ipac Infection Prevention and Control Canada

pci Prévention et contrôle des infections Canada

Infection Prevention and Control (IPAC) Program Standard

A national standard developed by Infection Prevention and Control Canada (IPAC Canada)

Reviewed and updated by the IPAC Program Standard Working Group

REVISED
NOVEMBER 2024

Table of Contents

2024 IPAC Program Standard Working Group Members

Chair

Madeleine Ashcroft RN BScN MHS CIC FAPIC
Infection Control Professional Community Outreach IPAC Hub
Trillium Health Partners
Mississauga, Ontario

Members

Barbara Catt RN BScN MEd CIC LTC-CIP
Senior Nursing Consultant
Public Health Agency of Canada
Ottawa, Ontario

Steven Ettles HBMSc MPH
Senior Research Analyst
Public Health Agency of Canada
Ottawa, Ontario

Lori Jessome-Croteau BScN MHS MEd RN CIC
Health Services Manager, Infection Prevention and Control, Central Zone
Nova Scotia Health
Halifax, Nova Scotia

Robin Johnson MLT BMLS CIC
Infection Control Practitioner – Long Term Care
Regina Pioneer Village
Regina, Saskatchewan

Donna Moore RPN MSc CMDRT CIC
Manager Infection Prevention & Control
William Osler Health System
Etobicoke, Ontario

Michelle Mutton RN BScN MSN/ED CIC
Nurse Manager CDE/IPC Team
Indigenous Services Canada
Ottawa, Ontario

Scott Stephens ACP
Superintendent, Regulatory Compliance and Infection Control
Ottawa Paramedic Service
Ottawa, Ontario

Reviewers

The IPAC Canada Program Standard 2024 version was peer-reviewed by the following content experts and the IPAC Canada Board:

Molly Blake RN BN MHS CIC
Director Infection Prevention and Control & MDR
Winnipeg Regional Health Authority
Winnipeg, Manitoba

Anne Bialachowski RN BN MS CIC
Director Infection Prevention and Control
St Joseph's Healthcare
Hamilton, Ontario

Melony Cooper RPN
CDOC/IPAC Lead
Anson Place Care Centre
Hagersville, Ontario

Christina Critelli RN BScN BKin
Infection Control Practitioner Community Outreach IPAC Hub
Trillium Health Partners
Mississauga, Ontario

Frederick Cundict BSc BEH(AD) CPHI(C)
Infection Control Professional
Alberta Health Services
Edmonton, Alberta

Tanya Denich MSc BSc CIC
Infection Prevention and Control Specialist
Public Health Ontario
Toronto, Ontario

Tara Donovan BHSc MSc
Network Director
Provincial Infection Control Network of BC
Vancouver, British Columbia

Mary Gregoire RN BN
Manager Infection Prevention & Control
Horizon Health Network
Moncton, New Brunswick

Jennifer Happe BSc MSc
Infection Control Professional
Alberta Children's Hospital
Calgary, Alberta

Robin Harry RN BScN BSc(Hons) CIC
Manager Infection Prevention and Control
North York General Hospital
Toronto, Ontario

Robyn Hunter RN, BSN, CIC (she/her)
Infection Prevention and Control (IPAC)
Interim Regional Director
Vancouver Coastal Health

Dione Kolodka MSc BSc CIC
Infection Prevention and Control Specialist
Alberta Health Services
Calgary, Alberta

Magdalena Krawczyk RN BScN
Infection Control Practitioner Community Outreach IPAC Hub
Trillium Health Partners
Mississauga, Ontario

Katherine Paphitis BSc BASc MSc CPHI(C) CIC
Enteric Zoonotic & Vectorborne Diseases Specialist
Public Health Ontario
Toronto, Ontario

Executive Summary

Healthcare-associated infections (HAIs) are defined as infections that occur in association with, or related to, the provision of health care. Examples of HAIs include bloodstream infections, post-surgical infections, urinary tract infections, and seasonal respiratory and enteric infections contracted within the organization/facility. In recent years, novel and imported infectious diseases such as severe acute respiratory syndrome (SARS), pandemic H1N1 influenza, and most notably the SARS-CoV-2 pandemic, have also been transmitted within Canadian healthcare organizations and in such cases have been classified as HAIs. Threats from epidemics, pandemics, and antimicrobial resistance (AMR) are recognized as top global priorities, with effective infection prevention and control (IPAC) as the cornerstone for action.[1-4] IPAC practices have a global impact as well as responsibility, including for stewardship of resources.[5]

HAIs are often associated with increased morbidity and mortality, contributing to approximately one-third of unexpected in-hospital deaths.[6] They remain an important patient safety and quality issue, representing a significant adverse outcome of health care, while outbreaks result in significant costs to acute and long-term care organizations.

It is estimated that up to 70% of HAIs are preventable. The landmark Study on the Efficacy of Nosocomial Infection Control (SENIC)[7] project estimated that one-third of HAIs in hospitals could be prevented if the essential components required for IPAC Programs were consistently implemented. IPAC Programs that have the required expertise and resources will contribute to improved protection of patients, healthcare workers, visitors, and others from HAIs, and reduce costs to the healthcare system. A strong, effective, and sustained IPAC Program strengthens health systems and supports the delivery of high quality, people-centered care.[1,8-10]

The original IPAC Program Standard was written in 2013 to describe the culture, scope, and foundational framework necessary for the development of a successful IPAC Program. It synthesized best practices, guidelines, and recommendations from Canadian (national and provincial) bodies and international agencies, and incorporated significant findings from then current scientific literature. The 2023 reviewers recognized the ongoing value of the content of the original document. Revision included a realignment, based on an adaptation of the WHO core components of infection prevention programs: guidelines, education and training, surveillance, and monitoring with audit and feedback. IPAC Programs use multimodal strategies, within an enabling environment with organizational support (including workload, work-life, and appropriate built environment and resources).[11] The Standard emphasizes the critical value of guidelines to inform policies, procedures, protocols, and ongoing best practice in all areas of the organization, while recognizing the importance of a strong hand hygiene program. Additional goals were to reduce duplication,

make the document more succinct and user-friendly, and increase applicability across all healthcare settings.

Recommendations from the following organizations have been used to support individual standards:

- Accreditation Canada
- Association for Professionals in Infection Control and Epidemiology (APIC)
- Canadian Standards Association (CSA)
- Health Standards Organization (HSO)
- Healthcare Excellence Canada
- International Society for Quality in Health Care (ISQua)
- National Institute for Health and Clinical Excellence (NICE)
- National/Provincial/Territorial Acts and Regulations
- Occupational Safety and Health Administration (OSHA)
- Public Health Agency of Canada (PHAC)
- Provincial Infectious Diseases Advisory Committee (PIDAC)
- Provincial Infection Control Network (PICNet)
- Society for Healthcare Epidemiology of America (SHEA)
- World Health Organization (WHO)

With a national voice representing IPAC professionals in all sectors of health care across all provinces and territories, IPAC Canada is a leader in the promotion of IPAC Program best practices and is uniquely placed to develop and promote a national IPAC Program Standard.

Process

This document is a resource for healthcare senior leaders and IPAC program staff, to use for prioritizing and developing their IPAC program, including to:

- foster senior management support for the IPAC Program;
- support consistency in the recommended program elements across all Canadian healthcare settings; and
- engage in strategic planning activities.

This standard was developed by an IPAC Canada committee with input from provincial and national IPAC leaders.

Abbreviations

ABHR	Alcohol-based Hand Rub
APIC	Association for Professionals in Infection Control and Epidemiology (U.S.)
ARO	Antimicrobial-resistant Organism
ASP	Antimicrobial Stewardship Program
CDI	*Clostridioides difficile* Infection
CEO	Chief Executive Officer
CIC®	Certification in Infection Control
CJD	Creutzfeldt-Jacob Disease
CPE	Carbapenemase-producing *Enterobacterales*
CSA	Canadian Standards Association
EMC	Emergency Management Committee
ERP	Emergency Response Plan
FTE	Full-time Equivalent
HAI	Healthcare-associated Infection
HCW	Healthcare Worker
HVAC	Heating, Ventilation and Air Conditioning
ICP	Infection Control Professional
ICS	Incident Command System
IMS	Incident Management System
IPAC	Infection Prevention and Control
IPACC	Infection Prevention and Control Committee
ISQua	International Society for Quality in Health Care
LTC	Long-term Care
LTCH	Long-term care home
MRSA	Methicillin-resistant *Staphylococcus aureus*
NICE	National Institute for Health and Clinical Excellence (U.K.)
OHS	Occupational Health and Safety
OMT	Outbreak Management Team

PHAC	Public Health Agency of Canada
PICNet	Provincial Infection Control Network (British Columbia)
PIDAC	Provincial Infectious Diseases Advisory Committee (Ontario)
PPE	Personal Protective Equipment
PP&P	Policies, Procedures, and Protocols
QI	Quality improvement
SENIC	Study on the Efficacy of Nosocomial Infection Control
SHEA	Society for Healthcare Epidemiology of America (U.S.)
SWOT	Strengths, Weaknesses, Opportunities and Threats
VRE	Vancomycin-resistant Enterococci

Glossary

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

Administrative Controls: Measures put in place to reduce the risk of infection to staff or to patients (e.g., infection prevention and control protocols and procedures, education and training).

Airborne Precautions: Additional Precautions for patients known or suspected of having an illness transmitted by the airborne route (i.e., by small droplet nuclei that remain suspended in the air and may be inhaled by others).

Alcohol-based Hand Rub (ABHR): A liquid, gel, or foam formulation of alcohol (e.g., ethanol, isopropanol) which is used to reduce the number of microorganisms on hands in clinical situations when the hands are not visibly soiled.

Antimicrobial-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).

Antimicrobial Stewardship: A coherent set of actions to promote the responsible use of antimicrobials to limit the development of antimicrobial resistant organisms.

Antimicrobial Stewardship Program: Program to support coordinated interventions designed to improve and measure the appropriate use of antimicrobials including selection, dosing, duration of therapy and route of administration.

Audit: A systematic, quantified comparison of observed practice against established standards of current best practice; in health care, to improve patient care and outcomes.

Champion: In infection prevention and control, leader who models positive infection prevention and control behaviour.

Certification in Reprocessing: Successful completion of a recognized certification course in reprocessing practices administered by an accredited body, such as the Canadian Standards Association (CSA).

***Clostridioides* (formerly *Clostridium*) *difficile* (*C. difficile*):** A Gram-positive anaerobic spore forming bacillus which causes antibiotic-associated colitis or pseudomembranous colitis and is the most common cause of healthcare-associated infectious diarrhea.

Cluster: An unusual aggregation, real or perceived, of health events that are grouped together in time and space and that are reported to a health agency; and may be used interchangeably with outbreak in some areas.

Community care: Health services delivered in people's homes, in addition to community hospitals, intermediate care facilities, clinics and schools.

Contact Precautions: Additional Precautions for patients known or suspected of having an infection that can be transmitted by direct or indirect contact.

Continuous Quality Improvement (CQI): A continuous and ongoing effort to achieve measurable improvements in the efficiency, effectiveness, performance, accountability, outcomes, and other indicators of quality in services or processes to achieve equity and health improvement.

Contractor/Contract worker: An individual or employer hired under contract to provide materials or services to another individual or employer. For the purposes of this document, contractors are included as Staff, based on the potential risk of exposure to infection through contact with staff, patients, or hazardous materials (e.g., asbestos or mould).

Culture of IPAC Safety: The shared commitment and demonstrated values, attitudes and actions of a healthcare organization's leaders and staff that support the belief that the work environment is to be safe from infection acquisition and transmission.

Denominator: In epidemiology, the population at risk.

Droplet Precautions: Additional Precautions for patients known or suspected of having an infection that can be transmitted by larger respiratory particles which are deposited on mucous membranes.[12]

Discharge/transfer cleaning: The thorough cleaning of a client/patient/resident room or bed space following discharge, death or transfer, to remove microorganisms that might be acquired by subsequent occupants and/or staff. Also performed when some types of Additional Precautions have been discontinued. Also called 'terminal' cleaning.

Diversity, Equity, and Inclusion (DEI): Promotion of fair treatment and full participation of all people, especially populations that have historically been underrepresented or subject to discrimination because of their background, identity, disability, or other characteristics or circumstances.

Diagnostic stewardship: Ordering the right tests for the right patient at the right time to inform optimal clinical care.

Diversity: The variety of unique dimensions, qualities, and characteristics humans possess, and the mix that occurs in any group of people.

Donning: Putting on (e.g., of personal protective equipment).

Doffing: Removing (e.g., of PPE).

Emergency Response Plan (ERP): A coordinated approach to the preparation for disasters and emergencies. See Incident command system (ICS)/incident management system (IMS)

Engineering Controls: Mechanical measures that are put in place to reduce the risk of infection to staff or patients (e.g., heating, ventilation and air conditioning systems, room design, placement of hand washing sinks).

Essential Care: emotional, physical and/or psychological support, required for the well-being of a patient.

Essential Caregiver/Partner: A designated individual (selected by the patient or by proxy) who provides essential care.

Equity: the absence of unfair, avoidable, or remediable differences in treatment among groups of people.

Fit-test: A qualitative or quantitative method to evaluate the fit of a specific make, model, and size of a respirator on an individual.

Goals: Desired end points in organizational development. Goals can be long-term, intermediate, or short-term.

Hand Care Program: A key component of hand hygiene that includes hand care assessment, healthcare worker education, provision of hand moisturizing products and provision of ABHR that contains an emollient.

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 an alcohol-based hand rub or soap and running water.

Hand Washing: The physical removal of microorganisms from the hands using soap (plain or antimicrobial) and running water**.**

Healthcare-associated Infection (HAI): An infection that a patient acquires in a setting where health care is delivered (e.g., a hospital), in an institution (e.g., a long-term care home), or in a home care arrangement. The infection was neither present nor developing at the time the individual was admitted (or started treatment).

