The Ministry agrees with this recommendation and is implementing public reporting for key indicators. In preparation for reporting on the first indicator, *C. difficile*-associated disease, the Ministry, with input from infection-control experts, has developed consistent definitions and collection processes. This will allow for standardized provincial reporting and trending, and eventually, benchmarking that can be used for hospital comparisons. The Ministry will follow this process with the other publicly reported indicators. The Ministry intends to expand public reporting to include key outcome data over time.

REPROCESSING OF MEDICAL EQUIPMENT

Reusable medical equipment, such as surgical instruments, must be appropriately cleaned as well as disinfected or sterilized between patients to prevent patients from acquiring infections. This process is called "reprocessing." Reprocessing involves first cleaning the equipment to remove organic matter, such as blood and tissue. If an item is not properly cleaned, any remaining organic matter can protect organisms on the equipment, making the disinfection or sterilization process ineffective.

The reprocessing procedures followed depend on the intended use of the equipment and the risk of patient infection from that use. The following commonly used classification system was developed in the United States:

- Critical medical devices, such as surgical instruments, must be sterilized. Successful sterilization kills all microbes, including spores, to prevent disease transmission.
- Semi-critical medical devices, such as the colonoscopes used for internal examinations, can be high-level disinfected, but sterilization is preferred.
- Non-critical items, such as blood-pressure cuffs or bed pans, should be cleaned and/or low-level disinfected.

PIDAC's April 2006 best practices for cleaning, disinfecting, and sterilization are based on the Canadian Standards Association's requirements for reprocessing equipment, the Public Health Agency of Canada's infection-control guidelines, and best practices found in medical literature. Best practices for reprocessing medical equipment include:

- written policies and procedures for reprocessing each type of medical equipment based on current recognized standards (such as manufacturers' recommendations), including where, how, and by whom all medical equipment is to be reprocessed;
- validating the cleanliness, sterility, and functionality of the reprocessed equipment; and
- continual monitoring of reprocessing procedures to ensure their quality, together with a process to deal with any concerns.

Reprocessing Policies and Procedures

None of the hospitals we visited audited their reprocessing procedures on a regular basis to ensure that they complied with manufacturer or hospital policy. However, the hospitals informed us that they did informal reviews or spot checks to

ensure that hospital staff were performing certain tasks correctly.

We selected a sample of disinfected and sterilized equipment to determine if the reprocessing procedures complied with the equipment manufacturer's instructions, the sterilizer manufacturer's instructions, or hospital policy, as appropriate. We found that staff did disinfect medical equipment requiring high-level disinfection for at least the length of time recommended by the manufacturer. However, we noted that, for 6% of a sample of devices requiring sterilization, staff did not perform the sterilization in accordance with either manufacturers' instructions or hospital policy. For example:

- Staff sterilized a surgical instrument set for a shorter time than the instrument manufacturer recommends. According to hospital staff, once we informed the hospital of this error, the hospital brought it to the attention of its quality-of-care committee. Under the *Quality of Care Information Protection Act, 2004*, we do not have access to information that is collected by or prepared for a quality-of-care committee for the sole or primary purpose of assisting the committee in carrying out its functions. Therefore, we could not verify whether this error was addressed—although we were informed that the applicable surgeon and patient were both notified.
- Staff sterilized a cystoscope—used to access or view the bladder—for a shorter time than the sterilizer manufacturer recommends. The hospital was unable to determine which patient this scope was used on because it does not record on patient charts the serial number of the scope used. Subsequent to our audit, the hospital reviewed a sample of cystoscope sterilization procedures done during the time frame that this error occurred. It did not find any other similar errors.
- Staff high-level disinfected a cystoscope that, according to both hospital policy and PIDAC best practices, should have been sterilized. Hospital staff were not sure why this occurred and indicated that this error was being investigated. Hospital staff also noted that, although the hospital's policy followed PIDAC best practices, the manufacturer's minimum requirement was high-level disinfection.

Given the importance of equipment reprocessing to the health of patients, hospitals need to have a formal monitoring or audit process in place to identify errors, such as the ones we noted above, so that they can determine how procedures can be changed to prevent the errors from recurring.

