

# **Best Practices for Infection Prevention and Control Programs in Ontario In All Health Care Settings**

This document is current to January 2011, and is not updated. It was prepared at a time when the Provincial Infectious Diseases Advisory Committee ("PIDAC") reported directly to the Minister of Health and Long-Term Care and Chief Medical Officer of Health. Note that effective April 1, 2011, the responsibility for and functions of PIDAC were transferred to the Ontario Agency for Health Protection and Promotion ("Agency"), and that PIDAC now reports to that Agency. You may wish to consult [www.pidac.ca](http://www.pidac.ca) or the Agency's website at [www.oahpp.ca](http://www.oahpp.ca) for more information.

Provincial Infectious  
Diseases Advisory  
Committee  
(PIDAC)

# **Best Practices for Infection Prevention and Control Programs in Ontario**

**In All Health Care Settings**

**THIS DOCUMENT IS INTENDED TO PROVIDE BEST PRACTICES ONLY.**

**HEALTH CARE SETTINGS ARE ENCOURAGED TO WORK TOWARDS THESE BEST PRACTICES IN AN EFFORT TO  
IMPROVE QUALITY OF CARE**

**Ministry of Health and Long-Term Care  
Published September, 2008  
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## Disclaimer for Best Practice Documents

This document was developed by the Provincial Infectious Diseases Advisory Committee (PIDAC). PIDAC is a multidisciplinary scientific advisory body that provides to the Chief Medical Officer of Health evidence-based advice regarding multiple aspects of infectious disease identification, prevention and control. PIDAC's work is guided by the best available evidence and updated as required. Best Practice documents and tools produced by PIDAC reflect consensus positions on what the committee deems prudent practice and are made available as a resource to the public health and health care providers.

### **Revisions to 'Best Practices for Infection Prevention and Control Programs in All Health Care Settings', originally published September, 2008:**

**This document incorporates revisions from the following updated Ontario legislation:**

- Long-Term Care Homes Act
- Public Hospitals Act

**New information and best practices from the scientific literature are also reflected in this revision.**

**New material from these documents is highlighted in grey in the text.**

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## **Executive Summary**

Health care-associated infections (HAIs) are defined as infections that occur as a result of health care interventions in any health care setting where care is delivered.

HAIs remain an important patient safety issue and represent a significant adverse outcome of the health care system. The acquisition of occupationally-acquired infections may pose a risk to health care providers. In both acute and long-term care, outbreaks result in significant cost to the organization.

In order to protect clients/patients/residents and staff and to reduce the costs of HAIs, it is necessary to prevent infections before they occur. Recent studies suggest that at least 20% of HAIs could be prevented through infection prevention and control strategies.

Infection prevention and control (IPAC) programs have been shown to be both clinically effective and cost-effective, providing important cost savings in terms of fewer HAIs, reduced length of hospital stay, less antimicrobial resistance and decreased costs of treatment for infections.

**The responsibility for the IPAC program in the health care setting lies primarily with the senior administration of the organization. Implementation of the program rests not only with the IPAC team, but also with nursing managers, Environmental Services, Occupational Health and Safety (OHS), directors of medical services, central reprocessing and other departments and individuals in the facility impacted by the effective delivery of the program.**

The purpose of this document is to outline the structure and elements of the IPAC program which include:

- demonstrable leadership by senior administration;
- presence of an active IPAC committee;
- clear and current policies and procedures to reduce the risk of transmission of infectious agents;
- hand hygiene program;
- surveillance program;
- education for staff and clients/patients/residents and their families;
- OHS related to transmission of infectious agents;
- timely access to microbiology laboratory reports;
- product review and evaluation;
- review of practices for reprocessing of equipment;
- review of practices for environmental cleaning;
- IPAC input into facility design and construction;
- effective immunization programs;
- outbreak detection and management; and
- adequate resources including adequate IPAC professionals trained and certified in infection prevention and control.

**A properly resourced and effectively functioning IPAC program is essential to improving patient and health care provider safety.**

## Abbreviations

<b>ARI</b>	Acute Respiratory Infection
<b>ARO</b>	Antibiotic-Resistant Organism
<b>BSI</b>	Bloodstream Infection
<b>CAD</b>	Canadian Dollars
<b>CHICA</b>	Community and Hospital Infection Control Association - Canada
<b>CIC®</b>	Certified in Infection Control
<b>CCC</b>	Complex Continuing Care
<b>FTE</b>	Full-Time Equivalent
<b>HAI</b>	Health care-Associated Infection
<b>HHC</b>	Home Health Care
<b>ICP</b>	Infection Prevention and Control Professional
<b>IPACC</b>	Infection Prevention and Control Committee
<b>IPAC</b>	Infection Prevention and Control
<b>LTC</b>	Long-Term Care
<b>MOHLTC</b>	Ministry of Health and Long-Term Care (Ontario)
<b>MRSA</b>	Methicillin-Resistant <i>Staphylococcus aureus</i>
<b>NHSN</b>	National Healthcare Safety Network (formerly NNIS)
<b>OHA</b>	Ontario Hospital Association
<b>OHS</b>	Occupational Health and Safety
<b>OMA</b>	Ontario Medical Association
<b>PHAC</b>	Public Health Agency of Canada
<b>PIDAC</b>	Provincial Infectious Diseases Advisory Committee
<b>PPE</b>	Personal Protective Equipment
<b>RICN</b>	Regional Infection Control Networks
<b>SENIC</b>	Study on the Efficacy of Nosocomial Infection Control
<b>SSI</b>	Surgical Site Infection
<b>VAP</b>	Ventilator-Associated Pneumonia
<b>VRE</b>	Vancomycin-Resistant Enterococci

## Glossary of Terms

**Acute Respiratory Infection (ARI):** Any new onset acute respiratory infection that could potentially be spread by respiratory droplets (either upper or lower respiratory tract), which presents with symptoms of a fever greater than 38°C and a new or worsening cough or shortness of breath (previously referred to as *febrile respiratory illness*, or *FRI*). It should be noted that elderly people and people who are immunocompromised may not have a febrile response to a respiratory infection.

**Additional Precautions:** Precautions (i.e., Contact Precautions, Droplet Precautions, Airborne Precautions) that are necessary in addition to Routine Practices for certain pathogens or clinical presentations. These precautions are based on the method of transmission (e.g., contact, droplet, airborne).

**Adverse event:** An unexpected and undesired incident directly associated with the care or services provided to the client/patient/resident.<sup>1</sup>

**Antibiotic-Resistant Organism (ARO):** A microorganism that has developed resistance to the action of several antimicrobial agents and that is of special clinical or epidemiological significance (e.g., MRSA, VRE).

**Audit:** In the context of this document, an audit is a tool used to examine a process for errors or omissions. An audit tool usually consists of a checklist of items which must be completed or be in place in order for a process to be considered to be correct.

**Benchmark:** A validated figure that may be used for comparison provided data is collected in the same way as that of the benchmark data. Benchmarks are used to compare infection rates to a standardized database that uses the same definitions for infection and is appropriately adjusted for patient risk factors so that meaningful comparisons can be made. Comparing infection rates to a validated benchmark will indicate whether the rates are below or above the recognized average.

**Certified in Infection Control (CIC®):** A credential obtained from the Certification Board of Infection Control and Epidemiology, Inc. (CBIC) following the successful completion of a written examination. Re-certification is required every five years to maintain certification. More information may be found on the CBIC website: <http://www.cbic.org/>. CIC® is a legal designation and may only be used by those who have attained and maintained certification.

**CHICA-Canada:** The Community and Hospital Infection Control Association of Canada, a professional organization of persons engaged in infection prevention and control activities in health care settings. CHICA-Canada members include infection prevention and control professionals from a number of related specialties including nurses, epidemiologists, physicians, microbiology technologists, public health and industry. The CHICA-Canada website is located at: <http://www.chica.org>.

**Client/patient/resident:** Any person receiving health care within a health care setting.

**Cluster:** A grouping of cases of a disease within a specific time frame and geographic location, suggesting a possible association between the cases with respect to transmission.

**Complex Continuing Care (CCC):** Continuing, medically complex and specialized services provided to both young and old, sometimes over extended periods of time. Such care also includes support to families who have palliative or respite care needs.

**Continuum of Care:** Across all health care sectors, including settings where emergency (including pre-hospital) care is provided, hospitals, complex continuing care, rehabilitation hospitals, long-term care homes, outpatient clinics, community health centres and clinics, physician offices, dental offices, offices of allied health professionals, Public Health and home health care.

**Febrile Respiratory Infection (FRI):** See *Acute Respiratory Infection*.

**Hand Hygiene:** A general term referring to any action of hand cleaning. Hand hygiene relates to the removal of visible soil and removal or killing of transient microorganisms from the hands. Hand hygiene may be accomplished using soap and running water or an alcohol-based hand rub (ABHR). Hand hygiene also includes surgical hand antisepsis.

**Health Care-Associated Infection (HAI):** A term relating to an infection that is acquired during the delivery of health care (also known as 'nosocomial infection').

**Health Care Facility:** A set of physical infrastructure elements supporting the delivery of health-related services. A health care facility does not include a patient's home or physician offices where health care may be provided.

**Health Care Provider:** Any person delivering care to a client/patient/resident. This includes, but is not limited to, the following: emergency service workers, physicians, dentists, nurses, respiratory therapists and other health professionals, personal support workers, clinical instructors, students and home health care workers. In some non-acute settings, volunteers might provide care and would be included as a health care provider. See also, *Staff*.

**Health Care Setting:** Any location where health care is provided, including settings where emergency care is provided, hospitals, complex continuing care, rehabilitation hospitals, long-term care homes, mental health facilities, outpatient clinics, community health centres and clinics, physician offices, dental offices, offices of allied health professionals and home health care.

**Hospital-Grade Disinfectant:** A low-level disinfectant that has a drug identification number (DIN) from Health Canada indicating its approval for use in Canadian hospitals.

**Infection:** The entry and multiplication of an infectious agent in the tissues of the host. Asymptomatic or sub-clinical infection is an infectious process running a course similar to that of clinical disease but below the threshold of clinical symptoms. Symptomatic or clinical infection is one resulting in clinical signs and symptoms (disease).

**Infection Prevention and Control (IPAC):** Evidence-based practices and procedures that, when applied consistently in health care settings, can prevent or reduce the risk of transmission of microorganisms to health care providers, clients/patients/residents and visitors.

**Infection Prevention and Control Committee (IPACC):** The Infection Prevention and Control Committee is a multidisciplinary committee that serves the health care facility and is responsible for verifying that the infection prevention and control recommendations and standards are being followed in the health care facility.

**Infection Prevention and Control Physician:** Physician with specific training and expertise in the principles of epidemiology and infection prevention and control, and who incorporates infection prevention and control into his/her continuing professional development.

**Infection Prevention and Control Program:** A health care facility or organization (e.g., hospital, long-term care, continuing complex care, home care) program responsible for meeting the recommended mandate to decrease infections in the patient, health care providers and visitors. The program is coordinated by health care providers with expertise in infection prevention and control and epidemiology.

**Infection Prevention and Control Professional(s) (ICPs):** Trained individual(s) responsible for a health care setting's infection prevention and control activities. In Ontario an ICP must receive a minimum of 80 hours of instruction in a CHICA-Canada endorsed infection control program within six months of entering the role and must acquire and maintain Certification in Infection Control (CIC), when eligible.

**Long-Term Care (LTC):** A broad range of personal care, support and health services provided to people who have limitations that prevent them from full participation in the activities of daily living. The people who use long-term care services are usually the elderly, people with disabilities and people who have a chronic or prolonged illness.

**Methicillin-Resistant *Staphylococcus aureus* (MRSA):** A strain of *S. aureus* that has a minimal inhibitory concentration (MIC) to oxacillin of  $\geq 4$  mcg/ml and contains the *mecA* gene coding for penicillin-binding protein 2a (PBP 2a). MRSA is resistant to all of the beta-lactam classes of antibiotics, such as penicillins, penicillinase-resistant penicillins (e.g., cloxacillin) and cephalosporins.

**National Healthcare Safety Network (NHSN):** A voluntary, secure, internet-based surveillance system that integrates and expands legacy patient and healthcare personnel safety surveillance systems managed by the Division of Healthcare Quality Promotion (DHQP) at CDC. NHSN also includes a component for hospitals to monitor adverse reactions and incidents associated with receipt

of blood and blood products. NHSN infection rates may be used for benchmarking acute care nosocomial infection rates provided that the same standardized definitions for infection are used. NHSN results are stratified by patient risk index. More information is available at: <http://www.cdc.gov/nhsn/>.

**Occupational Health and Safety (OHS):** Preventive and therapeutic health services in the workplace provided by trained occupational health professionals, e.g., nurses, hygienists, physicians.

**Outbreak:** For the purposes of this document, an outbreak is an increase in the number of cases above the number normally occurring in a particular health care setting over a defined period of time.

**Outcome Surveillance:** Surveillance used to measure client/patient/resident outcomes (changes in the client/patient/resident's health status that can be attributed to preceding care and service). An example of outcome surveillance related to infection prevention and control is surveillance of infection rates. Outcome surveillance reflects the effectiveness of the infection prevention and control program in protecting clients/patients/residents, health care providers and visitors from health care-associated infections while decreasing costs from infections.

**Personal Protective Equipment (PPE):** Clothing or equipment worn for protection against hazards.

**Point-of-Care:** The place where three elements occur together: the client/patient/resident, the health care provider and care or treatment involving client/patient/resident contact. The concept usually refers to a hand hygiene product which is easily accessible to staff by being as close as possible, i.e., within arm's reach, to where client/patient/resident contact is taking place. Point-of-care products should be accessible to the care provider without the provider leaving the zone of care, so they can be used at the required moment.

**Precautions:** Interventions to reduce the risk of transmission of microorganisms (e.g., patient-to-patient, patient-to-staff, staff-to-patient, contact with the environment, contact with contaminated equipment).

**Process Surveillance:** Surveillance used to assess or measure client/patient/resident processes (things done to or for a client/patient/resident during their encounter with the health care system).<sup>1</sup> An example of process surveillance related to infection prevention and control is planned audits to verify that procedures and/or standards of practice are being followed.

**Provincial Infectious Diseases Advisory Committee (PIDAC):** A multidisciplinary scientific advisory body that provides to the Chief Medical Officer of Health evidence-based advice regarding multiple aspects of infectious disease identification, prevention and control. More information is available at: <http://www.pidac.ca>.

**Public Health Agency of Canada (PHAC):** A national agency which promotes improvement in the health status of Canadians through public health action and the development of national guidelines. The PHAC website is located at: <http://www.phac-aspc.gc.ca/>.

**Regional Infection Control Networks (RICN):** The RICN of Ontario coordinate and integrate resources related to the prevention, surveillance and control of infectious diseases across all health care sectors and for all health care providers, promoting a common approach to infection prevention and control and utilization of best-practices within the region. There are 14 regional networks in Ontario. More information is available at: <http://www.ricn.on.ca>.

**Routine Practices:** The system of infection prevention and control practices recommended by the Public Health Agency of Canada to be used with all clients/patients/residents during all care to prevent and control transmission of microorganisms in all health care settings.<sup>2</sup> For a full description of Routine Practices, refer to PIDAC's *Routine Practices and Additional Precautions for all Health Care Settings*.<sup>3</sup> PIDAC's Routine Practices fact sheet is available as Appendix E in: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best\\_prac/bp\\_routine.pdf](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best_prac/bp_routine.pdf).

**Sentinel Event:** A colonization or infection in which the occurrence of even a single case (e.g., rare or particularly severe) may signal the need to re-examine preventive practices.

**Staff:** Anyone conducting activities in settings where health care is provided, including health care providers. See also, *Health Care Providers*.

**Surveillance:** The systematic ongoing collection, collation and analysis of data with timely dissemination of information to those who require it in order to take action. See PIDAC's *Best Practices for Surveillance of Health Care-Associated Infections in Patient and Resident Populations*<sup>4</sup> for more information regarding surveillance. Available online at: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_hai.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_hai.html).

**Syndromic Surveillance:** The detection of individual and population health indicators of illness (i.e., signs and symptoms of infectious disease) that are discernible before confirmed laboratory diagnoses are made.<sup>5</sup>

**Vancomycin-Resistant Enterococci (VRE):** Strains of *Enterococcus faecium* or *Enterococcus faecalis* that have a minimal inhibitory concentration (MIC) to vancomycin of  $\geq 32$  mcg/ml. and/or contain the resistance genes *vanA* or *vanB*.

## I. PREAMBLE

In the wake of the 2003 outbreak of Severe Acute Respiratory Syndrome (SARS) in Ontario, it was clear that provincial infection prevention and control (IPAC) programs were under-resourced, practices were not standardized across the continuum of care and basic knowledge and training in the fundamentals of IPAC were insufficient. Reports on the condition of the province's IPAC programs highlighted the following:

- In Chapter 2 of the *Final Report of the Ontario Expert Panel on SARS and Infectious Disease Control* ("Walker Report"),<sup>6</sup> there is a clear mandate to "articulate the core foundational elements for a formal program of infection control in all acute and non-acute facilities, including necessary resources". This outlined the need to develop comprehensive provincial infection control standards of practice for all health care settings in Ontario, including acute and non-acute care hospitals, long-term care facilities and primary care/community settings. Available online at: [http://www.health.gov.on.ca/english/public/pub/ministry\\_reports/walker04/chapter\\_2.pdf](http://www.health.gov.on.ca/english/public/pub/ministry_reports/walker04/chapter_2.pdf).
- In 2006 Mr. Justice Archie Campbell, in the final report of the independent SARS Commission, recommended "that the Ministry of Health ensure that all Ontario hospitals have infection control personnel, resources and program components, including surveillance, control and education, consistent with Canadian recommendations and best practices".<sup>7</sup> Available online at: [http://www.health.gov.on.ca/english/public/pub/ministry\\_reports/campbell04/campbell04.pdf](http://www.health.gov.on.ca/english/public/pub/ministry_reports/campbell04/campbell04.pdf).

In 2004 the Ministry of Health and Long-Term Care responded to many of the interim recommendations by introducing *Operation Health Protection: An Action Plan to Prevent Threats to our Health and to Promote a Healthy Ontario*<sup>8</sup>, a 3-year action plan to revitalize the public health system. This plan included clear direction regarding infection control and communicable disease capacity in the province. Many of the planned actions have been implemented, such as the formation of the Provincial Infectious Diseases Advisory Committee (PIDAC), the Regional Infection Control Networks (RICN) and the Ontario Agency for Health Protection and Promotion (OAHPP).

Regional Infection Control Networks (RICN) do not replace local IPAC capacity and resources, but support and enhance the planning, coordination and integration being undertaken at the local level. The RICN strengthen the coordination between IPAC activities at acute and non-acute facilities and public health communicable disease control activities and identify gaps and trends within the region. The RICN may be called upon to assist with mentorship of new infection control professionals or to provide education or training resources to a facility or region. More information on the RICN may be found at: <http://www.ricn.on.ca>.

The IPAC requirements of legislative bodies, such as Ontario's *Occupational Health and Safety Act*,<sup>9</sup> the *Public Hospitals Act*<sup>10</sup> and the *Long-Term Care Homes Act*,<sup>11</sup> must be followed in all health care settings where they apply. See Section II.4, 'Compliance with Legislation and Accreditation Standards', for applicable references to legislation.

Health care settings must work with organizations that have IPAC expertise, such as academic health science centres, Regional Infection Control Networks, public health units that have professional staff certified in infection prevention and control and local IPAC associations (e.g., Community and Hospital Infection Control Association – Canada chapters), to develop their IPAC programs.

- For a list of recommended IPAC resources, refer to Appendix A, 'Resources for Infection Prevention and Control'.

## 1. About This Document

The purpose of this document is to provide recommendations for:

- a) specific activities for IPAC programs across the continuum of health care delivery in Ontario; and
- b) adequate and appropriate resource allocation for IPAC programs across the continuum of health care delivery.

This document is targeted to senior administration, administrators in local health integration networks, medical officers of health and others in a management role. IPAC programs will also find these best practices useful for prioritizing and developing their programs and engaging in strategic planning activities for the future.

***The responsibility for the infection prevention and control program in the health care setting lies primarily with the senior administration of the organization. Implementation of the program rests not only with the IPAC team, but also with nursing managers, Environmental Services, OHS, directors of medical services, central reprocessing and other departments and individuals in the facility impacted by the effective delivery of the IPAC program.***

## 2. Evidence for Recommendations

The best practices in this document reflect the best evidence and expert opinion available at the time of writing. As new information becomes available, this document will be reviewed and updated.

**The recommendations in this document are based on Level AII evidence unless stated otherwise.** Level AII evidence is good evidence to support a recommendation for use with evidence from at least one well-designed clinical trial without randomization, from cohort or case-controlled analytic studies, preferably from more than one centre, from multiple time series, or from dramatic results in uncontrolled experiments (source: Public Health Agency of Canada).

## 3. How and When to Use This Document

### FOR RECOMMENDATIONS IN THIS DOCUMENT:

- “**shall**” indicates mandatory requirements based on legislated requirements or national standards (e.g., Canadian Standards Association – CSA);
- “**must**” indicates best practice, i.e., the minimum standard based on current recommendations in the medical literature;
- “**should**” indicates a recommendation or that which is advised but not mandatory; and
- “**may**” indicates an advisory or optional statement.

It is expected that all settings in Ontario where health care is provided, across the continuum of health care, will comply with the basic IPAC practices and principles set out in this document. This includes settings where emergency (including pre-hospital) care is provided, hospitals,<sup>12, 13</sup> long-term care homes, outpatient clinics, community health centres and clinics, public health clinics, physician offices, dental offices, offices of allied health professionals and home health care.

Access to IPAC expertise is required in all health care settings, including the community and clinics, so that the recommendations in this document may be met. For non-institutional settings, guidance may be sought from other sources of published recommendations, for example:

- College of Physicians and Surgeons of Ontario's "*Infection Control in the Physician's Office*"<sup>14</sup>
- Canadian Standards Association's "*Infection prevention and control in office-based health care and allied systems*"<sup>15</sup>

#### **4. Occupational Health and Safety (OHS)**

Health care facilities are required to comply with applicable provisions of the *Occupational Health and Safety Act* (OHS Act), R.S.O. 1990, c.0.1 and its Regulations.<sup>16</sup> Employers, supervisors and workers have rights, duties and obligations under the OHS Act. Specific requirements under the OHS Act are available at:

[http://www.e-laws.gov.on.ca/html/statutes/english/elaws\\_statutes\\_90o01\\_e.htm](http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90o01_e.htm).

The *Occupational Health and Safety Act* places duties on many different categories of individuals associated with workplaces, such as employers, constructors, supervisors, owners, suppliers, licensees, officers of a corporation and workers. A guide to the requirements of the *Occupational Health and Safety Act* is available at:

<http://www.labour.gov.on.ca/english/hs/pubs/ohsa/index.php>.

Specific requirements for certain health care and residential facilities may be found in the *Regulation for Health Care and Residential Facilities*,<sup>9</sup> available at:

[http://www.e-laws.gov.on.ca/html/regs/english/elaws\\_regs\\_930067\\_e.htm](http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_930067_e.htm).

In addition, the OHS Act section 25(2)(h), the 'general duty clause', requires an employer to take every precaution reasonable in the circumstances for the protection of a worker. There is a general duty for an employer to establish written measures and procedures for the health and safety of workers, in consultation with the joint health and safety committee or health and safety representative, if any. Such measures and procedures may include, but are not limited to, the following:

- a) safe work practices;
- b) safe working conditions;
- c) proper hygiene practices and the use of hygiene facilities; and
- d) the control of infections.

At least once a year the measures and procedures for the health and safety of workers shall be reviewed and revised in the light of current knowledge and practice. The employer, in consultation with the joint health and safety committee or health and safety representative, if any, shall develop, establish and provide training and educational programs in health and safety measures and procedures for workers that are relevant to the workers' work.

A worker who is required by his or her employer or by the *Regulation for Health Care and Residential Facilities* to wear or use any protective clothing, equipment or device shall be instructed and trained in its care, use and limitations before wearing or using it for the first time and at regular intervals

thereafter and the worker shall participate in such instruction and training. The employer is reminded of the need to be able to demonstrate training, and is therefore encouraged to document the workers trained, the dates training was conducted, and materials covered during training. Under the *Occupational Health and Safety Act*, a worker must work in compliance with the Act and its regulations, and use or wear any equipment, protective devices or clothing required by the employer.

- For more information, contact your local Ministry of Labour office. A list of local Ministry of Labour offices in Ontario may be found at <http://www.labour.gov.on.ca/>.

## II. BEST PRACTICES FOR INFECTION PREVENTION AND CONTROL PROGRAMS IN ONTARIO

### TERMS USED IN THIS DOCUMENT (see glossary for details and examples):

**Health Care Provider:** Any person delivering care to a client/patient/resident

**Staff:** Anyone conducting activities within a health care setting (includes health care providers)

### 1. What are Health Care-Associated Infections (HAIs)?

HAIs are defined as infections that occur as a result of health care interventions in any health care setting where care is delivered. Some examples of HAIs include bloodstream, post surgical, urinary, respiratory, gastrointestinal, skin and soft tissue infections.<sup>17</sup> Factors that increase the risk to clients/patients/residents for development of HAIs include advanced age; underlying illness; complex treatment modalities; the emergence of novel infectious agents; emergence of community-associated communicable diseases<sup>18</sup>; prevalence of antibiotic-resistant organisms (AROs)<sup>19</sup>; and international travel. All of these factors have heightened the need to identify, prevent, control and treat infections in a systematic fashion in order to improve patient and community safety and to decrease health care costs.

HAIs remain a patient safety issue and represent a significant adverse outcome of the health care system.<sup>20-24</sup> With the changing trends in health care that have resulted in the provision of complex treatments outside of the acute care setting (e.g., ambulatory care, physician office and home settings), the need for IPAC programs spans the continuum of health care settings.

The acquisition of occupationally-acquired infections may pose a risk to health care providers; however, following Routine Practices and Additional Precautions, including an appropriate risk assessment, will minimize this risk.

***Patients with one or more HAIs during their in-patient stay remain in hospital longer and incur costs on average three times greater than uninfected patients.***

### 2. Adverse Health Care Events and HAIs

It is estimated that 5% to 10% of hospitalized patients acquire an infection after admission to hospital.<sup>25</sup> It has also been shown that patients with HAI remain in hospital longer on average than patients without infection,<sup>26,27</sup> with the longest hospital stay and highest costs associated with multiple infections.

Infections and AROs result in significant morbidity, mortality and economic costs to the health care system.<sup>19, 21, 22, 24, 25, 28-31</sup> In the U.S., HAIs can contribute to approximately one-third of unexpected in-hospital deaths.<sup>32</sup> Based on U.S. estimates of infection<sup>13</sup> and using the observed incidence of HAIs and the average number of hospital discharges, it has been estimated that 220,000 incidents of HAI occur each year in Canada, resulting in more than 8,000 deaths.<sup>33</sup>

The fear of acquiring an HAI may also impact the client/patient/resident's and community's confidence in the delivery of health care.

### 3. The Cost of HAIs

HAIs have a significant impact on health care spending as a result of prolonged hospital stay,<sup>26, 27, 34</sup> readmissions,<sup>26</sup> increasing consumption of costly resources<sup>25-27</sup> and, occasionally, legal and litigation costs.