Healthcare Facility: A set of physical infrastructure elements supporting the delivery of health-related services (i.e., “the building”). A healthcare facility does not include a patient’s home.

Healthcare Setting: Any location where health care is provided, including emergency care, prehospital care, hospitals, long-term care, home care, ambulatory care, and facilities and locations in the community where care is provided (e.g., educational institutions, residential facilities, correctional facilities, dental offices, and physician's offices), including in remote and isolated settings. Note: Definitions of healthcare settings can overlap, as some settings provide a

range of care, such as chronic care or ambulatory care provided in acute care, and complex care provided in long-term care.

Healthcare Organization: Any facility, corporation, agency, association, consortium, or company where health care is provided. This includes organizations 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, independent health facilities, out-of-hospital premises, offices of other health professionals, public health clinics and home health care.

Healthcare Worker (HCW), also known as Healthcare Provider: An individual who works in a healthcare organization and has direct contact with patients, including but not limited to a nurse, physician, dentist, nurse practitioner, paramedic and sometimes emergency first responder, allied health professional, unregulated healthcare worker, clinical instructor and student, environmental services staff, and volunteers.

Home Care: The delivery of a wide range of healthcare and support services to clients/patients for health restoration, health promotion, health maintenance, respite, palliation and for prevention/delay in admission to long-term residential care. Home care is delivered where clients/patients reside (e.g., homes, retirement homes, group homes and hospices).

Hygienically clean: Free of pathogens in sufficient numbers to cause human illness.

Incident command system (ICS) / incident management system (IMS): A standardized on-site management system designed to enable effective, efficient incident management by integrating a combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure.

Inclusion: Creating a culture that embraces, respects, accepts, and values diversity. A mindful and equitable effort to meet individual needs so everyone feels valued, respected, and able to contribute to their fullest potential.

Infection Prevention and Control (IPAC): The discipline concerned with preventing healthcare-associated infection.

Infection Prevention and Control (IPAC) Canada: A professional organization of persons engaged in or with an interest in IPAC activities in healthcare settings. IPAC Canada members include infection prevention and control professionals from related specialties including nursing, epidemiology, medicine, laboratory technology and public health, as well as industry. The IPAC Canada website is located at: ipac-canada.org.

Interpersonal risks: Actions or words that lead one to potentially look ignorant, incompetent or disruptive, which may lead to not speaking up against the majority.

IPAC Audit: A comprehensive and objective evaluation of the design and effectiveness of elements or all of a healthcare organization's IPAC program against an approved standard.

IPAC Lead: Individual responsible for the IPAC Program in an organization. May be a sole practitioner (e.g., in a long-term care facility) or leader of a team of IPAC staff.

IPAC Practice: The implementation of standards, policies, procedures, and protocols within healthcare organizations to prevent healthcare-associated infections.

IPAC Professional (ICP): An individual who is primarily responsible for development, implementation, and evaluation of, and education related to policies, procedures, and practices that impact the prevention of infections. See IPAC Canada: https://ipac-canada.org/definition-of-an-icp

IPAC Program: In the context of this document, all elements of IPAC within a healthcare organization, supported by Board/Senior Leadership, managed by the IPAC Program Lead or Team, and delivered by all individuals in the organization.

IPAC Program Team/IPAC team: A unit in the healthcare organization that specializes in infection prevention and control, comprised of individuals with IPAC training and expertise.

IPAC Standard: An overarching requirement of a particular attribute of the IPAC Program.

Key performance indicators: Measurable and quantifiable metrics used to evaluate and assess the performance of an organization's activities.

Leadership: The state or position of being a leader of a group of people or an organization, or the ability to do this.

Manager: A person who has accountability and responsibility for administering and/or supervising the operational affairs of a healthcare organization and/or who has authority over staff.

Medical Device Reprocessing (MDR): The cleaning, disinfection, and sterilization of reusable medical equipment/devices in healthcare; a functional area that reprocesses reusable medical devices (not necessarily centralized). In smaller healthcare settings, such as clinics or offices in the community, this refers to any segregated area where reprocessing of reusable medical devices takes place, away from patients.

Measurable Objectives: Specific, measurable steps that can be taken to meet a goal.

Methicillin-resistant *Staphylococcus aureus* (MRSA): A strain of *Staphylococcus aureus* that is resistant to beta-lactam antibiotics, such as cloxacillin and cephalosporins.

Numerator: Each event that occurs among a population at risk (the denominator) for the event under surveillance.

Occupational Health and Safety (OHS): Preventive and therapeutic services provided in the workplace by trained occupational health professionals, e.g., nurses, hygienists, physicians. Also known as Occupational Health Services, Occupational Health and Wellness, People Health, and other names in some jurisdictions.

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

Outbreak Management Team (OMT): A multidisciplinary committee that has the authority to implement changes in practice or take other actions that are required to control an outbreak.

Outcome Surveillance: Surveillance used to measure outcomes that can be attributed to care in a healthcare organization (e.g., healthcare-associated infections). An example of outcome surveillance related to the IPAC Program is surveillance of infection rates.

Patient: For the purposes of this document, the term "patient" includes clients, patients, residents, and others receiving health care. A person receiving or registered to receive healthcare.

Performance Indicator: A quantifiable measurement that reflects the critical success factors of a healthcare organization. Performance indicators are related to IPAC Program goals or objectives and provide a means for tracking performance against that goal or objective, to guide action toward improvement and enhancement.

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

Policy: The documented principles by which a healthcare organization is guided in its management of affairs.

Precautionary Principle: Requirement for higher levels of caution/preventative action where there are risks of serious outcomes from and lack of full scientific certainty regarding an infectious organism.

Procedure: An established or official way of doing something; a series of actions conducted in a certain order or manner to complete a specific task or process.

Protocol: A formal set of rules, guidelines, or procedures that define courses of action in specific situations or events.

Psychological safety: The absence of harm and/or threat of harm to mental well-being that a worker might experience, improved by taking precautions to avert injury or danger to worker psychological health.

Process Surveillance: Surveillance used to assess or measure processes (things done to or for a patient during their encounter with the healthcare system).

Primary care: Routine care for urgent but minor or common health problems, mental health care, maternity and paediatric care, psychosocial services, liaison with home care, health promotion and disease prevention, nutrition counselling and end-of-life care. Primary care includes general practice, pharmacy, dental and optometry services.

Rationale: When applied to an IPAC standard, the scientific analysis, evidence, best practice, or guidance to support or validate the standard.

Relevant Parties: Those who are affected by or can affect a decision; a person such as an employee, customer, or citizen, or a group involved with an organization, with responsibilities towards it and/or an interest in its success.

Resource Stewardship: The sustainable use of renewable resources so that future generations can benefit from them, through conservation, preservation, and government policies.

Risk: IPAC-related threats or negative outcomes that can be expected to occur if a particular operation or practice does not meet the standard (i.e., is not performed or is performed incorrectly).

Routine Practices (RP): 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. Also termed Standard Precautions internationally.

Scope: For the purpose of this document, the breadth of the IPAC Program, encompassing the extent of the area, subject matter, target audience and/or relevant parties.

Staff: Anyone conducting activities in a healthcare organization, including but not limited to healthcare workers, contract workers, students. See also: *Healthcare Worker*.

Standard: Authoritative statements that reflect the expectations, values, and priorities of a role, profession, or Program. For the purposes of this document, the minimum requirements of a (IPAC) Program.

Stewardship: The responsible use (including conservation) of natural resources in a way that takes full and balanced account of the interests of society, future generations, the species, as well as of private needs, and accepts significant answerability to society.[5]

Supervisor: Anyone who directs the work of another healthcare worker.

Surge capacity: The ability to redirect current resources and obtain additional resources for day-to-day operation when demands exceed resources.

SWOT Analysis: A structured planning method used to evaluate the strengths, weaknesses, opportunities, and threats involved in a project or program.

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.

Syndromic Surveillance: The monitoring for and detection of signs and symptoms of infectious diseases that are discernible before confirmed laboratory diagnoses are made.

Vancomycin-resistant Enterococci (VRE): Strains of *Enterococcus faecium* or *Enterococcus faecalis* that are resistant to vancomycin and/or contain the resistance genes vanA or vanB.

Volunteer: A person who provides support to a patient or organization willingly and without payment and is part of an organization's program delivery team.

Visitor: Any person in the healthcare organization who is not under the direct control of the employer and is not actively involved in care.

Work-life: For the purposes of this document, the practice of providing initiatives designed to create a more flexible, supportive work environment, enabling staff to focus on work tasks while at work.

NOTE

Within this document, the following terms align with CSA Standards terminology:

"**Shall**" is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard;

"**Should**" is used to express a recommendation or that which is advised but not required; and

"**May**" is used to express an option or that which is permissible within the limits of the standard.

Introduction

Background

Healthcare-associated infections (HAIs) are infections that occur in association with, or related to, the provision of health care. HAIs include bloodstream infections, post-surgical infections, urinary tract infections, and seasonal respiratory and enteric infections. For more than 20 years, HAIs have been recognized as a patient safety issue and a significant adverse outcome of health care,[1-4,13-19] and despite improvements in some areas (e.g., CDI), they remain a serious concern.[19-22]

Point prevalence studies in Canada estimated 7.9% of hospitalized patients had at least one HAI.[20,21] HAIs have a significant impact on healthcare spending as a result of prolonged hospital stay, readmissions, and increasing consumption of costly resources.[9,23,24]

When HAIs involve antimicrobial resistant organisms, outcomes are worsened,[25] with 15.2% to 32.7% mortality from antimicrobial resistant organisms (AROs) in 2017,[20] and 14,000 deaths in 2018.[21] Most recent estimates suggest that infections with AROs add $1.4 billion per year to the healthcare sector costs in Canada.[26] In long-term care (LTC), outbreaks result in significant costs to the organization, although studies are limited;[27] however, estimates of Canadian rates of HAIs in LTCHs approximates 5–6/1000 resident days.[28] Worldwide, about 40% of all deaths due to Severe Acute Respiratory Syndrome – Corona Virus Disease-2 (SARS-CoV-2/COVID-19) in the first year of the pandemic were LTC residents,[29] and in parts of Canada, the proportion was even higher.[30]

The cost-effectiveness of IPAC strategies in non-acute settings has not been fully studied.[31]

Purpose of the IPAC Program

It has long been estimated that up to 70% of HAIs are preventable,[32-36] and that an effective IPAC Program,[37,38] can result in fewer HAIs,[39-44] reduced length of hospital stay,[24] less antimicrobial use and resistance,[45] and lower costs related to treatment for infections.[46] Ongoing studies confirm this.[47]

As health care continues to evolve and complex treatments are progressively provided outside of the acute care setting (e.g., ambulatory care, primary care offices, long-term care, and home settings), IPAC Programs must span the continuum of healthcare organizations and settings. In long-term care, a 2005 survey showed that IPAC resources and programming fell far short of the suggestions of Canadian and U.S. experts,[48] and the COVID-19 experience demonstrated that this had not changed.[49,50]

The recent SARS-CoV-2 pandemic experience in Canadian long-term care homes highlighted the urgency to implement appropriately resourced IPAC Programs as a standard of practice for healthcare safety.[50,51]

HAIs also impact staff as evidenced by the up to 43% incidence of SARS-CoV-2 infection among healthcare workers,[52] and despite community exposure, the proportion of COVID-19 cases among healthcare workers exceeding 10% in the first wave.

The IPAC Program and the organizational leadership must address stewardship issues, beyond antimicrobial resistance.[53] At a global level, the need for resource stewardship has never been stronger. The COVID-19 pandemic illustrated how healthcare in general[54] and IPAC Programs in particular[55] have the capacity to generate vast amounts of medical waste. Not only is the appropriate use of healthcare resources a critical component of patient-centred care[56] and occupational health and safety,[57] it also impacts the planet, especially through the environmental impact of waste (e.g., single use products,[58] plastics from PPE59, and chemicals).[60]

IPAC Program Standard

Why do we need an IPAC Program Standard?

While international IPAC guidance is provided by the World Health Organization (WHO),[61] the healthcare system in Canada is based on the *Canada Health Act*,[62] providing publicly funded universal health care, with provincial and territorial jurisdiction. Economics and population changes (e.g., aging, and greater life expectancy) have resulted in healthcare facilities running at greater than 100% occupancy and long waiting lists for services, including for long-term care placement.[51]

National, provincial, territorial, regional/municipal, and local healthcare programs have distinctive roles in determining essential IPAC Program components:[63]

- The national-level authority is responsible for health protection and regulation, consumer safety, and disease surveillance and prevention, including the development and dissemination of national technical guidelines using the best evidence available for the basic set of guidelines.

  The national-level health authority should, directly or by delegation, regulate, provide guidance, promote, and supervise compliance with regulations.
- The provincial/territorial authority should administer and deliver most healthcare services.
- Regional/municipal authorities are largely responsible for the administration of health units and the oversight of infectious disease responses
- At the local level (healthcare organization), care must be provided in a safe and efficient manner for patients, staff, and others. The healthcare

organization adapts and implements national technical guidelines to the local level.

- The IPAC Program components of national, provincial, and local level programs should be aligned and consistent.

Publications from scientific societies, provincial agencies, or other expert groups and professional associations[1,64-66] provide suggestions for IPAC Program components based on expertise or other rationale.

Standards reflect the expectations, values, and priorities of the profession.[67] When applied to an individual, a standard is an expected and achievable level of performance against which actual performance can be measured.[68] Self-regulating professions are characterized by standards of practice, based on the values of the profession.[69] With a national voice representing IPAC professionals in all sectors of healthcare across all provinces and territories, IPAC Canada is a leader in the promotion of IPAC best practices and able to identify standards that are part of effective IPAC Programs.