Manufacturers' instructions for reprocessing certain new types of medical equipment often stipulate longer sterilization times than the standard cycle of three to four minutes. Health Canada's Scientific Advisory Panel on Reprocessing of Medical Devices (a panel with experts in the field of infection prevention and control, and sterile processing of medical devices, which provides scientific and technical advice on current and emerging issues in reprocessing) noted in October 2006 that manufacturers were recommending up to 10 different extended cycles, ranging from five to 40 minutes. Hospitals must ensure that staff change the sterilizer settings to match the recommended cycle for each type of medical equipment, which can increase the risk of human error. Therefore, the Panel recommended in 2006 that sterilization cycle times be standardized across medical-equipment manufacturers and that the number of different times should be minimized. However, standard sterilization cycles have not been established.

Two of the three hospitals we visited used four to five preset sterilizer settings. They sterilized instruments at the next-longer setting if the manufacturer's instructions did not match one of the hospital's standardized settings. Staff at one of these hospitals indicated that they used a 10-minute cycle for approximately 95% of their instruments—even though many of these instruments required

only a three-to-four minute sterilization cycle. Staff at both hospitals indicated that, while sterilizing these instruments for a longer period than recommended may affect their expected life, they had not noticed any adverse impact to date. At the third hospital, staff generally changed the sterilizer's settings to match the manufacturers' instructions for that type of instrument.

Validating Equipment Sterility

In addition to reviewing a printout from the sterilizer that indicates the temperature and length of the sterilization cycle, hospitals use two methods to assure them that the reprocessing is working as intended. The first is chemical indicators and chemical integrators. Chemical indicators are used for three-to-four minute sterilization cycles and change colour to show that the conditions for sterilization have been met. They do not, however, verify that the equipment actually is sterile. Chemical indicators are placed in the most hard-to-reach parts of the medical instrument tray. Steam must penetrate the entire tray to penetrate the indicators thus placed. When the indicators change colour, staff know that the conditions for sterilization—being penetrated by steam—have been met for the entire tray of instruments. Chemical integrators work similarly to chemical indicators but are used for specific longer sterilization cycles, such as 10 minutes.

The second method is using biological indicators. Such indicators use biological matter to monitor the actual effectiveness of the sterilization process, which is intended to kill all microbes, including spores. If the biological matter in the indicator is killed, the indicator will not change colour and the sterilization process was effective. Staff use biological indicators in the first equipment load of the day to ensure the sterilizer is functioning properly. Because biological indicators monitor actual effectiveness, staff also use them for every load with implantable devices, such as hip replacements.

Now that manufacturers are recommending extended sterilization cycles for certain new types of equipment, the Scientific Advisory Panel on Reprocessing of Medical Devices recommended that manufacturers also develop chemical and biological indicators for the extended cycles. For example, to effectively monitor a 10-minute steam sterilization cycle, a biological indicator would need to contain biological matter that could survive for the 10 minutes it takes for the sterilizer to kill it. However, there are no biological or chemical indicators, and only a few chemical integrators, for steam sterilization cycles longer than three to four minutes. One of the hospitals we visited used chemical integrators to monitor its 10-minute steam sterilization cycle. Hospital staff commented that these integrators were the best way to monitor the 10-minute sterilization cycle but cost two-and-a-half times the amount of chemical indicators. The other two hospitals we visited used chemical indicators for all loads, regardless of the length of the sterilization cycle. They told us that they did not use chemical integrators because chemical integrators were not available for all of the sterilization cycles they used.

Monitoring of Reprocessing

Recall of Improperly Reprocessed Instruments

Depending on the sterilizer used, an incubation time of three to 48 hours must pass before staff can read biological indicators and determine if the sterilization process was effective. Since medical equipment may already be back in use by the time an indicator shows it was not successfully sterilized, hospitals must have a system for recalling the equipment and notifying surgeons and patients, if necessary, of possible infection-control issues. In 2006, the Scientific Advisory Panel on Reprocessing of Medical Devices recommended

that health-care facilities implement an instrument-tracking process. In particular, PIDAC recommends that health-care facilities track the use on patients of endoscopes—an instrument for looking inside the body during surgery. This includes recording the endoscope's identifying number in the patient's chart so hospitals can find every patient an improperly reprocessed instrument was used on. Hospitals can then notify those patients and the surgeons involved of the error if necessary and of the possible risk of infection. All the hospitals we visited did use a system to track endoscopes, but one hospital informed us that it did not document the endoscope's identifying number in the patient's chart as required.

One of the hospitals we visited had a medical-instrument-tracking system. This system tracked the location of each instrument set and enabled the hospital to determine which patient particular instruments were used on. Although the other two hospitals did not have a system to track all instruments, they agreed that it would be useful to have information on which instruments were used on which patients.

Reuse of Single-use Devices

The manufacture and use of single-use, or disposable, devices has increased since the 1970s. This is owing primarily to advances in technology, particularly in the plastics industry. In some cases, manufacturers market a device as single-use because they have not determined if it can be reused safely.