The emergence of AROs has also resulted in increased cost to the health care system. It is estimated that AROs increase the annual direct and indirect costs to patients by an additional \$40 to \$52 million in Canada.<sup>19, 35</sup> Expenses associated with HAIs include readmission due to infection; prolonged length of stay; prolonged wait times; longer staff hours; requirement for additional treatments, laboratory testing and antimicrobial use; and increased surveillance activities, single room accommodation for IPAC purposes, PPE, cleaning supplies and outbreaks, all of which increase the cost of providing health care.<sup>19, 25, 26, 36-38</sup>

Some cost estimates recently reported in Canada and the U.S. include:

- a) the median cost associated with methicillin-resistant *Staphylococcus aureus* (MRSA) can be almost two times greater than the cost of methicillin-sensitive *Staphylococcus aureus* in a long-term care facility<sup>39</sup> and more than twice the cost in acute care facilities<sup>40</sup>;
- b) in acute care, the cost for precautions and management of patients colonized and/or infected with MRSA continues to increase:
  - i) colonization with MRSA cost CAD \$1,363 per patient in 1997<sup>36</sup> and now costs CAD \$8,841 per patient<sup>40</sup>;
  - ii) infection with MRSA cost CAD \$14,360 per patient in 1997<sup>36</sup> and now costs CAD \$27,661<sup>40</sup>;
  - iii) in a 2007 Canadian study, the cost per day for contact precautions was CAD \$172.81 and the cost of MRSA control per patient was CAD \$2,937<sup>41</sup>;
  - iv) the incremental cost to prevent a case of nosocomial MRSA, from the hospital perspective, is under \$20 (2005 CAD); this figure takes into account the cost of hospital control programs versus the cost of MRSA colonization and infection; it does not take into account societal costs of MRSA, which are significant<sup>40</sup>;
- c) the mean cost of interventions to reduce the rate of extended-spectrum beta lactamase-producing Enterobacteriaceae (ESBL) is CAD \$3,191 per case<sup>42</sup>; and
- d) in long-term care, outbreaks result in significant cost to the organization; some examples:
  - i) scabies outbreak cost CAD \$200,000 to control<sup>43</sup>;
  - ii) outbreak of adenoviral conjunctivitis cost US \$29,527<sup>44</sup>;
  - iii) VRE outbreak cost CAD \$12,061 to control<sup>45</sup>;
  - iv) mean cost of a case of influenza-like illness is US \$968 +/- \$1806<sup>46</sup>; and
  - v) oseltamivir prophylaxis during an influenza outbreak was estimated to cost CAD \$2,331 per 100 residents.<sup>47</sup>

In summary, the impact of HAIs on health care delivery efficiencies and client/patient/resident outcomes is significant. An effective IPAC program can reduce this impact and the costs associated with HAIs.<sup>48</sup>

## 4. Patient Safety and Infection Prevention and Control

The safety culture of an organization is the product of individual and group values, attitudes, perceptions, competencies and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organization's health and safety management. Organizations with a positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety and by confidence in the efficacy of preventive measures.

Many national and international groups have focused their attention on infections as an issue in patient safety with campaigns such as:

- *Safer Healthcare Now!* (Canadian Patient Safety Institute):  
<http://www.saferhealthcarenow.ca/EN/Pages/default.aspx>
- *5 Million Lives* (U.S. Institute for Healthcare Improvement):  
<http://www.ihl.org/IHI/Programs/Campaign/>
- *Clean Care is Safer Care* (World Health Organization):  
[http://www.who.int/patientsafety/events/05/global\\_challenge/en/index.html](http://www.who.int/patientsafety/events/05/global_challenge/en/index.html)

Infection prevention and control is a key priority of Ontario's patient safety agenda. Public reporting of hospital infections and hand hygiene compliance was initiated in Ontario in 2008 as a means of improving quality of care while ensuring both transparency and accountability. IPAC is a critical component of patient safety, as HAIs are by far the most common complication affecting hospitalized patients and many patient safety indicators have long been IPAC indicators. In order to protect

clients/patients/residents and staff and to reduce the costs of HAIs, it is necessary to prevent infections before they occur. Not all HAIs can be prevented, but a recent systematic review suggests that at least 20% could be prevented through effective IPAC strategies.<sup>49</sup>

***"The human and economic burdens that HAIs place on Canadians and their health care system speak to the importance of an effective Infection Prevention and Control Program."***

Public Health Agency of Canada

## 5. Impact of IPAC Programs

IPAC programs have been shown to be both clinically effective and cost-effective,<sup>12, 24, 38, 50, 51</sup> providing important cost savings in terms of fewer HAIs, reduced length of hospital stay, less antimicrobial resistance and decreased costs of treatment for infections.<sup>13, 34, 52-57</sup> The Public Health Agency of Canada (PHAC) has outlined the human and economic perspectives of HAIs, demonstrating the rationale and need for appropriate and adequate resources for IPAC programs.<sup>35</sup>

Prevention and control of HAIs is a legal obligation in many countries, including the Netherlands,<sup>58</sup> Germany<sup>59</sup> and Belgium.<sup>60</sup> Several reliable authorities have published comprehensive guidelines for the practice of infection prevention and control in a variety of health care settings including acute care, long-term care and out-of-hospital settings.<sup>61-63</sup> Evidence of the efficacy of infection surveillance and control programs was first established by the Study on the Efficacy of Nosocomial Infection Control (SENIC) project, which was conducted between 1974 and 1983.<sup>13</sup> This project demonstrated that 32% of nosocomial infections in acute care involving four major sites (bloodstream, surgical wound, urinary tract and respiratory tract) could be prevented with infection surveillance and control programs. Several subsequent studies have supported the efficacy of IPAC activities in reducing the number of infections, improving survival, reducing morbidity and shortening the length of hospital stay.<sup>54, 64-69</sup> There is also evidence that concerted interventions can substantially reduce MRSA transmission, even in MRSA-endemic settings.<sup>70</sup>

A Canadian survey of acute care hospitals identified deficits in several components of effective IPAC programs, including appropriate staffing levels, surveillance activities and access to laboratories.<sup>33</sup> In long-term care, a 2005 survey showed that IPAC resources and programming fell far short of the suggestions of Canadian and United States experts.<sup>71</sup> To improve health care safety and cost-efficiencies in Ontario, appropriately resourced IPAC programs must be a standard of practice. While the final accountability rests with the administration of the organization, IPAC programs that have the required expertise and resources will assist and support the organization to improve patient safety by protecting clients/patients/residents, health care providers, visitors and others from HAIs, with the added benefit of reducing costs to the health care system.<sup>24, 25, 61</sup>

## **6. Mandate/Goals and Functions of the IPAC Program**

The goals of an IPAC program are:

- a) to protect clients/patients/residents from HAIs, resulting in improved survival rates, reduced morbidity associated with infections, shorter length of hospital stay and a quicker return to good health; and
- b) to prevent the spread of infections from patient-to-patient, from patients to health care providers, from health care providers to patients, from health care providers to health care providers and to visitors and others in the health care environment.

These goals are relevant to care activities across the spectrum of health care settings including acute care, complex continuing care, rehabilitation hospitals, long-term care homes, ambulatory settings and home health care programs.<sup>61-63</sup>

In order to achieve these goals in a cost-effective manner, an active, effective, organization-wide IPAC program must be developed and continuously supported by senior administration.

The core functions of IPAC in both hospital and non-hospital settings focus on strategies to protect clients/patients/residents, staff and others from exposures to infections. These include:

- a) management of critical data and information, including surveillance for nosocomial and other infections;
- b) implementation of evidence-based practice, standards and guidelines through setting-specific policy and procedure;
- c) direct interventions to prevent the transmission of infection, including outbreak prevention and control;
- d) effective occupational health programs (including healthy workplace policies and immunization services);
- e) education and training of health care providers, clients/patients/residents and their families;
- f) timely communication of infection-related issues and relevant practices to leaders and staff to facilitate improvement; and
- g) ongoing evaluation and continuous improvement of the IPAC program.

The success of an IPAC program is defined by the organization's effectiveness in preventing the occurrence, or limiting the spread, of HAIs. The selection of appropriate process and outcome surveillance indicators will reflect the specific goals of the organization (see Section II.9.A, "Surveillance"). In particular, outcome indicators should reflect the efficacy of the organization in protecting clients/patients/residents, health care providers, visitors and others from HAIs as well as determine the cost-effectiveness of the program activities.

**Recommendations:**

1. **All health care settings in Ontario must assess needs for, develop, provide and evaluate an active, effective IPAC program that meets the mandate and goal to decrease the risk of health care-associated infections and improve health care safety.**
2. **Continuing support for the IPAC program must be an organizational priority.**

## **7. Structure and Elements of the IPAC Program**

IPAC activities should be based on a continuous quality improvement approach where the processes and outcomes are continuously reviewed and improved. Prior to implementing an IPAC program, and periodically thereafter, there should be an initial review of the entire facility or organization for the strengths, weaknesses, opportunities and threats related to IPAC practices (i.e., SWOT analysis). The results from this analysis may be used to assist in prioritizing the needs of the program and should be strategically aligned with organizational priorities. This is a dynamic process that needs to be flexible enough to respond to evolving organizational needs.

### **A. Structure of the IPAC Program**

Individuals with appropriate academic and practice credentials, training and experience related to health care IPAC programs are responsible for directing IPAC activities including implementing, monitoring and evaluating the IPAC program with the support of senior administration and the infection prevention and control committee (IPACC). The ICP(s) should have direct access to the Senior Management individual who is accountable for the organization's program and who can facilitate the actions that are required.

### **B. Elements of the IPAC Program**

The elements of the IPAC program must be based on the type of health care setting. Elements of this program will fall under the responsibility of, and have resource implications for, other areas and departments of the facility as well as IPAC (e.g., OHS, Laboratory Services, Environmental Services).

IPAC programs should include the following:

- a) a hand hygiene program;
- b) surveillance based on systematic data collection to identify infections, subsequent analysis of data and timely dissemination of results to persons who require the data to make improvements;
- c) a system of precautions to reduce the risk of transmission of infectious agents (i.e., Routine Practices, Additional Precautions);
- d) continuing education for health care providers in IPAC;
- e) education for clients/patients/residents and visitors;
- f) a system for detection, investigation and control of health care-associated outbreaks;
- g) IPAC policies and procedures;
- h) process audits;
- i) a resident health program that addresses the prevention and control of infectious disease in long-term care homes (e.g., immunization);
- j) elements of an occupational health program for health care providers related to transmission of microorganisms;
- k) an antimicrobial stewardship program;
- l) reportable disease reporting to public health authorities;

- m) timely access to microbiology laboratory reports and expertise;
- n) active participation in facility maintenance standards and all phases of facility design and construction/renovation;
- o) product review and evaluation;
- p) review of care policies and procedures for practices impacting on IPAC;
- q) continuous quality improvement activities related to HAIs and IPAC activities;
- r) review of practices for reprocessing of equipment;
- s) review of practices for environmental cleaning; and
- t) participation in research activities for programs affiliated with academic health science centres, teaching hospitals and other settings that have the capability of doing these activities.

**Recommendations:**

- 3. Health care settings must evaluate their IPAC needs and then implement an IPAC program suited to those needs.**
- 4. Periodic review of the IPAC program must be carried out to reassess the organization's needs and to determine which elements are required to continue to meet the goals of the program for that health care setting.**
- 5. Senior administration and the infection prevention and control committee must support the implementation and execution of the IPAC program by the IPAC staff.**

## **8. The Infection Prevention and Control Committee (IPACC)**

All health care facilities must have a formal committee structure to oversee the activities of the IPAC program. In larger hospitals this should take the form of an Infection Prevention and Control Committee (IPACC).

***The IPACC and its members should act as advocates and role models for the program and for practicing infection prevention and control best practices.***

Smaller organizations or other health care settings should consider implementing an IPACC or include IPAC issues as a standing agenda item for other committees. All facilities and agencies accredited by Accreditation Canada will require an IPACC.

This multidisciplinary committee should report to the Board of Directors through the Medical Advisory Committee (for hospitals) and/or Senior Management.

This committee is responsible for:

- a) reviewing and approving the annual goals of the IPAC program;
- b) evaluating the results of the activities developed to meet those goals;
- c) bringing to the attention of senior administration issues dealing with compliance with relevant legislation;
- d) ensuring that the IPAC recommendations and standards of the Ministry of Health and Long-Term Care, Canadian Standards Association, Public Health Agency of Canada and specific accrediting bodies and other recognized organizations are being followed in the health care setting;
- e) advocating for resources necessary to accomplish the goals of the program; and
- f) reviewing patient safety/risk management/quality assurance initiatives related to HAIs.

Members of this committee should be multidisciplinary<sup>72</sup> and include<sup>63</sup>:

- a) the IPAC professional(s) (ICPs);
- b) the IPAC physician (or the medical director in non-acute facilities);
- c) OHS representative;
- d) Public Health representative;
- e) Environmental Services representative;
- f) senior nursing representative(s) from key clinical programs;
- g) senior medical representative(s) from key clinical programs;
- h) senior management representative.

Other members may be added depending on the organization's programs and needs. For instance, in acute care settings these might include:

- a) specialist in microbiology;
- b) pharmacy representative;
- c) central equipment reprocessing area(s) representative;
- d) operating room representative;
- e) epidemiologist;
- f) infectious diseases representative;
- g) quality assurance/risk management representative.

The IPACC in hospitals reports to the Medical Advisory Committee (MAC)<sup>10</sup> and other designated committees as appropriate. Minutes of meetings must be kept and be circulated to Senior Administration and to the Board of Directors via the MAC in acute care; to Senior Administration in non-acute care; and to designated subcommittees. In long-term care settings, consideration should be given to providing the Residents' Council with meeting minutes.

For very large organizations there may be variations in committee membership, roles and responsibilities. Focused clinical committees might carry out the mandates of the program in specialized areas, in addition to the formal IPAC Committee (e.g., transplant units, dialysis units and burn units).

The IPACC must meet often enough to meet the objectives of the IPACC and Accreditation Canada; and to properly discharge its responsibilities to review IPAC surveillance data and related analyses, approve policies and monitor program goals and activities.<sup>59, 60</sup>

**Recommendation:**

- 6. Each health care facility shall have a multidisciplinary infection prevention and control committee whose responsibilities include annual goal-setting, program evaluation and ensuring that the IPAC program meets current legislated standards and requirements as well as the requirements of the facility.**

## 9. IPAC Program Functions

IPAC program functions are a collaboration of a multidisciplinary team that includes representation from IPAC. They require accountability from all areas and organization-wide support.

### A. Surveillance

**NOTE: Details regarding surveillance methodology may be found in PIDAC's *Best Practices for Surveillance of Health Care-Acquired Infections in Patients and Residents*<sup>4</sup> [available at: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best\\_prac/bp\\_hai.pdf](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best_prac/bp_hai.pdf)].**

A well-designed surveillance program is essential for performing all of the other necessary activities of the IPAC program.<sup>61, 63</sup> The collection, analysis and dissemination of surveillance data has been shown to be an important factor in the prevention of HAIs.<sup>13</sup> The IPAC program and the IPACC must clearly define what surveillance indicators will be collected, analyzed, benchmarked and reported, then verify that the necessary actions are taken. The type and method of surveillance should be based on the types of infection most important to the health care setting and to the care or services provided and the population served.<sup>73</sup> Surveillance for some processes and outcomes is appropriately monitored on a continual basis; others may be monitored periodically.

Some surveillance systems (e.g., ventilator-associated pneumonia) are specific to a particular facility or agency. Others (e.g., central line-associated bacteraemia in oncology patients) are specific to a client/patient/resident population, whose members may be cared for by staff from multiple facilities or agencies. IPAC program leads must consider which infections are important sources of morbidity and mortality for their clients/patients/residents, and collaborate with other agencies to support needed surveillance programs.

In Ontario, public reporting of specific IPAC indicators has been in place since 2008, with the goal of improving performance and enhancing patient safety. IPAC indicators should be used to drive quality improvement within facilities and should not be used in a punitive way. While public reporting of infections can serve to provide transparency regarding hospital outcomes, there is concern that misuse of these indicators could be counter-productive and hinder patient safety as resources are increasingly diverted away from the evidence-based interventions and prevention strategies most likely to benefit patients.<sup>74, 75</sup>

- For more information about Ontario's Patient Safety initiatives, visit: [http://www.health.gov.on.ca/patient\\_safety/public/ps\\_pub\\_initiative.html](http://www.health.gov.on.ca/patient_safety/public/ps_pub_initiative.html).

There are two types of IPAC surveillance: **process** surveillance and analysis; and **outcome** surveillance and analysis. Both measures will reflect the efficacy of the program in protecting the clients/patient/resident, health care provider and visitor from HAIs while decreasing costs from infections.

***The outcome of surveillance should be an action plan for improvement.***

#### 1. Process Surveillance

Process surveillance (i.e., ongoing audit of practice) is done to verify that procedures and/or standards of practice are being followed and an action plan is in place to improve practice. One of the advantages of process audits is that the feedback given to providers is immediate. Process audits are based on validated evidence that has been demonstrated to improve outcomes.

Ongoing audits of practices must be done to monitor IPAC processes in health care facilities. Audit results should be analyzed and reported back to the audited area in a timely fashion. A plan for improvement, including organizational accountability, should be developed by the audited area in conjunction with IPAC, based on the results of the audit.

**Practice audits are the joint responsibility of the IPAC program and the area delivering the process being audited.**

#### Process Surveillance Indicators

Targeted audits should be performed in all health care settings.<sup>76-78</sup> Ambulatory care centres that carry out invasive procedures (e.g., surgery, urgent care) should use acute care process surveillance indicators. Some recommended specific audits are summarized in Table 1 and include:

##### a) Client/patient/resident process surveillance indicators:

- i) adherence to screening protocols for AROs according to PIDAC's, 'Annex A: Screening, Testing and Surveillance for Antibiotic-Resistant Organisms (AROs)'<sup>79</sup>;
- ii) adherence to screening protocols for acute respiratory infection (ARI) according to PIDAC's 'Annex B: Best Practices for Prevention of Transmission of Acute Respiratory Infection'<sup>80</sup>;
- iii) adherence to screening protocols for acute gastrointestinal (GI) illness in clients/patients/residents;
- iv) adherence to screening protocols for tuberculosis in clients and residents in long-term care facilities/homes and home health care<sup>81</sup>;
- v) vaccination rates of residents who receive influenza and pneumococcal vaccine<sup>82</sup>;
- vi) adherence to screening protocols for hepatitis,<sup>83</sup> MRSA and VRE in hemodialysis patients<sup>84, 85</sup>; and
- vii) appropriateness of surgical antimicrobial prophylaxis for prevention of surgical site infections.<sup>86, 87</sup>

##### b) Staff process surveillance indicators in collaboration with Occupational Health:

- i) adherence to screening protocols for employees at risk of occupational exposure to tuberculosis<sup>88</sup>;
- ii) vaccination rates in staff, including annual influenza vaccination rates<sup>82</sup>;
- iii) sharps injury<sup>89, 90</sup>;

##### c) Practice audits:

- i) adherence to practices relating to interventions that reduce the risk of infection associated with central lines<sup>91-93</sup>;
- ii) adherence to practices relating to interventions that reduce the risk of infection associated with ventilator use<sup>94, 95</sup>;
- iii) adherence to practices relating to interventions that reduce the risk of infection associated with surgical procedures<sup>86, 87</sup>;
- iv) adherence to hand hygiene protocols<sup>96-98</sup>;
- v) adherence to Routine Practices protocols, including wearing of personal protective equipment appropriately and correctly<sup>2, 3</sup>;
- vi) adherence to sterilization and disinfection protocols (including the management of single-use devices) throughout the health care setting to verify that current standards from the MOHLTC,<sup>99</sup> Canadian Standards Association [website: <http://www.csa.ca>] and the Public Health Agency of Canada<sup>96</sup> are being followed with regard to reprocessing of medical equipment;
- vii) adherence to IPAC protocols related to construction/renovation sites<sup>100, 101</sup>;
- viii) adherence to environmental cleaning protocols<sup>96, 102</sup>; and
- ix) adherence to practices to limit urinary catheter use.<sup>103</sup>

- d) **Antimicrobial utilization** in acute and other settings is reviewed by an appropriate committee, group or delegate and recommendations are made based on current scientific guidelines/recommendations for selection of antimicrobials and prudent prescribing of antimicrobial agents. It is recommended that utilization be reported to the IPACC annually.<sup>63, 104</sup>

**Table 1: Recommended Process Surveillance Indicators**

Surveillance Component	Reference #	Acute Care	CCC	LTC	HHC
Adherence to ARO screening protocols for clients/patients/residents	79	✓	✓	✓	
Adherence to ARI screening protocols for clients/patients/residents	80	✓	✓	✓	✓
Adherence to screening protocols for tuberculosis in clients/residents	81		✓	✓	
Adherence to screening protocols for acute GI infection in clients/patients/residents		✓	✓	✓	✓
Influenza vaccination rates (clients/residents)	82		✓	✓	
Pneumococcal vaccination rates (clients/residents)	82		✓	✓	
Adherence to screening protocols for hepatitis, MRSA and VRE in hemodialysis patients	83-85	✓	✓	✓	
Staff tuberculosis screening	81	✓	✓	✓	✓
Staff vaccination rates including annual influenza vaccination	82	✓	✓	✓	✓
Sharps injury surveillance	89, 90	✓	✓	✓	✓
Adherence to central line protocols	91-93	✓	✓	✓	✓
Adherence to ventilator use protocols	94, 95	✓	✓		
Adherence to protocols related to surgical procedures (e.g., pre-operative antibiotic use)	86, 87	✓			
Adherence to hand hygiene protocols	96-98	✓	✓	✓	✓
Adherence to Routine Practices protocols, including the correct use of PPE	2, 3	✓	✓	✓	✓
Adherence to reprocessing practices protocols	96, 105	✓	✓	✓	✓
Adherence to environmental cleaning protocols	96, 102	✓	✓	✓	
Adherence to IPAC construction/renovation protocols	100, 101	✓	✓	✓	
Adherence to recommendations of the antimicrobial stewardship program	63, 104, 106	✓	✓	✓	
Adherence to practices to limit urinary catheter use	103	✓	✓	✓	✓
Legend: CCC = Complex Continuing Care LTC = Long-term Care HHC = Home Health Care					

## 2. Outcome Surveillance

Outcome surveillance monitors definable events or outcomes, such as surgical site infections, in a specific population. Surveillance must be targeted to the specific needs of the organization. Results should be accompanied by an action plan that will lead to quality improvement.

***The goals of outcome surveillance are to identify clusters and outbreaks (i.e., increases above baseline levels), to compare infection rates to external benchmarks and to measure internal improvement over time.***

The outcome surveillance process consists of collecting data on individual cases to determine whether or not an HAI is present based on defined criteria. The surveillance process should incorporate the following elements<sup>61</sup>:

- a) the identification and description of the problem or event to be studied;
- b) the definition of the population at risk;
- c) the selection of the appropriate methods of measurement, including statistical tools and adjustment for client/patient/resident risk factors;
- d) the identification and description of data sources and methods;
- e) the definition of numerators and denominators;
- f) benchmarks used for comparison;
- g) analysis of results and recommendations for targeted improvements; and
- h) preparation and timely distribution of reports to appropriate groups for action.

### *Data Collection and Definitions for Outcome Surveillance Indicators*

Individuals performing infection surveillance must have access to all data and information systems required to perform these activities (e.g., laboratory results, admission records, client/patient/resident medical records, imaging results). This should include access to computerized databases that are required for accurate and complete identification and analysis of the infectious complications of health care.

Outcome surveillance data should be used for:

- a) planning IPAC strategies;
- b) detecting outbreaks;
- c) directing continuing education;
- d) identifying interventions for modifiable client/patient/resident risks; and
- e) measuring results of targeted improvement strategies.

Outcome surveillance requires objective, valid definitions of infections. The definitions used for surveillance must be relevant to settings inside and outside of the acute care environment.<sup>107-110</sup> Most acute care surveillance definitions are based on the National Healthcare Safety Network (NHSN) system<sup>17</sup> but there are no standards for outcome surveillance in long-term care, home care, or ambulatory care settings. NHSN definitions<sup>111</sup> rely heavily on laboratory data and recorded clinical observations.

Outcome surveillance is important in all health care facilities to enable appropriate management and precautions.<sup>112</sup> In non-hospital facilities, radiology and microbiology data are not readily available and clinical notes may be brief. Detection of HAIs in non-hospital facilities often depends on recognition of signs and symptoms of infection by staff.<sup>63</sup> Modified long-term care-specific surveillance criteria have been developed by a Canadian consensus panel<sup>110</sup> and surveillance definitions for home health care and hospice settings have recently been published in the U.S.<sup>113</sup>

Facilities must adapt surveillance systems to balance the availability of resources with priorities for data collection, population needs and institutional objectives. Wherever possible, ICPs should use

established database systems available in their health care system to obtain denominator data. This can facilitate functional collaboration between and among programs to work together to improve care.

#### *Analysis, Benchmarking and Reporting Outcome Indicators*

Infections should always be expressed as a rate, not as a count (i.e., numbers of infections). Baseline infection rates should be established to track progress, determine trends and detect outbreaks and for comparison to other facilities and external benchmarks. Analysis and reporting of infection case data should be done on a regular basis (e.g., monthly, quarterly, annually) to detect trends.

Selection of specific events to be monitored should be guided by validated, nationally and/or internationally, available benchmarks appropriately adjusted for client/patient/resident risks, so that meaningful comparisons can be made. Recognized benchmark data for infection rates outside acute care are not readily available, thus each organization should monitor its own data for trends.

Comparison of infection rates within and among organizations requires:

- a) use of the same methodology;
- b) careful evaluation of variations in client/patient/resident characteristics in different facilities;
- c) access to, and use of, diagnostic tests; and
- d) resources available in each setting to ensure the completeness and accuracy of the surveillance.

For those facilities that have been doing standardized surveillance for a number of years, current rates may be compared with their own past experience to gauge progress. In acute care settings, the NHSN database<sup>17</sup> for infections with aggregate data collected from 300 U.S. acute care facilities may be used for benchmarking until such time as there is a Canadian national database for comparison.

Aggregate non-nominal surveillance analyses and information should be reported to the appropriate designated individuals/committees in a timely fashion.<sup>114</sup> Development of a plan of action to address any issues arising from the surveillance information is vital. The ICP may use reports from nursing staff, chart review, laboratory or radiology reports, treatment review and clinical observations as sources of information to identify trends or issues. Whenever possible, reporting infection rates with the associated cost impact in terms of length of stay and/or additional costs of the infections is recommended.

The selection of external comparators should be focused on infections that may be most readily identifiable and preventable and must take into account issues such as confidentiality, uniform definitions, data elements, infrastructure of data management and data quality. Clinical performance and assessment indicators used to support external comparative measurements should meet the criteria developed by the Society for Healthcare Epidemiology of America (SHEA)<sup>115, 116</sup> and the Association for Professionals in Infection Control and Epidemiology (APIC). These indicators and their analyses must address the following parameters:

***In addition to the collection of baseline infection rates, the ICP should investigate sentinel events and unusual pathogens (e.g., group A streptococcal surgical site infections, nosocomial legionellosis).***

- a) relation to outcome or process;
- b) ability to measure variation in quality;
- c) definition of numerators and denominators;
- d) reliability, completeness and feasibility of data collection;
- e) appropriate risk adjustment;
- f) comparability of populations, severity and case-mix adjustments for external comparisons;
- g) training required for indicator implementation; and
- h) applicable benchmarks as standards of care.

### Outcome Surveillance Indicators

The IPACC should verify that surveillance is done in all health care settings in collaboration with the IPAC program. Recommended surveillance indicators are summarized in Table 2 and include:

#### a) Outcome surveillance indicators to detect clusters:

- i) surveillance for facility-acquired respiratory infection according to PIDAC's *Annex B: Best Practices for Prevention of Transmission of Acute Respiratory Infection in All Health Care Settings*,<sup>80</sup> available at:  
[http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_fri.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_fri.html);
- ii) facility-acquired acute gastrointestinal (GI) infection in clients/patients/residents;
- iii) facility-acquired group A streptococcal infection acquisition in clients/patients/residents;
- iv) skin and soft tissue infections in long-term care and complex continuing care; and
- v) staff tuberculin skin test (or interferon-gamma release assay) conversions.<sup>81</sup>

#### b) Outcome surveillance indicators to obtain facility-acquired infection rates:

- i) surveillance for facility-acquired AROs, such as MRSA and VRE, according to PIDAC's *Annex A: Screening, Testing and Surveillance for Antibiotic-Resistant Organisms (AROs) in All Health Care Settings*,<sup>79</sup> available at:  
[http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best\\_prac/bp\\_staff.pdf](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best_prac/bp_staff.pdf);
- ii) surveillance for facility-acquired *Clostridium difficile* infection according to PIDAC's *Annex C: Testing, Surveillance and Management of Clostridium difficile in All Health Care Settings*,<sup>117</sup> available at:  
[http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best\\_prac/bp\\_cdif.pdf](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best_prac/bp_cdif.pdf);
- iii) additional outcome surveillance indicators are required for facilities that perform invasive procedures or other specialized services (including ambulatory care centres):

##### a. surgical site infection (SSI) surveillance<sup>86, 87</sup> in collaboration with the department or agency that performed the surgery (e.g., acute care, ambulatory care centres that perform in-and-out surgery):

- outcome surveillance performed with analysis and benchmarking against recognized databases that use the same definitions for infection, and is appropriately adjusted for patient risk factors, has been shown to reduce the rate of surgical site infection<sup>87</sup>;
- selected procedure-specific rates are to be calculated and analyzed; the surgical procedure(s) to target for surveillance will vary. The decision on which procedure(s) to choose for surveillance is based on:
  - the type of procedure(s) done; and
  - whether high-risk procedure or high-volume procedure (e.g., total hip and knee replacements and cardiac surgical procedures have serious outcomes if infected, so they would be a priority to survey);
- the surgical site surveillance program should also be able to capture post-discharge information, as the majority of infections develop after discharge from the surgical facility;
- there should be a system to capture surgical site infections across the continuum of care using consistent definitions;
- accurate infection rates with an analysis of the data are to be reported to the surgical program; **reporting of SSI rates should be procedure-specific, not overall general surgical infection rates**;
- confidential surgeon-specific rates should be reported to the individual surgeon.