The IPAC Program standards draw together resources, scientific studies, guidelines, and recommendations related to the development, implementation, and evaluation of IPAC Programs across the continuum of care. The implementation of IPAC Canada's Program Standards will contribute to safe patient care and IPAC practice in Canada.

Auditing the IPAC Program

A program audit is a comprehensive and objective evaluation of the design and effectiveness of all aspects of a healthcare organization's IPAC Program against an approved standard. Auditing is recognized as essential to assess status and inform quality improvement initiatives across departments and services.[70]

The data derived from audits will inform the IPAC Program's annual goals and objectives. The data may also identify areas for quality improvement. Quality improvement (QI) cycles may involve modification of practice. Successful QI includes sustained changes in practice and spread of improvement in IPAC processes.[71]

The infection control professional (ICP) who performs audits acts as a role model and change agent.[72] Engaged staff and managers will be successful in improving IPAC processes and in reducing HAIs,[73] particularly when results of audit activities are provided to managers and staff to drive improvements.[74,75]

IPAC Canada's IPAC Program Audit Tool (PAT©) helps auditors to assesses whether the IPAC Program standards have been met. The PAT© has been published as a separate document, together with an auditing annex, Auditing the Infection Prevention and Control (IPAC) Program, available for IPAC Canada members.

It should be noted that core components of IPAC Programs included in these Standards are not intended to be a ranked order of the importance of each component. All core components should be considered equally important and crucial for the establishment and effective functioning of IPAC Programs and practices.

In addition, these standards are not intended to be exhaustive, and healthcare workers will be required to refer to other guidance, policies, and procedures (local, provincial/territorial, and national) in addition to this document.

IPAC CANADA PROGRAM STANDARDS

1 Enabling Environment: A Culture of Safety

Central to all healthcare organizations is the focus on patient safety as an organizational commitment. Reducing the risk of infections is important for a safe environment for patients and workers, and all within the organization. IPAC Programs address quality indicators to support continuous quality improvement in a learning organization. A culture of IPAC safety is the shared commitment and demonstrated values, attitudes and actions of leaders and staff that support the belief that the healthcare environment is to be safe from infection acquisition and transmission.

1.1 IPAC Culture (Management Commitment and Support)

The healthcare organization engages all in promoting an IPAC culture within the organization.[64-66,76-77] Active involvement of and commitment to patient and staff safety by all levels of leadership are significant predictors of adherence to IPAC practices.[78-80] Partnership and collaboration with internal relevant parties including HCWs, physicians, and volunteers, informed by patients and families, is important for developing and disseminating guidelines and best practices within an organization. The IPAC team works with its partners to implement IPAC activities, education, and awareness campaigns.

Sustained organizational IPAC culture change depends on shared accountability[63] and communal responsibility for the IPAC process,[66] and results in improved patient safety.[64]

The IPAC Program is greater than the IPAC team and develops organizationally through collaboration with internal and external partners at all levels.

STANDARD 1	**The healthcare organization's leaders and staff shall communicate, role model and be actively involved, engaged, and committed in developing and maintaining a culture of infection prevention throughout the organization.**

STANDARD 2	**IPAC Program activities and awareness campaigns shall be developed through partnership and collaboration with relevant parties.**

1.2 IPAC Program Mission, Vision, and Values

Preventing infections is a shared vision for everyone in health care. All must understand their role with respect to the IPAC Program, supported by widespread multidisciplinary engagement, with a clear message that everyone in the organization matters and everyone is responsible for preventing infections.78,79

The IPAC Program has a clear vision and purpose or mission that:

- is consistent with the organization's mission, vision, and values;
- provides the basis for the IPAC Program's planning and direction;
- is communicated to partners; and
- is regularly reviewed.

The Board/Senior Leadership identifies the IPAC Program as critical in the organization's strategic plan to improve quality and patient safety.80 Annual operational plans support the IPAC Program's strategic plan, goals, and objectives, and align with day-to-day operations. There is a culture of endorsement and accountability through senior leadership/Board-level support for IPAC Program goals and priorities in the organization.[81]

STANDARD 3	**There shall be a clear vision for the healthcare organization's IPAC Program, supported by the Board/governing body/senior management.**

1.3 Patient Safety

Patient safety is a strategic quality improvement priority for the healthcare organization. The critical role of the IPAC Program is recognized by accreditation organizations, whose patient safety goals include to reduce the risk of HAIs and their impact across the continuum of care.[82,83]

Senior leaders and governing bodies of healthcare organizations in Canada focus on clinical quality and patient safety.[84] The governing body is ultimately accountable for the quality and safety of the organization's services, and through awareness of patient safety issues, promotes a patient safety culture which leads to improved outcomes and care processes.[82]

Many elements of the IPAC Program are indicators of quality of care, including outcome indicators such as infection rates and process indicators such as practice audit trends.[83]

While a positive safety culture contributes to successful interventions, implementing of effective interventions by healthcare organizations also drives improvements in culture.[84]

The IPAC Program's role in patient safety is also aimed at the patients, family members, and visitors to the organization. Examples of IPAC Program interventions related to patient safety may include:

- initial screening for communicable diseases and resistant organisms and ongoing risk assessment;
- access to resources for hand hygiene and personal protective equipment (PPE); and
- user-friendly information about Routine Practices and Additional Precautions

Opportunities should be provided for patients to become involved with planning and decision-making on quality improvement activities,[85,86] including those related to the IPAC Program. This might include using a patient ombudsman, resident council members, through patient surveys, and/or patient feedback during outbreak investigations and root-cause analyses.

STANDARD 4	**Patient safety related to the IPAC Program shall be a strategic priority for the healthcare organization.**

1.4 Work-life in Relation to IPAC

Work-life includes organizational structural and cultural support to assist employees to integrate paid work with other important life roles,[87] creating a more flexible, supportive work environment that enhances employee focus on work tasks while at work. Work-life effectiveness is a philosophy and specific set of organizational supports for workers to achieve success both at work and at home. This includes management commitment to organizational quality of work-life, a work culture that supports safe work improvement activities, programs to meet life event needs, ensuring policies enhance staff control over their lives, and flexibility to meet the needs of both staff and workplace/healthcare organizations.[88]

Organizations identify a healthy and safe workforce and environment as a strategic priority for quality care.[89] IPAC Program initiatives for the prevention of illness and injury to staff are part of health and wellness work-life programs including:

- IPAC Program policies, procedures, and protocols that comply with relevant legislation;
- healthcare worker training in risk assessment and use of PPE and other safety equipment if required;
- access to research and best practice information related to staff safety;

- resources to protect staff from infectious diseases (e.g., PPE, hand hygiene equipment, immunization programs, sharps safety initiatives);
- protocols for management of staff exposures to infections in the event they occur;
- incident investigations to prevent recurrence;
- action to deal with non-compliance issues relating to IPAC practices; and
- accommodation including related to infectious diseases/exposure.

Staff safety also includes psychological safety,[90] a shared belief that the culture in the team supports interpersonal risk-taking, and staff can be themselves, without fear of harassment or incivility,[91] leading to increased confidence, creativity, trust, and productivity.[92,93] Leaders frame the work to identify and support valued contributors, create an environment that fosters continued learning and excellence, and encourage team members to recognize and let go of unconscious biases.[94,95]

A safe workplace demonstrates integrity and respect for all, through supporting diversity, equity, and inclusion, including equal opportunities, and condemning racism and discrimination. This is facilitated by awareness activities to enhance cultural competence, included in hiring, research, and daily work.

STANDARD 5	**The healthcare organization shall demonstrate commitment to strategies for the prevention of staff exposures to organisms, and resulting infections.**

STANDARD 6	**The healthcare organization shall demonstrate commitment to work-life strategies to actively support staff's mental well-being and psychological safety.**

STANDARD 7	**The healthcare organization shall demonstrate commitment to diversity, equity, and inclusion in the workplace.**

2 IPAC Program: Foundational Framework

2.1 IPAC Program Leadership and Governance

Effective organizational leadership plays an important role in activities related to the prevention of HAIs, cultivating a culture of excellence and inspiring staff.[96]

Leadership plays a key role in HAI prevention and involving IPAC experts in the process, facilitates translation of IPAC research findings into practice.[96]

Governance refers to the framework through which healthcare organizations are accountable for ensuring that rigorous systems are established so healthcare safety and quality is monitored and supported, evaluated and continuously improved.[97,98] The IPAC Program is an essential part of governance, maintaining a high clinical profile and a high management profile.

2.1.1 IPAC Program Value to the Governing Body/Senior Leadership

The quality of healthcare is inherent in clinical governance and a direct responsibility of the Chief Executive Officer (CEO), Board/governing body, and Senior Leadership of the healthcare organization. The organization ensures commitment through active leadership participation and sponsorship, which are key elements to a successful IPAC Program.[99]

A well-functioning and supported IPAC Program demonstrates value and cost-effectiveness to the organization, contributing to a reduction in HAIs, reduced length of stay, and decreased costs of treatment for HAIs.[8,35] Investing in IPAC Programs is a valuable organizational-wide priority.[81] Organizational leadership support includes adequate resourcing of IPAC Programs to meet standards.[97]

The Board/Senior Leadership demonstrates to patients, the public, staff and itself that it is making continuous progress towards meeting all of its commitments related to the IPAC Program.[98] There is evidence of regular communication from the Senior Leadership to the Board/governing body regarding their expectations of patients, visitors and staff in relation to the IPAC Program.[98]

STANDARD 8	**The IPAC Program shall be an essential part of governance and maintain a high clinical and management profile.**

2.1.2 IPAC Program's Role in the Healthcare Organization's Strategic Plan

A comprehensive organizational approach is required to ensure that an effective IPAC Program is implemented with the senior leadership having ultimate accountability.

The organization's leaders provide support for the development and implementation of the IPAC Program's operational plans to achieve its strategic plan, goals and objectives and to guide day-to-day operations.[96] Implementation of the program rests not only with the IPAC team, but also with nursing and departmental managers, Environmental Services, OHS, directors of medical services, medical device reprocessing, and other departments and individuals in the facility impacted by the effective delivery of the program.[64,77]

STANDARD 9	**The Board/Senior Leadership shall identify the IPAC Program as a critical component of the healthcare organization's strategic plan.**

2.1.3 IPAC Program Positioning and Reporting Relationships

The IPAC Program is essential to the healthcare organization and is positioned in a reporting relationship that empowers the program to enact change. The IPAC Program must have direct reporting to the Board/governing body through senior leadership. At the very least, reporting is to a senior level that crosses all department levels within the organization, for example Risk/Quality Management, Nursing in long-term care, or Wellness in retirement homes

There is evidence the IPAC Program is appropriately positioned so that it has the most functional reach and all departments have accountability to reduce HAIs. Senior leadership can justify the IPAC Program's positioning for the most effective impact (e.g., under risk management versus under nursing or laboratory). The IPAC Program policies and procedures shall be consistently applied across the organization.

STANDARD 10	**The IPAC Program shall be positioned in the organization such that there is an effective reporting conduit to senior leadership.**

2.1.4 Clinical Risk Related to the IPAC Program

Clinical quality and patient safety are important to healthcare organizations.[83] HAIs are surpassed only by adverse drug events as the most common adverse event affecting hospitalized patients[84,100] Reducing clinical risks, such as preventing and controlling infections, results in safe and effective care.

Infection rates and other data on key indicators such as deaths, surgical complications, patient complications and patient satisfaction are key performance indicators to provide to governing bodies in order to monitor improvements in care. Healthcare Excellence Canada recognizes several IPAC Program strategies to reduce the incidence of preventable morbidity and mortality in healthcare.[101,102]

The critical role of the IPAC Program in patient safety is also recognized by accreditation organizations, with shared safety goals to reduce the risk of HAIs and their impact across the continuum of care.[103] Accreditation Canada requires organizations to complete a risk assessment to identify and address high-risk activities, such as performing aerosol-generating medical procedures; handling specimens, sharps, and biohazardous spills, and exposure to contaminated waste.[64]

Healthcare organizations are required to:[64]

- adhere to IPAC guidelines and consensus recommendations;
- deliver appropriate IPAC education and training to staff;
- monitor infection rates and benchmark this information;
- formulate and initiate strategies to reduce risk, considering relevant legislation and published guidelines; and
- continuously initiate actions to further improve their processes.

An integrated risk management approach (i.e., continuous, proactive, and systematic) is used to mitigate and manage IPAC risks in the organization,[64] There is evidence that the governing body/Board is aware that risk monitoring mechanisms are in place in each clinical area and that each area is accountable for compliance with IPAC Program protocols and procedures,[99] including IPAC-related patient and staff process and outcome indicators (e.g., hand hygiene rates, device-related infection rates). This information is also regularly, disseminated throughout the organization and shared with external partners. The IPAC team is involved in the development of key staff performance indicators relating to the IPAC Program.[80]

The organization's leaders assess IPAC risks and opportunities that have been identified and incorporate strategies to address them within the strategic plan.[64] The leaders understand the organizational environment and consider any anticipated changes that may be an IPAC risk or present an opportunity for the

organization.[64] Mechanisms are in place to inform the governing body/Board on IPAC control measures that have been implemented.[99]

STANDARD 11	**The organization shall have a structured process for mitigating infectious disease risks.**

2.2 IPAC Program Administration

2.2.1 IPAC Program Development

An IPAC Program shall be in place in all healthcare settings such as acute care and long-term care facilities, office-based practices (e.g., general practice clinics, dental clinics, community health facilities), and other community settings.