Single-use devices include inexpensive items—such as syringes and drainage catheters—as well as more expensive items—such as angioplasty catheters (flexible tubes with an inflatable "balloon" at the tip) and biopsy forceps. In the 1980s, some hospitals began to clean, sterilize, and reuse certain high-cost single-use devices.

A Health Canada report expressed concern about the health risks associated with reusing single-use devices. These include possible transmission of diseases and the possibility that the device does not continue to function properly. Since single-use devices are meant to be used only once, manufacturers are not required to provide any information on how to clean and disinfect or sterilize them.

Several Canadian jurisdictions have published guidance on the reuse of single-use devices:

- Manitoba ordered its hospitals to stop reusing "critical contact" single-use devices (those that contact the bloodstream or a sterile body cavity) in 1999.
- The Northwest Territories stated that, as of 2005, health-care facilities were not to reuse single-use devices.
- Ontario's PIDAC advised in March 2006 that only licensed reprocessors (all in the United States) could reprocess critical and semi-critical single-use devices. Hospitals must not reprocess the devices themselves and reuse them.
- British Columbia stipulated that, as of January 1, 2008, only a licensed third-party reprocessor, certified by a national regulatory authority, can reprocess critical-contact single-use devices. All health authorities must eliminate any other reprocessing and reuse of such devices.

The US Food and Drug Administration (FDA) established regulations that came in effect in August 2000 controlling all reprocessing of single-use devices. The regulations subject hospitals and third-party reprocessors to the same quality system requirements as manufacturers. In January 2004, the Ontario Hospital Association recommended the following:

- Hospitals should not reprocess critical and semi-critical single-use devices.
- Health Canada should develop applicable regulations and regulate third-party reprocessors.

- Until Canadian regulations are established, hospitals should consider using third-party reprocessors licensed by the US FDA.

The Scientific Advisory Panel on Reprocessing of Medical Devices recommended in February 2005 that the reuse of single-use devices be allowed only if Health Canada regulates it. However, Health Canada's October 2007 review concluded that it did not have the authority to regulate the reprocessing of single-use medical devices by hospitals or third parties. Rather, this responsibility rests with the provinces and territories.

In February 2008, the Canadian Agency for Drugs and Technologies in Health (a not-for-profit organization funded by the federal, provincial, and territorial governments to provide advice and evidence-based information about the effectiveness of drugs and other health technologies) reported on its survey of Canadian acute-care hospitals regarding the reprocessing and reuse of single-use devices. It found that 16% of the 92 hospitals responding to the survey in Ontario, and 28% of the 398 hospitals responding to the survey across Canada, reprocessed single-use devices. Furthermore, 60% of the hospitals across Ontario that reprocessed single-use devices did the reprocessing themselves instead of using a licensed third-party reprocessor, as recommended by PIDAC. Staff at the hospitals that we visited told us they did not reuse critical and semi-critical single-use devices.

RECOMMENDATION 5

To help prevent the transmission of hospital-acquired infections:

- hospitals should periodically monitor or audit the effectiveness of the processes they have in place to ensure that medical equipment is properly disinfected and sterilized;
- the Ministry of Health and Long-Term Care—in conjunction with hospitals, the Canadian Standards Association, and Health Canada—should work with medical-equipment vendors to create standard sterilization cycles and the biological indicators and chemical indicators or integrators needed to ensure the effectiveness of these cycles;
- hospitals should implement a system for tracking medical equipment that enables them to recall improperly sterilized equipment and notify surgeons and patients of possible infection risks; and
- hospitals, in conjunction with the Ministry, should ensure that, in accordance with PIDAC recommendations, critical and semi-critical single-use devices are not reused unless they are cleaned and then disinfected or sterilized by a licensed service provider.

SUMMARY OF HOSPITALS' RESPONSES

The hospitals all generally agreed with this recommendation.

One hospital commented that hospitals have a responsibility to self-audit their reprocessing practices on a regular basis and in April 2008 commenced monthly audits of washer and sterilization functioning, sterile trays, case carts, and incident reports. This hospital indicated that it also supports occasional provincially mandated audits, such as the one mandated by the

Ministry in 2003 to assess the reuse of single-use items, because they provide additional opportunity for review and practice improvement and help to hold hospitals accountable. Another hospital noted that it had implemented a quarterly process to review the effectiveness of its reprocessing practices.