- b. **specialized programs**, such as dialysis, burn, intensive care, transplant, neonatal, oncology and cardiac, as well as free-standing facilities that perform invasive procedures, should do both process audits and outcome surveillance that are pertinent to their area, such as:
- central line-associated bloodstream infection in collaboration with the department or agency that inserted the central line (e.g., oncology, intensive care, hemodialysis)<sup>91-93</sup>;
  - facility-acquired hepatitis in hemodialysis patients<sup>84</sup>;

**Additional process and outcome surveillance should be done for critical processes or other procedures that are high risk or high volume for the health care setting.**

**Table 2: Recommended Outcome Surveillance Indicators**

Surveillance Component	Reference #	Acute Care	CCC	LTC	HHC
Facility-acquired respiratory infection in clients/patients/residents	80	✓	✓	✓	
Facility-acquired ARO in clients/patients/residents	79	✓	✓	✓	
Facility-acquired <i>Clostridium difficile</i> -associated disease in clients/patients/residents	117	✓	✓	✓	
Facility-acquired acute GI infection in clients/patients/residents		✓	✓	✓	
Facility-acquired group A streptococcal infections in clients/patients/residents		✓	✓	✓	
Staff tuberculin skin test (or interferon-gamma release assay) conversions	81	✓	✓	✓	✓
Procedure-specific surgical site infections (SSI)	86, 87	✓			✓*
Central line-associated bloodstream infections in high risk areas	91-93	✓			✓*
New acquisition of hepatitis in hemodialysis patients	84	✓	✓	✓	
Skin and soft tissue infections in clients/residents			✓	✓	

Legend: CCC = Complex Continuing Care    LTC = Long-term Care    HHC = Home Health Care

**\* in collaboration with the agency that inserted the central line/performed the surgery**

**Recommendations:**

- 7. Health care settings must monitor targeted IPAC processes with regular audits of practices.**
- 8. Health care settings must monitor targeted IPAC outcomes using surveillance for health care-associated infections in specific populations.**

9. ***Infection surveillance must include standardized collection of data using written definitions of infections, identification of risk population, methods of measurement, description of data sources and benchmarks used for comparison.***
10. ***Results of process and outcome surveillance must be analyzed and reported back in a timely fashion; a plan for improvements, including organizational accountability, must be developed by the targeted area in conjunction with Infection Prevention and Control based on the results of surveillance.***

## **B. Policies and Procedures**

An important aspect of IPAC programs is the development and ongoing review of IPAC policies and procedures that must be based on the current scientific literature and authoritative guidelines that have a positive impact on processes and prevention of HAIs. The RICN may be used as a resource.

***Health care settings should strive to incorporate all Best Practice guidelines developed by the Provincial Infectious Diseases Advisory Committee (PIDAC) into the development of IPAC policies.***

Policies and procedures must be relevant to the setting and be accessible to all staff. In establishing policies and procedures, how these will be implemented must be clearly stated, including responsible individuals.

Policies and procedures must:

- a) be practical to implement;
- b) be reviewed and audited regularly to maintain accuracy, validity and performance/compliance<sup>61-63</sup>;
- c) follow a standardized template;
- d) be linked to an educational program so that the users understand and follow the policy;
- e) be written to serve as a resource for providers responsible for their implementation; and
- f) be written in collaboration with the targeted group.

Information sources to be consulted during policy development should include:

- a) surveillance data;
- b) scientific literature;
- c) professional practice guidelines and standards; and
- d) legal requirements and regulatory standards.

Health care providers should be made aware of IPAC policies and procedures. A system for monitoring staff compliance with IPAC policies and procedures should be developed and implemented.

### **Recommendations:**

11. ***IPAC policies and procedures must be consistent with relevant legislation and standards and based on sound scientific knowledge.***
12. ***Policies and procedures must be reviewed and updated as required on a regular basis.***
13. ***Policies and procedures must be linked to educational programs and action plans for implementation must be developed.***

**14. A system for monitoring and improving staff compliance with IPAC policies and procedures must be developed and implemented.**

**C. Compliance with Legislation and Accreditation Standards**

All health care organizations are subject to regulation and oversight by various agencies, authorities and government bodies. Some regulations may be specific to extended care, home health care, or ambulatory care, whereas others are generally relevant to all health care facilities.

IPAC program staff should have appropriate access to medical or other relevant records and to staff who can provide information on the adequacy of the institution's compliance with regard to regulations, standards and guidelines.<sup>61</sup> The IPAC program should collaborate with, and provide liaison to, appropriate local and provincial public health departments for reporting of communicable diseases and related conditions and to assist with the control of infectious diseases.<sup>61</sup>

**Health Care Regulations Pertaining to Infection Prevention and Control**

*Health Protection and Promotion Act (HPPA)*<sup>118</sup>

Health care providers in Ontario shall comply with the *Health Protection and Promotion Act* which states that:

- a) "A physician or registered nurse in the extended class who, while providing professional services to a person, forms the opinion that the person is or may be infected with an agent of a communicable disease shall, as soon as possible after forming the opinion, report thereon to the medical officer of health of the health unit in which the professional services are provided". [R.S.O.1990, c.H.7,s.26; 2007, c.10, Sched. F, s.4].
- b) "The administrator of a hospital shall report to the medical officer of health of the health unit in which the hospital is located if an entry in the records of the hospital in respect of a patient in or an out-patient of the hospital states that the patient or out-patient has or may have a reportable disease or is or may be infected with an agent of a communicable disease." [R.S.O. 1990, c. H.7, s.27(1)].
- c) "The superintendent of an institution shall report to the medical officer of health of the health unit in which the institution is located if an entry in the records of the institution in respect of a person lodged in the institution states that the person has or may have a reportable disease or is or may be infected with an agent of a communicable disease." [R.S.O. 1990, c. H7, s.27(2)].
- d) "The administrator or superintendent shall report to the medical officer of health as soon as possible after the entry is made in the records of the hospital or institution, as the case may be." [R.S.O. 1990, c.H.7, s.27(3)].

➤ More information is available at:

[http://www.e-laws.gov.on.ca/html/statutes/english/elaws\\_statutes\\_90h07\\_e.htm](http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90h07_e.htm).

*Public Hospitals Act*<sup>120</sup>

Requirements of the *Public Hospitals Act* related to IPAC include:

- a) The *Hospital Management Regulation* under the *Public Hospitals Act* states: "Every board shall pass by-laws that, ... (b) provide for the organization of the medical staff, set out duties of the medical staff and set out at least, ... (vi) the establishment of one or more committees of the medical staff, including the duties and powers of such committees, to assess... infection control... and all other aspects of medical care and treatment in the hospital, ...". [R.R.O. 1990, Reg. 965, s.4]. Available at:  
[http://www.e-laws.gov.on.ca/html/regs/english/elaws\\_regs\\_900965\\_e.htm](http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_900965_e.htm).

- b) The *Hospital Management Regulation* under the *Public Hospitals Act* (section 4) requires hospital boards to “establish and provide for the operation of a health surveillance program including a communicable disease surveillance program in respect of all persons carrying on activities in the hospital... (as) set out in any applicable communicable disease surveillance protocol published jointly by the Ontario Hospital Association and the Ontario Medical Association for that disease and approved by the Minister”. [R.R.O. 1990, Reg. 965/90, s.4(1-2)]. Available at:  
[http://www.e-laws.gov.on.ca/html/regs/english/elaws\\_regs\\_900965\\_e.htm#BK3](http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_900965_e.htm#BK3).
- c) It is recommended that all health care settings follow the Communicable Disease Surveillance Protocols, developed by the Ontario Hospital Association and the Ontario Medical Association Joint Communicable Diseases Surveillance Protocols Committee in collaboration with the Ministry of Health and Long-Term Care, (*Public Hospitals Act Reg. 965*) and other legislated requirements. These protocols include: adenovirus conjunctivitis,<sup>121</sup> antibiotic-resistant organisms,<sup>122</sup> blood-borne diseases,<sup>89</sup> cytomegalovirus,<sup>123</sup> enteric diseases,<sup>124</sup> group A streptococcal disease,<sup>125</sup> herpes simplex,<sup>126</sup> influenza,<sup>127</sup> measles,<sup>128</sup> meningococcal disease,<sup>129</sup> pertussis,<sup>130, 131</sup> rubella,<sup>132</sup> scabies,<sup>133</sup> tuberculosis<sup>134</sup> and varicella/zoster<sup>135</sup> and are available at:  
<http://www.oha.com/SERVICES/HEALTHSAFETY/Pages/CommunicableDiseasesSurveillanceProtocols.aspx>.
- d) The *Hospital Management Regulation* under the *Public Hospitals Act* [R.R.O. 1990, Reg. 965, s. 22.2] states:
- (1) A hospital, when requested to do so by the Minister in writing, shall disclose information concerning indicators of the quality of health care provided by the hospital, as specified by the Minister, that relate to any or all of the following:
1. Diagnoses of hospital-acquired infections.
  2. Activities undertaken to reduce hospital-acquired infections.
  3. Mortality. [O. Reg. 257/08, s. 1]
- (2) The hospital shall disclose the information under subsection (1) through the hospital’s website and through such other means and to such other persons as the Minister may direct. [O. Reg. 257/08, s. 1]
- (3) In this section, “information” does not include identifying information as defined in subsection 4 (2) of the Personal Health Information Protection Act, 2004. [O. Reg. 257/08, s. 1]

#### *Long-Term Care Homes Act (LTCHA), O. Reg 79/10*<sup>11</sup>

Long-term care homes in Ontario must be in compliance with the LTCHA, including the provisions for program organization, surveillance for infection, outbreak management, staff and resident screening and immunization and pet programs. Available at:

[http://www.e-laws.gov.on.ca/html/statutes/english/elaws\\_statutes\\_07108\\_e.htm](http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_07108_e.htm).

#### *Accreditation Canada*<sup>136</sup>

Standards for IPAC introduced by Accreditation Canada’s accreditation program include a number of surveillance requirements; process audit requirements; education of staff/patients/visitors in IPAC; and plans for the control of outbreaks and pandemics.

#### *Occupational Health & Safety Act and Ontario Regulations*

Staff safety is addressed in these documents, such as the use of personal protective equipment; regulations pertaining to the proximity of food and drink to infectious materials; needle safety; and ceiling exposure values for biological and chemical agents.

- a) *Ontario Regulation 67/93* states that “every employer in consultation with the joint health and safety committee or health and safety representative, if any, ...shall develop, establish and put into effect measures and procedures for the health and safety of workers” [O. Reg. 67/93, S. 8], and “...such measures and procedures may deal with...**the control of infections**” [O. Reg. 67/93, S. 9(1)].<sup>9</sup> In health care settings, effective infection prevention and control is important both for the safety of those who carry on activities in the health care setting and for the clients/patients/residents receiving care in those settings. Available at: [http://www.e-laws.gov.on.ca/html/regs/english/elaws\\_regs\\_930067\\_e.htm](http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_930067_e.htm).
- b) *Ontario Regulation 474/07*: Needle safety is addressed in this Regulation.<sup>137</sup> Available at: [http://www.e-laws.gov.on.ca/html/source/regs/english/2007/elaws\\_src\\_regs\\_r07474\\_e.htm](http://www.e-laws.gov.on.ca/html/source/regs/english/2007/elaws_src_regs_r07474_e.htm).
- c) *Ontario Regulation 833*: This regulation governs control of exposure to biological or chemical agents.<sup>138</sup> Available at: [http://www.e-laws.gov.on.ca/html/source/regs/english/2005/elaws\\_src\\_regs\\_r05607\\_e.htm](http://www.e-laws.gov.on.ca/html/source/regs/english/2005/elaws_src_regs_r05607_e.htm);
- d) *Ontario Regulation 851*: The Industrial Establishments regulation related to community care.<sup>139</sup> Available at: [http://www.e-laws.gov.on.ca/html/regs/english/elaws\\_regs\\_900851\\_e.htm](http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_900851_e.htm);

### **Recommendations:**

**15. Health care settings shall be in compliance with all legal and accreditation standards that pertain to the practice of infection prevention and control.**

**16. The IPAC program should collaborate with, and provide liaison to, appropriate local and provincial public health departments for reporting of reportable diseases, including institutional respiratory and gastrointestinal outbreaks, to assist with the control of infectious diseases.**

## **D. Occupational Health and Safety Issues**

IPAC and OHS programs must work collaboratively and closely to decrease the risk of health care-acquired infections in clients/patients/residents and staff. Health care providers are exposed to infectious diseases and may also pose a risk to clients/patients/residents and other health care providers if they work while ill with a communicable disease. Non-acute care health care providers, such as those working in home health care, nursing homes, clinics and emergency medical services, should also be considered as being at risk. Health care organizations have the dual responsibility of preventing transmission of infections from clients/patients/residents to health care providers and of interrupting the spread of infections from health care providers to both clients/patients/residents and other health care providers.

While reviewing the need for IPAC resources, it is also important to consider the impact on OHS services. There must be sufficient resources to implement recommended best practices successfully. Key elements of an occupational health service include:

- a) preplacement assessment;
- b) immunization review and update;
- c) staff influenza vaccination program;
- d) TB status screening and surveillance, based on facility and activity risk assessment;
- e) exposure prevention and management;
- f) post-exposure prophylaxis; and
- g) health and safety education.

Close liaison between IPAC and OHS is essential to ensure proper exposure and outbreak management, including contact tracing. Ideally, information on health care provider vaccination status should be easily accessible and kept in a confidential, electronic database. Adequate resources to implement an annual influenza vaccine program must be in place. Education regarding prevention of blood borne pathogen exposures and access to timely post-exposure prophylaxis and follow-up is essential. Pregnant and immunocompromised health care providers may require additional considerations.

Staff who are required to wear an N95 respirator to provide care to clients/patients/residents must participate in a respiratory protection program with respirator fit-testing, at least every two years.

In an acute care setting, an occupational health service should have access to occupational physician expertise and ideally will have a certified occupational health nurse on site (CCOHN). Other health care settings should review their human resource requirements to ensure that key program elements can be accomplished.

### 1. **Joint Health and Safety Committee**

IPAC should be represented on the facility's Joint Health and Safety Committee. IPAC issues affecting OHS should be included on the committee's agenda.

### 2. **Policies and Procedures**

The IPAC component of the OHS program should be developed jointly with IPAC, including policies and procedures that address the diagnosis, treatment and prevention of infections in health care providers.

Examples of OHS policies that may require IPAC involvement include<sup>61, 140</sup>:

- a) pre-placement evaluations;
- b) immunization programs;
- c) evaluation of potentially harmful infectious exposures and implementation of appropriate preventive measures;
- d) coordination of plans for managing outbreaks involving health care providers;
- e) provision of care to health care providers for work-related infections or exposures;
- f) education regarding infection risks related to employment or special conditions; and
- g) development of guidelines for work restrictions when a health care provider has an infectious disease.

OHS policies relating to IPAC in all health care settings should comply with the *Communicable Diseases Surveillance Protocols*, developed by the Ontario Hospital Association and the Ontario Medical Association Joint Communicable Diseases Surveillance Protocols Committee in collaboration with the Ministry of Health and Long-Term Care. The *Communicable Diseases Surveillance Protocols* define the tests, examinations and vaccinations that must be done when an individual begins work in health care facilities.

***Although the Communicable Diseases Surveillance Protocols were written for acute care settings, and are mandated for hospitals under the Public Hospitals Act, they should be followed in all health care settings.***

- *Communicable Diseases Surveillance Protocols* are available at:  
<http://www.oha.com/SERVICES/HEALTHSAFETY/Pages/CommunicableDiseasesSurveillanceProtocols.aspx>.

Policies should also comply with the Public Health Agency of Canada's occupational health guidelines<sup>141, 142</sup>.

### 3. **Communicable Disease Status**

At the time of employment, all health care providers should be evaluated by an OHS clinician (or delegate) for conditions relating to communicable diseases. The evaluation should include the following<sup>61, 63</sup>:

- a) medical history, including vaccination status and assessment for conditions that may predispose staff to acquiring or transmitting communicable diseases;
- b) assessment for latent or active tuberculosis<sup>134</sup>; and
- c) serologic screening for select vaccine-preventable diseases, if indicated.<sup>128, 132, 135, 143</sup>

Immunization programs are highly effective and are a critical component of the OHS program.<sup>140, 141, 144, 145</sup> Health care providers must be offered appropriate vaccinations for communicable diseases. Vaccinations should be based on requirements such as the *Communicable Disease Surveillance Protocols*<sup>89, 127-129, 132, 135</sup> and be consistent with recommendations from the National Advisory Committee on Immunization for health care providers.<sup>82</sup> Appropriate vaccine use protects the health care provider, colleagues and the client/patient/resident.

It has been demonstrated that influenza vaccination of staff reduces influenza mortality in residents of complex continuing care and long-term care homes.<sup>82, 146, 147, 148</sup> Despite this evidence, vaccination rates among staff remain low.

Several recent publications have assessed achievable rates of healthcare worker vaccination in acute care hospitals. In general, with active multi-faceted programs with declination forms, programs can achieve rates of 55-70%.<sup>149-153</sup> Although relatively few reports of programs with mandatory vaccination exist, those that are in place have reported increases in vaccination rates to above 98%.<sup>153</sup>

- A list of U.S. healthcare organizations with policies requiring healthcare worker vaccination, with information about their policies, can be found at: <http://www.immunize.org/honor-roll>.

Staff vaccination rates should be used as a corporate patient safety indicator.

Health care provider vaccinations should include<sup>61, 63, 82</sup>:

- a) tetanus;
- b) diphtheria;
- c) influenza (annually)<sup>127</sup>;
- d) hepatitis B (HBV) (if occupational exposure is a possibility)<sup>89</sup>;
- e) varicella vaccine is indicated if a health care provider is not immune<sup>135</sup>;
- f) measles/mumps/rubella (MMR)<sup>128, 132</sup>;
- g) acellular pertussis<sup>131</sup>; and
- h) other vaccines that might be required in specific situations (e.g., meningococcal).<sup>129</sup>

### 4. **Post-exposure Management**

Occupational health policies and procedures should address post-exposure follow-up and prophylaxis, when indicated.<sup>89, 129, 141</sup>

- More information regarding post-exposure management may be found at: <http://www.oha.com/SERVICES/HEALTHSAFETY/Pages/CommunicableDiseasesSurveillanceProtocols.aspx>.

## 5. Work Restrictions

All health care settings should establish a clear expectation that staff do not come into work when ill, and support this expectation with appropriate attendance management policies.<sup>63</sup> Staff carrying on activities in a health care setting who develop a communicable disease may be subject to some work restrictions. The *Communicable Diseases Surveillance Protocols* state: "Health care workers have a responsibility to their patients and colleagues regarding not working when ill with symptoms that are likely attributable to an infectious disease. This includes staff with influenza-like illness, acute respiratory infection, gastroenteritis and conjunctivitis".<sup>154</sup>

The OHS program in both acute care and long-term care must develop policies and procedures for the evaluation of health care providers which include:

- a) assessment of disease communicability;
- b) management of health care providers who have been exposed to infectious diseases, including post-exposure prophylaxis and work restrictions;
- c) indications for work restrictions:
  - i) health care providers with infected skin lesions should not have direct contact with clients/patients/residents or with food consumed by others<sup>63</sup>;
  - ii) health care providers with symptoms of gastroenteritis should not work while symptomatic<sup>124</sup>;
  - iii) health care providers with symptoms of influenza-like illness or other acute respiratory infection should not work while symptomatic<sup>80, 127</sup>;
  - iv) health care providers with acute conjunctivitis should not have direct contact with clients/patients/residents or other staff<sup>121</sup>;
  - v) staff susceptible to the vaccine-preventable diseases measles, mumps, rubella and varicella should not care for clients/patients/residents who have those diseases.<sup>128, 132, 135</sup>
- d) a program to deal with staff exposures which includes:
  - i) collection and analysis of exposures, including assessment of the exposure, determination of exposure risk, follow-up of exposed health care providers and other staff, and preventive actions that may be put into place;
  - ii) policies to deal with spills and staff exposure to blood or body fluids; and
  - iii) a sharps injury prevention program (e.g., CDC's *Workbook for Designing, Implementing, and Evaluating a Sharps Injury Prevention Program*, available at: <http://www.cdc.gov/sharpsafety/pdf/WorkbookComplete.pdf>).<sup>89, 90</sup>

## 6. Personal Protective Equipment (PPE)

Health care settings should have a process for evaluating PPE to ensure it meets quality standards where applicable, including a respiratory protection program compliant with the Ministry of Labour requirements.<sup>155</sup> PPE should be appropriate and accessible.

### **Recommendations:**

**17. Infection Prevention and Control should be represented on the facility's Joint Health and Safety Committee.**

**18. The IPAC component of the Occupational Health and Safety program must be developed jointly by Occupational Health and Infection Prevention and Control.**

- 19. All health care providers must be evaluated by Occupational Health for conditions relating to communicable diseases that can be spread in the health care setting.**
- 20. Health care providers must be offered appropriate vaccinations to protect them from occupationally-relevant communicable diseases.**
- 21. Health care settings must have easily accessible personal protective equipment (PPE), appropriate to the task.**
- 22. Attendance management policies shall discourage health care providers from working while ill with a communicable disease that can be spread in the health care setting.**
- 23. If any worker acquires an occupational infection, or a claim in respect of an occupational infection has been filed with the Workplace Safety and Insurance Board, a notice in writing shall be made to the Ministry of Labour.**

#### **E. IPAC Education, Training and Evaluation**

One of the most important roles of the ICP is educating staff in IPAC principles. The goal of a quality IPAC education and training program is to develop a culture wherein all health care providers follow the recommended policies and 'best practices' at all times and take pride in practicing good infection prevention and control as part of their daily routine. Health care settings must provide regular education and support to help staff consistently implement appropriate IPAC practices.

In order for changes in practice to occur, the organization must review enablers and barriers that support or impede putting guidelines into practice and provide the necessary tools to effect the change. Uptake and retention of education will only occur when the tools required to carry out the practice are readily available and there is a plan for implementation (e.g., hand hygiene compliance may improve if point-of-care product is in place).

Occupational Health and IPAC should collaborate on educational programs.

#### **1. Education and Training in Infection Prevention and Control**

The prevention of HAIs requires an organized education and training program regarding proper IPAC procedures in the health care setting, aimed at health care providers, clients/patients/residents and their caregivers.<sup>156, 157</sup> A coordinated, effective educational program will result in improved IPAC activities.<sup>158</sup>

**Regulated health care professionals should be aware of the infection prevention and control standards of their regulatory college.**

Education programs should be flexible enough to meet the diverse needs of the range of health care providers and other staff who work in the health care setting. The local public health unit and Regional Infection Control Networks may be a resource and can provide assistance in developing and providing education programs for all health care settings.

IPAC education should be provided to all staff, especially those providing direct client/patient/resident care,<sup>114</sup> at the initiation of employment as part of their orientation and as ongoing continuing education.

Effective IPAC education programs should emphasize<sup>159</sup>:

- a) disease transmission, the risks associated with infectious diseases and basic epidemiology of HAIs specific to the setting;
- b) the benefits of case finding/surveillance and the extent and nature of existing and potential problems related to infection in the organization (e.g., MRSA, VRE);
- c) hand hygiene and basic personal hygiene, including the use of alcohol-based hand rubs and hand washing;
- d) principles and components of Routine Practices as well as additional transmission-based precautions;
- e) assessment of the risk of infection transmission and the appropriate use of personal protective equipment (PPE), including safe application, removal and disposal;
- f) appropriate cleaning and/or disinfection of health care equipment, supplies and surfaces or items in the health care environment (e.g., beds, bed tables, call bells, toilets, privacy curtains);
- g) aseptic practices;
- h) the importance of proper and prudent use of antimicrobial agents;
- i) individual staff responsibility for keeping clients/patients/residents, themselves and co-workers safe;
- j) prevention of blood and body fluid exposure; and
- k) early recognition of symptoms of transmissible infections and outbreaks.

IPAC professionals with knowledge of epidemiology and infectious diseases should be active participants in the planning and implementation of these educational programs.<sup>61</sup>

IPAC education must be given:

- a) at orientation of new staff;
- b) on an ongoing scheduled basis (e.g., annually);
- c) if a situation demonstrates a specific need (e.g., during outbreaks; to provide information on a new emerging infections; when required based on results of audits); and
- d) for all trainees prior to the start of their clinical placements.

Education techniques must be applicable to adult learning styles. The teaching methods used must be sensitive to language, cultural background and educational level. Teaching formats should be varied through the use of individualized programmed educational units using video and computer technology, face-to-face discussions with IPAC professionals and practical demonstrations. IPAC education should be simple, clear and relevant to the policies of the health care facility.

IPAC may assist staff in education of clients/patients/residents and visitors through developing and/or reviewing educational materials such as information sheets pertaining to IPAC.

## **2. Evaluation of IPAC Education and Training**

Educational programs should be evaluated periodically for effectiveness and attendance should be monitored and reported back to the manager for incorporation into the performance review.<sup>61</sup> Results of process audits of practices and monitoring of client/patient/resident care practices should be incorporated into education and be used to assess the effectiveness of educational interventions. Surveillance information should be available to inform the facility about problems occurring in their setting. Feedback serves as an educational tool to stimulate change in client/patient/resident care practices and to refine programs.

## **3. Performance Management**

Adherence to IPAC practices should be part of job descriptions and performance reviews.

**Recommendations:**

- 24. Education in infection prevention and control must span the entire health care setting and be directed to all who work in that setting.**
- 25. Orientation programs for staff new to the health care setting must include an IPAC component.**
- 26. Health care facilities should have appropriate policies and procedures that ensure:**
  - a) mandatory attendance at, or completion of, periodic IPAC training/education for all employees; and**
  - b) attendance recorded and reported back to the manager to become a part of the individual's performance review.**
- 27. Continuing education must address the IPAC needs of the organization with regard to content, target audience and timing of the education (e.g., scheduled continuing education, special education based on specific needs such as outbreaks).**
- 28. There must be evaluation of the IPAC education program to ensure that it is current, relevant and effective.**
- 29. The resources required to carry out the IPAC education program must be allocated to achieve the educational goals of the program.**
- 30. Adherence to IPAC practices should be part of the performance review.**

**F. Other Key Components of the IPAC Program****1. Hand Hygiene**

Hand hygiene is considered the most important and effective IPAC measure to prevent the spread of HAIs.<sup>96, 160</sup> Despite this, compliance with hand hygiene protocols by health care providers has been, and continues to be, unacceptably low at 20% to 50%.<sup>161-165</sup> A facility-wide hand hygiene program, which includes administrative leadership, sanction, support and rewards, can be effective at reducing the incidence of HAIs.<sup>97, 165</sup>

To make it possible for health care providers to clean their hands at the right time, alcohol-based hand rub (ABHR) must be provided **at the point-of-care**, where busy health care providers can clean their hands without leaving the client/patient/resident. Clients/patients/residents who see the health care provider performing hand hygiene are reassured that everything is being done to protect them from unnecessary infections.

**ABHR is the preferred method for decontaminating hands.**

**Using ABHR is more effective than washing hands (even with an antibacterial soap) when hands are not visibly soiled.**

**Where dedicated hand washing facilities are not immediately available, ABHR should be used.**

All health care settings must implement a hand hygiene program which incorporates the following elements:

- a) a written policy and procedure regarding hand hygiene;
- b) easy access to hand hygiene agents at point-of-care;
- c) 70-90% ABHR is preferred and must be provided by the health care setting;
- d) education that includes indications for hand hygiene, techniques, indications for hand hygiene agents and hand care;
- e) a hand care program; and
- f) a program to monitor hand hygiene compliance with audits of hand hygiene practices and feedback to individual employees, managers, chiefs of service and the Medical Advisory Committee via the Infection Prevention and Control Committee.