Implementation of the IPAC Program rests with the IPAC team, senior leadership, and all departments impacted by the effective delivery of the program.[66]

Prior to implementing an IPAC Program, and periodically thereafter, there is an organizational risk assessment to determine strengths, weaknesses, opportunities, and threats related to IPAC practices (i.e., SWOT analysis). The results are used to assist in prioritizing program needs and are strategically aligned with organizational priorities and provincial/territorial regulations. This dynamic process is flexible to respond to evolving organizational needs[66] and emerging infectious disease threats (e.g., pandemic).

IPAC standards and guidelines are implemented in every part of the organization. The IPAC standards are planned and developed with multidisciplinary teams and Senior Leadership support.[1,2,64,66,99]

A collaborative approach to supporting the IPAC Program[64] requires program functions to be planned, developed, implemented, and evaluated by an IPAC team or multidisciplinary committee.[66] The committee should review and guide the organization's IPAC Program, strategies, and plans.

Collaboration between the IPAC Program and other departments fosters good working relationships that are essential for program success.[80] IPAC activities are linked with those of key partners within the organization (e.g., OHS).[64] Multidisciplinary quality improvement committees include IPAC team representation.[95]

IPAC Program activities are based on continuous quality improvement methodologies where process and outcomes are continuously reviewed and improved.[64] In recent years, increases in IPAC Program resources appear to have been driven by large scale infectious disease threats such as Severe Acute Respiratory Syndrome (SARS-CoV-1) in Ontario, *C. difficile* outbreaks in Quebec,

and the COVID-19 (SARS-CoV-2) pandemic. The IPAC Program key performance indicators are based on the complexity of the healthcare facility, the characteristics of the patient population, the needs of the facility and legislation.

An organizational risk assessment is conducted annually, to ensure that policies, procedures, and protocols are consistent, achieve their stated objectives, and are in compliant with current best practices and regulations.[64-66]

The reliability, validity, and application of IPAC practice are assessed by:

- Analyzing surveillance and epidemiological data;
- Incorporating national, regional, and legal requirements into policies, procedures, and protocols;
- Regularly evaluating efficiencies and priorities to determine compliance with best practices using quality indicators and benchmarks; and
- Utilizing high quality, peer-reviewed current IPAC research/literature.

STANDARD 12	**The IPAC Program shall be developed in collaboration with relevant parties within the healthcare organization.**

STANDARD 13	**IPAC Program deliverables shall be based on organizational priorities, legislative requirements, the complexity of the healthcare facility, characteristics of the population served, and the needs of the community.**

2.2.2 IPAC Program Goals and Objectives

The goal of an IPAC Program is to protect patients, staff, and visitors from HAIs, resulting in improved survival rates, reduced morbidity, shorter length of healthcare stay,[66] and reduction in lost time by staff.

IPAC Program goals are evidence-based,[75,103,104] with measurable objectives that are reviewed at least annually and revised based on key performance indicator data, local epidemiology, and the organizational risk assessment. IPAC Program goals are consistent with mandatory reporting and legislation requirements.[99]

The organization-wide IPAC Program includes clearly defined objectives and an annual work plan developed in collaboration with the multidisciplinary committee and key internal and external relevant parties.

Essential objectives include:

- Annual review of program goals.

- Board/Senior Leadership support for goals.
- Evaluation of key performance indicators with revisions as necessary.
- Sharing of critical data and information including key performance indicators and surveillance data with partners.
- Delegation of responsibility and authority to individuals who can deliver the required outcomes, with timely communication to facilitate improvement.
- Proactive and responsive services (including IPAC education and training) that are coordinated by the IPAC team in conjunction with key partners.
- Use of evidence-based standards and guidelines to develop and/or revise policies, procedures, and protocols.
- Prompt identification and response to trends of concern (including emerging issues/pathogens), clusters, outbreaks, and sentinel events.
- Targeted surveillance activities identified through process and outcome indicator data.

STANDARD 14	**IPAC Program goals shall be evidence-based and have measurable objectives that are reviewed/revised at least annually.**

2.2.3 Infection Prevention and Control Committee (IPACC)

The IPAC team has the support of an IPACC or advisory group structured to include representation from partners across the organization[64] including, but not limited to, ICPs, OHS, Environmental Services, nursing and medical representation from key clinical programs including infectious diseases, microbiology, local public health and senior leadership.[105] In hospitals, this multidisciplinary committee may report to the Board of Directors through the Medical Advisory Committee,[66] and in other organizations, senior leadership is involved. Accreditation Canada requires this to be a formal committee structure.[64]

The IPACC is responsible for:[64,66]

- annual goal-setting and strategic planning for the IPAC Program and the IPACC;
- ensuring that the IPAC Program meets current legislated standards and organizational requirements;
- advocating for resources to accomplish the program goals;
- serving in an expert advisory capacity on controversial issues (e.g., impact of closure of clinical departments due to outbreaks);
- reviewing patient safety/risk management/quality assurance initiatives related to HAIs; and

- IPAC Program evaluation.

The frequency of IPACC meetings should be based on:[66,106]

- the objectives of the IPAC Program;
- requirements of accrediting bodies;
- national/provincial/territorial legislation;
- policy approval processes; and
- time required to effectively review IPAC Program surveillance data and related analyses and to monitor program goals and activities.

There is a process in place to ensure that items or issues brought to the IPACC for review are addressed in a timely manner. There is necessary follow-up on important issues, particularly those relating to risk management or patient safety. Minutes of the meetings are recorded and maintained.

The IPACC terms of reference are reviewed annually to ensure that the committee membership adequately represents IPAC Program needs in the organization and that goals have been met.

STANDARD 15	**There shall be a multidisciplinary IPAC Committee that supports the IPAC Program, and reports to senior leadership.**

STANDARD 16	**IPAC Committee shall review annual goals, advocate for resources to accomplish the goals, review quality improvement initiatives and provide input to IPAC Program deliverables.**

2.2.4 IPAC Information Management

Data, information, and knowledge-based systems provide reliable, timely service to support the IPAC Program's objectives. Surveillance for HAIs is foundational for a successful IPAC Program. Automated surveillance system components are efficient tools to support the data management work of the IPAC team with increased accuracy and timeliness of results.[107,108]

IPAC Program information management protocols and systems meet current information needs, anticipate future needs, and enhance organizational performance. There is dedicated computer access within the IPAC department. New technology, innovation and practice are incorporated into policies, procedures, and protocols,[99] such as the use of hand-held devices to collect surveillance and audit data.

A. IPAC Program Information Management Plan

There is a plan that defines how the IPAC Program will:[64]

- define and prioritize current and future information needs;
- capture, analyze, enter, and disseminate data;
- report accurate data results in a standardized way;
- support, educate and train IPAC staff in the processing and use of IPAC Program information management information, including the optimal use of technology;
- manage surge capacity in the face of outbreaks, emergencies, and disasters;
- incorporate flexibility to manage change and future needs;
- maintain confidentiality, integrity, and security of data; and
- manage record retention and information storage according to local legislation.

B. Record Retention and Information Storage

Data, information, and knowledge resources are securely stored (as per the Canadian Personal Information Protection and Electronic Documents Act – PIPEDA) but accessible for ICPs. Processes are in place for the recovery of data in case of disaster or system failures.

IPAC Program records are kept for organization's approved period, based on local legislation and organizational policy (e.g., minimum three years in some facilities, 7 or 10 in others). This includes investigation reports, IPAC Committee meeting minutes, education and training records, statistics, and epidemiology databases.[109]

STANDARD 17	**The IPAC Program's information management protocols and plans shall meet current needs and anticipate future needs to enhance IPAC Program performance.**

STANDARD 18	**The use of confidential patient information for IPAC Program purposes shall comply with federal (PIPEDA) and provincial/territorial legislation (including for retention and storage) and ethical standards of privacy and confidentiality.**

2.2.5 IPAC Program Resources

Investing in IPAC Programs, including adequate allocation of resources,[82] positively impacts the quantity and quality of HAI surveillance in acute care settings.[34] Increased surveillance for AROs and targeted IPAC education have been shown to reduce ARO rates in hospital and long-term care settings;[45,106] however, studies of the economic value of IPAC Programs in long-term care have been limited.[49,50]

IPAC Program resources include material, financial and human resources, and depend on the size of the organization, the type of services provided and the mandate of the IPAC Program.[64,66]

The IPAC team reviews IPAC Program resources on a regular basis (e.g., annually), and advocates for resources as required.

STANDARD 19	**The healthcare organization shall regularly review the resources needed to support the IPAC Program.**

2.2.5.1 Access to Microbiology Laboratory Services

The IPAC Program has access to an accredited microbiology laboratory that supports the surveillance program by reporting all significant microbiological isolates (e.g., positive blood and respiratory cultures, rapid detection of antimicrobial resistant microorganisms) in an accessible format to facilitate early detection of HAIs.[64,66] Ideally, IPAC staff have access to laboratory reports and notification of high-risk organisms.

The microbiology laboratory is adequately resourced to provide quick turnaround for high-risk organisms such as *C. difficile* and to assist with outbreak investigation in a timely manner.

STANDARD 20	**The IPAC Program shall have the support of an accredited microbiology laboratory.**

2.2.5.2 Budget Requirements

There is dedicated, sustained resource allocation for the IPAC Program, with sufficient funding including for:[66]

- intellectual resources (e.g., books, manuals, guidelines, online resources, subscriptions), including their maintenance;

- material resources (e.g., office equipment, electronic equipment such as computers and software, education and training materials, audio-visual materials);
- human resources (e.g., IPAC physician, ICPs, administrative support, IPAC leadership e.g., lead/manager/director); and
- continuing education (e.g., attendance at conferences, teleconferencing, videoconferencing, webinars, training courses).

STANDARD 21	**There shall be financial resources allocated to meet the IPAC Program needs.**

2.2.5.3 Staffing Requirements

There is management support to ensure that staff with IPAC expertise are available within the organization, and for the IPAC Program objectives and IPAC staff to deliver quality services.[99]

Administrative/Clerical Support

The organization provides administrative assistance to the IPAC Program.[66] Support staff allow the ICP(s) to attend to IPAC Program needs in clinical areas. Administrative support will depend on the complexity of the IPAC Program.

STANDARD 22	**The IPAC Program shall have sufficient support staff to meet their needs and goals.**

Infection Control Professional (ICP)

The ICP position is a dedicated position. Regardless of the size of the organization, the expected number of hours per week that are devoted to infection prevention and control must be clearly stated and protected.[66]

ICP staffing levels are related to the type of care services provided by the organization and will vary depending on volume, complexity, and acuity. Staffing should not be based exclusively on total bed numbers and should include the organizational risk assessment.[64,66] Ontario guidance published in 2012 in Ontario recommended:[66]

- a minimum ratio of 1.0 full-time equivalent (FTE) ICP per 115 acute care beds;

- a minimum ratio of 1.0 FTE ICP per 100 occupied acute care beds if there are high risk activities (e.g., dialysis);
- additional ratio of 1.0 FTE ICP per 30 intensive care beds should be considered where ventilation and haemodynamic monitoring are routinely performed;
- 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;
- 1.0 FTE ICP per 150-200 beds in other settings depending on acuity levels.

More recent publications have identified increasing demands,[110,111] advocate for a staffing model that focuses on a granular assessment of programs, settings, and roles,[112] and encourage higher ratios, e.g., 1.25 IP per 100 inpatient census and 1.0 infection prevention full-time equivalent per 69 beds if ambulatory, long-term care, or home care are included.[112,113]

The need for enhanced IPAC Program resources in US nursing homes, including staffing, post-pandemic has been identified.[113,114] Since 2022, legislated Long-Term Care (LTC) IPAC Standards in Ontario[106] required that the IPAC Lead works regularly in that position on site for at least the following minimum hours:

- For LTC homes with a licensed bed capacity of 69 beds or fewer (smaller homes), at least 17.5 hours per week.
- For homes with a licensed bed capacity of more than 69 beds but less than 200 beds, at least 26.25 hours per week.
- For homes with a licensed bed capacity of 200 beds or more, at least 35 hours per week. (s.102(15) of the Regulation).
- 1.0 FTE ICP per 150-200 beds in other organizations depending on acuity levels.

The organization ensures that new ICPs are enrolled in an IPAC training program (minimum 80 hours) within the first six months of entering the profession[66] (e.g., those provided or endorsed by IPAC Canada) and are supported by an experienced ICP after hire. A preceptor is made immediately available to a new ICP when the individual has no previous IPAC experience. Once initial orientation is completed, an ICP continues to increase competency,[115] and should seek a mentor. It takes an estimated minimum of five years to become an expert/fully competent in a particular area of health care.[116] ICPs are encouraged to join their professional association (i.e., IPAC Canada and local chapter). It is an expectation that the ICP continues to seek opportunities for education to enhance knowledge and further develop skills related to the IPAC Program competencies in:[115,117]

- Education
- Infectious diseases and microbiology
- Routine Practices and Additional Precautions
- Surveillance and epidemiology

- Research Utilization
- Healthcare facility design, construction, renovation, and maintenance
- Occupational Health and Safety
- Outbreak management and infectious disease threats
- Quality improvement and patient safety
- Cleaning and disinfection
- Reprocessing of medical devices
- Communication
- Leadership
- Program and project management
- Professionalism
- Diversity, Equity, and Inclusion
- Asepsis
- Product evaluation
- Information technology and data management
- Program administration, where relevant[114]
- Legislative issues/policymaking
- Antimicrobial stewardship

IPAC Canada endorses as a core requirement for the position of ICP the achievement and maintenance of certification in infection prevention and control (CIC® or LTC-CIP, depending on setting) from the Certification Board of Infection Control and Epidemiology Inc. (CBIC). Certification signifies that the specialized body of knowledge required for competent performance of current IPAC practice has been attained and maintained. An ICP prepares for certification through a combination of IPAC Canada endorsed course(s), on the job mentoring and life-long learning. The CIC® should be completed between 2-5 years of assuming the roles and responsibilities of infection prevention and control.[118]

The LTC organization has at least one ICP who holds certification (Certified in Infection Control (CIC®) or LTC-CIP), or who will obtain certification when eligible, depending on the acuity of the facility.[66, 118] Education is provided that will enable new ICPs to obtain and maintain certification.[66] *Also see Education*

Continuing Education Requirements

The organization ensures that ICPs maintain their knowledge and skills through continuing education relevant to their professional practice and re-certification in infection control every five years.[66]

ICPs remain current on IPAC best practices through evidence-based research, consensus, and review of established guidelines, and incorporation of published research findings into practice, education and/or consultation.[66,115]

IPAC training resources are reviewed on a regular basis to ensure consistency with established evidence and with professional and occupational standards.[99]

See also Professional Development

STANDARD 23	**The organization shall dedicate and protect ICP hours for the IPAC Program appropriate to the acuity and volume of care.**

STANDARD 24	**ICPs shall be supported to achieve and maintain competency in IPAC practice.**

STANDARD 25	**ICPs shall be certified in infection prevention and control when eligible and maintain certification while functioning as an ICP.**

IPAC Physician

The organization has access to a qualified IPAC physician who has knowledge, expertise, and training in IPAC Program elements,[64,66] and dedicated time to achieve defined objectives in this role.[80] Depending on the organization's size and patient acuity, the IPAC Physician may be onsite, accessible via consultation, or accessed through a local hospital.