With respect to tracking the medical equipment used on each patient, one hospital indicated that it already has a tracking system in place, and another hospital indicated that it was discussing such a system. The third hospital commented, however, that the reason that a computerized tracking system was not currently in place in every Ontario hospital related to financial resources. This hospital noted that funding from the Ministry and/or LHINs would be needed to implement such a system because hospital global budgets cannot absorb the large capital and operating costs involved.

MINISTRY RESPONSE

Since the release in 2006 of the Provincial Infectious Diseases Advisory Committee's (PIDAC) document *Best Practices for Cleaning, Disinfecting and Sterilization*, a number of initiatives have taken place, including several video conferences to review the document's recommendations, a fact sheet, and a request from the Deputy Minister and the CEO of the Ontario Hospital Association that hospitals review their sterilization procedures and incorporate PIDAC's recommendations. Hospital boards and staff are key to the prevention, management, and control of infectious diseases.

The Ministry is represented on the Canadian Standards Association's (CSA) committee on reprocessing and has had input into its recommendations. The Ministry will bring the recommendations in the Auditor General's report to its attention. The CSA is updating its guidelines, and these are expected to be published in 2009. The Ministry is also represented on the Canadian Agency for Drugs and Technologies in Health (CADTH) review of the reuse of single-use devices. PIDAC's guidelines will be updated once this and other new information becomes available from the CSA, CADTH, and other sources.

Appendix—Details of PIDAC and Ministry Initiatives

BEST-PRACTICE DOCUMENTS

PIDAC has developed the following best-practices documents. These documents incorporate the applicable standards from entities such as the Canadian Standards Association and the Public Health Agency of Canada, as well as recommendations from medical literature.

- *Best Practices for Cleaning, Disinfection and Sterilization* (March 2006, revised April 2006)—focuses on medical equipment, including surgical instruments.
- *Preventing Febrile Respiratory Illnesses* (September 2005, revised August 2006)—includes guidance on detecting and containing clusters and outbreaks of common respiratory infections, such as influenza.
- *Best Practices for Infection Prevention and Control of Resistant Staphylococcus aureas and Enterococci* (March 2007)—includes guidance on controlling the transmission of MRSA and VRE and managing patients with MRSA and VRE.
- *Best Practices Document for the Management of* Clostridium difficile *in all Health Care Settings* (December 2004, revised November 2007)—includes guidance on identifying clusters of *C. difficile*, preventing their transmission, and managing patients with the infection.
- *Best Practices for Hand Hygiene* (May 2008)—includes guidance on when, why, and how hospital staff should wash their hands.
- *Best Practices for Surveillance of Health Care-Associated Infections in Patient and Resident Populations* (June 2008)—includes guidance on tracking and monitoring health-care-associated infections.
- *Best Practices for Infection Prevention and Control Programs in Ontario* (September 2008)—includes guidance on the human resources and skills needed for an infection-prevention-and-control program, as well as the specific activities that should be included.

In addition, at the time of our audit PIDAC was expected to release best-practice documents on environmental cleaning in early 2009.

CORE COMPETENCIES PROJECTS

In response to the 2004 *Final Report of the Ontario Expert Panel on SARS and Infectious Disease Control* by Dr. David Walker and the Ministry's Operation Health Protection plan, PIDAC and the Ministry developed educational material to enhance infection-control training for front-line staff. In spring 2007, the Ministry and PIDAC developed three educational modules: routine infection-control practices; hand hygiene; and the chain of infection transmission. These modules were posted on the Ministry's website for health-care professionals, and the Ministry offered related video conferencing and "train the trainer" sessions to assist hospitals in training their staff. According to the Ministry, additional educational modules will be developed on topics such as reprocessing medical instruments and occupational-health-and-safety issues.

HAND HYGIENE IMPROVEMENT PROGRAM

Proper hand hygiene (that is, using alcohol-based rub or soap and water to clean hands) by health-care workers is one of the most effective ways of preventing HAIs. In March 2006, the Ministry and the Public Health Agency of Canada held a workshop to learn from the world's leading authorities—such as the World Health Organization and experts from across Canada, the United States, and the United Kingdom—about programs

that resulted in sustainable change in hand hygiene practices. The workshop also discussed how these programs could be adapted for use in Ontario. The Ministry developed the Hand Hygiene Improvement Program on the basis of this workshop. The Ministry piloted this program in selected units at 10 hospitals in Ontario from December 2006 to August 2007. The Ministry informed us that, between April and June 2008, it, in conjunction with the Ontario Hospital Association, held training sessions for all hospitals on how to implement the Ministry's hand hygiene program.

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