#### *Hand Hygiene Policies and Procedures*

A hand hygiene policy and procedure should be developed by each health care setting that includes the following:

- a) indications for hand hygiene;
- b) selection of hand hygiene agent;
- c) management of soap containers;
- d) hand lotion use;
- e) use of ABHRs; and
- f) hand hygiene monitoring and compliance audits.

Hand hygiene policies and procedures should be consistent with the information found in PIDAC's *Best Practices for Hand Hygiene in All Health Care Settings*,<sup>98</sup> available at: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_hh.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_hh.html).

#### *Hand Care Program*

The health care setting should have a hand care program to assess and maintain the skin integrity of health care providers who perform frequent hand hygiene. If the skin integrity of a health care provider cannot be maintained, the health care provider should be offered modified work that does not require frequent hand hygiene.

Products chosen for hand hygiene should be of proven benefit to skin. Hand care lotion should be readily available to staff free of charge and products chosen should not interfere with glove integrity or with other hand hygiene products.

### Education

Education should include:

- a) indications for hand hygiene;
- b) factors that reduce compliance with hand hygiene;
- c) hand hygiene agents;
- d) hand hygiene techniques; and
- e) hand care to promote skin integrity.

### Compliance

Strategies for hand hygiene promotion include education, performance feedback on hand hygiene adherence and encouragement and provision of role models from key members in the work unit.<sup>97</sup>

At the institutional level, strategies for improvement include written guidelines, selection of hand hygiene agents, hand care promotion and agents, hand hygiene facilities and efforts to prevent high workload, downsizing and understaffing.

Results of monitoring and feedback should be used to inform and direct ongoing educational and motivational activities to encourage long-lasting improvement in hand hygiene practices.<sup>166</sup>

A plan of action should be evident for persistent failure with compliance of hand hygiene. Non-compliance should not be tolerated, as this is a patient and health and safety issue. Compliance results should be part of the performance appraisal.

- For more information regarding hand hygiene, refer to the MOHLTC website on hand hygiene at: <http://www.ontario.ca/handhygiene> and PIDAC's *Best Practices for Hand Hygiene in All Health Care Settings* at: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_hh.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_hh.html).

### Recommendations:

- 31. All health care settings must develop and implement a hand hygiene program, including hand hygiene agents available at the point-of-care in acute care settings and easily accessible in all other health care settings. In health care facilities this program must also include:**
    - a) *demonstrable senior administration commitment;*
    - b) *written policies and procedures;*
    - c) *education in hand hygiene indications and techniques;*
    - d) *a hand care program; and*
    - e) *a program to measure hand hygiene compliance.*
  - 32. Hand hygiene policies and procedures should be consistent with the information found in PIDAC's *Best Practices for Hand Hygiene in All Health Care Settings*, available at: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_hh.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_hh.html).**
  - 33. Infection Prevention and Control and Occupational Health must be consulted and involved in all hand hygiene product selection and trials in the health care setting.**
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## 2. Routine Practices and Additional Precautions

**Routine Practices** refer to IPAC practices to be used for the routine care of all clients/patients/residents to prevent transmission of microorganisms from person-to-person in the health care setting.

- The full description of Routine Practices to prevent and control transmission of nosocomial pathogens can be found in PIDAC's *Routine Practices and Additional Precautions in All Health Care Settings*,<sup>3</sup> located at: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_routine.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_routine.html).

Routine Practices include<sup>3</sup>:

- a) risk assessment of the client/patient/resident and the health care provider's interaction with the client/patient/resident;
- b) the four moments for hand hygiene (before contact with a client/patient/resident or their environment, before invasive/aseptic procedures, after contact with body fluids, after contact with a client/patient/resident or their environment)<sup>98</sup>;
- c) environmental controls (appropriate client/patient/resident placement, cleaning of equipment<sup>99</sup> and the environment,<sup>102</sup> engineering controls, point-of-care sharps containers<sup>90, 137, 142</sup> and hand hygiene products<sup>98</sup>);
- d) administrative controls (policies and procedures, education, healthy workplace policies, vaccination, respiratory etiquette, monitoring of compliance with feedback, sufficient staffing levels); and
- e) sufficient, easily accessible and appropriate PPE (e.g., gloves, gown, mask, eye protection)<sup>3</sup>.

***Consistent use of Routine Practices with all clients/patients/residents is critical to preventing transmission of microorganisms from patient-to-patient, from staff-to-patient and from patient-to-staff.***

**Additional Precautions** (i.e., Contact Precautions, Droplet Precautions, Airborne Precautions) refer to IPAC interventions to be used **in addition to** Routine Practices for certain pathogens or clinical presentations. These precautions are based on the method of transmission (i.e., contact, airborne or large droplet).

- The full description of Additional Precautions to prevent and control transmission of nosocomial pathogens can be found in PIDAC's *Routine Practices and Additional Precautions in All Health Care Settings*,<sup>3</sup> available at: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_routine.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_routine.html).

Additional Precautions include:

- a) appropriate accommodation based on the mode of transmission (e.g., single room for Droplet Precautions, single room with inward directional air flow (i.e., "negative pressure") for Airborne Precautions, single room with individual toileting facilities for Contact Precautions)<sup>2, 79</sup>;
- b) modified or enhanced environmental cleaning procedures for Contact Precautions<sup>79</sup>;
- c) limiting transport of client/patient/resident and using appropriate barriers during transport<sup>2, 79</sup>; and
- d) equipment dedicated to the client/patient/resident on Contact Precautions wherever possible.<sup>79</sup>

***All regulated health care providers must have the authority to initiate Additional Precautions without a physician's order.***

**Recommendations:**

- 34. Staff in all health care settings must follow Routine Practices and Additional Precautions and facilities must implement a program that includes:**
  - a) written policies and procedures;**
  - b) staff education and training in indications and techniques for Routine Practices and Additional Precautions; and**
  - c) a program to measure compliance with Routine Practices and Additional Precautions.**
  
- 35. Health care facilities should ensure that appropriate policies and procedures are in place to ensure mandatory attendance at training/education in Routine Practices and Additional Precautions (including hand hygiene) and that attendance is recorded and reported back to the manager to become a part of the employee's performance review.**
  
- 36. Each health care setting should have a policy authorizing any regulated health care professional to initiate the appropriate Additional Precautions at the onset of symptoms. [BII]**
  
- 37. The health care setting should have a policy that permits discontinuation of Additional Precautions in consultation with the Infection Prevention and Control Professional or designate. [BIII]**

**3. Immunization of Clients/Patients/Residents**

One of the most effective preventive measures to protect clients/patients/residents and staff from acquiring communicable diseases is immunization. All health care settings should have an age-appropriate immunization program.

One of the major functions of a resident health program is the immunization of the elderly resident.<sup>63</sup> In long-term care homes, resident health programs are believed to be important in the prevention of nosocomial infections.<sup>110</sup> Residents of long-term care facilities should be immunized against tetanus, diphtheria, pneumococcus and influenza. The influenza vaccine should be given annually in the fall.

**Recommendations:**

- 38. All health care settings must have an immunization program in place appropriate to their clients/patients/residents.**
  
- 39. Residents of non-acute care facilities must have immunization programs that also include pneumococcal and annual influenza vaccination.**

**4. Cluster/Outbreak Management and Investigation**

All facilities should have appropriate resources to manage an outbreak. The facility should assess its capabilities for the management of different types of infections and the implementation of different types of precautions systems.

All health care facilities must have a program with the capacity to identify the occurrence of clusters or outbreaks of infectious diseases.<sup>61, 63</sup> This may be accomplished by:

- a) using baseline surveillance data on the incidence of HAIs in order to identify increases (see section II.9.A, “*Surveillance*”);
- b) having health care providers report any clusters or potential outbreaks to the IPAC program immediately;
- c) having ICPs review microbiology reports in a timely manner to identify unusual clusters or a greater than usual incidence of certain species or strains of microorganisms.<sup>61, 63</sup>

Epidemic HAIs are defined as HAIs that represent an increase in incidence over expected rates (“cluster” or “outbreak”). Early intervention to prevent outbreaks or limit the spread of infections once an outbreak has been identified will interrupt transmission of disease, decreasing the impact on clients/patients/residents’ health, patient care and cost.<sup>63, 167-171</sup>

Additional facility expertise and resources may be required for outbreaks. In these cases, expertise may be obtained from:

- a) public health units;
- b) formal consultation arrangement with experts in IPAC and health care epidemiology (e.g., contracted services);
- c) regional infection control networks;
- d) academic health sciences centres; and/or
- e) linkages with other facilities.

#### *Outbreak Management Team*

In the event of an outbreak, the IPAC Committee shall convene an Outbreak Management Team (OMT), consisting of members appropriate to the facility:

- IPAC physician
- IPAC professional(s)
- microbiologist
- epidemiologist
- occupational health manager/delegate and occupational health physician
- Medical Officer of Health or delegate (including outbreaks of reportable diseases, including institutional respiratory and gastroenteric outbreaks)
- nursing manager(s) and staff from the affected area
- environmental services representative
- physician representative from the affected area
- senior administrator(s) or delegate
- public relations representative
- other ad hoc members as dictated by the circumstances

The OMT must have the authority to institute changes in practice or take other actions that are required to control the outbreak.<sup>61, 63</sup> All health care facilities should have an administrative policy for dealing with infectious disease outbreaks, including the authority to relocate clients/patients/residents, cohort clients/patients/residents and staff, confine clients/patients/residents to their rooms, restrict admissions and transfers, restrict visitors, obtain cultures and administer relevant prophylaxis or treatment.<sup>63</sup>

#### *Role of the Microbiology Laboratory in an Outbreak*

Appropriate microbiology laboratory capacity is essential for the detection and investigation of outbreaks. In an outbreak, the microbiology laboratory must be capable of providing timely results to the outbreak management team and, for some outbreaks, should have timely access to typing results for the microorganism causing the outbreak.

Clinical microbiology staff must be able to perform or obtain appropriate testing to make a determination of microorganism species. Appropriate clinical specimens must be obtained and sent for culture. Microbiology laboratory records must be kept in a manner that permits retrieval of information, preferably from a computerized database, by type of microorganism, antibiotic susceptibility pattern, type of clinical specimen, ward service, attending physician or surgeon and date the culture was obtained. Where laboratory services are contracted out, these provisions must be included in the contract.

**The ICP should have the authority to implement outbreak management measures up to, and including, closure of the affected unit.**

#### *Role of the ICP in an Outbreak*

Policies must define what authority the ICP has during an outbreak. To investigate an outbreak fully and identify all possible cases as well as attempt to identify the source of the outbreak, IPAC staff must have unrestricted access to all necessary information, including medical, nursing, laboratory and administrative records within the health care setting.

#### **Recommendations:**

- 40. All health care facilities must have the ability and the capacity to identify and manage clusters or outbreaks of infectious diseases.**
- 41. Outbreaks in health care facilities should be managed by a multidisciplinary team that includes the ICP.**
- 42. The ICP should have the authority to implement outbreak management measures up to, and including, closure of the affected unit.**

## **5. Communications**

All health care settings should develop a communications policy addressing both internal and external communication on IPAC issues. Health professionals play a key role in communicating relevant health information within their institution, to public health and to other health care providers. Timely communication assists health care settings in determining priorities, preventing further cases of infection, effective control of clusters/outbreaks and minimizing the impact of the event. Health information communicated must comply with the requirements of the *Personal Health Information Protection Act*<sup>172</sup> (PHIPA), available at:

[http://www.e-laws.gov.on.ca/html/statutes/english/elaws\\_statutes\\_04p03\\_e.htm](http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_04p03_e.htm).

All health care settings should have established procedures for receiving and responding appropriately to all international, national, provincial, regional and local health notices. They should communicate health notices promptly to all staff responsible for case finding/surveillance and provide regular updates. Current health notices are available from local public health units; the MOHLTC; Health Canada and Public Health Agency of Canada websites [<http://www.phac-aspc.gc.ca/tmp-pmv/pub-eng.php>] and Important Health Notices (IHN) issued by the Ministry of Health and Long-Term Care in response to abnormal events that require ministry direction or instruction. In the absence of these events, Important Health Notices are issued on a bi-annual basis to provide health care providers with appropriate updates on emergency-related activities and information and are posted at:

<http://www.health.gov.on.ca/english/providers/program/emu/ihn.html>.

**Recommendations:**

**43. All health care settings must ensure the development and implementation of communication and reporting policies.**

**44. All health care settings must ensure reception, appropriate response and prompt communication of advisories and Important Health Notices.**

**6. Environment**

Maintaining a clean and safe health care environment is an essential component of IPAC. Health care settings must devote adequate resources, including human resources, to Environmental Services/Housekeeping to enable written procedures for cleaning and disinfection of client/patient/resident rooms and equipment; education and continuing education of cleaning staff; increased capacity for outbreak management; and ongoing review of procedures.

The Environmental Services/Housekeeping department is responsible to ensure that the quality of cleaning maintained in the health care setting meets appropriate infection prevention and control best practices. The responsibility for ensuring that the standardized cleaning practices are adhered to lies not just with the person performing the task, but also with the direct supervisor and management of the department or agency providing the cleaning service. To that end, it is important to incorporate elements of quality improvement into the program, including monitoring, audits and feedback to staff and management.<sup>102</sup>

- For more information regarding assessment of cleanliness and quality control, see PIDAC's *Best Practices for Environmental Cleaning for Prevention and Control of Infections in All Health Care Settings*,<sup>102</sup> available at:  
[http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_enviro\\_clean.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_enviro_clean.html).

Policies and procedures should address the environmental aspects of areas when the role of the environment may be a significant factor in the prevention of HAIs. Consult the following for more information:

**a) Environmental Cleaning**

- PIDAC's *Best Practices for Environmental Cleaning for Prevention and Control of Infections in All Health Care Settings*,<sup>102</sup> available at:  
[http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_enviro\\_clean.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_enviro_clean.html);
- Regional Infection Control Networks of Ontario's Environmental Cleaning Best Practices Educational Toolkit, available at: <http://ricn.on.ca/manualsandtoolkitsc3462.php>.

**b) Laundry**

- *Occupational Health and Safety Act, R.S.O. 1990, c.0.1.*, including *Health Care and Residential Facilities Ontario Regulation 67/93*,<sup>9</sup> for legal requirements relating to laundry, available at: [http://www.e-laws.gov.on.ca/html/reg/english/elaws\\_regs\\_930067\\_e.htm](http://www.e-laws.gov.on.ca/html/reg/english/elaws_regs_930067_e.htm);
- PIDAC's *Best Practices for Environmental Cleaning for Prevention and Control of Infections in All Health Care Settings*,<sup>102</sup> available at:  
[http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_enviro\\_clean.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_enviro_clean.html);

**c) Waste Management**

- *Environmental Protection Act, RSO 1990. Guideline C-4. The Management of Biomedical Waste in Ontario*,<sup>173</sup> available at: <http://www.ene.gov.on.ca/publications/7397e.pdf>;

- *Transportation of Dangerous Goods Act, 1992*,<sup>174</sup> available at: <http://laws-lois.justice.gc.ca/eng/acts/T-19.01/>;
  - CSA's *Handling of waste materials within health care facilities*,<sup>175</sup> available for purchase at: <http://www.csa.ca/cm/ca/en/home>;
  - PIDAC's *Best Practices for Environmental Cleaning for Prevention and Control of Infections in All Health Care Settings*,<sup>102</sup> available at: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_enviro\\_clean.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_enviro_clean.html);
- d) Medical and Surgical Equipment Reprocessing**
- PIDAC's *Best Practices for Cleaning, Disinfection and Sterilization of Medical Equipment/Devices in All Health Care Settings*, available at: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best\\_prac/bp\\_cds\\_2.pdf](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best_prac/bp_cds_2.pdf);
- e) Food Preparation**
- *Health Protection and Promotion Act, R.S.O. 1990*,<sup>118</sup> sections 16-18, available at: [http://www.e-laws.gov.on.ca/html/statutes/english/elaws\\_statutes\\_90h07\\_e.htm#BK19](http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90h07_e.htm#BK19);
  - PIDAC's *Best Practices for Environmental Cleaning for Prevention and Control of Infections in All Health Care Settings*,<sup>102</sup> available at: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_enviro\\_clean.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_enviro_clean.html);
- f) Facility Design**
- CSA's *Infection Control During Construction or Renovation of Health Care Facilities*<sup>176</sup>, *Special requirements for plumbing installations in health care facilities*<sup>177</sup> and *Special requirements for heating, ventilation and air-conditioning (HVAC): systems in health care facilities*,<sup>178</sup> available for purchase at: <http://www.csa.ca/cm/ca/en/home>;
  - American Institute of Architects' *Guidelines for Design and Construction of Health Care Facilities, 2010*,<sup>179</sup> regarding infection prevention and control related to facility design in health care facilities, available at: <http://www.fgiguilines.org/2010guidelines.html>;
  - PIDAC's *Best Practices for Environmental Cleaning for Prevention and Control of Infections in All Health Care Settings*,<sup>102</sup> available at: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_enviro\\_clean.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_enviro_clean.html);
- g) Construction and Containment Issues**
- Public Health Agency of Canada's *Construction-related Nosocomial Infections in Patients in Health Care Facilities*,<sup>101</sup> available at: <http://dsp-psd.pwgsc.gc.ca/Collection/H12-21-3-27-2E.pdf>;
  - CSA's *Infection Control During Construction or Renovation of Health Care Facilities*<sup>176</sup>, available for purchase at: <http://www.csa.ca/cm/ca/en/home>;
  - PIDAC's *Best Practices for Environmental Cleaning for Prevention and Control of Infections in All Health Care Settings*,<sup>102</sup> available at: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_enviro\\_clean.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_enviro_clean.html).

**Recommendations:**

- 45. Health care settings should have policies and procedures addressing infection prevention and control for environmental services, handling of laundry and waste, reprocessing of medical equipment, food handling and storage, and facility design and construction.**

- 46. There must be adequate numbers of staff with appropriate training to provide a clean and safe environment, including extra environmental cleaning capacity during outbreaks.**
  
- 47. Cleaning practices in the health care setting must be monitored and results reported back appropriately to become a part of the employee's performance review.**
  
- 48. Infection Prevention and Control must have input at all stages of construction and renovation, from design to commissioning, and have the authority to halt projects if there is a risk to client/patient/resident or staff safety.**

### III. RESOURCES FOR THE IPAC PROGRAM

#### 1. Human Resources

Several documents have outlined the human resources required for effective IPAC programs in a variety of settings.<sup>61-63, 180</sup> There is evidence that indicates that all health care facilities must have IPAC professionals (ICPs) and should have access to a trained IPAC physician as well as administrative support staff appropriate to the IPAC program. In addition to a trained ICP, there is evidence that establishing a relationship with IPAC champions in clinical programs and departments aids the IPAC team in carrying out their mandate.<sup>72, 181</sup>

##### A. The Infection Prevention and Control Professional (ICP)

All health care settings should have access to a certified ICP or trained individuals to implement the IPAC program and resources that are proportional to the size, sophistication, case mix and estimated risk of the populations served by the health care setting.<sup>61</sup> The IPAC program must clearly be the responsibility of at least one designated person. In some organizations, such as long-term care homes or ambulatory care settings, this person may also have other responsibilities.

**Regardless of the size of the facility, the expected number of hours per week that are devoted to infection prevention and control must be clearly stated and protected.**

#### 1. Education, Training and Certification of ICPs

It is recommended that certain qualifications be met by professionals in IPAC<sup>182</sup>:

- a) ICPs must be Certified in Infection Control (CIC<sup>®</sup>) from the Certification Board of Infection Control and Epidemiology (CBIC) when eligible (see below for more information about certification);
- b) ICPs must pass a CHICA-Canada endorsed education program which comprises a minimum of 80 hours of instruction. Eligible programs may be accessed from the CHICA-Canada website at: [http://www.chica.org/educ\\_education.php](http://www.chica.org/educ_education.php);
- c) ICPs should have knowledge and experience in<sup>183, 184</sup>:
  - i) areas of patient care practices;
  - ii) microbiology;
  - iii) asepsis;
  - iv) disinfection/sterilization;
  - v) adult education;
  - vi) infectious diseases;
  - vii) communication;
  - viii) outbreak management;
  - ix) policy development;
  - x) critical appraisal of the literature;
  - xi) program administration
  - xii) surveillance; and
  - xiii) epidemiology;
- d) ICPs must have a health sciences background with teaching, problem-solving, communication and analytical skills that will allow them to plan, implement and evaluate their programs.

- Refer to Appendix B, “APIC/CHICA-Canada/CBIC Infection Control and Epidemiology: Professional and Practice Standards”, for qualifications for ICPs.

### *CIC® Credential*

All health care facilities and organizations providing IPAC consultation (e.g., public health units) should have an ICP who has, or who will have when eligible, the CIC® credential (Certified in Infection Control) from the Certification Board of Infection Control and Epidemiology (CBIC). Other health care settings should have access to a certified ICP.

To be eligible for certification a candidate must:

- a) have a current license or registration certification as a medical technologist or clinical laboratory scientist, physician or registered nurse; OR have a minimum of a baccalaureate degree; **AND**
- b) include **BOTH** of the following activities in their job responsibilities and tasks:
  - i) analysis and interpretation of collected infection control data AND the investigation and surveillance of suspected outbreaks of infection;
  - ii) **AT LEAST THREE** of the following:
    - a. planning, implementation and evaluation of IPAC measures;
    - b. education of individuals about infection risk, prevention and control;
    - c. development and revision of infection control policies and procedures;
    - d. management of IPAC activities;
    - e. provision of consultation on infection risk assessment, prevention and control strategies.

A written (computer-based) examination must be taken to acquire certification. More information about Certification in Infection Control may be found on the CBIC website at: <http://www.cbic.org/>.

## **2. Ongoing Professional Competency of ICPs**

IPAC has a rapidly developing and expanding knowledge base. The certified ICP must acquire and maintain current knowledge and skills in IPAC and epidemiology through continuing education relevant to their professional practice and CBIC re-certification every five years. While the infection control professionals themselves have a responsibility to achieve this, they must be provided with support from the administration and have a job description which requires continuing education.<sup>61</sup>

***ICPs must become CBIC certified in infection prevention and control and must maintain certification.***

The ICP maintains a knowledge base of current IPAC information through:

- a) peer networking;
- b) internet access to published literature;
- c) attendance at professional meetings including, as a minimum, annual attendance at an IPAC-related conference;
- d) membership and time to participate in the Community and Hospital Infection Control Association – Canada (CHICA-Canada), including local chapter activities; information about joining CHICA-Canada may be found on the national website at: <http://www.chica.org>.

ICPs are encouraged to participate in research and quality improvement projects that will result in improved client/patient/resident care in their health care setting and prevention of infections in their patient population, leading to advancements in the IPAC field.

### 3. Roles and Responsibilities of ICPs

The ICP serves as a leader, mentor and role model for the profession, based on accepted professional and practice standards.<sup>182</sup> The ICP in a health care setting:

- a) acquires and maintains current IPAC knowledge and skills in epidemiology;
- b) makes decisions and performs activities in an ethical manner; and
- c) is responsible for the development, evaluation and improvement of his/her own practice in relation to the practice standards for IPAC.

Some practices that are common to most ICPs include:

- a) conducting prevention and control activities that are specific to the health care setting, the population served and the continuum of care;
- b) applying epidemiological principles and statistical methods, including risk stratification, to identify target populations, analyze trends and risk factors, and design and evaluate prevention and control strategies;
- c) using a systematic surveillance approach to monitor the effectiveness of prevention and control strategies that are consistent with the organization's goals and objectives;
- d) acting as an educational resource for IPAC and health care epidemiology;
- e) providing expert knowledge and guidance in epidemiology and IPAC-related issues;
- f) incorporating fiscal responsibility into the IPAC program; and
- g) applying relevant research findings to IPAC practice.

Responsibilities of ICPs will vary with the health care setting, but should include the following:

- a) education of staff and clients/patients/residents related to IPAC;
- b) review of equipment design and reprocessing practices;
- c) involvement with facility design, maintenance and construction projects;
- d) management of, and surveillance for, infections;
- e) development of policies and procedures related to IPAC;
- f) involvement in product selection related to agents for hand hygiene and disinfection;
- g) management of clusters and outbreaks;
- h) review of environmental cleaning practices;
- i) involvement in safety issues relating to IPAC;
- j) internal and external communications regarding IPAC and communicable disease issues; and
- k) participation in planning activities for emerging pathogens, bioterrorism and pandemics.

The role of the ICP in an emergency or disaster is to reduce the risk of transmission or incidence of infection. Crucial elements of the ICP role are associated with participation in planning for a potential event, advising on prevention of infectious consequences of the event and management of infectious consequences if they occur.<sup>185</sup>

### 4. ICP Staffing Levels

Many elements that are critical to a functioning organizational IPAC program are performed by health care providers or others who are not ICPs. It is recognized that specific infection prevention and control skill sets are required to establish and maintain an adequate IPAC program.

- For more information, see Section III.1.A.1, 'Education, Training and Certification of ICPs' and Appendix B, 'APIC/CHICA-Canada/CBIC Infection Control and Epidemiology: Professional and Practice Standards'

There have been a number of reports and studies published dealing with the complex issue of ICP staffing levels in health care settings. A review of different processes in North America used to develop the recommendations for ICP staffing ratios are included below.<sup>13, 180, 186-190</sup> These staffing levels apply only to core ICPs.

*Quebec Health and Social Services [2005]<sup>186, 190</sup>:*

Following an outbreak of *Clostridium difficile* in the province of Quebec, Quebec Health and Social Services (Santé et Services sociaux Québec) issued recommendations for the prevention and control of nosocomial infections in health care facilities. The recommendations called for one ICP per 100 beds in areas of higher acuity and one ICP per 133 beds in areas of lesser acuity in hospitals. In long-term care the recommended ratio was one ICP per 250 beds.

*The Delphi Project [2002]<sup>187</sup>:*

The Delphi project surveyed both American and Canadian ICPs and found that IPAC responsibilities have expanded beyond the traditional acute care setting. Respondents represented acute care, long-term care and community settings and recommendations for staffing were based not only on the number of occupied beds, but also on the scope of the IPAC program, the complexity of the health care setting, the characteristics of the client/patient/resident population and the unique needs of the facility and community. Recommended staffing ratios were one ICP for every 100 occupied care beds regardless of the type of setting.

*Canadian Consensus Panels [2001]<sup>188</sup>:*

The Canadian Consensus panels have suggested appropriate staffing levels for IPAC programs as follows:

- a) The acute care group projected that, in the absence of hemodialysis, endemic antimicrobial-resistant microorganisms and major surgical sub-specialty programs, three full-time equivalent ICPs are required per 500 beds.
- b) The long-term care group estimated that one full-time equivalent position is required per 150 to 250 beds.
- c) In LTC facilities with resident groups who are ventilator-dependent, have spinal cord injuries, are colonized or infected with antimicrobial-resistant organisms, or who require dialysis, one dedicated full-time equivalent ICP per 150 beds is required.
- d) The home care group identified essential supports for the community or home care ICP including access to external IPAC experts, secretarial/database staff and laboratory support. The increasing numbers and acuity of clients/patients/residents in this setting stresses the need for qualified ICPs.

*National Nosocomial Infections Surveillance (NNIS) system [1999]<sup>17</sup>:*

The NNIS system was developed in the early 1970s in the U.S. to monitor the incidence of health care-associated (nosocomial) infections and their associated risk factors and pathogens in participating acute care facilities. Participation in the program required meeting the minimum requirement of one full-time equivalent ICP for the first 100 occupied beds and 1 full-time equivalent ICP for each additional 240 beds. A survey of hospitals involved in the NNIS system found that the median number of occupied beds per ICP was 115 and most ICP IPAC activities took place on acute inpatient wards (60%).<sup>189</sup> Most hospitals reported that ICPs were also involved in non-IPAC activities such as occupational health, quality management and clinical or administrative activities. The range of non-IPAC activities accounted for approximately 40% of the ICP's time.<sup>189</sup>

*SENIC Study [1985]<sup>12</sup>:*

In 1985 the landmark SENIC study suggested that a minimum of one ICP per 250 occupied beds was required in order to have effective IPAC programs. This ratio was established prior to the expansion of the ICP's role into such diverse areas as preparedness for bioterrorism and pandemics; surge capacity; increased management and surveillance of AROs; emerging pathogens; patient safety issues; surveillance for acute respiratory infection (ARI); involvement with facility design and construction containment; and review of equipment design and reprocessing. The volume and complexity of the modern ICP's work has also increased in direct proportion to increases in the intensity and complexity of client/patient/resident care; increased severity of illness of the patient population at risk; and increased activity in health care delivery beyond the hospital.