In acute care settings, a dedicated in-house or contract IPAC physician supports the IPAC Program and engages the medical community in IPAC Program activities.[32,106] In smaller hospitals and nursing homes, or in remote or isolated communities, the local Medical Officer of Health may act as the IPAC physician resource to the IPAC Program.

IPAC Epidemiologist

Access to an epidemiologist is beneficial to assist with data analysis and management. In smaller or non-acute organizations, this may be provided through the local public health unit.

STANDARD 26	**The organization shall have access to a qualified IPAC physician to provide input into the IPAC Program.**

2.2.5.4 Intellectual/Technical Requirements

The organization ensures the availability of key resources to support the IPAC Program as required by legislation, best practices, and the organization's strategic plan.[64,66] Ready access to the organization's data systems is essential to support key IPAC Program functions, such as surveillance and outbreak investigation. IPAC staff receive required training and support when new electronic equipment and/or software programs are installed.

Information Retrieval (information coming in)

Sources of information retrieval for IPAC Program purposes include:

- ready access to demographic data from information systems (e.g., electronic patient record, laboratory results, pharmacy systems);
- standards, guidelines, and best practices necessary to develop the IPAC program manual and other policies, procedures, and protocols; and
- linkages to other organizational plans, such as the strategic, business or quality plans.66

Information Analysis (information handling)

Data are analyzed and the results used to inform decision-making and meet program objectives. [66]

IPAC staff use analyzed data and retrieved information to inform IPAC processes and practice, education, and training and to engage the support of patients and the public for IPAC activities (e.g., published hand hygiene compliance rates).

Information Dissemination (information going out)

The IPAC team communicates with colleagues and external groups for information-sharing, professional support, and direction, and therefore requires access to communication equipment (e.g., intranet, internet, teleconferencing, videoconferencing) on-site.

Data are disseminated, following privacy and copyright requirements, with appropriate permissions, and preserving confidentiality.[66]

Resources to ensure that the intellectual requirements of the IPAC Program are met include access to:

- computer and internet;
- current relevant standards, guidelines, best practices, and legislation to develop the IPAC Program manual and other policies, procedures, and protocols;[64,66]
- the patient record (preferably electronic) with the ability to "flag" records when patients need to be followed up on subsequent visits;
- electronic laboratory, pharmacy, and surgery records;

- a means to analyze IPAC Program activity data (e.g., for surveillance and outbreak analysis);
- electronic communication for group discussion and collaboration (e.g., email, webinars, online training, document viewing and sharing, teleconferencing and/or videoconferencing); and
- competent information technology (IT) staff to maintain equipment.

STANDARD 27	**IPAC staff shall have access to required intellectual resources.**

STANDARD 28	**IPAC staff shall be equipped with current electronic tools to support the Program and collaborate with partners.**

STANDARD 29	**IPAC staff shall have electronic access to internal and external communication resources for the purpose of collaboration and education.**

3 IPAC Program Linkages: Scope

The scope of the IPAC Program is the breadth of the program and the extent of the target population or relevant parties impacted on or by the IPAC Program.

3.1 IPAC Program Impact, Collaboration, and Engagement

3.1.1 IPAC Program Relevant Parties

The IPAC Program must address relevant parties' requirements, to determine how best to meet their IPAC needs.[66]

There is a process to identify, assess and evaluate the IPAC Program needs both inside and outside of the healthcare organization. Written policies, procedures, and protocols (PP&P) are developed with input from internal and external relevant parties and may be used to guide the work of the IPAC Program.[98,99]

Internal relevant parties include healthcare workers, patients and others who function within the healthcare organization. Assessing internal relevant parties' needs might take the form of pre- and post-test questions, questionnaires, or surveys,[119] results of environmental scans, or pilot studies and reviews to identify engagement strategies.[120,121]

A healthcare organization's IPAC Program also influences external healthcare agencies and organizations such as pre-hospital, ambulatory clinics, public health units, hospitals, long-term care homes, physician offices and/or home health care. In these environments, periodic practice audits (e.g., telephone/email surveys) and evaluation may be useful to address and assess IPAC knowledge, practices, and compliance with best practice recommendations within the community.[122]

IPAC Program relevant party needs are reassessed according to jurisdictional requirements or periodically as determined with their agreement. Continuous feedback, communication, and a system to measure improvement and/or gaps are important to ensure that the IPAC Program is meeting its goals, establishing effective relationships, and satisfying relevant parties' needs.[123]

There is a process to provide feedback to the relevant parties within the organization. This may be done through formal means, such as reports from audits and outbreaks, or through accessible informal bulletins, such as newsletters and/or through the organization's intranet.

STANDARD 30	**The IPAC needs of internal and external relevant parties are identified, assessed, evaluated, and reassessed on a regular basis.**

3.1.2 IPAC Program Liaison and Collaboration

The IPAC Program has a relationship to all other departments within the organization and there is a communications process for internal and external communications (e.g., to public health) on IPAC issues and other relevant health information.[64]

There is clear communication within the organization about HAIs, communicable diseases, and infections circulating in the community, and how to reduce harm from infections.[64,99] Coordinated local/regional/provincial/territorial/national approaches to IPAC issues support standardization of processes and allow comparison of outcomes, validation of methodologies and benchmarking.[122] The organization's IPAC Program serves as an important link in local/regional/provincial/territorial systems.[124]

IPAC Program issues are incorporated as a standing agenda item for other committees[66] and there is mutual benefit having an ICP participate in the other department's committees, and vice versa. Multidisciplinary departmental teams, within the healthcare organization may benefit from an ICP on the team for improved communication, input into the decision-making process and reinforcement of IPAC Program strategies and initiatives.[81,126] Complex decisions related to IPAC resources and actions may be assisted through the use of an Ethical Infection Prevention and Control Decision Making Framework.[127] [Ethical Infection Prevention and Control (EIPAC) Decision-Making Framework (ipac-canada.org)]

Healthcare organizations have established procedures for receiving and responding to all international, national, provincial/territorial, regional and local health notices. Important health notices are communicated promptly within the organization should follow-up be required.

STANDARD 31	**The IPAC Program shall collaborate and liaise with internal and external program relevant parties.**

STANDARD 32	**The IPAC Program use an ethical framework to guide complex decision-making.**

STANDARD 33	**The IPAC Program shall have a communications process to disseminate timely and/or critical IPAC information to internal and external program relevant parties.**

3.2 Guidelines: IPAC Program Policies, Procedures, and Protocols

General Principles for Development and Maintenance of IPAC Program Policies, Procedures, and Protocols (PP&P)

The organization maintains IPAC Program PP&P that are based on local / provincial / territorial / national regulations, evidence, and best practices in accordance with organizational priorities and risk assessment data.[64] Risk assessments are completed in collaboration with IPAC staff and other departments.

The IPAC team works in partnership with others to develop IPAC Program PP&P that are:[64,66,128]

- clear and concise;
- relevant to the organization;
- practical to implement;
- accessible to all staff; and
- written with input from staff, patients, and families, when appropriate.

PP&P are evidence-based,[64,66] and consistent with:

- regulatory and legal requirements;
- national and provincial standards, guidelines, and best practices;
- evidence from the scientific literature;
- principles of stewardship;[5]
- results from the organization's own surveillance, internal audits, and investigation reports.

To maintain currency and relevancy, IPAC Program PP&Ps are reviewed, evaluated, and updated regularly,[1,33,64,66,128,129] as required by the organization and accrediting bodies. The evaluation includes assessing the effectiveness of existing protocols to identify areas for improvement.[128,129] Any changes to local/ provincial/territorial regulations, evidence and best practices are also incorporated into PP&P updates.[64]

Staff, service providers and volunteers know where to find and have access to IPAC Program PP&P.[64,66] Compliance is monitored and improvements are made based on the results of performance audits.[1,64,66] This process includes a

mechanism for staff, volunteers, patients and families to report non-compliance,[64] and process audits of staff compliance (see section 2.3, *Surveillance*). IPAC Canada has developed audit tools, available on the IPAC Canada website (https://ipac-canada.org/tools).

PP&P are linked to educational programs and action plans for implementation.[66] The IPAC Program staff provides expert advisory support for IPAC protocol implementation,[128] and works in partnership with others to educate staff and others, when necessary.[66,128]

STANDARD 34	**The organization shall have IPAC Program policies, procedures, and protocols that are current, based on local/provincial/territorial regulations, evidence, and best practices, including resource stewardship, in accordance with the organization's priorities, and accessible to all persons who work within the organization.**

STANDARD 35	**IPAC Program policies, procedures, and protocols are linked to educational programs with action plans and clearly defined accountability for implementation and sustainability.**

3.2.1 Departmental Policies, Procedures, and Protocols (PP&P)

IPAC staff may provide expert input towards the development of departmental policies, procedures, and protocols.[128,129] The IPAC Program is consulted and provides input when any department is developing protocols that have implications for the IPAC Program. In addition to OHS protocols and procedures that pertain to IPAC-related subjects (e.g., sharps safety, use of personal protective equipment, immunization), other departmental protocols and procedures that require IPAC staff input include, but are not limited to:[66]

- environmental cleaning and disinfection;
- HVAC (heating, ventilation, and air conditioning systems);
- purchasing and procurement of equipment and supplies;
- cleaning, disinfection, and sterilization of medical devices;
- laundry and waste handling;
- dietary and food handling.
- facility construction, maintenance, renovation, and design; and
- contractor agreements.

Where services are contracted to an external provider, the organization has a process to define their role and responsibilities in relation to IPAC issues to ensure that organizational standards are being met and PP&Ps are followed.[64]

Involving IPAC staff at all stages including tendering and contract development, will assist in identifying and mitigating IPAC risks.

See relevant appendix for details related to:

A. The Healthcare Environment
B. Medical Equipment
C. Cleaning, Disinfection and Sterilization of Medical Devices
D. Laundry
E. Dietary / Food Services
F. Materials Management/Product Evaluation
G. Facility Design, Construction and Maintenance

STANDARD 36	**The organization's services/clinics/departmental policies, procedures, and protocols shall include IPAC staff input and interventions to prevent and control IPAC risks.**

3.3 Role of Occupational Health in the IPAC Program

The Occupational Health and Safety (OHS) Program places emphasis on preventing blood borne infections, tuberculosis, vaccine-preventable diseases, and acute respiratory and gastrointestinal infections in staff.[99] A proactive and accessible OHS Program or access to trained occupational health providers with a high level of competence in all areas related to the IPAC Program helps to ensure the welfare of staff (including contract workers and volunteers). In some organizations such as community level facilities, this may include referring health issues to local public health, family physicians, or emergency departments. The organization shall ensure both IPAC and OHS Programs are in place and collaborate.

3.3.1 Relationship Between IPAC and OHS Programs

The IPAC Program, in conjunction with the organization's Senior Leadership/Board, supports a healthy and safe work environment clearly outlining the organization's IPAC strategic priority and how a safe work environment can be achieved.

The Senior Leadership/Board is updated on IPAC-related healthy and safe work environment priorities and progress toward achieving and aligning with the organizational priorities.[64]

There is IPAC Program representation on the Joint Health and Safety Committee and IPAC issues affecting OHS are included on the committee's agenda.[66] IPAC staff may act as an expert resource in response to incidents, complaints, and claims. Conversely, there is OHS representation on IPAC committees.

STANDARD 37	**The healthcare organization's leaders shall provide support for IPAC- related health and safety requirements as a strategic priority within the organization and ensure that IPAC Program policies, procedures, and protocols are incorporated in the work environment.**

3.3.2 OHS Policies and Procedures Relating to the IPAC Program

The OHS and IPAC Programs work collaboratively to develop policies, procedures, and protocols for healthcare staff such as placement evaluations, healthy workplace programs, immunization programs and exposure follow-up protocols.[33,66,130]

The organization's leaders ensure that the OHS Program has current health and safety protocols and procedures for staff, including contracted staff and volunteers.[66] An organizational risk assessment is used to formulate strategies to reduce IPAC-related issues to staff, considering relevant legislation and published guidelines.

OHS Program procedures and protocols that incorporate IPAC Program components include:

- assessment of disease communicability among staff, including an immunization program;
- management of healthcare workers who have been exposed to infectious diseases, including post-exposure prophylaxis, attendance management protocols and indications for work restrictions;
- safe handling of sharps and biohazardous materials;
- education and training in Routine Practices and Additional Precautions, in particular the correct use of PPE, including a respiratory protection program; and
- implementation of a hand care program.