Most of the ratios from the Canadian Consensus recommendations and others do not take into account the expanded role of the IPAC program to include issues regarding bioterrorism, surge capacity, increases in AROs, ARI surveillance, patient safety issues, facility design and construction input, IPAC education, reprocessing of equipment, etc.

Staffing will be further impacted by factors such as:

- a) the number and type of ambulatory clinics;
- b) presence of oncology, dialysis, intensive care and burn units;
- c) provision of day surgery or emergency medical services;
- d) construction and facility design projects;
- e) health care settings located in rural areas where ICPs must travel to many sites for the provision of services; and
- f) other activities that require IPAC resources.

**Minimum recommendations for staffing should not be based exclusively on bed numbers. The ratio of ICPs will vary according to the acuity and activity of the health care setting and the volume and complexity of the ICP's work.**

**B. The IPAC Physician**

The SENIC study<sup>12</sup> showed that IPAC programs that did not have trained physicians with IPAC expertise were less effective than those that did. All facilities should have access to an IPAC physician. Acute care facilities must have a dedicated in-house or contract physician with knowledge and expertise in IPAC.<sup>61</sup> Long-term care facilities should consider an IPAC-trained physician on at least a consultative basis.<sup>63</sup> The physician should have specialized post-graduate training in IPAC.

The ICP and the IPAC physician oversee the IPAC program and ensure that the minimum IPAC core competencies and surveillance programs are implemented. The IPAC physician will:

- a) provide expertise and advice on complex medical issues related to IPAC;
- b) champion and support the IPAC program to senior administration and medical staff;
- c) review policies and procedures and provide input and support for implementation;
- d) attend IPACC meetings;
- e) attend or present IPAC education;
- f) liaise with public health on complex IPAC issues and related medical issues;
- g) review, monitor and report antimicrobial utilization in the facility as well as resistance monitoring and reporting;
- h) support ICP(s) and provide leadership with the ICP(s) during outbreaks;
- i) address IPACC minutes and IPAC issues at Medical Advisory Committee meetings.

Professional development in IPAC should be part of the physician's continuing medical education. Other non-patient care training and skills required of the physician include:

- a) surveillance and epidemiology;
- b) microbiology and infectious diseases;
- c) outbreak management; and
- d) ability to critically review the IPAC literature.

### **C. Administrative Assistant**

Administrative assistance is essential for the IPAC program, to allow the ICP to carry out their duties outside the office. The number of administrative assistants must be commensurate with the complexity of the program and the numbers of ICPs supported.

Support staff should have skills in, and may assist with, the following:

- a) word processing for document development and control;
- b) database/spreadsheet management for surveillance data entry;
- c) arranging meetings and recording meeting minutes;
- d) copying, faxing, mailing;
- e) billing and ordering supplies;
- f) responding to telephone calls; and
- g) filing.

### **D. Other Human Resources**

In addition to IPAC staff and physician support, an effective IPAC program requires:

- a) laboratory staff sufficient to carry out program activities (e.g., surveillance);
- b) environmental services/housekeeping staff sufficient to carry out program activities (e.g., effective implementation of Additional Precautions and outbreak management); and
- c) occupational health staff sufficient to carry out program activities (e.g., immunization).

Increases to staffing levels may be required in some cases for effective program management.

#### **Recommendations:**

- 49. All health care facilities must have trained infection prevention and control professional(s) (ICP) and resources to implement the IPAC program that are proportional to the size, complexity, case mix and estimated risk of the populations served by the health care facility. Other health care settings should have access to infection control expertise.**
- 50. The expected number of hours per week that are devoted to infection prevention and control must be clearly stated and protected.**
- 51. All health care facilities must have an ICP(s) who is/are Certified in Infection Control (CIC<sup>®</sup>), or who will obtain certification within two to five years of hire, depending on the acuity of the facility.**

- 52. Health care facilities must ensure that ICPs maintain their knowledge and skills through continuing education relevant to their professional practice and recertification in infection control every five years.**
- 53. Financial resources must be provided for the continuing professional education of ICP(s).**
- 54. ICP staffing levels must be appropriate to the size and complexity of care of the health care facility. Recommendations for staffing should not be based exclusively on bed numbers. The ratio of ICPs will vary according to the acuity and activity of the health care facility and the volume and complexity of the ICP's work. This includes high risk ambulatory care centres such as oncology and dialysis.**
- 55. Recommendations for staffing and resources in Ontario health care facilities include the following:**
- a) a minimum ratio of 1.0 FTE ICP per 115 acute care beds;**
  - b) a minimum ratio of 1.0 FTE ICP per 100 occupied acute care beds if there are high risk activities (e.g., dialysis);**
  - c) it is recommended that an additional ratio of 1.0 FTE ICP per 30 intensive care beds be considered where ventilation and haemodynamic monitoring are routinely performed;**
  - d) 1.0 FTE ICP per 150 occupied long-term care beds where there are ventilated patients, patients with spinal cord injuries and dialysis or other high acuity activities; and**
  - e) 1.0 FTE ICP per 150-200 beds in other settings depending on acuity levels**
- 56. Each facility's IPAC program should include a physician with knowledge, expertise and training in infection prevention and control.**
- 57. Health care settings must provide the appropriate human and material resources to support the IPAC program.**
- 58. Health care settings must provide administrative assistance to the IPAC program.**

## **2. Other Program Resources**

### **A. Laboratory Support**

All health care settings should have access to a licensed and accredited microbiology laboratory that can provide analysis of single or multiple strains of infectious organisms. As a minimum, the laboratory should have a system to alert the IPAC program when targeted microorganisms are isolated or detected and provide assistance with surveillance information including microorganism identification and typing capabilities. The ICP must be provided with laboratory reports in a timely fashion and have the ability to obtain customized reports when required.

Ideally there should be an established relationship between IPAC and the Microbiology Laboratory, to support the IPAC program. This includes appropriate utilization of laboratory facilities, the ability to process screening specimens in a timely fashion and laboratory support during outbreaks. A microbiology budget sufficient for investigation of outbreaks should be available to the IPAC team.

## **B. Program Administrative Support**

### **1. Material Resources**

Health care settings should provide material resources to support the IPAC program. This should include<sup>61</sup>:

- a) sufficient-sized, suitably located office space and equipment, including furniture and lockable filing cabinets for confidential records in order to protect the privacy of individual clients/patients/residents;
- b) communication tools sufficient to support the program (at minimum this should include telephone, pager, fax and copying services, and basic office supplies); and
- c) access to a laptop and data projector for educational presentations.

### **2. Information Technology Resources**

The IPAC program requires:

- a) a computer system that includes a password-protected desktop or laptop computer and a printer;
- b) word processing, presentation and spreadsheet software and training including the ability to generate statistical reports;
- c) access to the electronic record, preferably through direct linkages to health information systems;
- d) access to electronic laboratory records, preferably through direct linkages to laboratory information systems;
- e) resources that enable access or linkages to other health information systems and programs; and
- f) internet access, including electronic mail.

### **3. Education Resources and Activities**

Maintaining current educational resources is essential for the IPAC program in order to develop policies and guidelines, participate in professional organizations and serve as an educational resource for IPAC and health care epidemiology. The IPAC program must have an annual budget allocated to the provision and maintenance of current educational resources such as:

- a) current textbooks;
  - b) national and provincial guidelines and standards (e.g., Canadian Standards Association, Public Health Agency of Canada, PIDAC best practices);
  - c) Communicable Disease Surveillance Protocols;
  - d) access to library services for IPAC journals (e.g., Infection Control and Hospital Epidemiology, Canadian Journal of Infection Control, American Journal of Infection Control);
  - e) APIC text of infection control and epidemiology; and
  - f) funding for attendance at annual conferences and other appropriate education.
- Refer to Appendix A, '*Resources for Infection Prevention and Control*', for a list of basic educational resources that IPAC programs should have available to ICPs.

#### **Recommendations:**

- 59. All health care settings must have access to an accredited microbiology laboratory that can alert the IPAC program to microorganisms of importance and provide assistance to the program with surveillance information in a timely fashion.**

**60. Health care settings must support the IPAC program with an annual budget for the maintenance of current educational resources.**

## SUMMARY OF RECOMMENDATIONS FOR BEST PRACTICES FOR INFECTION PREVENTION AND CONTROL PROGRAMS IN ALL HEALTH CARE SETTINGS

This summary table is intended to assist with self-assessment internal to the health care setting for quality improvement purposes. See complete text for rationale.

	Recommendation	Compliant	Partial Compliance	Non-compliant	Action Plan	Accountability
<b>Mandate/Goals and Functions of the IPAC Program</b>						
1.	<i>All health care settings in Ontario must assess needs for, develop, provide and evaluate an active, effective IPAC program that meets the mandate and goal to decrease the risk of health care-associated infections and improve health care safety.</i>					
2.	<i>Continuing support for the IPAC program must be an organizational priority.</i>					
<b>Structure and Elements of the IPAC Program</b>						
3.	<i>Health care settings must evaluate their IPAC needs and then implement an IPAC program suited to those needs.</i>					
4.	<i>Periodic review of the IPAC program must be carried out to reassess the organization's needs and to determine which elements are required to continue to meet the goals of the program for that health care setting.</i>					

	Recommendation	Compliant	Partial Compliance	Non-compliant	Action Plan	Accountability
5.	<b>Senior administration and the infection prevention and control committee must support the implementation and execution of the IPAC program by the IPAC staff.</b>					
<b>The Infection Prevention and Control Committee (IPACC)</b>						
6.	<b>Each health care facility shall have a multidisciplinary infection prevention and control committee whose responsibilities include annual goal-setting, program evaluation and ensuring that the IPAC program meets current legislated standards and requirements as well as the requirements of the facility.</b>					
<b>IPAC Program Functions: Surveillance</b>						
7.	<b>Health care settings must monitor targeted IPAC processes with regular audits of practices.</b>					
8.	<b>Health care settings must monitor targeted IPAC outcomes using surveillance for health care-associated infections in specific populations.</b>					
9.	<b>Infection surveillance must include standardized collection of data using written definitions of infections, identification of risk population, methods of measurement, description of data sources and benchmarks used for comparison.</b>					

	Recommendation	Compliant	Partial Compliance	Non-compliant	Action Plan	Accountability
10.	<i>Results of process and outcome surveillance must be analyzed and reported back in a timely fashion; a plan for improvements, including organizational accountability, must be developed by the targeted area in conjunction with Infection Prevention and Control based on the results of surveillance.</i>					
<b>IPAC Program Functions: Policies and Procedures</b>						
11.	<i>IPAC policies and procedures must be consistent with relevant legislation and standards and based on sound scientific knowledge.</i>					
12.	<i>Policies and procedures must be reviewed and updated as required on a regular basis.</i>					
13.	<i>Policies and procedures must be linked to educational programs and action plans for implementation must be developed.</i>					
14.	<i>A system for monitoring and improving staff compliance with IPAC policies and procedures must be developed and implemented.</i>					
<b>IPAC Program Functions: Compliance with Legislation and Accreditation Standards</b>						
15.	<i>Health care settings shall be in compliance with all legal and accreditation standards that pertain to the practice of infection prevention and control.</i>					

	Recommendation	Compliant	Partial Compliance	Non-compliant	Action Plan	Accountability
16.	<i>The IPAC program should collaborate with, and provide liaison to, appropriate local and provincial public health departments for reporting of communicable diseases, including respiratory and gastrointestinal outbreaks, to assist with the control of infectious diseases.</i>					
<b>IPAC Program Functions: Occupational Health and Safety Issues</b>						
17.	<i>Infection Prevention and Control should be represented on the facility's Joint Health and Safety Committee.</i>					
18.	<i>The IPAC component of the Occupational Health and Safety program must be developed jointly by Occupational Health and Infection Prevention and Control.</i>					
19.	<i>All health care providers must be evaluated by Occupational Health for conditions relating to communicable diseases that can be spread in the health care setting.</i>					
20.	<i>Health care providers must be offered appropriate vaccinations to protect them from occupationally-relevant communicable diseases.</i>					
21.	<i>Health care settings must have easily accessible personal protective equipment (PPE), appropriate to the task</i>					

	Recommendation	Compliant	Partial Compliance	Non-compliant	Action Plan	Accountability
22.	<i>Attendance management policies shall discourage health care providers from working while ill with a communicable disease that can be spread in the health care setting.</i>					
23.	<i>If any worker acquires an occupational infection, or a claim in respect of an occupational infection has been filed with the Workplace Safety and Insurance Board, a notice in writing shall be made to the Ministry of Labour.</i>					
<b>IPAC Program Functions: Education, Training and Evaluation</b>						
24.	<i>Education in infection prevention and control must span the entire health care setting and be directed to all who work in that setting.</i>					
25.	<i>Orientation programs for staff new to the health care setting must include an IPAC component.</i>					
26.	<i>Health care facilities should have appropriate policies and procedures that ensure:</i> <ul style="list-style-type: none"> <li>a) <i>mandatory attendance at, or completion of, periodic IPAC training/education for all employees; and</i></li> <li>b) <i>attendance recorded and reported back to the manager to become a part of the employee's performance review.</i></li> <li>c)</li> </ul>					
27.	<i>Continuing education must address the IPAC needs of the organization with regard to content, target audience and timing</i>					

	Recommendation	Compliant	Partial Compliance	Non-compliant	Action Plan	Accountability
	<i>of the education (e.g., scheduled continuing education, special education based on specific needs such as outbreaks).</i>					
28.	<b><i>There must be evaluation of the IPAC education program to ensure that it is current, relevant and effective.</i></b>					
29.	<b><i>The resources required to carry out the IPAC education program must be allocated to achieve the educational goals of the program.</i></b>					
30.	<b><i>Adherence to IPAC practices should be part of the performance review.</i></b>					
<b>IPAC Program Functions: Other Key Components</b>						
31.	<b><i>All health care settings must develop and implement a hand hygiene program, including hand hygiene agents available at the point-of-care in acute care settings and easily accessible in all other health care settings. In health care facilities this program must also include:</i></b>  <ul style="list-style-type: none"> <li><b><i>a) demonstrable senior administration commitment;</i></b></li> <li><b><i>b) written policies and procedures;</i></b></li> <li><b><i>c) education in hand hygiene indications and techniques;</i></b></li> <li><b><i>d) a hand care program; and</i></b></li> <li><b><i>e) a program to measure hand hygiene compliance.</i></b></li> </ul>					
32.	<b><i>Hand hygiene policies and procedures should be consistent with the information found in PIDAC's Best Practices for Hand Hygiene in All Health Care Settings,</i></b>					

	Recommendation	Compliant	Partial Compliance	Non-compliant	Action Plan	Accountability
	<p><i>available at:</i>  <a href="http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_hh.html">http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_hh.html</a>.</p>					
33.	<p><b><i>Infection Prevention and Control and Occupational Health must be consulted and involved in all hand hygiene product selection and trials in the health care setting.</i></b></p>					
34.	<p><b><i>Staff in all health care settings must follow Routine Practices and Additional Precautions and facilities must implement a program that includes:</i></b></p> <ul style="list-style-type: none"> <li><b><i>a) written policies and procedures;</i></b></li> <li><b><i>b) staff education and training in indications and techniques for Routine Practices and Additional Precautions; and</i></b></li> <li><b><i>c) a program to measure compliance with Routine Practices and Additional Precautions.</i></b></li> </ul>					
35.	<p><b><i>Health care facilities should ensure that appropriate policies and procedures are in place to ensure mandatory attendance at training/education in Routine Practices and Additional Precautions (including hand hygiene) and that attendance is recorded and reported back to the manager to become a part of the employee's performance review.</i></b></p>					
36.	<p><b><i>Each health care setting should have a policy authorizing any regulated health care professional to initiate the appropriate Additional Precautions at the onset of symptoms. [BII]</i></b></p>					

	Recommendation	Compliant	Partial Compliance	Non-compliant	Action Plan	Accountability
37.	<i>The health care setting should have a policy that permits discontinuation of Additional Precautions in consultation with the Infection Prevention and Control Professional or designate. [BIII]</i>					
38.	<i>All health care settings must have an immunization program in place appropriate to their clients/patients/residents.</i>					
39.	<i>Residents of non-acute care facilities must have immunization programs that also include pneumococcal and annual influenza vaccination.</i>					
40.	<i>All health care facilities must have the ability and the capacity to identify and manage clusters or outbreaks of infectious diseases.</i>					
41.	<i>Outbreaks in health care facilities should be managed by a multidisciplinary team that includes the ICP.</i>					
42.	<i>The ICP should have the authority to implement outbreak management measures up to, and including, closure of the affected unit.</i>					
43.	<i>All health care settings must ensure the development and implementation of communication and reporting policies.</i>					
44.	<i>All health care settings must ensure reception, appropriate response and prompt communication of advisories and</i>					

	Recommendation	Compliant	Partial Compliance	Non-compliant	Action Plan	Accountability
	<b><i>Important Health Notices.</i></b>					
45.	<b><i>Health care settings should have policies and procedures addressing infection prevention and control for environmental services, handling of laundry and waste, reprocessing of medical equipment, food handling and storage, and facility design and construction.</i></b>					
46.	<b><i>There must be adequate numbers of staff with appropriate training to provide a clean and safe environment, including extra environmental cleaning capacity during outbreaks.</i></b>					
47.	<b><i>Cleaning practices in the health care setting must be monitored and results reported back appropriately to become a part of the employee's performance review.</i></b>					
48.	<b><i>Infection Prevention and Control must have input at all stages of construction and renovation, from design to commissioning, and have the authority to halt projects if there is a risk to client/patient/resident or staff safety.</i></b>					
<b>Resources for the IPAC Program</b>						
49.	<b><i>All health care facilities must have trained infection prevention and control professional(s) (ICP) and resources to implement the IPAC program that are proportional to the size, complexity, case mix and estimated risk of the</i></b>					

	Recommendation	Compliant	Partial Compliance	Non-compliant	Action Plan	Accountability
	<i>populations served by the health care facility. Other health care settings should have access to infection control expertise.</i>					
50.	<i>The expected number of hours per week that are devoted to infection prevention and control must be clearly stated and protected.</i>					
51.	<i>All health care facilities must have an ICP(s) who is/are Certified in Infection Control (CIC®), or who will obtain certification within two to five years of hire, depending on the acuity of the facility.</i>					
52.	<i>Health care facilities must ensure that ICPs maintain their knowledge and skills through continuing education relevant to their professional practice and recertification in infection control every five years.</i>					
53.	<i>Financial resources must be provided for the continuing professional education of ICP(s).</i>					
54.	<i>ICP staffing levels must be appropriate to the size and complexity of care of the health care facility. Recommendations for staffing should not be based exclusively on bed numbers. The ratio of ICPs will vary according to the acuity and activity of the health care facility and the volume and complexity of the ICP's work.</i>					

	Recommendation	Compliant	Partial Compliance	Non-compliant	Action Plan	Accountability
	<i>This includes high risk ambulatory care centres such as oncology and dialysis.</i>					
55.	<p><b>Recommendations for staffing and resources in Ontario health care facilities include the following:</b></p> <ul style="list-style-type: none"> <li>a) <b>a minimum ratio of 1.0 FTE ICP per 115 acute care beds;</b></li> <li>b) <b>a minimum ratio of 1.0 FTE ICP per 100 occupied acute care beds if there are high risk activities (e.g., dialysis);</b></li> <li>c) <b>it is recommended that an additional ratio of 1.0 FTE ICP per 30 intensive care beds be considered where ventilation and haemodynamic monitoring are routinely performed;</b></li> <li>d) <b>FTE ICP per 150 occupied long-term care beds where there are ventilated patients, patients with spinal cord injuries and dialysis or other high acuity activities; and</b></li> <li>e) <b>1.0 FTE ICP per 150-200 beds in other settings depending on acuity levels</b></li> </ul>					
56.	<b>Each facility's IPAC program should include a physician with knowledge, expertise and training in infection prevention and control.</b>					
57.	<b>Health care settings must provide the appropriate human and material resources to support the IPAC program.</b>					

	Recommendation	Compliant	Partial Compliance	Non-compliant	Action Plan	Accountability
58.	<i>Health care settings must provide administrative assistance to the IPAC program.</i>					
59.	<i>All health care settings must have access to an accredited microbiology laboratory that can alert the IPAC program to microorganisms of importance and provide assistance to the program with surveillance information in a timely fashion.</i>					
60.	<i>Health care settings must support the IPAC program with an annual budget for the maintenance of current educational resources.</i>					

## APPENDIX A: RESOURCES FOR INFECTION PREVENTION AND CONTROL

### RECOMMENDED OFFICE/LIBRARY RESOURCES

The following basic educational materials are recommended for ICPs in their health care setting in order to maintain current knowledge and to act as a resource for IPAC in their health care setting. Depending on patient care programs in a health care setting, additional resources may be required.

#### Textbooks

1. Heymann D, editor. **Control of Communicable Diseases Manual**. 19th ed. Washington (DC): American Public Health Association; 2008.  
*Excellent desktop resource for communicable disease control. Good quick reference and model for creating fact sheets for specific infectious diseases.*
2. Association for Professionals in Infection Control and Epidemiology (APIC):
  - i) **APIC text of infection control and epidemiology**. 2009 ed. Washington (DC): Association for Professionals in Infection Control and Epidemiology (APIC); 2009. Available for purchase from APIC online store at: [http://www.apic.org/AM/Template.cfm?Section=APIC\\_Text&Template=/CM/ContentDisplay.cfm&ContentID=14836](http://www.apic.org/AM/Template.cfm?Section=APIC_Text&Template=/CM/ContentDisplay.cfm&ContentID=14836).  
*This is the essential practice textbook/manual for the ICP. It also provides a frame of reference for writing the CIC certification exam when eligible.*
  - ii) McGoldrick-Friedman M, Rhinehart E. **Infection control in Home Care and Hospice**. Washington (DC): Association for Professionals in Infection Control and Epidemiology (APIC); 2006. Available for purchase from APIC online store at: [http://www.apic.org/source/orders/index.cfm?section=store&task=3&CATEGORY=BOOKS&PRODUCT\\_TYPE=SALES&SKU=SLS2098&DESCRIPTION=&FindSpec=&CFTOKEN=45814480&continue=1&SEARCH\\_TYPE=find&StartRow=16&PageNum=4](http://www.apic.org/source/orders/index.cfm?section=store&task=3&CATEGORY=BOOKS&PRODUCT_TYPE=SALES&SKU=SLS2098&DESCRIPTION=&FindSpec=&CFTOKEN=45814480&continue=1&SEARCH_TYPE=find&StartRow=16&PageNum=4).
  - iii) Friedman C, Peterson K. **Infection control in ambulatory care**. Washington (DC): Association for Professionals in Infection Control and Epidemiology (APIC); 2004. Available for purchase from APIC online store at: [http://www.apic.org/source/orders/index.cfm?section=store&task=1&StartRow=11&PageNum=3&SEARCH\\_TYPE=find&FindSpec=&continue=1&CATEGORY=BOOKS&FindIn=](http://www.apic.org/source/orders/index.cfm?section=store&task=1&StartRow=11&PageNum=3&SEARCH_TYPE=find&FindSpec=&continue=1&CATEGORY=BOOKS&FindIn=)
  - iv) **Infection Prevention Manual for Behavioral Health**. Washington (DC): Association for Professionals in Infection Control and Epidemiology (APIC); 2000. Available for purchase from APIC online store at: [http://www.apic.org/source/orders/index.cfm?section=store&task=3&CATEGORY=BOOKS&PRODUCT\\_TYPE=SALES&SKU=SLS9802&DESCRIPTION=&FindSpec=&CFTOKEN=45814480&continue=1&SEARCH\\_TYPE=find&StartRow=21&PageNum=5](http://www.apic.org/source/orders/index.cfm?section=store&task=3&CATEGORY=BOOKS&PRODUCT_TYPE=SALES&SKU=SLS9802&DESCRIPTION=&FindSpec=&CFTOKEN=45814480&continue=1&SEARCH_TYPE=find&StartRow=21&PageNum=5)
  - v) **Infection Prevention Manual for Home Health Care**. Washington (DC): Association for Professionals in Infection Control and Epidemiology (APIC); 2000. Available for purchase from APIC online store at: [http://www.apic.org/source/orders/index.cfm?section=store&task=3&CATEGORY=BOOKS&PRODUCT\\_TYPE=SALES&SKU=SLS9803&DESCRIPTION=&FindSpec=&CFTOKEN=45814480&continue=1&SEARCH\\_TYPE=find&StartRow=21&PageNum=5](http://www.apic.org/source/orders/index.cfm?section=store&task=3&CATEGORY=BOOKS&PRODUCT_TYPE=SALES&SKU=SLS9803&DESCRIPTION=&FindSpec=&CFTOKEN=45814480&continue=1&SEARCH_TYPE=find&StartRow=21&PageNum=5)
  - vi) **Infection Prevention Manual for LTC Facilities**. Washington (DC): Association for Professionals in Infection Control and Epidemiology (APIC); 2009. Available for purchase from APIC online store at:

- [http://www.apic.org/source/orders/index.cfm?section=store&task=3&CATEGORY=BOOKS&PRODUCT\\_TYPE=SALES&SKU=SLS6008&DESCRIPTION=&FindSpec=&FTOKEN=45814480&continue=1&SEARCH\\_TYPE=find&StartRow=21&PageNum=5](http://www.apic.org/source/orders/index.cfm?section=store&task=3&CATEGORY=BOOKS&PRODUCT_TYPE=SALES&SKU=SLS6008&DESCRIPTION=&FindSpec=&FTOKEN=45814480&continue=1&SEARCH_TYPE=find&StartRow=21&PageNum=5)
- vii) **Infection Prevention Manual for Hospitals**. Washington (DC): Association for Professionals in Infection Control and Epidemiology (APIC); 2010. Available for purchase from APIC online store at:  
[http://www.apic.org/source/orders/index.cfm?section=store&task=3&CATEGORY=BOOKS&PRODUCT\\_TYPE=SALES&SKU=SLS9801&DESCRIPTION=&FindSpec=&FTOKEN=45814480&continue=1&SEARCH\\_TYPE=find&StartRow=21&PageNum=5](http://www.apic.org/source/orders/index.cfm?section=store&task=3&CATEGORY=BOOKS&PRODUCT_TYPE=SALES&SKU=SLS9801&DESCRIPTION=&FindSpec=&FTOKEN=45814480&continue=1&SEARCH_TYPE=find&StartRow=21&PageNum=5)
3. American Academy of Pediatrics. **Red Book: 2009 Report of the Committee on Infectious Diseases**. 28th ed. Elk Grove Village (IL): American Academy of Paediatrics; 2009. Available online at: <http://aapredbook.aappublications.org/>.  
*Essential for settings where paediatric patients receive care.*
  4. American Academy of Paediatrics. **Guidelines for perinatal care**. 6th ed. Elk Grove Village (IL): American Academy of Paediatrics; 2007. Available at: <http://ebooks.aap.org/product/guidelines-for-perinatal-care>.
  5. Wenzel RP. **Prevention and Control of Nosocomial Infections** (4th edition). Baltimore, MD: Williams and Wilkins; 2003.
  6. Mandell GL, Bennett JE, Dolin R. **Principles and Practice of Infectious Diseases** (7th edition). New York, NY: Churchill Livingstone; 2009. Available for purchase at: [http://www.elsevier.com/wps/find/bookdescription.cws\\_home/719114/description#description](http://www.elsevier.com/wps/find/bookdescription.cws_home/719114/description#description).
  7. Bennett JV, Brachman PS. **Hospital Infections** (5th edition). Baltimore, MD: Lippincott Williams & Wilkins; 2007.

## Journals

1. **Canadian Journal of Infection Control** (CJIC). Available from CHICA-Canada: [http://www.chica.org/inside\\_cjic\\_past\\_issues.php](http://www.chica.org/inside_cjic_past_issues.php)
2. **American Journal of Infection Control** (AJIC). Available online at: <http://www.apic.org/Content/NavigationMenu/Publications/AJIC/AJIC.htm>
3. **Infection Control and Hospital Epidemiology** (ICHE). Available online at: <http://www.shea-online.org/PublicationsNews/ICHEJournal.aspx>
4. **Canada Communicable Disease Report** (CCDR). Available online at: <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/index-eng.php>
5. **Canadian Journal of Infectious Diseases and Medical Microbiology** (CJIC). Available online at: <http://www.pulsus.com/journals/journalHome.jsp?jnlKy=3&/home.htm>
6. **Clinical Infectious Diseases** (CID). Available online at <http://cid.oxfordjournals.org/>
7. **Emerging Infectious Diseases** (EID). Available online at: <http://www.cdc.gov/ncidod/eid/index.htm>
8. **Hospital Infection Control** (HIC). Available online at: <http://www.hiconline.com/>
9. **Journal of Hospital Infection** (JHI). Available online at: [http://www.his.org.uk/the\\_journal\\_of\\_hospital\\_infection.cfm](http://www.his.org.uk/the_journal_of_hospital_infection.cfm)
10. **Journal of Infectious Diseases** (JID). Available online at: <http://jid.oxfordjournals.org/>
11. **Morbidity and Mortality Weekly Report** (MMWR). Available online at: <http://www.cdc.gov/mmwr/>

**Standards & Guidelines****Ontario Ministry of Health and Long-Term Care (MOHLTC)** [<http://www.health.gov.on.ca>]

1. Ontario Ministry of Health and Long-Term Care. **Ontario Health Pandemic Influenza Plan**. Available online at:  
[http://www.health.gov.on.ca/english/providers/program/emu/pan\\_flu/pan\\_flu\\_plan.html](http://www.health.gov.on.ca/english/providers/program/emu/pan_flu/pan_flu_plan.html)
2. *Best practices and fact sheets for IPAC are published by the Ontario Ministry of Health and Long-Term Care on the PIDAC website at:*  
[http://www.health.gov.on.ca/english/providers/program/infectious/pidac/pidac\\_mn.html](http://www.health.gov.on.ca/english/providers/program/infectious/pidac/pidac_mn.html).
  - i) **Best Practices for Cleaning, Disinfection and Sterilization in all Health Care Settings (revised 2010):**  
[http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_cds.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_cds.html).
  - ii) **Best Practices for Hand Hygiene in all Health Care Settings (revised January 2009):**  
[http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_hh.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_hh.html)
  - iii) **Best Practices for Surveillance of Health Care-Associated Infections in Patient and Resident Populations:**  
[http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_hai.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_hai.html)
  - iv) **Best Practices for Infection Prevention and Control Programs in Ontario in All Health Care Settings:**  
[http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_ipcp.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_ipcp.html).
  - v) **Routine Practices and Additional Precautions in All Health Care Settings:**  
[http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_routine.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_routine.html).
  - vi) **Annex A: Screening, Testing and Surveillance for Antibiotic-Resistant Organisms (AROs):**  
[http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best\\_prac/bp\\_staff.pdf](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best_prac/bp_staff.pdf).
  - vii) **Annex B: Best Practices for Prevention of Transmission of Acute Respiratory Infection:**  
[http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best\\_prac/bp\\_fri\\_080406.pdf](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best_prac/bp_fri_080406.pdf).
  - viii) **Annex C: Testing, Surveillance and Management of Clostridium difficile:**  
[http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best\\_prac/bp\\_cdifff.pdf](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best_prac/bp_cdifff.pdf).
  - viii) **Environmental Cleaning for Prevention and Control of Infections in All Health Care Settings:**  
[http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_enviro\\_clean.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_enviro_clean.html).
  - ix) **Fact Sheet: "PIDAC'S Hand Hygiene Fact Sheet for Health Care Settings"**. Available online at:  
[http://www.health.gov.on.ca/english/providers/program/infectious/pidac/fact\\_sheet/fs\\_handwash\\_010107.pdf](http://www.health.gov.on.ca/english/providers/program/infectious/pidac/fact_sheet/fs_handwash_010107.pdf)

**Public Health Agency of Canada (PHAC)** [<http://www.phac-aspc.gc.ca>]

The Public Health Agency of Canada publications are available at no charge from their website. An alphabetical list of **all publications** may be found at: <http://www.phac-aspc.gc.ca/publications-eng.php>. The listing includes the following:

Public Health Agency of Canada. **Health Alerts – Travel Medicine Program**. Available online at: <http://www.phac-aspc.gc.ca/tmp-pmv/index-eng.php>.

Infection control guidelines may be found at: <http://www.phac-aspc.gc.ca/dpg-eng.php#infection>:

1. **Essential Resources for Effective Infection Prevention and Control Programs: A Matter of Patient Safety – A Discussion Paper (2010)**. Available online at: <http://www.phac-aspc.gc.ca/nois-sinp/guide/ps-sp/index-eng.php>.
2. **Controlling antimicrobial resistance. An integrated action plan for Canadians**. *Can Commun Dis Rep*. 1997;23 Suppl 7: 1-32. Available online at: <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/97vol23/index.html>.
3. **Laboratory Biosafety Guidelines**. 3<sup>rd</sup> ed. Ottawa (ON): Public Health Agency of Canada; 2004. Available online at: [http://www.phac-aspc.gc.ca/publicat/lbg-ldmbl-04/pdf/lbg\\_2004\\_e.pdf](http://www.phac-aspc.gc.ca/publicat/lbg-ldmbl-04/pdf/lbg_2004_e.pdf)
4. **Construction-related Nosocomial Infections in Patients in Health Care Facilities: Decreasing the Risk of Aspergillus, Legionella and Other Infections**. Available online at: <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/01vol27/27s2/index.html>
5. **Prevention and control of occupational infections in health care**. *Can Commun Dis Rep*. 2002;28 Suppl 1:1-264. Available online at: <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/02vol28/28s1/index.html>
6. **Classic Creutzfeldt-Jakob Disease in Canada**. *Can Commun Dis Rep*. 2002;28 Suppl 5:1-84. Available online at: <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/02vol28/28s5/index.html>
7. **Foot care by health care providers**. *Can Commun Dis Rep*. 1997;23 Suppl 8:i-iv, 1-8. Available online at: <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/97vol23/23s8/index.html>
8. **Preventing infections associated with indwelling intravascular access devices**. *Can Commun Dis Rep*. 1997;23 Suppl 8:i-iv, 1-32. Available online at: [http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/97vol23/23s8/iadinde\\_e.html](http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/97vol23/23s8/iadinde_e.html)
9. **Construction-related Nosocomial Infections in Patients in Health Care Facilities: Decreasing the Risk of Aspergillus, Legionella and Other Infections**. *Can Commun Dis Rep*. 2001;27 Suppl 2:i-iv, 1-38. Available online at: [http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/97vol23/23s8/iadinde\\_e.html](http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/97vol23/23s8/iadinde_e.html)
10. **Preventing infections associated with indwelling intravascular access devices**. *Can Commun Dis Rep*. 1997;23 Suppl 8:i-iv, 1-32. Available online at: <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/01vol27/27s2/index.html>
11. **Preventing the spread of vancomycin-resistant enterococci (VRE) in Canada**. *Can Commun Dis Rep*. 1997;23 Suppl 8:i-iv, 1-16, i-iv, 1-19. Available online at: <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/97vol23/23s8/index.html>
12. **Guidelines for the prevention and control of meningococcal disease**. *Can Commun Dis Rep*. 2005;31 Suppl 1:i-ii, 1-21. Available online at: [http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/05pdf/31s1\\_e.pdf](http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/05pdf/31s1_e.pdf)

13. **Canadian contingency plan for viral hemorrhagic fevers and other related diseases.** *Can Commun Dis Rep.* 1997;23 Suppl 1:i-iii, 1-13; i-iii, 1-13. Available online at: <http://www.collectionscanada.gc.ca/webarchives/20071124191322/http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/97vol23/23s1/index.html>
14. **Guidelines for preventing the transmission of tuberculosis in Canadian Health Care Facilities and other institutional settings.** *Can Commun Dis Rep.* 1996;22 Suppl 1:i-iv, 1-50, i-iv, 1-5. Available online at: <http://www.collectionscanada.gc.ca/webarchives/20071125005218/http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/96vol22/22s1/index.html>
15. **Canadian Tuberculosis Standards.** 6<sup>th</sup> ed. Ottawa (ON):Public Health Agency of Canada; 2007. Available online at: [http://www.lung.ca/cts-sct/pdf/tbstand07\\_e.pdf](http://www.lung.ca/cts-sct/pdf/tbstand07_e.pdf).

#### National Advisory Committee on Immunization.

**Canadian immunization guide.** 7th ed. Ottawa (ON): Canadian Medical Association; 2006. Available online at: <http://www.phac-aspc.gc.ca/publicat/cig-gci/index-eng.php>

#### Canadian Standards Association (CSA) [<http://www.csa.ca>]

Canadian Standards are available for purchase on the CSA website at <http://www.csa.ca/Default.asp?language=English>] or from:

Canadian Standards Association  
5060 Spectrum Way, Suite 100  
Mississauga, Ontario L4W 5N6  
Phone: (416) 747-4044

#### Centers for Disease Control and Prevention (CDC) [<http://www.cdc.gov>]

The CDC publishes IPAC guidelines in *Infection Control and Hospital Epidemiology (ICHE)*, the *American Journal of Infection Control (AJIC)* and *Morbidity and Mortality Weekly Report (MMWR)*. A listing of IPAC guidelines may be downloaded from the CDC website at: <http://www.cdc.gov/hai/>. The listing includes the following:

1. **CDC Definitions of Nosocomial Infections [excluding Pneumonia].** Available online at: <http://www.cdc.gov/ncidod/dhqp/pdf/nnis/NosInfDefinitions.pdf>.
2. **Guideline for Hand Hygiene in Healthcare Settings – 2002.** *MMWR Recomm Rep.* 2002;51(RR-16):1-56. Available online at: <http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf>.
3. **Guidelines for Environmental Infection Control in Health-care Facilities.** *MMWR Recomm Rep.* 2003; 52(RR-10): 1-42. Available online at: <http://www.cdc.gov/mmwr/PDF/rr/rr5210.pdf>.
4. **Guideline for Isolation Precautions: Preventing transmission of Infectious Agents in Healthcare Settings 2007.** Available online at: <http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/Isolation2007.pdf>.
5. **Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2002.** *MMWR Recomm Rep.* 2002;51(RR-10):1-36. Available online at: <http://www.cdc.gov/mmwr/PDF/rr/rr5110.pdf>.
6. **Guidelines for Preventing Health-care-associated Pneumonia, 2003.** *MMWR Recomm Rep.* 2004 Mar 26;53(RR-3):1-36. Available online at: <http://www.cdc.gov/mmwr/PDF/rr/rr5303.pdf>

7. **Guideline for the Prevention of Surgical Site Infection, 1999.** *Infect Control Hosp Epidemiol.* 1999;20(4):1-32. Available online at: <http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/SSI.pdf>.
8. **Guideline for Prevention of Catheter-associated Urinary Tract Infections, 2009.** Available online at: [http://www.cdc.gov/HAI/ca\\_uti/uti.html](http://www.cdc.gov/HAI/ca_uti/uti.html).
9. **Management of Multidrug-Resistant Organisms in Healthcare Settings, 2006.** Available online at: <http://www.cdc.gov/ncidod/dhqp/pdf/ar/mdroGuideline2006.pdf>.
10. **Guideline for Infection Control in Healthcare Personnel, 1998.** *Infect Control Hosp Epidemiol.* 1998 Jun;19(6):407-63. Available online at: <http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/InfectControl98.pdf>.
11. **Guidelines for the Management of Occupational Exposures to Hepatitis B, Hepatitis C, and HIV and Recommendations for Postexposure Prophylaxis.** *MMWR Recomm Rep.* 2001;50(RR-11):1-67. Available online at: <http://www.cdc.gov/mmwr/PDF/rr/rr5011.pdf>.
12. **Guidelines for Preventing Opportunistic Infections Among Hematopoietic Stem Cell Transplant Recipients.** *MMWR Recomm Rep.* 2000;49(RR-10):1-147. Available online at: <http://www.cdc.gov/mmwr/PDF/rr/rr4910.pdf>.
13. **Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health-Care Settings, 2005.** *MMWR Recomm Rep.* 2005;54(RR-17):1-141. Available online at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5417a1.htm>.
14. **Recommendations for preventing transmission of infections among chronic hemodialysis patients.** *MMWR Recomm Rep* 2001;50(RR-5):1-43. Available online at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5005a1.htm>.
15. **Guidelines for the Investigation of Contacts of Persons with Infectious Tuberculosis.** *MMWR Recomm Rep.* 2005;54(RR-15):1-37. Available online at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5415a1.htm>.
16. **Guidelines for Infection Control in Dental Health-Care Settings, 2003.** *MMWR Recomm Rep.* 2003;52(RR-17):1-61. Available online at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5217a1.htm>.
17. **Workbook for Designing, Implementing and Evaluating a Sharps Injury Prevention Program, 2004.** Available online at: <http://www.cdc.gov/sharpsafety/pdf/WorkbookComplete.pdf>.

#### Other Sources of Published Guidelines

1. **Position Papers from the Society for Healthcare Epidemiology of America (SHEA)**  
*Position Statements are developed by the Guidelines Committee of SHEA to assist infection control and epidemiology professionals in policy development and decision making in areas that are unclear or controversial. Position papers may be accessed from the SHEA website at: <http://www.shea-online.org/>.*
  - i) **SHEA Guideline for Management of Healthcare Workers Who Are Infected with Hepatitis B Virus, Hepatitis C Virus, and/or Human Immunodeficiency Virus.** *Infect Control Hosp Epidemiol* 2010;31(3):203-232. Available online at: [http://www.shea-online.org/Assets/files/guidelines/BBPathogen\\_GL.pdf](http://www.shea-online.org/Assets/files/guidelines/BBPathogen_GL.pdf).
  - ii) **Multi-Society Guideline for Reprocessing Flexible Gastrointestinal Endoscopes.** *Infect Control Hosp Epidemiol* 2003;24(7):532-7. Available online at: <http://www.apic.org/AM/Template.cfm?Section=Home&CONTENTID=6381&TEMPLATE=/CM/ContentDisplay.cfm>.
  - iii) **SHEA guideline for preventing nosocomial transmission of multidrug-resistant strains of Staphylococcus aureus and Enterococcus.** *Infect Control Hosp*

- Epidemiol 2003;24:362-386. Available online at: [http://www.shea-online.org/Assets/files/position\\_papers/SHEA\\_MRSA\\_VRE.pdf](http://www.shea-online.org/Assets/files/position_papers/SHEA_MRSA_VRE.pdf).
- iv) **Clostridium difficile in long-term-care facilities for the elderly.** Infect Control Hosp Epidemiol 2002;23:696-703. Available online at: [http://www.shea-online.org/Assets/files/position\\_papers/SHEA\\_Cdiff.pdf](http://www.shea-online.org/Assets/files/position_papers/SHEA_Cdiff.pdf).
  - v) **Clostridium difficile -associated diarrhea and colitis.** Infect Control Hosp Epidemiol 1995;16(8):459-477. Available online at: [http://www.shea-online.org/Assets/files/position\\_papers/Cldiff95.PDF](http://www.shea-online.org/Assets/files/position_papers/Cldiff95.PDF).
  - vi) **Guidelines for the prevention of antimicrobial resistance in hospitals.** Infect Control Hosp Epidemiol 1997;18(4):275-291. Available online at: [http://www.shea-online.org/Assets/files/position\\_papers/AntimicroResist97.PDF](http://www.shea-online.org/Assets/files/position_papers/AntimicroResist97.PDF).
  - vii) **Antimicrobial resistance in long-term-care facilities.** Infect Control Hosp Epidemiol 1996;17(2):129-140. Available online at: [http://www.shea-online.org/Assets/files/position\\_papers/AbxR-LTCF96.PDF](http://www.shea-online.org/Assets/files/position_papers/AbxR-LTCF96.PDF).
  - viii) **Antimicrobial use in long-term-care facilities.** Infect Control Hosp Epidemiol 1996;17(2):119-128. Available online at: [http://www.shea-online.org/Assets/files/position\\_papers/Abx-LTCF96.PDF](http://www.shea-online.org/Assets/files/position_papers/Abx-LTCF96.PDF).
  - ix) **An approach to the evaluation of quality indicators of the outcome of care in hospitalized patients, with a focus on nosocomial infection indicators.** Infect Control Hosp Epidemiol 1995;16(5):308-316. Available online at: [http://www.shea-online.org/Assets/files/position\\_papers/Q-Indicators95.PDF](http://www.shea-online.org/Assets/files/position_papers/Q-Indicators95.PDF).
2. **Association for Professionals in Infection Control and Epidemiology (APIC)**  
*A number of Position Statements, Guidelines and State-of-the-Art reports have been published by APIC and may be accessed on their website at: <http://www.apic.org>.*
  3. **Ontario Hospital Association (OHA)**  
Ontario Hospital Association. **Communicable Diseases Surveillance Protocols.** Available online at: <http://www.oha.com/SERVICES/HEALTHSAFETY/Pages/CommunicableDiseasesSurveillanceProtocols.aspx>.
  4. **Other Guidelines**
    - i) **World Alliance for Patient Safety, "Clean Hands are Safer Hands", 2009.** WHO Guidelines on Hand Hygiene in Health Care. Available online at: [http://whqlibdoc.who.int/publications/2009/9789241597906\\_eng.pdf](http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf)
    - ii) **Treatment of Tuberculosis: Guidelines for National Programmes.** WHO Global Programme on Tuberculosis, Third Edition (WHO/CDS/TB/2003.313). Available online at: [http://whqlibdoc.who.int/hq/2003/WHO\\_CDS\\_TB\\_2003.313\\_eng.pdf](http://whqlibdoc.who.int/hq/2003/WHO_CDS_TB_2003.313_eng.pdf).
    - iii) **Diagnostic Standards and Classification of Tuberculosis in Adults and Children.** Am J Respir Crit Care Med 2000;161:1376-1395. Available online at: <http://www.cdc.gov/tb/publications/PDF/1376.pdf>.
    - iv) American Institute of Architects (AIA); Facility Guidelines Institute (FGI). **Guidelines for design and construction of hospital and health care facilities.** 2006 ed. Washington (DC): American Institute of Architects; 2006.
    - v) **AAMI Standards**  
*The Association for the Advancement of Medical Instrumentation (AAMI) publishes standards, recommended practices, technical information reports and other resources covering sterilization, dialysis, biological evaluation of medical devices, quality systems and medical equipment. The standards must be purchased. NOTE: These standards might not be applicable to all Canadian settings, but may be used as an extra resource. Standards are available at: <http://www.aami.org/publications/standards/index.html>.*
    - vi) College of Physicians and Surgeons of Ontario. **Infection Control in the Physician's Office.** 2004 Edition. Available online at: <http://www.cpso.on.ca/policies/guidelines/default.aspx?id=1766>.

## LEGISLATION

1. **Health Protection and Promotion Act.** R.S.O. 1990, Chapter H.7. Available online at: [http://www.e-laws.gov.on.ca/Download?dDocName=elaws\\_statutes\\_90h07\\_e](http://www.e-laws.gov.on.ca/Download?dDocName=elaws_statutes_90h07_e).
2. **Long-Term Care Homes Act.** S.O. 2007, Chapter 8. Available online at: [http://www.e-laws.gov.on.ca/Download?dDocName=elaws\\_regs\\_100079\\_e](http://www.e-laws.gov.on.ca/Download?dDocName=elaws_regs_100079_e).
3. **Occupational Health and Safety Act.** R.S.O. 1990, Chapter O.1. Available online at: [http://www.e-laws.gov.on.ca/Download?dDocName=elaws\\_statutes\\_90o01\\_e](http://www.e-laws.gov.on.ca/Download?dDocName=elaws_statutes_90o01_e)
4. **Occupational Health and Safety Act.** Ontario Regulation 67/93. Health Care and Residential Facilities. Available online at: [http://www.e-laws.gov.on.ca/Download?dDocName=elaws\\_regs\\_930067\\_e](http://www.e-laws.gov.on.ca/Download?dDocName=elaws_regs_930067_e).
5. **Occupational Health and Safety Act.** R.R.O. 1990, Regulation 860 Amended to O. Reg. 36/93. **Workplace Hazardous Materials Information System (WHMIS).** Available online at: [http://www.e-laws.gov.on.ca/Download?dDocName=elaws\\_regs\\_900860\\_e](http://www.e-laws.gov.on.ca/Download?dDocName=elaws_regs_900860_e).
6. **Public Hospitals Act.** R.S.O. 1990, Chapter P.40. Available online at: [http://www.e-laws.gov.on.ca/Download?dDocName=elaws\\_statutes\\_90p40\\_e](http://www.e-laws.gov.on.ca/Download?dDocName=elaws_statutes_90p40_e).

## PROFESSIONAL ASSOCIATIONS

The following professional associations are also a source for guidelines, standards, best practices and position statements that the ICP may use when preparing policies. Membership in these organizations will often include a subscription to the organization's journal as well as discounted registration at annual conferences.

1. **Community and Hospital Infection Control Association – Canada (CHICA-Canada)**  
Website: <http://www.chica.org/>
2. **Association for Professionals in Infection Control and Epidemiology (APIC)**  
Website: <http://www.apic.org>
3. **Society for Healthcare Epidemiology of America (SHEA)**  
Website: <http://www.shea-online.org/>

## OTHER RESOURCES

1. **Canadian Patient Safety Institute**  
Website: <http://www.saferhealthcarenow.ca>  
*The Safer Healthcare Now! Intervention kits are designed to engage your teams and clinicians in a dynamic approach to quality improvement. Three of the kits relate to IPAC:*
  - i) **Prevention of Central Line-Associated Bloodstream Infection.** Available online at: <http://www.saferhealthcarenow.ca/EN/Interventions/CLI/Pages/default.aspx>
  - ii) **Prevention of Surgical Site Infection.** Available online at: <http://www.saferhealthcarenow.ca/EN/Interventions/SSI/Pages/default.aspx>
  - iii) **Prevention of Ventilator-Associated Pneumonia.** Available online at: <http://www.saferhealthcarenow.ca/EN/Interventions/VAP/Pages/default.aspx>
  - iv) **NACS – New Approach to Controlling Superbugs.** Available online at: [http://www.saferhealthcarenow.ca/EN/Interventions/aro\\_mrsa/Pages/default.aspx](http://www.saferhealthcarenow.ca/EN/Interventions/aro_mrsa/Pages/default.aspx)
2. **Important Health Notices**

Updates on emergency-related activities and information and will be posted at:

<http://www.health.gov.on.ca/english/providers/program/emu/ihn.html>

3. **Certification Board of Infection Control and Epidemiology, Inc. (CBIC)**

Website: <http://www.cbic.org>

*Become certified in infection control (CIC®) when eligible by taking the examination available from this Board. The CBIC examination is recognized in both the U.S. and Canada.*

4. **ProMED-Mail**

Website: <http://www.promedmail.org/pls/apex/f?p=2400:1000>

*Sign up for regular emails on emerging infectious diseases from around the globe*

5. **PubMed**

Website: <http://www.ncbi.nlm.nih.gov/entrez/query.fcgi>

*A service of the U.S. National Library of Medicine that includes over 16 million citations from MEDLINE and other life science journals for biomedical articles. PubMed includes links to full text articles and other related resources.*

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## TRAINING

1. IPAC courses sanctioned by the Community and Hospital Infection Control Association-Canada: [http://www.chica.org/educ\\_education.html](http://www.chica.org/educ_education.html)
2. Epidemiology courses offered from the Centers for Disease Control and Prevention: <http://www.cdc.gov/vaccines/ed/default.htm>

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## **APPENDIX B: APIC/CHICA-CANADA/CBIC INFECTION CONTROL AND EPIDEMIOLOGY: PROFESSIONAL AND PRACTICE STANDARDS**

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### **APIC/CHICA-Canada/CBIC infection prevention, control and epidemiology: Professional and practice standards**

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**Ruth Curchoe, RN, MSN, CIC (CBIC)**  
**Margie Foster, RN, CIC (CHICA-Canada)**  
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**Sharon Krystofiak, MS, MS, MT (ASCP), CIC (APIC)**  
**Rebecca L Lark, MD (APIC)**  
**Linda Laxson, RN, BSN, CIC (CBIC)**  
**Mary Jane Ruppert, RN (APIC)**  
**Linda Spaulding, RNC, CIC (APIC)**

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The Association for Professionals in Infection Control and Epidemiology, Inc (APIC) and the Community and Hospital Infection Control Association-Canada (CHICA-Canada) collaborated to craft this document, Infection prevention, control and epidemiology: Professional and practice standards. Both professional organizations affirm their responsibility to their memberships and the public they serve to provide professional and practice standards. This document replaces the 1999 edition.

Standards are authoritative statements that reflect the expectations, values, and priorities of the profession. While voluntary, these standards provide direction and a dynamic framework for the evaluation of practice to address the needs of the customers served. Standards also define the profession's accountability in terms of desired outcomes for which infection prevention and control professionals (ICPs) are responsible. These standards are designed to be used in identifying areas for professional growth, developing job descriptions, and providing criteria for performance evaluations.

These standards encompass a broad spectrum of practice settings and professional backgrounds and include key indicators that are designed to be used in evaluating both the competency of the individual and their practice. The key indicators represent multiple skills considered necessary to meet the demands of the evolving health care environment. It is expected that the ICP will meet or exceed the indicators associated with both the Professional and Practice Standards.

In general, the standards will remain stable over time as they reflect each organization's philosophy and values; however the indicators will be reviewed periodically to ensure that they incorporate and address current scientific knowledge, clinical practice, global issues, and technology.

## **I. PROFESSIONAL STANDARDS**

Professional Standards describe a level of individual competence in the professional role. ICPs strive to maintain integrity and a high degree of competency through education, training, and certification. Professionals are expected to incorporate these standards appropriate to their role and practice setting. Key indicators for each standard are designed for use in professional performance evaluation.

### **1. Qualifications**

Meets recommended qualifications to practice in the profession.

#### **Indicators**

- Experienced healthcare professional with a health sciences background
- Becomes certified in infection prevention and control when eligible through the Certification Board of Infection Control and Epidemiology
- Maintains certification

### **2. Professional development**

Acquires and maintains current knowledge and skills in the area of infection prevention, control and epidemiology.

#### **Indicators**

- Completes a basic infection prevention and control training course within the first 6 months of entering the profession
  - Demonstrates basic knowledge and advances his/her education, knowledge and skills as it relates to infection prevention and control in the following areas:
    - Epidemiology, including outbreak management
    - Infectious diseases
    - Microbiology
    - Patient care practices
    - Asepsis
    - Disinfection/sterilization
    - Occupational health
    - Facility planning/construction
    - Emergency preparedness
    - Learning/education principles
    - Communication
    - Product evaluation
    - Information technology
    - Program administration
    - Legislative issues/Policy making
    - Research
  - Incorporates and disseminates research findings into practice, education, and/or consultation
  - Collaborates with other professional organizations and academic entities to further the prevention of infection
  - Participates in professional organizations and networking opportunities
  - Maintains current knowledge and functions well with electronic media, e.g., computers and hand held devices, with which to communicate in the IPC environment
-

### 3. Ethics

Makes decisions and performs activities in an ethical manner.

#### Indicators

- Complies with laws and regulations
- Holds paramount the confidentiality, safety, health and welfare of all persons in the performance of professional duties
- Practices in a nonjudgmental, nondiscriminatory manner with sensitivity to diversity
- Acts in such a manner as to uphold and enhance personal and professional honor, integrity, and dignity.
- Engages in IPAC research in a professional manner
- Collaborates with and supports others to improve competency in the science of infection prevention, control, and epidemiology
- Ensures transparency and disclosure in performing research or applying for grants
- Builds professional reputation on personal merit
- Refrains from competing unfairly with others
- Refuses gratuities, gifts, or favors that might impair or appear to impair professional judgment, or offer any favor, service, or thing of value to obtain special advantage

### 4. Professional accountability

Responsible for the development, evaluation, and improvement of his/her own practice in relation to the Practice Standards.

#### Indicators

- Establishes and works toward professional goals and objectives
- Performs regular self-evaluations to identify strengths and areas for improvement
- Seeks constructive feedback regarding professional practice
- Keeps current on best practices through evidence-based research, consensus and guidelines
- Participates in professional organizations
- Acknowledges the commitment to protect clients through the support of safe practices and policies

### 5. Leadership

Serves as a leader, mentor, and role model.

#### Indicators

- Provides direction and works collaboratively with others
- Shares knowledge and expertise
- Mentors less experienced health care providers/ancillary personnel
- Recognizes and supports the importance of research in shaping the practice of infection prevention, control, and epidemiology
- Brings creativity and innovation to practice
- Seeks opportunities to influence and educate policymaking bodies and the public
- Collaborates and/or educates self with regard to the global infection prevention and control community

## **II. PRACTICE STANDARDS**

ICPs strive to incorporate relevant components of these standards in their own practice. Key indicators for each standard are designed to be used in personal and program development, evaluation, and enhancement.