STANDARD 38	**Health and safety protocols relating to the IPAC Program comply with relevant OHS legislation, and IPAC standards, guidelines, and best practices.**

STANDARD 39	**The IPAC component of the OHS Program shall be developed jointly by OHS and IPAC staff. If OHS and IPAC are not separate, the organization will ensure both elements are resourced.**

3.3.3 IPAC Components of Staff and Job Risk Assessment

There is a process in place to identify IPAC risks associated with employment in a healthcare organization. The organization evaluates workplace IPAC risks (e.g., related to ventilation, sharps containers and hand hygiene equipment) and implements engineering controls, where possible, to safeguard staff. The healthcare worker evaluates IPAC risks related to the tasks they will be performing and takes steps to reduce or eliminate the risk (e.g., point of care risk assessment, putting on PPE, obtaining immunizations, teaching respiratory etiquette to patients).

At the time of initial employment, all staff are evaluated by OHS for conditions relating to communicable diseases that can be spread and/or acquired in the organization.[64,66] This includes vaccination status, assessment for latent or active tuberculosis and serologic screening for vaccine-preventable diseases, as indicated.[66]

STANDARD 40	**There shall be an OHS process for evaluating healthcare workers for communicable diseases at hire, following exposure and additionally as required.**

STANDARD 41	**There shall be an OHS process to evaluate potential IPAC risks to staff in the workplace and to ensure that controls are in place to manage the risk(s).**

3.3.3.1 Immunization

All healthcare organizations have an immunization program in place to screen and facilitate vaccinations for staff and physicians, to protect them from occupationally relevant communicable diseases.[64] Volunteers, contracted staff, essential caregivers, and others may also be supported. Immunization programs follow provincial and federal guidelines, such as those produced by the National Advisory Committee on Immunization (NACI).[131]

Information on healthcare worker vaccination status is accessible and kept in a secure, confidential electronic database. Adequate resources to implement a vaccine-preventable disease program (e.g., annual influenza and COVID-19 and others as may arise) is in place. In some jurisdictions, up to date vaccination is a condition of continued employment in, or appointment to, the healthcare organization,[65] and a requirement to work in some outbreak settings.[132]

STANDARD 42	**There shall be an OHS vaccination policy, procedure, and protocol, for healthcare workers, which includes a means to maintain documentation of immune status and immunization history.**

3.3.3.2 Attendance Management Policies

The healthcare organization establishes a clear expectation that staff do not come into work when ill (presenteeism), supported with attendance management protocols.[64,66]

Work restrictions prevent staff with communicable infections from coming into direct contact with coworkers, patients, food or sterile supplies, devices, and equipment. They include limiting duties and responsibilities and taking precautions, such as wearing PPE for source control.

The organization has work restrictions and return to work policies for staff, service providers, volunteers or students with transmissible infections that follow national, provincial/territorial and OHS guidelines.[64]

STANDARD 43	**There shall be an OHS policy, to prevent staff from working while ill with a communicable disease.**

3.3.3.3 Response and Investigation of IPAC-related Injuries and Exposures

OHS PP&P address post-exposure follow-up and prophylaxis,[66] using a framework developed for the response and investigation of IPAC-related injuries (e.g., needle sticks, blood and body fluid exposures and other lapses of practice resulting in exposure to infectious agents), and include counselling, follow-up, and work modification.

There is a close liaison between IPAC and OHS staff to ensure proper exposure and outbreak management, including staff contact tracing.[66]

In smaller organizations, all or part of the OHS Program may be outsourced.

STANDARD 44	**The healthcare organization shall provide counselling, follow-up and work restriction recommendations for IPAC-related injuries/illnesses resulting from exposure to infectious agents.**

3.3.3.4 Handling of Sharps and Biohazardous Materials

The organization follows its policies, procedures, and protocols and legal requirements when handling biohazardous materials.64 The Transportation of Dangerous Goods Act, 1992 regulates the movement of biohazardous materials in Canada.133 The Canadian Standards Association (CSA)'s Handling of Waste Materials within Health Care Facilities134 provides guidance for waste management of biohazardous materials. Most provinces/territories and some municipalities also have their own regulatory framework for handling and transporting garbage and biohazardous materials.

Contaminated sharps pose the most significant risk of bloodborne infection to workers. Policies which support prevention and management of these injuries are implemented in all healthcare organizations.64,66,135,136 Sharps are discarded at the point-of-use in appropriate puncture-resistant sharps containers.[64]

Use of safety-engineered devices for sharps and other high-risk materials[64] is a legislated requirement.[135]

STANDARD 45	**There shall be an OHS sharps injury prevention program in place.**

3.3.3.5 Personal Protective Equipment (PPE)

The organization provides PPE that is readily available, easily accessible, and appropriate to the task/risk.136

The organization provides healthcare worker training on how to select PPE based on point-of-care risk assessment (PCRA), including the type of exposure anticipated, and appropriateness to the task and fit.136

Healthcare organizations have written PP&P for putting on (donning) and taking off (doffing) PPE, in a safe manner that prevents contamination. Staff are trained on appropriate PPE selection, use, removal, and disposal.64,135,136

Staff who are required to wear a respirator participate in a respiratory protection program at least every two years.[66] A respiratory protection program includes:[137]

- a health assessment;
- respirator fit-testing, according to CSA standards; and
- training in the use, maintenance, and care of a respirator.

STANDARD 46	**Personal protective equipment (PPE) shall be readily available and easily accessible.**

STANDARD 47	**The healthcare organization shall provide training in the appropriate selection, use, removal, and disposal of PPE.**

STANDARD 48	**There shall be a respiratory protection program.**

4 Education and Training

4.1 IPAC Culture of Learning in the Organization

The organization promotes a culture of learning that ensures staff have time to participate in IPAC training and education.[66,129] An organization is fulfilling its work-life strategies (*see section 1.6*) when resources are provided for staff to do their jobs and continued competence is supported through education.[64] Following recommended IPAC protocols and best practices enhances staff pride in practicing good IPAC as part of their daily routine.[136] The WHO identifies training (skills and curriculum) of IPAC professionals and healthcare workers as a priority.[77]

For more information regarding ICP education, see section 4.3.1.1.

STANDARD 49	**There shall be a culture of learning that supports IPAC education for all staff, physicians, and volunteers.**

4.2 IPAC Program Champions and Role Models

Staff compliance is significantly influenced by the behavior of other healthcare workers, such as champions and role models[138-140] including medical staff. Champions take personal responsibility for modelling best practices and hold others accountable as part of an organization's internal responsibility system.[66] Specific key champions are used, depending on the nature and location of the initiative (e.g., hospital unit, department, long-term care floor, community facilities, etc.)[141]

Communication can be effective in changing behavior,[142,143] as demonstrated in recent years with promotion of hand hygiene by champions and role models[144-149] within healthcare organizations, which has been shown to positively impact staff motivation and may reduce infection rates.[146,148,150] Sustained improvement in practices and subsequent significant reduction in HAIs have also been reported.[151]

STANDARD 50	**IPAC shall be promoted through the engagement of staff, physicians, volunteers, champions, and role models.**

4.3 IPAC Education

IPAC education and training are provided for all healthcare workers within the organization to promote and enhance a culture of safety.

Educational priorities include:

- improvement of job skills and competence;
- solution-based response to emerging issues in the field;
- alignment with administrative and financial goals, productivity, and the need to benchmark against the best professional practices;
- needs assessments or performance improvement studies to identify deficiencies in knowledge, skills, or attitude as the basis for educational program development;
- development of a well-defined plan for each learning experience that includes goals, objectives, and appropriate teaching methods; and
- links to the organization's vision, mission, values, and processes.[152]

4.3.1 IPAC Education for Staff in the Organization

The organization's multi-faceted approach to the IPAC Program includes an education program tailored to its priorities, such as staff orientation, role-specific training, outbreak management, plus additional sessions as required,[64,143] directed to all who work within the organization.[63] 6here must be allocated time provided for all employees to complete their IPAC education.

IPAC educational programs meet the needs of the target audience,[66] are tailored to role-related competencies,[115] and are sufficiently flexible to provide learning experiences for people with a wide range of educational backgrounds,[66,130] and roles.[152]

STANDARD 51	**An IPAC education program shall be provided at minimum for orientation, annually, and regularly as required, for all within the organization.**

4.3.1.1 IPAC Educational Program Content

The content of the IPAC education program varies and is determined by the needs of the individuals within the organization, the scope of services provided, and include the IPAC Program goals and objectives. Topics such as IPAC Program PP&P, IPAC core competencies for healthcare providers, and common HAIs affecting the organization shall be included.[64] The IPAC Program also works with local health partners (e.g., public health) to include lessons learned

from the management of outbreaks and IPAC incidents in the education program content.[129]

As a minimum, the IPAC education program includes:[152]

- critical IPAC assessment skills / risk assessment;
- IPAC core competencies, based on role;[151,153,154]
- chain of infection and routes of transmission;
- Routine Practices and Additional Precautions, including:[64,136]
  - hand hygiene for everyone within the organization;
  - use of PPE;
  - safe management of sharps;
  - environmental cleaning;
  - equipment cleaning and disinfection/sterilization;
- how and when to report IPAC-related incidents, including exposures and patient-related issues;
- healthcare worker immunization;
- work restrictions due to infectious diseases;
- information on commonly encountered infections within the organization; and
- how to access IPAC resources.

STANDARD 52	**An IPAC education program shall meet the priorities of the healthcare organization.**

STANDARD 53	**IPAC education programs shall include IPAC core competencies based on roles and responsibilities of those within the organization.**

4.3.1.2 IPAC Educational Program Development

The IPAC team actively participates in development, coordination, and the delivery of IPAC training initiatives within the organization.[33,64,66,68]

The organizational IPAC education plan is developed based on:[153,154]

- adult teaching-learning principles;[33,136,155]
- assessing learner needs;
- setting clear goals and measurable objectives;

- considering setting, content, format, teaching materials;
- establishing a climate conducive to learning;
- preparing an evaluation; and
- implementing, evaluating, and annually reviewing/revising the program.

The teaching methods used are sensitive to language, cultural background, and educational level/literacy, and include diversity, equity, and inclusion (DEI).[66] Educational materials are standardized to ensure ease of use and consistency.[142] A variety of teaching methods are utilized, relevant to content, learner needs, and desired outcomes.

STANDARD 54	**IPAC professionals shall participate in the development of the healthcare organization's IPAC educational programs using the principles of adult teaching and learning.**

4.3.2 IPAC Program Professional Development

ICPs lead the development of the knowledge, skills and practices required for an effective IPAC Program.[68,121]

ICPs:

- collaborate to embed the IPAC Program culture within the workforce;
- have a health sciences background with teaching, problem-solving, communication and analytical skills that will allow them to plan, implement and evaluate their programs; and
- consistently utilize learning and development opportunities and solutions to improve the IPAC Program.[66,66,115]

Continuing professional development and learning for ICPs is supported by the organization.[66,121] The WHO identifies training (skills and curriculum) of IPAC professionals as a priority.[61,77] Specialized ICP training needs are developed and provided as required.[61,77]

Education and training for ICPs is based on IPAC Canada's Core Competencies[115] and includes:

- basic IPAC education from a recognized course (e.g., IPAC courses endorsed by IPAC Canada);
- IPAC training specific to the practice environment (e.g., acute care, LTC, public health, dentistry);
- ongoing professional IPAC development through formal continuing education, attendance at professional meetings, workshops, and seminars;
- access to current IPAC literature, textbooks, journals, and the internet; and

- networking resources and opportunities with peers in the field of IPAC.[66,115]

The healthcare organization encourages and supports specialized certification in infection control (CIC® or LTC-CIP® depending on setting) once the minimum requirements for certification have been met. While there are no minimal requirements for Associate – Infection Prevention and Control (a-IPC), novice ICPs and those interested in pursuing IPAC careers may find it valuable. Preparing for certification and recertification fosters ongoing learning and maintenance of competence. Certification is maintained as part of the ICP's professional standards.[66,115,118]

STANDARD 55	**The healthcare organization shall support continuing professional development and provide resources for continuing learning for infection control professionals.**

4.3.3 IPAC Education for Patients, Caregivers, and Visitors

Prevention of HAI requires that patients have access to up-to date, accurate information about HAIs provided in a suitable format.[129] ICPs work in conjunction with staff to have access to relevant patient information resources and current local surveillance information so they can communicate about HAIs effectively.[1] ICPs may assist staff in the education of patients and visitors through developing and/or reviewing educational materials, such as information sheets pertaining to HAIs and other infections, and their prevention (e.g., hand hygiene).[152] Patient information is based on the principles of health literacy and learning,[154-157] and considers DEI principles.

STANDARD 56	**The healthcare organization shall provide relevant information about minimizing infection risks to patients, caregivers, and visitors.**

4.4 Evaluation of IPAC Education

IPAC education is based on a continuous quality improvement cycle (plan-do-study-act) and program adjustments are made and communicated, based on the findings, including:

- feedback on all components (e.g., post-education evaluations, tests, teacher evaluation);[158]
- results of process compliance audits of practices (e.g., return demonstration);

- behavioural change; and
- impact on adverse events such as HAIs on these results;[64]

Ongoing monitoring of care practices is required to identify areas of continued concern and to assess the effectiveness of educational intervention,[33] and IPAC-related incident investigations (e.g., blood and body fluid exposures) may be used to inform IPAC education.