### **1. Infection prevention and control practice**

Incorporates into practice effective activities that are specific to the practice setting, the population served, and the continuum of care.

#### **Indicators**

- Integrates surveillance findings into formal plans for improvement of practice and patient outcomes in various health care settings
- Reviews, analyzes, and implements regulations, standards and/or guidelines of applicable governmental agencies and professional organizations
- Integrates relevant local, national and global public health issues into practice
- Analyzes and applies pertinent information from current scientific literature and publications
- Develops and implements policies and procedures based on currently accepted infection prevention and control best practices
- Ensures that findings, recommendations, and policies of the program are disseminated to appropriate groups or individuals
- Provides knowledge on the function, role, and value of the program to customers

### **2. Surveillance**

Uses a systematic approach to monitor the effectiveness of prevention and control strategies that are consistent with the organization's goals and objectives.

#### **Indicators**

- Develops a surveillance plan based on the population(s) served, services provided, and previous surveillance data
- Selects indicators and designs surveillance based on the projected use of the data
- Integrates pertinent regulatory requirements
- Uses standardized definitions for the identification and classification of events, indicators, or outcomes
- Utilizes information technology and systems applications
- Reports epidemiologically significant findings to appropriate customers
- Ensures requirements for communicable disease reporting are met
- Periodically evaluates the effectiveness of the surveillance plan and modifies as necessary

### **3. Epidemiology**

Applies epidemiologic principles and statistical methods, including risk stratification and benchmarking, to identify target populations, determine risk factors, design prevention and control strategies, analyze trends, and evaluate processes.

#### **Indicators**

- Uses epidemiologic principles to conduct surveillance and investigations
- Employs statistical techniques to describe the data, calculate risk-adjusted rates, and benchmark

- Incorporates information technology and systems applications in the analysis and dissemination of data
- Critically evaluates significance of findings and makes recommendations for improvement based on those findings

#### **4. Education**

Serves as an educator and educational resource for health care providers, ancillary staff, patients, families and the general public.

##### **Indicators**

- Assesses the needs of customers and develops educational objectives and strategies to meet those needs
- Utilizes learning principles appropriate to the target audience
- Utilizes appropriate information technology in educational design and delivery
- Collaborates in the development and delivery of educational programs and/or tools that relate to infection prevention, control, and epidemiology
- Evaluates the effectiveness of educational programs and learner outcomes

#### **5. Consultation**

Provides expert knowledge and guidance in infection prevention, control, and epidemiology

##### **Indicators**

- Stays current with developments in infection prevention, control, and epidemiology
- Integrates into practice, policies, and procedures:
  - Pertinent regulatory requirements
  - Accreditation standards
  - Guidelines
- Supports patients/families, administration, committees, health care providers, and ancillary staff in infection prevention, control, and epidemiology issues
- Provides input into patient safety and healthcare quality initiatives
- Collaborates with community health organizations

#### **6. Occupational Health**

Collaborates with occupational health in the development of strategies that address the risk of disease transmission to health care providers and ancillary staff.

##### **Indicators**

- Participates in development/review of occupational health policies and procedures related to infection prevention and control.
- Assists in the development of an immunization program.
- Consults on post-exposure protocols and activities related to communicable diseases.

#### **7. Program administration and evaluation**

Systematically evaluates the effectiveness of the program appropriate to the practice setting.

##### **Indicators**

- Develops and reviews the effectiveness of the program goals and objectives
  - Assures that customer needs/expectations are considered in the development and continuous improvement of processes, products and services
-

- Determines resource needs to accomplish the proposed goals and objectives
- Communicates resource needs to administration based on goals and objectives

## **8. Fiscal responsibility**

Practices in a fiscally responsible and accountable manner

### **Indicators**

- Considers financial implications, safety and clinical outcomes when:
  - Making recommendations
  - Evaluating technology and products
  - Developing policies and procedures
- Incorporates fiscal assessments into program evaluation and/or reports, as applicable
- Develops and maintains a departmental budget, as appropriate

## **9. Performance improvement**

Functions as an integral part of performance improvement initiatives to promote positive patient and employee outcomes.

### **Indicators**

- Identifies opportunities for improvement based on observations, process and outcome indicators, and other findings
- Acts as an agent of change and participates in the change process
- Directs the organization's infection prevention and control improvement activities
- Participates in the organization's multidisciplinary improvement strategies
- Utilizes established measurement tools and techniques, e.g., outbreak investigation, root cause analysis, brainstorming, etc.
- Contributes epidemiologic skills to improvement processes

## **10. Research**

Conducts, participates, evaluates and/or applies relevant research findings to infection prevention, control, and epidemiology practice. Research includes informal epidemiologic studies, e.g., outbreak/cluster investigations, surveillance findings, etc.

### **Indicators**

- Critically evaluates published research and incorporates appropriate findings
- Disseminates relevant research findings through practice, education, and/or consultation
- Participates in infection prevention and control related research independently or collaboratively
- Organizes and shares findings from surveillance activities and/or outbreak investigations
- Publishes or presents research findings to assist in advancing the field of infection prevention, control and epidemiology
- Incorporates cost analysis into infection prevention and control research when possible

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## **Resources**

1. Scheckler WE, Brimhall D, Buck AS, Farr BM, Friedman C, Garibaldi RA, et al. Requirements for infrastructure and essential activities of infection control and epidemiology in hospitals: a
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- Consensus Panel Report. *Am J Infect Control* 1998; 26:47-60. [Accessed October 1, 2010]. [http://www.apic.org/AM/Template.cfm?Section=Search&section=Consensus\\_Reports&template=/CM/ContentDisplay.cfm&ContentFileID=284](http://www.apic.org/AM/Template.cfm?Section=Search&section=Consensus_Reports&template=/CM/ContentDisplay.cfm&ContentFileID=284).
2. Friedman C, Barnette M, Buck AS, Ham R, Harris JA, Hoffman P, et al. Requirements for infrastructure and essential activities of infection control and epidemiology in out-of-hospital settings: a Consensus Panel report. *Am J Infect Control* 1999; 27(5):418-30. [Accessed October 1, 2010]. Available at: [http://www.apic.org/AM/Template.cfm?Section=Search&section=Consensus\\_Reports&template=/CM/ContentDisplay.cfm&ContentFileID=277](http://www.apic.org/AM/Template.cfm?Section=Search&section=Consensus_Reports&template=/CM/ContentDisplay.cfm&ContentFileID=277).
  3. The role of the infection control practitioner—CHICA-Canada. *Can J Infect Control* 1996; 11:36-7.
  4. Horan-Murphy E, Barnard B, Chenoweth C, Friedman C, Hazuka B, Russell B, et al. APIC/CHICA-Canada Infection Control and Epidemiology: Professional and Practice Standards. Association for Professionals in Infection Control and Epidemiology, Inc., and the Community and Hospital Infection Control Association-Canada. *Am J Infect Control* 1999; 27(1):47-51. [Accessed October 1, 2010]. Available at: <http://www.chica.org/pdf/PPS.pdf>.
  5. Applied Management Professionals for Certification Board of Infection Control. A national job analysis of the infection control professional. Final report. Washington (DC): Applied Management Professionals for Certification Board of Infection Control; 2006.
  6. APIC Code of Ethics. *Am J Infect Control* 1999; 27(1):51.
  7. College of Nurses of Ontario Professional Standards. [Accessed October 1, 2010]. Available at: <http://www.cno.org/prac/profstandards.html>.
  8. National Association for Healthcare Quality Standards of Practice for Healthcare Quality Professionals. [Accessed October 1, 2010]. Available at: <http://www.nahq.org/about/code.htm>.
  9. Standards of Practice in Oncology Social Work, 2001. [Accessed October 1, 2010] Available at: <http://www.aosw.org/html/prof-standards.php>.
  10. Lee TB, Montgomery, OG, Marx, J, Olmsted, RN, Scheckler, WE. Recommended practices for surveillance: Association for Professionals in Infection Control and Epidemiology (APIC), Inc. *American Journal of Infection Control* 2007; 35(7):427-440. [Accessed October 1, 2010]. Available at: [http://www.apic.org/Content/NavigationMenu/PracticeGuidance/SurveillanceDefinitionsReportandRecommendations/AJIC\\_Surveillance\\_2007.pdf](http://www.apic.org/Content/NavigationMenu/PracticeGuidance/SurveillanceDefinitionsReportandRecommendations/AJIC_Surveillance_2007.pdf).

## APPENDIX C: SELF-ASSESSMENT TOOL FOR ICPS

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SAMPLE :

Element		Yes	No
<b>1.0 Qualifications, Education, Ethics and Accountability</b>			
1.1	I am an experienced health care professional with a health sciences background		
1.2	I have completed an infection prevention and control (IP&C) training course that has been endorsed by CHICA-Canada		
1.3	I am certified or working toward the CIC® credential		
1.4	I have maintained the CIC® credential		
1.5	I maintain confidentiality		
1.6	I support my profession's standards/ code of ethics and CHICA-Canada's position paper on the role of the infection control practitioner/professional		
1.7	I am knowledgeable, accountable and responsible for my actions		
1.8	I practice in a non-judgemental, non-discriminatory manner and am sensitive to diversity		
1.9	I recognize and resolve conflict of interest situations		
1.10	I engage in IP&C research in a professional manner		
1.11	I ensure transparency and disclosure in performing research or applying for grants		

## REFERENCES

1. Davies J, Hebert P, Hoffman C. The Canadian patient safety dictionary. Ottawa: The Royal College of Physicians and Surgeons of Canada; 2003.
2. Health Canada. Infection Control Guidelines: Routine practices and additional precautions for preventing the transmission of infection in health care [under revision]. Can Commun Dis Rep 1999;25 Suppl 4:1-142.
3. Ontario. Provincial Infectious Diseases Advisory Committee. Routine Practices and Additional Precautions in All Health Care Settings; 2009. [cited August 31, 2009]; Available from: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_routine.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_routine.html).
4. Ontario. Provincial Infectious Diseases Advisory Committee. Best Practices for Surveillance of Health Care-Associated Infections in Patient and Resident Populations 2008 June 2008. [cited November 24, 2008]; Available from: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_hai.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_hai.html).
5. Mandl KD, Overhage JM, Wagner MM, Lober WB, Sebastiani P, Mostashari F, et al. Implementing syndromic surveillance: a practical guide informed by the early experience. J Am Med Assoc 2004;11(2):141-50.
6. Walker D. A Plan of Action. Final Report of the Ontario Expert Panel on SARS and Infectious Disease Control; 2004 April. [cited September 11, 2010]; Available from: [http://www.health.gov.on.ca/english/public/pub/ministry\\_reports/walker04/walker04\\_mn.html](http://www.health.gov.on.ca/english/public/pub/ministry_reports/walker04/walker04_mn.html).
7. Campbell A. The SARS Commission. Spring of Fear. Recommendations from the Final Report of the SARS Commission.; 2006 December 2006. [cited September 11, 2010]; Available from: [http://www.health.gov.on.ca/english/public/pub/ministry\\_reports/campbell04/campbell04.pdf](http://www.health.gov.on.ca/english/public/pub/ministry_reports/campbell04/campbell04.pdf).
8. Ontario. Ministry of Health and Long-Term Care. Operation Health Protection. An Action Plan to Prevent Threats to our Health and to Promote a Healthy Ontario.[Toronto]:[Ministry of Health and Long-Term Care]; 2004. [cited September 11, 2010]; Available from: [http://www.health.gov.on.ca/english/public/pub/ministry\\_reports/consumer\\_04/oper\\_healthprotect ion04.pdf](http://www.health.gov.on.ca/english/public/pub/ministry_reports/consumer_04/oper_healthprotect ion04.pdf).
9. Ontario. Regulation for health care and residential facilities, made under the *Occupational Health and Safety Act* : Revised Statutes of Ontario, 1990, chapter O.1 as amended : O. Reg. 67/93.[Toronto]:[Ontario Ministry of Labour Operations Division]; 1995. [cited September 11, 2010]; Available from: <http://www.search.e-laws.gov.on.ca/en/isysquery/15458eca-0d5a-40c6-9f38-c1ff8e8a27cf/7/doc/?search=browseStatutes&context=#hit1>.
10. Ontario. Ministry of Health and Long-Term Care. *Public Hospitals Act* : R.S.O. 1990, chapter P.40, amended to 2010 [Toronto, Ontario]; 2005. [cited September 11, 2010]; Available from: <http://www.search.e-laws.gov.on.ca/en/isysquery/56ed7adb-167f-4a5a-b07a-d5dc7d372d38/5/doc/?search=browseStatutes&context=#hit1>.
11. Ontario. Ministry of Health and Long-Term Care. *Long-Term Care Homes Act*, 2007. O. Reg 79/10.[Toronto, Ontario]; 2007. [cited November 24, 2010]; Available from: <http://www.search.e-laws.gov.on.ca/en/isysquery/f58373ac-e1ab-4a72-8932-9120a418ef06/1/doc/?search=browseStatutes&context=#BK36>.
12. Haley RW, Morgan WM, Culver DH, White JW, Emori TG, Mosser J, et al. Update from the SENIC project. Hospital infection control: recent progress and opportunities under prospective payment. Am J Infect Control 1985;13(3):97-108.
13. Haley RW, Culver DH, White JW, Morgan WM, Emori TG, Munn VP, et al. The efficacy of infection surveillance and control programs in preventing nosocomial infections in US hospitals. Am J Epidemiol 1985;121(2):182-205.
14. The College of Physicians and Surgeons of Ontario. Infection Control in the Physician's Office; 2004. [cited September 11, 2010]; Available from: <http://www.cpso.on.ca/policies/guidelines/default.aspx?id=1766>.

15. Canadian Standards Association. PLUS 1112. Infection prevention and control in office-based health care and allied systems. 2nd ed. Mississauga, Ont.: Canadian Standards Association; 2004.
16. Ontario. Occupational Health and Safety Act. R.S.O. 1990, Chapter O.1. [cited September 14, 2010]; Available from: [http://www.e-laws.gov.on.ca/html/statutes/english/elaws\\_statutes\\_90o01\\_e.htm](http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90o01_e.htm).
17. National Nosocomial Infections Surveillance (NNIS) System Report, data summary from January 1992 through June 2004, issued October 2004. *Am J Infect Control* 2004;32(8):470-85.
18. Barton M HM, Moore D, Conly J, Nicole OL, Allen U et al. Guidelines for the prevention and management of community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA): A perspective for Canadian Health care practitioners. *Can J Infect Dis Med Microbiol* 2006;17 Suppl C:4-19.
19. Birnbaum D. Antimicrobial resistance: a deadly burden no country can afford to ignore. *Can Commun Dis Rep* 2003;29(18):157-64.
20. Niederman MS. Impact of antibiotic resistance on clinical outcomes and the cost of care. *Crit Care Med* 2001;29(4 Suppl):N114-20.
21. Engemann JJ, Carmeli Y, Cosgrove SE, Fowler VG, Bronstein MZ, Trivette SL, et al. Adverse clinical and economic outcomes attributable to methicillin resistance among patients with *Staphylococcus aureus* surgical site infection. *Clin Infect Dis* 2003;36(5):592-8.
22. Schwaber MJ, Navon-Venezia S, Kaye KS, Ben-Ami R, Schwartz D, Carmeli Y. Clinical and economic impact of bacteremia with extended- spectrum-beta-lactamase-producing Enterobacteriaceae. *Antimicrob Agents Chemother* 2006;50(4):1257-62.
23. Baker GR, Norton PG, Flintoft V, Blais R, Brown A, Cox J, et al. The Canadian Adverse Events Study: the incidence of adverse events among hospital patients in Canada. *CMAJ* 2004;170(11):1678-86.
24. Stone PW, Larson E, Kowar LN. A systematic audit of economic evidence linking nosocomial infections and infection control interventions: 1990-2000. *Am J Infect Control* 2002;30(3):145-52.
25. Plowman R, Graves N, Griffin MA, Roberts JA, Swan AV, Cookson B, et al. The rate and cost of hospital-acquired infections occurring in patients admitted to selected specialties of a district general hospital in England and the national burden imposed. *J Hosp Infect* 2001;47(3):198-209.
26. Zoutman D, McDonald S, Vethanayagan D. Total and attributable costs of surgical-wound infections at a Canadian tertiary-care center. *Infect Control Hosp Epidemiol* 1998;19(4):254-9.
27. Graves N, Weinhold D, Tong E, Birrell F, Doidge S, Ramritu P, et al. Effect of healthcare-acquired infection on length of hospital stay and cost. *Infect Control Hosp Epidemiol* 2007;28(3):280-92.
28. Haley RW, Culver DH, White JW, Morgan WM, Emori TG. The nationwide nosocomial infection rate. A new need for vital statistics. *Am J Epidemiol* 1985;121(2):159-67.
29. Plowman R, Graves N, Roberts JA. Hospital Acquired Infection. 1997.
30. Fabbro-Peray P, Sotto A, Defez C, Cazaban M, Molinari L, Pinede M, et al. Mortality attributable to nosocomial infection: a cohort of patients with and without nosocomial infection in a French university hospital. *Infect Control Hosp Epidemiol* 2007;28(3):265-72.
31. Shurland S, Zhan M, Bradham DD, Roghmann MC. Comparison of Mortality Risk Associated With Bacteremia Due to Methicillin-Resistant and Methicillin-Susceptible *Staphylococcus aureus*. *Infect Control Hosp Epidemiol* 2007;28(3):273-9.
32. Morgan DJ, Lomotan LL, Agnes K, McGrail L, Roghmann MC. Characteristics of healthcare-associated infections contributing to unexpected in-hospital deaths. *Infect Control Hosp Epidemiol* 2010;31(8):864-6.
33. Zoutman DE, Ford BD, Bryce E, Gourdeau M, Hebert G, Henderson E, et al. The state of infection surveillance and control in Canadian acute care hospitals. *Am J Infect Control* 2003;31(5):266-72; discussion 72-3.
34. Monge Jodra V, Sainz de Los Terreros Soler L, Diaz-Agero Perez C, Saa Requejo CM, Plana Farras N. Excess length of stay attributable to surgical site infection following hip replacement: a nested case-control study. *Infect Control Hosp Epidemiol* 2006;27(12):1299-303.

35. Public Health Agency of Canada. Essential Resources for Effective Infection Prevention and Control Programs: A Matter of Patient Safety: A Discussion Paper; 2010.
36. Kim T, Oh PI, Simor AE. The economic impact of methicillin-resistant *Staphylococcus aureus* in Canadian hospitals. *Infect Control Hosp Epidemiol* 2001;22(2):99-104.
37. Rubin RJ, Harrington CA, Poon A, Dietrich K, Greene JA, Moiduddin A. The economic impact of *Staphylococcus aureus* infection in New York City hospitals. *Emerg Infect Dis* 1999;5(1):9-17.
38. Wenzel RP. The Lowbury Lecture. The economics of nosocomial infections. *J Hosp Infect* 1995;31(2):79-87.
39. Capitano B, Leshem OA, Nightingale CH, Nicolau DP. Cost effect of managing methicillin-resistant *Staphylococcus aureus* in a long-term care facility. *J Am Geriatr Soc* 2003;51(1):10-6.
40. Lim S. The Financial Impact of Hospital-acquired Methicillin-resistant *Staphylococcus aureus*: an Incremental Cost and Cost-Effectiveness Analysis. Toronto: University of Toronto; 2006.
41. Conterno LO, Shymanski J, Ramotar K, Toye B, van Walraven C, Coyle D, et al. Real-Time Polymerase Chain Reaction Detection of Methicillin-Resistant *Staphylococcus aureus*: Impact on Nosocomial Transmission and Costs. *Infect Control Hosp Epidemiol* 2007;28(10):1134-41.
42. Conterno LO, Shymanski J, Ramotar K, Toye B, Zvonar R, Roth V. Impact and cost of infection control measures to reduce nosocomial transmission of extended-spectrum beta-lactamase-producing organisms in a non-outbreak setting. *J Hosp Infect* 2007;65(4):354-60.
43. de Beer G, Miller MA, Tremblay L, Monette J. An outbreak of scabies in a long-term care facility: the role of misdiagnosis and the costs associated with control. *Infect Control Hosp Epidemiol* 2006;27(5):517-8.
44. Piednoir E, Bureau-Chalot F, Merle C, Gotzamanis A, Wuibout J, Bajolet O. Direct costs associated with a nosocomial outbreak of adenoviral conjunctivitis infection in a long-term care institution. *Am J Infect Control* 2002;30(7):407-10.
45. Armstrong-Evans M, Litt M, McArthur MA, Willey B, Cann D, Liska S, et al. Control of transmission of vancomycin-resistant *Enterococcus faecium* in a long-term-care facility. *Infect Control Hosp Epidemiol* 1999;20(5):312-7.
46. Carroll NV, Delafuente JC, McClure KL, Weakley DF, Khan ZM, Cox FM. Economic burden of influenza-like illness in long-term-care facilities. *Am J Health Syst Pharm* 2001;58(12):1133-8.
47. Risebrough NA, Bowles SK, Simor AE, McGeer A, Oh PI. Economic evaluation of oseltamivir phosphate for postexposure prophylaxis of influenza in long-term care facilities. *J Am Geriatr Soc* 2005;53(3):444-51.
48. Haley RW. Managing hospital infection control for cost-effectiveness. Chicago: American Hospital Publishing Inc.; 1986.
49. Harbarth S, Sax H, Gastmeier P. The preventable proportion of nosocomial infections: an overview of published reports. *J Hosp Infect* 2003;54(4):258-66.
50. Ebnother C, Tanner B, Schmid F, La Rocca V, Heinzer I, Bregenzler T. Impact of an infection control program on the prevalence of nosocomial infections at a tertiary care center in Switzerland. *Infect Control Hosp Epidemiol* 2008;29(1):38-43.
51. Graves N, Halton K, Lairson D. Economics and preventing hospital-acquired infection: broadening the perspective. *Infect Control Hosp Epidemiol* 2007;28(2):178-84.
52. Ehrenkranz NJ. The efficacy of a Florida hospital consortium for infection control: 1975-1982. *Infect Control* 1986;7(6):321-6.
53. Haley RW, White JW, Culver DH, Hughes JM. The financial incentive for hospitals to prevent nosocomial infections under the prospective payment system. An empirical determination from a nationally representative sample. *JAMA* 1987;257(12):1611-4.
54. Miller PJ, Farr BM, Gwaltney JM, Jr. Economic benefits of an effective infection control program: case study and proposal. *Rev Infect Dis* 1989;11(2):284-8.
55. Filice GA, Nyman JA, Lexau C, Lees CH, Bockstedt LA, Como-Sabetti K, et al. Excess costs and utilization associated with methicillin resistance for patients with *Staphylococcus aureus* infection. *Infect Control Hosp Epidemiol* 2010;31(4):365-73.
56. Reed SD, Friedman JY, Engemann JJ, Griffiths RI, Anstrom KJ, Kaye KS, et al. Costs and outcomes among hemodialysis-dependent patients with methicillin-resistant or methicillin-

- susceptible *Staphylococcus aureus* bacteremia. *Infect Control Hosp Epidemiol* 2005;26(2):175-83.
57. McHugh CG, Riley LW. Risk factors and costs associated with methicillin-resistant *Staphylococcus aureus* bloodstream infections. *Infect Control Hosp Epidemiol* 2004;25(5):425-30.
  58. Voss A, Kluytmans JA. Models for hospital infection control--a view from The Netherlands. *Clin Microbiol Infect* 2000;6(8):410-2.
  59. Frank U, Gastmeier P, Ruden H, Daschner FD. The organization of infection control in Germany. *J Hosp Infect* 2001;49(1):9-13.
  60. Reybrouck G, Vande Putte M, Zumofen M, Haxhe JJ. The organization of infection control in Belgium. *J Hosp Infect* 2001;47(1):32-5.
  61. Scheckler WE, Brimhall D, Buck AS, Farr BM, Friedman C, Garibaldi RA, et al. Requirements for infrastructure and essential activities of infection control and epidemiology in hospitals: a consensus panel report. Society for Healthcare Epidemiology of America. *Infect Control Hosp Epidemiol* 1998;19(2):114-24.
  62. Friedman C, Barnette M, Buck AS, Ham R, Harris JA, Hoffman P, et al. Requirements for infrastructure and essential activities of infection control and epidemiology in out-of-hospital settings: a consensus panel report. Association for Professionals in Infection Control and Epidemiology and Society for Healthcare Epidemiology of America. *Infect Control Hosp Epidemiol* 1999;20(10):695-705.
  63. Smith PW, Rusnak PG. Infection prevention and control in the long-term-care facility. SHEA Long-Term-Care Committee and APIC Guidelines Committee. *Am J Infect Control* 1997;25(6):488-512.
  64. Zoutman DE, Ford BD. The relationship between hospital infection surveillance and control activities and antibiotic-resistant pathogen rates. *Am J Infect Control* 2005;33(1):1-5.
  65. Zafar AB, Gaydos LA, Furlong WB, Nguyen MH, Mennonna PA. Effectiveness of infection control program in controlling nosocomial *Clostridium difficile*. *Am J Infect Control* 1998;26(6):588-93.
  66. Tomic V, Svetina Sorli P, Trinkaus D, Sorli J, Widmer AF, Trampuz A. Comprehensive strategy to prevent nosocomial spread of methicillin-resistant *Staphylococcus aureus* in a highly endemic setting. *Arch Intern Med* 2004;164(18):2038-43.
  67. Souweine B, Traore O, Aublet-Cuvelier B, Bret L, Sirot J, Laveran H, et al. Role of infection control measures in limiting morbidity associated with multi-resistant organisms in critically ill patients. *J Hosp Infect* 2000;45(2):107-16.
  68. Rosenthal VD, Guzman S, Pezzotto SM, Crnich CJ. Effect of an infection control program using education and performance feedback on rates of intravascular device-associated bloodstream infections in intensive care units in Argentina. *Am J Infect Control* 2003;31(7):405-9.
  69. Lobo RD, Levin AS, Gomes LM, Cursino R, Park M, Figueiredo VB, et al. Impact of an educational program and policy changes on decreasing catheter-associated bloodstream infections in a medical intensive care unit in Brazil. *Am J Infect Control* 2005;33(2):83-7.
  70. Cooper BS, Stone SP, Kibbler CC, Cookson BD, Roberts JA, Medley GF, et al. Isolation measures in the hospital management of methicillin resistant *Staphylococcus aureus* (MRSA): systematic review of the literature. *BMJ* 2004;329(7465):533.
  71. Zoutman DE, Ford BD, Gauthier J. A cross-Canada survey of infection prevention and control in long-term care facilities. *Am J Infect Control* 2009;37(5):358-63.
  72. Griffiths P, Renz A, Hughes J, Rafferty AM. Impact of organisation and management factors on infection control in hospitals: a scoping review. *J Hosp Infect* 2009;73(1):1-14.
  73. Friedman MM. Designing an infection control program to meet JCAHO standards. *Caring* 1996;15(7):18-25.
  74. Muller MP, Detsky AS. Public reporting of hospital hand hygiene compliance--helpful or harmful? *Jama* 2010;304(10):1116-7.
  75. McKibben L, Horan T, Tokars JI, Fowler G, Cardo DM, Pearson ML, et al. Guidance on public reporting of healthcare-associated infections: recommendations of the Healthcare Infection Control Practices Advisory Committee. *Am J Infect Control* 2005;33(4):217-26.