Training materials are reviewed regularly to ensure consistency with current guidelines and best practices.[129] Feedback on education information and materials is obtained from users (including patients) and used to revise those materials or produce new materials.[143]

Processes have been put in place to learn from experiences outside the organization in relation to the IPAC Program.[129]

STANDARD 57	**IPAC education shall be evaluated regularly, and the education program revised accordingly.**

5 Surveillance: The IPAC Surveillance Program

5.1 The Role of Surveillance and Epidemiology in Reducing HAIs

The collection, analysis and dissemination of surveillance data have been shown to be important factors in the prevention of HAIs.[36,159] IPAC surveillance systems routinely gather data on targeted infections of relevance within the organization in order to monitor the effectiveness of IPAC strategies that are consistent with the organization's goals and objectives and to inform the organization's response to HAIs[66,99,159] Organizational HAI rates can be significantly reduced by appropriate intervention methods. Prompt feedback to HCWs and facility management enhances timely action for quality improvement.[159] For example, feedback of infection rates to surgeons is an essential surveillance component to reduce surgical site infection and antimicrobial use.[160] Infection rates are key indicators of patient outcomes to report to senior management/Boards, funders, and governments.[95,159]

The success of an IPAC Program is reflected by the organization's effectiveness in surveillance and preventing or limiting the spread of HAIs.[99]

The surveillance program focuses on local epidemiology and the specific infection risks within the organization.

STANDARD 58	**The healthcare organization shall have an IPAC surveillance program that addresses the organization's population at risk.**

5.2 Implementing an IPAC Surveillance Program

An active, ongoing, resourced IPAC surveillance program to monitor HAIs that meets regulations, mandatory reporting requirements, evidence and best practices is an organizational priority.[64,99] The surveillance program is managed by trained IPAC staff with allocated time for surveillance activities.[66,159] The surveillance program is based on the population(s) served, services provided and previous surveillance data.

The IPAC surveillance program protocols and procedures include:[99]

- specific, locally defined objectives for surveillance;1
- recognized, standardized and written case definitions for indicators (numerator); 1,63,65,121
- identification and description of sources of data;66

- identification and description of population at risk (denominator);66
- processes for data cleaning and analysis, including calculation of rates;
- reporting mechanisms;
- benchmarks used for comparison;66
- strategies for identifying and addressing deficiencies; and
- processes to evaluate the program.

The incidence of HAIs in non-acute settings should be regularly monitored. The type and scope of surveillance will be determined by the type of services being provided and the associated risk to patients.[159]

In the community, surveillance can be a challenge. Community services may be called on to extend hospital-based programs, such as surveillance for post-operative infections in patients discharged home. Infections related to procedures carried out in community clinics and home care, such as intravenous cannulation, urinary catheter insertion, and dental treatment, as well as any occupational exposures to blood and/or body fluids should be monitored and reported to the relevant authorities (e.g., healthcare provider organization, public health unit).[159]

STANDARD 59	**The surveillance program shall be adequately resourced and managed by trained staff with dedicated time and tools to carry out the program.**

5.3 Outcome Surveillance

Outcome surveillance is surveillance used to measure key patient outcomes that can be attributed to care in a healthcare organization.[159]

The goals of IPAC 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.[64] HAI indicators are provided to the healthcare organization's Board/governing body/senior leadership.

Outcome surveillance includes:

- determining measurable outcome indicators to be tracked, which may include infection rates and associated mortality rates;[64]
- using standardized case definitions for infections;
- determining sources of infection data;
- identifying the population at risk for the specific outcome;

- conducting appropriate statistical analysis; and
- interpreting results.

Indicators for Infection

When planning outcome surveillance, a healthcare organization assesses the types of patients that it serves, the key medical interventions and procedures that they undergo and the types of infections for which they are most at risk. This assessment is done to establish priorities for the surveillance system.[159] The most important infections are prioritized to be included in the surveillance system.

Considerations when choosing indicators for infection include:[64,66,159]

- reportable diseases/diseases of public health significance – these are legislated requirements of all healthcare organizations;
- mandatory reporting - the healthcare organization may be mandated to monitor specific infections to comply with provincial/territorial reporting requirements;
- accreditation review – tracking and trending some infections may be a requirement of accreditation;
- AROs such as Methicillin resistant *Staphylococcus aureus* (MRSA), Vancomycin resistant enterococcus (VRE), Carbapenamase-producing Enterobacteriaceae (CPE), and Candida auris (*C. auris);*
- HAIs important by virtue of their frequency, communicability, preventability and/or system impact (e.g., CDI, device-related infections, procedure-related infections, seasonal influenza, COVID-19, noroviruses, urinary tract infections and soft tissue infections in long-term care); and
- syndromic surveillance indicators - for respiratory infections and gastroenteritis is required by all hospitals and some congregate living settings in some provinces,[159] with the added benefit of detecting HAIs (e.g., CDI), outbreaks, and sentinel events.

STANDARD 60	**The healthcare organization shall track targeted outcome indicators of significance to the organization's services. Legislated requirements shall be fulfilled.**

Data collection

Data collection methods are in place to provide the surveillance program with reliable information on HAIs in the healthcare organization. Important sources of infection data include:

- access to an accredited microbiology laboratory that reports all significant isolates to IPAC staff in a convenient and accessible format and timely

laboratory analyses, including quick turnaround time for high-risk microorganisms such as *C. difficile*;[64]

- staff, service providers and discharged patients report HAIs (e.g., surgical site infections) to the IPAC team;[64]
- other areas or departments provide data and/or clinical indicators for surveillance, including access to computerized databases66 (e.g., pharmacy data, operating room records); and
- admission data identify patients admitted with communicable diseases, patients flagged with AROs, and readmissions for post-surgical/ post-procedural infections.

STANDARD 61	**The healthcare organization shall use data collection methods to promptly detect HAI trends.**

Definitions of Infection

In order to compare infection rates, both within a healthcare organization and against external benchmarks, standardized definitions for infections are used.[61,63,157] For example:

- Canadian Nosocomial Infection Surveillance Program (CNISP) definitions for HAIs currently under surveillance across Canada.[161]
- National Healthcare Safety Network (NHSN) system in the U.S., when CNISP definitions are lacking.[162]
- IPAC Canada's Surveillance Definitions of Infections in Canadian Long Term Care Homes.[163]
- Partners for Appropriate Community Therapy (PAACT) for community-based infections.[164]

STANDARD 62	**Standardized definitions for HAIs shall be used for internal outcome surveillance and for comparisons with internal trends and external benchmarks.**

5.4 Process Surveillance

Process surveillance is an audit of practice done to verify that procedures and/or standards of practice are being followed and to build an action plan to improve practice.[66] The advantages of process surveillance are that it is more sensitive to differences in the quality of care, and it is a direct measure of quality.[165]

The audit process is an ongoing cycle that bridges the gap between policy and practice. Stages in this process include setting standards, testing practice against these standards, providing results and constructive feedback to those audited, correcting practice when deficits are noted and re-auditing to ensure that the standards are met.[64]

The healthcare organization identifies which performance measures to monitor based on its IPAC Program priorities, health outcomes, and risks.[64] For example, if the results of outcome surveillance suggested an increased number of HAIs in a given area, increased auditing of IPAC practices such as hand hygiene would be indicated.

IPAC Canada has developed extensive audit tools to monitor practice in various settings. The IPAC Canada *Audit Toolkit* is available from IPAC Canada for members at: https://ipac-canada.org/tools.

STANDARD 63	**The healthcare organization shall follow targeted process indicators of significance to the organization. Legislated requirements shall be fulfilled.**

5.5 Analysis and Benchmarking

Results of process and outcome surveillance are collated, analyzed, and reported in a timely manner.[66,125] IPAC staff apply epidemiologic principles and statistical methods to identify target populations, analyze trends and risk factors and design and evaluate prevention and control strategies.[159] A plan for improvements, including organizational accountability, is developed by the targeted area in conjunction with the IPAC team, based on the results of surveillance.[66]

Effective analysis of surveillance data includes

- describing data in terms of person, place, and time;
- calculating risk-adjusted infection rates (e.g., surgical site infection rates based on surgical class);[160]
- benchmarking infection rates against historical internal data as well as external benchmarks, where available;[161]
- investigating the source or cause of the HAI using epidemiological, root-cause, or statistical analysis;[64]
- consulting with other experts, including infectious diseases physicians, medical microbiologists, nurses, public health, or other professionals;[64]
- critically evaluating the significance of findings and making recommendations for improvement based on those findings.[68,115]

- External benchmarks are available through reports such as:
  - Ontario Health[166]
  - National: Healthcare Acquired Infections Currently Under Surveillance[167]
  - International: U.S. National Healthcare Safety Network (NHSN) reports[168]
  - Health InfoBase:[169] The most up to date Canadian dataset for benchmarking ARO, CDI and VRI HAIs in adult/pediatric settings as well as geographic distribution across Canada: https://health-infobase.canada.ca/cnisp/index.html

Electronic surveillance programs are available to assist with the collection, analysis, and dissemination of surveillance data.[170]

STANDARD 64	**The healthcare organization shall apply epidemiological principles to surveillance data to investigate the source/cause of HAIs, identify risk factors for infection, analyze trends, identify clusters and outbreaks, and make recommendations for improvement based on findings.**

5.6 Reporting IPAC Surveillance Results

The healthcare organization disseminates surveillance information in a regular and timely way (e.g., quarterly reports to all departments) in particular to those with the capacity to affect change (e.g., HCWs, managers/decision-makers).[64,159,171] Based on HAI tracking data, the organization determines what surveillance information is shared, in what format it is made available (e.g., printed reports, website posting), and who will receive the information (e.g., the governing body, senior management, staff, service providers). Certain HAIs must be reported to national and provincial/territorial public health agencies (e.g., reportable infections, mandatory provincial/territorial reporting).[64]

The organization shares trends in HAIs and significant findings with other organizations, public health agencies, and the community,[64] based on jurisdictional reporting requirements.

STANDARD 65	**The healthcare organization shall share surveillance information in a timely manner.**

6 Patient Flow

IPAC Program standards for the containment and control of transmissible infections are met regarding placement, accommodation, and flow of patients within the healthcare organization. IPAC staff are part of the multidisciplinary patient flow team, providing expert advice to inform action within the limits and constraints of the facility, including unusual contagious events that may impact patient flow (e.g., outbreaks).

Barriers to optimal patient flow include situations where the demand for services exceeds the organization's capacity to deliver those services, impairing seamless transitions through the continuum of patient care.[172] From an IPAC perspective, this might include situations where single rooms or dedicated washrooms/commodes are required to contain transmission of microorganisms, but are not available, resulting in delays in patient flow from Emergency Departments or admission to Long-Term Care or other congregate settings. IPAC staff collaborate with clinical staff and placement services to arrange for alternative accommodations, optimize cohorting and advise on interventions to reduce transmission in crowded spaces such as use of barriers, air flow, and HEPA-filter air cleaner units.[173]

IPAC staff work collaboratively with operational areas to support patient flow during outbreaks and infectious disease emergencies, such as epidemics.[64,66] Examples include:

- establishing priorities for single rooms;
- enhancing bed capacity by cohorting patients having the same microorganism;
- identification of alternative/unconventional spaces (within[174] and beyond[175] the building) to care for patients, and supporting initial and ongoing risk assessment, revision, and implementation of IPAC processes to ensure safe care;
- working with environmental services to improve bed and room-cleaning turnaround times;
- facilitating the transfer of information between departments or services; and
- liaising with community agencies to facilitate timely discharge/transfer of patients with infectious diseases.

STANDARD 66	**IPAC staff shall be involved in decision-making when patient placement, accommodation and flow is restricted by the presence of infectious disease.**

7 Outbreak Management

The healthcare organization has dedicated resources to manage an outbreak. An organizational risk assessment determines the IPAC Program needs related to outbreaks with infections that are spread by different routes (e.g., contact, droplet, airborne) and the capacity of the organization to implement the precautions required for each.[66]

Outbreaks or clusters of infection in community care organizations may be managed by public health authorities when required, including when the organization does not have sufficient trained internal resources.

7.1 Outbreak Policies, Procedures, and Protocols

There are protocols and procedures for detection of cases and clusters, identification of outbreaks and causative organism, investigation, immediate response, and ongoing control. Outbreak protocols are based on evidence-based best practices and are in line with applicable local, provincial/territorial and/or federal regulations. The organization's protocols and procedures address how to manage emerging, rare, or problematic organisms, including AROs, and food-borne outbreaks.[64]

STANDARD 67	**The healthcare organization shall have policies, procedures and protocols for outbreak detection, identification, investigation, response, and control.**

7.2 Identification of an Outbreak

An outbreak is an increase in the occurrence of a disease above the baseline or expected endemic level.[159] An outbreak may be one case of a rare occurrence (e.g., anthrax) or many cases of a more common disease (e.g., influenza) or colonization (e.g., MRSA). Early intervention to prevent and limit outbreaks will decrease transmission and impact healthcare and cost.[66]

Most outbreaks in healthcare organizations are detected through routine surveillance. Outbreaks of infectious diseases that are not included in routine surveillance are identified through other means, such as recognition of a cluster of similar infections by nursing / medical staff or through review of microbiology reports.[159]

The healthcare organization has a program with the capacity to identify the occurrence of clusters or outbreaks of infectious diseases in a timely manner.[33,64,106] The program includes:[66,153]

- ongoing surveillance on the incidence of HAIs to identify increases above baseline;
- mechanisms for clinical staff to report clusters or potential outbreaks to the IPAC Program;
- timely review of microbiology reports to identify unusual clusters or a greater than usual incidence of specific microorganisms; and
- prompt recognition of rare organisms (e.g., anthrax).

STANDARD 68	**The healthcare organization shall identify outbreaks of infectious diseases in a timely manner.**

7.3 Outbreak Response and Control

Infectious disease incidents and outbreaks are managed in hospitals and other healthcare and congregate living facilities by a multidisciplinary outbreak management team (OMT).[66,99,128] The OMT is convened by the IPAC Committee or the IPAC team investigating the outbreak, and are often guided by the local public health unit in non-acute settings.