76. Bialachowski A, Clinker K, LeBlanc M, McDonald S. The audit process: Part III. Closing the Loop. *Can J Infect Control* 2010;25(3):161-5.
77. Bialachowski A, Clinker K, LeBlanc M, McDonald S. The audit process: Part I. Pre-audit preparation. *Can J Infect Control* 2010;25(1):68-70.
78. Bialachowski A, Clinker K, LeBlanc M, McDonald S. The audit process: Part II. Setting the Audit Criteria. *Can J Infect Control* 2010;25(2):109-11.
79. Ontario. Provincial Infectious Diseases Advisory Committee. Routine Practices and Additional Precautions in All Health Care Settings. Annex A: Screening, Testing and Surveillance for Antibiotic-Resistant Organisms (AROs); 2010 May, 2010. [cited October 1, 2010]; Available from: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_staff.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_staff.html).
80. Ontario. Provincial Infectious Diseases Advisory Committee. Routine Practices and Additional Precautions in All Health Care Settings. Annex B: Best Practices for Prevention of Transmission of Acute Respiratory Infection; 2010 May, 2010. [cited October, 2010]; Available from: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best\\_prac/bp\\_fri\\_080\\_406.pdf](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best_prac/bp_fri_080_406.pdf).
81. Public Health Agency of Canada. Canadian Tuberculosis Standards. 6th ed. Ottawa: Public Health Agency of Canada; 2007.
82. National Advisory Committee on Immunization. Canadian immunization guide. 7th ed. [Ottawa]: Canadian Medical Association; 2006.
83. Community and Hospital Infection Control Association - Canada. Position Statement: Infection Prevention and Control Measures to Prevent Transmission of Hepatitis B Among Hemodialysis Patients; 2007. [cited September 24, 2009]; Available from: <http://www.chica.org/pdf/hemodialysisHBV.pdf>.
84. Centers for Disease Control and Epidemiology. Recommendations for preventing transmission of infections among chronic hemodialysis patients. *MMWR Recomm Rep* 2001;50(RR-5):1-43.
85. Blake M. DIG screening recommendations for routine surveillance of methicillin-resistant *Staphylococcus aureus* and vancomycin-resistant enterococci in the hemodialysis setting. *Can J Infect Control* 2010;25(2):113-4.
86. Canadian Patient Safety Institute. Safer Healthcare Now! Prevention of Surgical Site Infection; 2005 April, 2005. [cited February 23, 2007]; Available from: <http://www.saferhealthcarenow.ca/Default.aspx?folderId=82&contentId=182>.
87. Mangram AJ, Horan TC, Pearson ML, Silver LC, Jarvis WR. Guideline for prevention of surgical site infection, 1999. Hospital Infection Control Practices Advisory Committee. *Infect Control Hosp Epidemiol* 1999;20(4):250-78; quiz 79-80.
88. Canadian Lung Association. Canadian tuberculosis standards. 5th ed. Ottawa: Canadian Lung Association; 2000.
89. Ontario Hospital Association and the Ontario Medical Association Joint Communicable Diseases Surveillance Protocols Committee in collaboration with the Ministry of Health and Long-Term Care. Blood-Borne Diseases Surveillance Protocol for Ontario Hospitals; 2010. [cited December 15, 2010]; Available from: <http://www.oha.com/Services/HealthSafety/Documents/Protocols/Blood%20Borne%20Diseases%20Protocol%20-%20Reviewed%20and%20Revised%20November%202010.pdf>.
90. Centers for Disease Control and Prevention. Workbook for Designing, Implementing and Evaluating a Sharps Injury Prevention Program:[Centers for Disease Control and Prevention.]; 2004. [cited December 15, 2010]; Available from: <http://www.cdc.gov/sharpssafety/resources.html>.
91. Canadian Patient Safety Institute. Safer Healthcare Now! Prevention of Central Line-Associated Bloodstream Infection; 2005. [cited February 23, 2007]; Available from: <http://www.saferhealthcarenow.ca/Default.aspx?folderId=82&contentId=184>.
92. O'Grady NP, Alexander M, Dellinger EP, Gerberding JL, Heard SO, Maki DG, et al. Guidelines for the prevention of intravascular catheter-related infections. *Infect Control Hosp Epidemiol* 2002;23(12):759-69.

93. Health Canada. Infection Control Guidelines: Preventing infections associated with indwelling intravascular access devices. *Can Commun Dis Rep* 1997;23 Suppl 8: i-iv, 1-32.
94. Canadian Patient Safety Institute. Safer Healthcare Now! Prevention of Ventilator-Associated Pneumonia; 2005 April 2005. [cited February 23, 2007]; Available from: <http://www.saferhealthcarenow.ca/Default.aspx?folderId=82&contentId=180>.
95. Tablan OC, Anderson LJ, Besser R, Bridges C, Hajjeh R. Guidelines for preventing health-care-associated pneumonia, 2003: recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee. *MMWR Recomm Rep* 2004;53(RR-3):1-36.
96. Health Canada. Infection Control Guidelines: Hand Washing, Cleaning, Disinfection and Sterilization in Health Care [currently under revision]. *Can Commun Dis Rep* 1998;24 Suppl 8:1-55.
97. Boyce JM, Pittet D. Guideline for Hand Hygiene in Health-Care Settings. Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. *Infect Control Hosp Epidemiol* 2002;23(12 Suppl):S3-40.
98. Ontario. Provincial Infectious Diseases Advisory Committee. Best Practices for Hand Hygiene in All Health Care Settings (version 2); 2009 January 2009. [cited January 22, 2009]; Available from: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_hh.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_hh.html).
99. Ontario. Provincial Infectious Diseases Advisory Committee. Best Practices for Cleaning, Disinfection and Sterilization in All Health Care Settings; 2010 February 2010. [cited May 1, 2010]; Available from: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_cds.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_cds.html).
100. Canadian Standards Association. CAN/CSA Z317.13-07 Infection Control during Construction, Renovation and Maintenance of Health Care Facilities. Mississauga, Ont.: Canadian Standards Association; 2007.
101. Health Canada. Infection Control Guidelines: Construction-related nosocomial infections in patients in health care facilities. Decreasing the risk of Aspergillus, Legionella and other infections. *Can Commun Dis Rep* 2001;27 Suppl 2:1-46.
102. Ontario. Provincial Infectious Diseases Advisory Committee. Best Practices for Environmental Cleaning for Prevention and Control of Infections in All Health Care Settings; 2009. [cited January 16, 2009]; Available from: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_enviro\\_clean.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_enviro_clean.html).
103. Gould CV, Umscheid CA, Agarwal RK, Kuntz G, Pegues DA. Guideline for prevention of catheter-associated urinary tract infections 2009. *Infect Control Hosp Epidemiol* 2010;31(4):319-26.
104. MacKenzie FM, Bruce J, Struelens MJ, Goossens H, Mollison J, Gould IM. Antimicrobial drug use and infection control practices associated with the prevalence of methicillin-resistant *Staphylococcus aureus* in European hospitals. *Clin Microbiol Infect* 2007;13(3):269-76.
105. Ontario Ministry of Health and Long-Term Care. Best Practices for Cleaning, Disinfection and Sterilization in All Health Care Settings; 2006 April 30, 2006.
106. Dellit TH, Owens RC, McGowan JE, Jr., Gerding DN, Weinstein RA, Burke JP, et al. Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America guidelines for developing an institutional program to enhance antimicrobial stewardship. *Clin Infect Dis* 2007;44(2):159-77.
107. Rhinehart E. Developing an infection surveillance system. *Caring* 1996;15(7):26-8, 31-2.
108. Lorenzen AN, Itkin DJ. Surveillance of infection in home care. *Am J Infect Control* 1992;20(6):326-9.
109. Rosenheimer L. Establishing a surveillance system for infections acquired in home healthcare. *Home Healthc Nurse* 1995;13(3):20-6.
110. McGeer A, Campbell B, Emori TG, Hierholzer WJ, Jackson MM, Nicolle LE, et al. Definitions of infection for surveillance in long-term care facilities. *Am J Infect Control* 1991;19(1):1-7.
111. Garner JS, Jarvis WR, Emori TG, Horan TC, Hughes JM. CDC definitions for nosocomial infections, 1988. *Am J Infect Control* 1988;16(3):128-40.

112. Garibaldi RA. Residential care and the elderly: the burden of infection. *J Hosp Infect* 1999;43 Suppl:S9-18.
113. Embry FC, Chinnes LF. APIC - HICPAC Surveillance Definitions for Home Health Care and Home Hospice Infections. Association for Professionals in Infection Control and Epidemiology, Inc, and the Hospital Infection Control Practices Advisory Committee; 2008. [cited; Available from: <http://www.apic.org/AM/Template.cfm?Section=Practice&Template=/CM/ContentDisplay.cfm&ContentFileID=9898>.
114. Smith PW. Consensus conference on nosocomial infections in long-term care facilities. *Am J Infect Control* 1987;15(3):97-100.
115. SHEA Position Paper: An approach to the evaluation of quality indicators of the outcome of care in hospitalized patients, with a focus on nosocomial infection indicators. The Quality Indicator Study Group. *Infect Control Hosp Epidemiol* 1995;16(5):308-16.
116. Society for Healthcare Epidemiology of America (SHEA), Association for Professionals in Infection Control and Epidemiology (APIC), Council of State and Territorial Epidemiologists (CSTE), Centers for Disease Control and Prevention (CDC) Healthcare-Associated Infection Working Group of the Joint Public Policy Committee. Essentials of Public Reporting of Healthcare-associated Infections: A Tool Kit. p. 1-4.
117. Ontario. Provincial Infectious Diseases Advisory Committee. Routine Practices and Additional Precautions in all Health Care Settings. Annex C: Testing, Surveillance and Management of *Clostridium difficile*; 2010 May, 2010. [cited October, 2010]; Available from: [http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic\\_cdifff.html](http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_cdifff.html).
118. Ontario. Ministry of Health and Long-Term Care. *Health Protection and Promotion Act: R.S.O. 1990, chapter H.7.* [Toronto, Ontario]; 2008. [cited September 11, 2010]; Available from: [http://www.e-laws.gov.on.ca/html/statutes/english/elaws\\_statutes\\_90h07\\_e.htm](http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90h07_e.htm).
119. Ontario. Health Protection and Promotion Act : Revised Statutes of Ontario, 1990, chapter H.7 ; and, the regulations thereunder Toronto: Queen's Printer for Ontario 2003. p. 70, [117].
120. Ontario. Public Hospitals Act : Revised Statutes of Ontario, 1990, chapter P.40, amended to 2004, chapter 3, sched. A, s. 96 ; and, the following regulations: Capital grants and loans (O. Reg. 459/93); Classification of hospitals (R.R.O. 1990, Reg. 964); Financial reports by hospital subsidiaries (O. Reg. 553/96); Hospital management (R.R.O. 1990, Reg. 965). Toronto; 2005. p. 23, 1, 2, 1, 13.
121. Ontario Hospital Association and the Ontario Medical Association Joint Communicable Diseases Surveillance Protocols Committee in collaboration with the Ministry of Health and Long-Term Care. Adenovirus Conjunctivitis Surveillance Protocol for Ontario Hospitals; 2009. [cited December 15, 2010]; Available from: <http://www.oha.com/Services/HealthSafety/Documents/Protocols/Adenovirus%20Protocol%20Revised.pdf>.
122. Ontario Hospital Association and the Ontario Medical Association Joint Communicable Diseases Surveillance Protocols Committee in collaboration with the Ministry of Health and Long-Term Care. Antibiotic Resistant Organisms Surveillance Protocol for Ontario Hospitals; 2009. [cited December 15, 2010]; Available from: <http://www.oha.com/Services/HealthSafety/Documents/Antibiotic%20Resistant%20Protocol.pdf>.
123. Ontario Hospital Association and the Ontario Medical Association Joint Communicable Diseases Surveillance Protocols Committee in collaboration with the Ministry of Health and Long-Term Care. Cytomegalovirus Surveillance Protocol for Ontario Hospitals; 2009. [cited August 5, 2009]; Available from: <http://www.oha.com/Services/HealthSafety/Documents/Protocols/Cytomegalovirus%20Protocol.pdf>.
124. Ontario Hospital Association and the Ontario Medical Association Joint Communicable Diseases Surveillance Protocols Committee in collaboration with the Ministry of Health and Long-Term Care. Enteric Diseases Surveillance Protocol for Ontario Hospitals; 2009. [cited January 16, 2010]; Available from: <http://www.oha.com/Services/HealthSafety/Documents/Protocols/Enteric%20Diseases.pdf>

125. Ontario Hospital Association and the Ontario Medical Association Joint Communicable Diseases Surveillance Protocols Committee in collaboration with the Ministry of Health and Long-Term Care. Group A Streptococcal Disease Surveillance Protocol for Ontario Hospitals; 2010 Revised November 2010. [cited December 15, 2010]; Available from:  
<http://www.oha.com/Services/HealthSafety/Documents/Protocols/Group%20A%20Streptococcal%20Protocol%20Reviewed%20and%20Revised%20November%202010.pdf>.
126. Ontario Hospital Association and the Ontario Medical Association Joint Communicable Diseases Surveillance Protocols Committee in collaboration with the Ministry of Health and Long-Term Care. Herpes Simplex Surveillance Protocol for Ontario Hospitals; 2010. [cited December 15, 2010]; Available from:  
<http://www.oha.com/Services/HealthSafety/Documents/Protocols/Herpes%20Simplex%20Protocol%20-%20Reviewed%20November%202010.pdf>.
127. Ontario Hospital Association and the Ontario Medical Association Joint Communicable Diseases Surveillance Protocols Committee in collaboration with the Ministry of Health and Long-Term Care. Influenza Surveillance Protocol for Ontario Hospitals; 2010. [cited December 15, 2010]; Available from:  
<http://www.oha.com/Services/HealthSafety/Documents/Influenza%20Protocol%20Revised%20May%202010.pdf>.
128. Ontario Hospital Association and the Ontario Medical Association Joint Communicable Diseases Surveillance Protocols Committee in collaboration with the Ministry of Health and Long-Term Care. Measles Surveillance Protocol for Ontario Hospitals; 2009. [cited December 15, 2010]; Available from:  
<http://www.oha.com/Services/HealthSafety/Documents/Protocols/Measles%20Protocol.pdf>.
129. Ontario Hospital Association and the Ontario Medical Association Joint Communicable Diseases Surveillance Protocols Committee in collaboration with the Ministry of Health and Long-Term Care. Meningococcal Disease Surveillance Protocol for Ontario Hospitals; 2009. [cited December 15, 2010]; Available from:  
<http://www.oha.com/Services/HealthSafety/Documents/Protocols/Meningococcal%20Disease%20Protocol%20Revised%20November%202009.pdf>.
130. Larson E. A causal link between handwashing and risk of infection? Examination of the evidence. *Infect Control* 1988;9(1):28-36.
131. Ontario Hospital Association and the Ontario Medical Association Joint Communicable Diseases Surveillance Protocols Committee in collaboration with the Ministry of Health and Long-Term Care. Pertussis Surveillance Protocol for Ontario Hospitals; 2009. [cited December 15, 2010]; Available from:  
<http://www.oha.com/Services/HealthSafety/Documents/Protocols/Pertussis%20Protocol%20Revised%20January%202009.pdf>.
132. Ontario Hospital Association and the Ontario Medical Association Joint Communicable Diseases Surveillance Protocols Committee in collaboration with the Ministry of Health and Long-Term Care. Rubella Surveillance Protocol for Ontario Hospitals; 2010. [cited December 15, 2010]; Available from:  
<http://www.oha.com/Services/HealthSafety/Documents/Rubella%20Protocol%20Revised%20May%202010.pdf>.
133. Ontario Hospital Association and the Ontario Medical Association Joint Communicable Diseases Surveillance Protocols Committee in collaboration with the Ministry of Health and Long-Term Care. Scabies Surveillance Protocol for Ontario Hospitals; 2010. [cited December 15, 2010]; Available from:  
<http://www.oha.com/Services/HealthSafety/Documents/Scabies%20Protocol%20Revised%20May%202010.pdf>.
134. Ontario Hospital Association and the Ontario Medical Association Joint Communicable Diseases Surveillance Protocols Committee in collaboration with the Ministry of Health and Long-Term Care. Tuberculosis Surveillance Protocol for Ontario Hospitals; 2010. [cited December 15, 2010]; Available from:

- <http://www.oha.com/Services/HealthSafety/Documents/Protocols/TB%20Protocol%20Revised%20May%202010.pdf>.
135. Ontario Hospital Association and the Ontario Medical Association Joint Communicable Diseases Surveillance Protocols Committee in collaboration with the Ministry of Health and Long-Term Care. Varicella/Zoster (Chickenpox/Shingles) Surveillance Protocol for Ontario Hospitals; 2010. [cited December 15, 2010]; Available from: <http://www.oha.com/Services/HealthSafety/Documents/Protocols/Varicella%20Protocol%20-%20Reviewed%20and%20Revised%20November%202010.pdf>.
  136. Canadian Council on Health Services Accreditation. Accreditation Standards. Ottawa: Canadian Council on Health Services Accreditation.
  137. Ontario. *Occupational Health and Safety Act*. Ontario Regulation 474/07. Needle Safety; 2007. [cited December 8, 2009]; Available from: [http://www.e-laws.gov.on.ca/Download?dDocName=elaws\\_regs\\_070474\\_e](http://www.e-laws.gov.on.ca/Download?dDocName=elaws_regs_070474_e).
  138. Ontario. Ontario. *Occupational Health and Safety Act*, R.S.O. 1990, c.O.1: *Control of Exposure to Biological or Chemical Agents*, R.R.O. 1990, Regulation 833 Amended to O. Reg. 607/05. [Part 5: Ceiling Exposure Values (CEV) for Biological and Chemical Agents]. [cited September 18, 2009]; Available from: [http://www.e-laws.gov.on.ca/html/source/regs/english/2005/elaws\\_src\\_regs\\_r05607\\_e.htm](http://www.e-laws.gov.on.ca/html/source/regs/english/2005/elaws_src_regs_r05607_e.htm).
  139. Ontario. *Occupational Health and Safety Act*. R.R.O. 1990, Regulation 851. Industrial Establishments. [cited October 1, 2010]; Available from: <http://www.search.e-laws.gov.on.ca/en/isysquery/0dce8fe1-40a8-4497-bf37-d4d5146a5196/1/doc/?search=browseStatutes&context=#hit1>.
  140. Bolyard EA, Tablan OC, Williams WW, Pearson ML, Shapiro CN, Deitchmann SD. Guideline for infection control in healthcare personnel, 1998. *Hospital Infection Control Practices Advisory Committee. Infect Control Hosp Epidemiol* 1998;19(6):407-63.
  141. Health Canada. Infection Control Guidelines. Prevention and control of occupational infections in health care *Can Commun Dis Rep* 2002;28 Suppl 1:1-264.
  142. Health Canada. Infection Control Guidelines: Preventing the transmission of bloodborne pathogens in health care and public service settings. *Can Commun Dis Rep* 1997;23 Suppl 3:i-vii, 1-52.
  143. Ontario Hospital Association and the Ontario Medical Association Joint Communicable Diseases Surveillance Protocols Committee in collaboration with the Ministry of Health and Long-Term Care. Mumps Surveillance Protocol for Ontario Hospitals; 2009. [cited December 15, 2010]; Available from: <http://www.oha.com/Services/HealthSafety/Documents/Protocols/Mumps%20Protocol%20Revised%20January%202009.pdf>.
  144. Nichol KL, Lind A, Margolis KL, Murdoch M, McFadden R, Hauge M, et al. The effectiveness of vaccination against influenza in healthy, working adults. *N Engl J Med* 1995;333(14):889-93.
  145. Diekema DJ, Doebbeling BN. Employee health and infection control. *Infect Control Hosp Epidemiol* 1995;16(5):292-301.
  146. Potter J, Stott DJ, Roberts MA, Elder AG, O'Donnell B, Knight PV, et al. Influenza vaccination of health care workers in long-term-care hospitals reduces the mortality of elderly patients. *J Infect Dis* 1997;175(1):1-6.
  147. Carman WF, Elder AG, Wallace LA, McAulay K, Walker A, Murray GD, et al. Effects of influenza vaccination of health-care workers on mortality of elderly people in long-term care: a randomised controlled trial. *Lancet* 2000;355(9198):93-7.
  148. Talbot TR, Babcock H, Caplan AL, Cotton D, Maragakis LL, Poland GA, et al. Revised SHEA position paper: influenza vaccination of healthcare personnel. *Infect Control Hosp Epidemiol* 2010;31(10):987-95.
  149. Babcock HM, Gemeinhart N, Jones M, Dunagan WC, Woeltje KF. Mandatory influenza vaccination of health care workers: translating policy to practice. *Clin Infect Dis* 2010;50(4):459-64.

150. Ajenjo MC, Woeltje KF, Babcock HM, Gemeinhart N, Jones M, Fraser VJ. Influenza vaccination among healthcare workers: ten-year experience of a large healthcare organization. *Infect Control Hosp Epidemiol* 2010;31(3):233-40.
151. Ribner BS, Hall C, Steinberg JP, Bornstein WA, Chakkalakal R, Emamifar A, et al. Use of a mandatory declination form in a program for influenza vaccination of healthcare workers. *Infect Control Hosp Epidemiol* 2008;29(4):302-8.
152. Tilburt JC, Mueller PS, Ottenberg AL, Poland GA, Koenig BA. Facing the challenges of influenza in healthcare settings: the ethical rationale for mandatory seasonal influenza vaccination and its implications for future pandemics. *Vaccine* 2008;26 Suppl 4:D27-30.
153. Talbot TR. Do declination statements increase health care worker influenza vaccination rates? *Clin Infect Dis* 2009;49(5):773-9.
154. Ontario Hospital Association and the Ontario Medical Association Joint Communicable Diseases Surveillance Protocols Committee in collaboration with the Ministry of Health and Long-Term Care. Introduction; 2010. [cited December 15, 2010]; Available from: <http://www.oha.com/Services/HealthSafety/Pages/CommunicableDiseaseBinder.aspx>.
155. Canadian Standards Association. Selection, use, and care of respirators : occupational health safety. Rexdale, Ont.: Canadian Standards Association; 1993.
156. Sheldon JE. 18 tips for infection control at home. *Nursing* 1995;25(8):32PP-QQ.
157. Simmons B, Trusler M, Roccaforte J, Smith P, Scott R. Infection control for home health. *Infect Control Hosp Epidemiol* 1990;11(7):362-70.
158. Daly PB, Smith PW, Rusnak PG, Jones MB, Giuliano D. Impact on knowledge and practice of a multiregional long-term care facility infection control training program. *Am J Infect Control* 1992;20(5):225-33.
159. Smith PW, Daly PB, Rusnak PG, Roccaforte JS. Design and dissemination of a multiregional long-term care infection control training program. *Am J Infect Control* 1992;20(5):275-7.
160. Jarvis WR. Handwashing--the Semmelweis lesson forgotten? *Lancet* 1994;344(8933):1311-2.
161. Bischoff WE, Reynolds TM, Sessler CN, Edmond MB, Wenzel RP. Handwashing compliance by health care workers: The impact of introducing an accessible, alcohol-based hand antiseptic. *Arch Intern Med* 2000;160(7):1017-21.
162. Goldmann D, Larson E. Hand-washing and nosocomial infections. *N Engl J Med* 1992;327(2):120-2.
163. Doebbeling BN, Stanley GL, Sheetz CT, Pfaller MA, Houston AK, Annis L, et al. Comparative efficacy of alternative hand-washing agents in reducing nosocomial infections in intensive care units. *N Engl J Med* 1992;327(2):88-93.
164. Meengs MR, Giles BK, Chisholm CD, Cordell WH, Nelson DR. Hand washing frequency in an emergency department. *Ann Emerg Med* 1994;23(6):1307-12.
165. Pittet D, Mourouga P, Perneger TV. Compliance with handwashing in a teaching hospital. *Infection Control Program. Ann Intern Med* 1999;130(2):126-30.
166. Muto CA, Sistrom MG, Farr BM. Hand hygiene rates unaffected by installation of dispensers of a rapidly acting hand antiseptic. *Am J Infect Control* 2000;28(3):273-6.
167. Nuorti JP, Butler JC, Crutcher JM, Guevara R, Welch D, Holder P, et al. An outbreak of multidrug-resistant pneumococcal pneumonia and bacteremia among unvaccinated nursing home residents. *N Engl J Med* 1998;338(26):1861-8.
168. Yonkosky D, Ladia L, Gackenheimer L, Schultz MW. Scabies in nursing homes: an eradication program with permethrin 5% cream. *J Am Acad Dermatol* 1990;23(6 Pt 1):1133-6.
169. Layton MC, Calliste SG, Gomez TM, Patton C, Brooks S. A mixed foodborne outbreak with *Salmonella heidelberg* and *Campylobacter jejuni* in a nursing home. *Infect Control Hosp Epidemiol* 1997;18(2):115-21.
170. Arden NH, Patriarca PA, Fasano MB, Lui KJ, Harmon MW, Kendal AP, et al. The roles of vaccination and amantadine prophylaxis in controlling an outbreak of influenza A (H3N2) in a nursing home. *Arch Intern Med* 1988;148(4):865-8.

171. Auerbach SB, Schwartz B, Williams D, Fiorilli MG, Adimora AA, Breiman RF, et al. Outbreak of invasive group A streptococcal infections in a nursing home. Lessons on prevention and control. *Arch Intern Med* 1992;152(5):1017-22.
172. Ontario. Ministry of Health and Long-Term Care. *Personal Health Information Protection Act, 2004*. [Ministry of Health and Long-Term Care]; 2004. [cited October 1, 2010]; Available from: [http://www.e-laws.gov.on.ca/html/statutes/english/elaws\\_statutes\\_04p03\\_e.htm](http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_04p03_e.htm).
173. Ontario. Ministry of the Environment. *Environmental Protection Act, RSO 1990, Part V, Sections 19 and 27; Part XVII, Section 197. Guideline C-4. The Management of Biomedical Waste in Ontario*. [Toronto, Ontario]; 2009. [cited December 20, 2010]; Available from: <http://www.ene.gov.on.ca/publications/7397e.pdf>.
174. Transport Canada. *Transportation of Dangerous Goods Act, 1992; 1994*. [cited September 17, 2009]; Available from: <http://laws.justice.gc.ca/en/T-19.01/>.
175. Canadian Standards Association. Z317.10-09. Handling of Waste Materials in Health Care Facilities and Veterinary Health Care Facilities. Rexdale, Ont.: Canadian Standards Association; 2009.
176. Canadian Standards Association. Infection control during construction or renovation of health care facilities. Mississauga, Ont.: Canadian Standards Association; 2003.
177. Canadian Standards Association. Special requirements for plumbing installations in health care facilities. Etobicoke, Ont.: Canadian Standards Association; 1999.
178. Canadian Standards Association. Special requirements for heating, ventilation, and air conditioning (HVAC) : systems in health care facilities. Rexdale, Ont.: The Association; 1991.
179. American Institutes of Architects. Guidelines for Design and Construction of Health Care Facilities: [The American Institute of Architects]; 2010. [cited October 1, 2010]; Available from: <http://www.fgiguideelines.org/2010guidelines.html>.
180. Morrison J. Development of a resource model for infection prevention and control programs in acute, long term, and home care settings: conference proceedings of the Infection Prevention and Control Alliance. *Am J Infect Control* 2004;32(1):2-6.
181. Dawson SJ. The role of the infection control link nurse. *J Hosp Infect* 2003;54(4):251-7; quiz 320.
182. Horan-Murphy E, Barnard B, Chenoweth C, Friedman C, Hazuka B, Russell B, et al. APIC/CHICA-Canada Infection Control and Epidemiology: Professional and Practice Standards. Association for Professionals in Infection Control and Epidemiology, Inc, and the Community and Hospital Infection Control Association-Canada. *Am J Infect Control* 1999;27(1):47-51.
183. Jenner EA, Wilson JA. Educating the infection control team - past, present and future. A British perspective. *J Hosp Infect* 2000;46(2):96-105.
184. Murphy CL, McLaws M. Credentialing, diversity, and professional recognition-foundations for an Australian infection control career path. *Am J Infect Control* 1999;27(3):240-6.
185. Harbarth S, Pittet D, Grady L, Goldmann DA. Compliance with hand hygiene practice in pediatric intensive care. *Pediatr Crit Care Med* 2001;2(4):311-4.
186. Bédard L, Frenette C, Gourdeau M. Comité sur les infections nosocomiales du Québec, Association des médecins microbiologistes infectiologues du Québec. Prévention et contrôle de la diarrhée nosocomiale associée au *Clostridium difficile* au Québec : lignes directrices pour les établissements de soins. 3e éd. ed. [Montréal]: Association des médecins microbiologistes infectiologues du Québec : l'Institut; 2005.
187. O'Boyle C, Jackson M, Henly SJ. Staffing requirements for infection control programs in US health care facilities: Delphi project. *Am J Infect Control* 2002;30(6):321-33.
188. Dougherty J. Development of a resource model for infection prevention and control programs in acute, long term, and home care settings: Conference Proceedings of the Infection Prevention and Control Alliance. *Canadian Journal of Infection Control* 2001;16(2):35-9.
189. Richards C, Emori TG, Edwards J, Fridkin S, Tolson J, Gaynes R. Characteristics of hospitals and infection control professionals participating in the National Nosocomial Infections Surveillance System 1999. *Am J Infect Control* 2001;29(6):400-3.

190. Comité d'examen sur la prévention et le contrôle des infections nosocomiales, Québec. D'abord, ne pas nuire-- : les infections nosocomiales au Québec, un problème majeur de santé, une priorité : rapport. Québec: Santé et services sociaux Québec; 2005. Report No.: 2-550-44561-9 (rel. à spirale).