Members of the OMT are chosen based on the nature and location of the outbreak, so that the appropriate departments and functions are represented.[66,128] At a minimum, the OMT includes representation from key relevant parties including the IPAC team, occupational health, nursing/patient care coordinator, environmental services, laboratory, pharmacy, joint health and safety chairpersons, administration and public relations.[66,106] Other members are added based on the location/setting, characteristics and implications of the outbreak.

The OMT has the authority to institute changes in practice or take other actions that are required to control the outbreak, including but not limited to:[66]

- relocating patients;
- cohorting patients and staff;
- restricting patient movement for essential purposes only
- restricting admissions and transfers;
- limiting visitors while supporting essential care providers;
- communicating urgent information;
- increasing environmental cleaning in the outbreak area;[64] and
- obtaining additional clinical specimens as required.

The management of an outbreak involves the IPAC team from the initial detection stage to the final reporting and evaluation stage. To investigate an outbreak fully and identify all possible cases as well as attempt to identify the source of the outbreak, IPAC staff have access to all necessary patient information, including medical, nursing, laboratory, and administrative records.[66]

ICPs may lead or be involved in any, or all, of the following:[128]

- analyzing the information available and seeking further evidence to establish its nature and scale, based on epidemiological principles;[64]
- informing and involving relevant colleagues and partner organizations in a timely manner;
- developing and delivering clear, accurate and timely messaging with colleagues, partner organizations and others, including patients and the public, throughout the outbreak;
- establishing agreement on the control measures to be taken to minimize exposure to hazards and to reduce risks and prevent further spread or exposures;
- application of the Precautionary Principle until more information is available;
- reviewing the availability of resources to implement the control measures throughout the outbreak;
- ensuring accurate records of the investigation and management of the outbreak are maintained throughout;
- providing education as required;
- reviewing the investigation and management of the outbreak and modifying measures as required; and
- evaluating the outbreak, making recommendations, and sharing them for future improvement.[64]

The roles and responsibilities of the IPAC team as well as other staff (e.g., nursing, environmental services) are clearly defined in outbreak policy, protocols, and procedures.[64] Protocols define what authority the ICP has during an outbreak, including measures such as closure of the affected unit.[66]

In an outbreak, the microbiology laboratory is capable of providing timely results to the OMT and, when necessary, has access to methods of assessing clonality (sameness) of organisms causing the outbreak.[66] An agreement is in place for referral to a larger reference laboratory should this become necessary.

STANDARD 69	**Outbreaks shall be managed by a multidisciplinary team that includes IPAC Program representation and organizational leadership.**

STANDARD 70	**ICPs shall be involved in the analysis and evaluation of outbreaks in the healthcare organization.**

STANDARD 71	**Access to timely microbiology laboratory reports shall be provided, especially during an outbreak.**

7.4 Communication and Collaboration During and Following an Outbreak

The healthcare organization has a policy and procedures/protocols for communication and reporting internally to staff and externally to other health agencies and the community during an outbreak.64 There is an individual identified as the communications source within the organization. Patients and families may be included in the communication.

Outbreak information is summarized, reviewed, and shared within the organization as soon as possible once the outbreak is detected and on an ongoing basis until the outbreak is over.

Recommendations from outbreak analysis and review are shared with staff, physicians, senior leadership, and the governing body.64

The organization collaborates with partners, in particular, public health agencies, during outbreaks to communicate accurate and timely information and coordinate strategies to mitigate risk. Information is reported to the appropriate authorities as regulated for the region. Following an outbreak, a summary report including background information, details of the investigation, results, and recommendations is made available to partners, and designated organizations in the community.64

Additional facility expertise and resources, if required, is obtained from:[66]

- public health units;
- formal consultation arrangement with experts in infectious diseases and/or healthcare epidemiology (e.g., contracted services);
- regional/provincial/territorial infection control networks;
- academic health sciences centres; and
- linkages with other organizations (e.g., IPAC Canada chapters).

STANDARD 72	**There shall be a communications strategy in place during an outbreak that includes dissemination of timely information and outbreak status both internally and externally.**

7.5 Post-Outbreak Follow-Up and Evaluation

Following an outbreak, the healthcare organization reviews its policy and procedures and makes improvements as needed to prevent a recurrence of the outbreak.[64] This might include recommendations for additional resources (material and/or human), education, or changes to program protocols, or equipment. The healthcare organization also works with local health partners to review and improve the management of major outbreaks.[99]

STANDARD 73	**The healthcare organization shall use the results of outbreak investigations to make improvements.**

8 Emergencies, Disasters, and Major Incidents

The IPAC Program has a role in the effective response to emergencies, disasters and major incidents that may increase risk of infection transmission. These may result from changes to infrastructure (e.g., water shortages, power outages, gas line breaks), unexpected influx of patients (e.g., natural disasters, emergency response to community incidents), or when expanded or extended care capabilities are needed (e.g., pandemics, unusual pathogens, bioterrorism).

8.1 IPAC Program Planning for Emergencies, Disasters, and Major Incidents

The organization prepares for disasters and emergencies, including those impacting the IPAC Program, by developing and implementing an emergency response plan (ERP),[176,177] usually through an incident command system (ICS) or incident management system (IMS). The ERP is based on an "all hazards" approach, informed by local, regional, provincial/territory/Indigenous, and federal regulations and ERPs, as well as international (e.g., WHO[178]) guidance.

The ERP:

- identifies immediate actions needed to respond to disasters and emergencies in a coordinated manner;
- defines the roles and responsibilities of team members, including IPAC staff and it may vary depending on the form of the emergency or disaster;
- includes pandemic planning as part of the organization's overall plan for disasters and emergencies;[64]
- anticipates catastrophic events and addresses all hazards identified from wide consultation by the organization's leaders, including IPAC staff; risk assessments; and action plans developed from audits of emergency preparedness;
- is tested as required, e.g., regular drills to test emergency management issues, or surge capacity procedures, and results from debriefings are used to inform the ERP and emergency procedures, as necessary; [179] and
- is aligned with those of partner organizations and local, regional, and provincial/territorial governments to facilitate coordinated, large-scale responses as required. [176,177,179]

There is a separate plan for each existing facility/site and for temporary healthcare sites associated with the organization, and the plans align.

The IPAC Program's role in the emergency response plan includes, but is not limited to:[64,181-185]

- **IPAC staffing:** IPAC staff are available as needed when there are issues relating to prevention and control of infections. The emergence of new

infectious diseases has emphasized the need for surge capacity in IPAC Programs as well as in other healthcare services. The concept of surge capacity[179] is based on resources for day-to-day operation and an ability to redirect resources in a time of need.[184,185]

- **Surveillance:** Accurate records of infection incidence and transmission are maintained by IPAC staff and used to help inform control measures. IPAC staff develop a process to track cases (e.g., line lists).
- **Patient placement:** IPAC staff oversee the movement and accommodation of patients with infections (or exposure to patients with infections), within and outside the organization. This may also include restricting visitors.
- **Staff placement:** Staff are cohorted, where possible, to care for selected groups of patients who have the same infection, to reduce the risk of transmission to other patients/staff.
- **Communications:** IPAC staff assist with dissemination of critical information about infection prevention to staff and other key internal relevant parties; provide signage to educate and inform staff, patients, visitors, and contractors; communicate with external agencies (e.g., public health) and the community on IPAC issues; and receive, respond to and promptly communicate important health notices.
- **Staff education and training:** IPAC staff ensure that consistent IPAC messaging and information is delivered, utilizing standard operating procedures (SOP), and developing appropriate tools for IPAC interventions and responses, to address issues such as lack of potable water, flooding, sewage backup, loss of power.
- **Materials management or procurement of supplies:** IPAC staff may facilitate adequate supplies of products such as ABHR, PPE, environmental cleaners and disinfectants.[186]
- **Environmental services:** IPAC staff assist with issues relating to acquisition of sufficient supplies (e.g., clean linen), as well as storage and disposal of increased waste. Increased environmental cleaning may be required (e.g., during floods, sewer backups). IPAC staff can advise on cleaning and staffing requirements.
- **Dietary:** IPAC staff assist with issues relating to safe food preparation, storage, and delivery in the face of infrastructure challenges such as flood or loss of potable water.
- **Sanitary facilities:** IPAC staff assist with issues relating to loss of potable water and/or sewer (e.g., back-up water supplies, temporary chemical toilets, hand hygiene agents).
- **Post-mortem care:** IPAC staff assist with issues relating to post-mortem care when highly infectious agents are involved.

STANDARD 74	**There shall be a written response plan with IPAC input to address IPAC-related issues in emergencies, disasters, and incidents.**

8.2 Command and Management of Emergencies, Disasters, and Major Incidents

There is an emergency/disaster management committee (EMC) with IPAC Program representation. The role of the IPAC member on the committee relates to issues dealing with the incidence or transmission of infection and may include:[6,182]

- evaluating the thoroughness and effectiveness of the organization's existing IPAC Program in relation to the emergency, to identify areas for additional IPAC interventions;
- assessing the information available and seeking further evidence, on the nature and scale of the emergency; whether one-time (e.g., sewer backup) or ongoing (e.g., a pandemic);
- establishing the IPAC response using local emergency/disaster planning guides; this might include unit or facility closures and/or visitor limitations;
- informing and involving relevant colleagues and partner organizations in a timely manner;
- communicating clear, accurate and timely information with colleagues, partner organizations and others to effectively manage risk and support effective teamwork;
- establishing agreement on the IPAC measures to minimize exposure to IPAC hazards, to reduce risks and to prevent further spread or exposures;
- liaising with other IPAC-related experts in the management of emergencies, disasters, and major incidents;
- understanding the organization's physical facilities (e.g., building layouts, ventilation systems) and the limitations and capabilities of the building(s), to make IPAC-related decisions (e.g., patient placement, cohorting, implementation of Additional Precautions);
- preparing or consulting on the preparation of education materials for staff, volunteers, patients, visitors, and others in the organization; and
- participating in ongoing evaluations and debriefing sessions and making recommendations for future improvements.

STANDARD 75	**There shall be IPAC involvement in emergency management.**

8.3 Preparedness Training for Emergencies, Disasters, and Major Incidents

There is a process for staff to report urgent IPAC issues in a timely fashion (e.g., sterilization failures, structural damage, flooding, sewer backup). IPAC-related education is provided to support the all-hazard emergency response plan, to create awareness and enhance the skills required to develop, implement, maintain, and execute the ERP.[182]

Relevant IPAC education and training enables staff to:

- Know when and to whom to report IPAC-related emergencies and major incidents;
- Be aware of reporting procedures related to infectious illnesses;
- Know who to contact to obtain additional IPAC-related supplies in the event of shortages (e.g., PPE, ABHR); and
- Be supported to attend scheduled emergency drills and exercises (including IPAC-related emergencies).[180,182]

STANDARD 76	**The emergency response plan shall include IPAC-related emergency response training and exercises for all staff.**

9 Antimicrobial Stewardship

Use of antimicrobial agents, an important health intervention, may result in unintended consequences including adverse effects, *C. difficile* infection and the development of microorganisms resistant to antimicrobial agents that may have a substantial impact on the health and safety of patients and the resources of the healthcare system.[64]

Effective antimicrobial stewardship (AMS) includes appropriate antimicrobial initiation (starting antimicrobials only when required), regimen selection (choice of antimicrobial, dose, and route), and duration of therapy. The primary focus of an antimicrobial stewardship program (ASP) is to optimize the use of antimicrobials to achieve the best patient outcomes, limit the potential for emergence of antimicrobial resistance, and minimize drug-related adverse events, thus promoting patient safety.[64, 187-189]

Active strategies to minimize unnecessary antimicrobial use and optimize antimicrobial therapy are the core of any ASP. In hospital settings, this may include the use of prospective audit and feedback in combination with other approaches such as guidelines, education, and order set optimization.[190] Antimicrobial stewardship in long-term care and primary care is emerging as an essential approach to optimize antimicrobial use in these settings. However, ASP strategies may need to be tailored to the resources and expertise available. Multi-modal strategies are most often used which may include approaches such as peer comparison, patient and family engagement, and decision aids/prescribing tools.[191,192]

Effective AMS, in combination with a comprehensive IPAC Program, has been shown to limit the emergence and transmission of AROs.[193,194] Studies indicate that ASPs are cost-effective, providing savings through reduced drug costs and avoidance of antimicrobial resistance.[195] Antimicrobial stewardship should be part of a health care organization's quality improvement program.[196]

Metrics are collected and disseminated to relevant parties to evaluate the effectiveness of ASPs and identify future directions. Antimicrobial use data is used by hospitals to measure the effects of ASP strategies, which can also be used to provide feedback to providers and justify ASP modification including optimizing human and IT resources.[197] There is also a growing recognition of the importance of monitoring antimicrobial use in outpatient settings.[198,199]

In hospitals, the organization implements a multi-disciplinary ASP in collaboration with specific relevant parties, including IPAC staff, pharmacy, infectious diseases specialists, microbiology, and prescribers.[64,99] The IPAC Program plays a vital role in an organization's ASP. IPAC staff:[193,196]

- actively support ASP committees;
- perform surveillance for AROs and other HAIs, monitoring and reporting trends over time;

- use surveillance data to inform risk assessment and planning for prevention of infection;
- translate surveillance data and infection rates to staff and administrators; and
- understand and advocate for the principles of prudent antimicrobial use, such as:
  - diagnostic stewardship[200]
  - minimizing the use of unnecessary antimicrobial treatment (e.g., for asymptomatic bacteriuria, upper respiratory tract infections that are mostly viral in nature);
  - switching from intravenous to oral antimicrobials;
  - use of narrowest spectrum antimicrobials once sensitivity results are available;
  - avoiding antimicrobials known to be associated with emergence of bacterial resistance;[193,201] and
  - awareness of ASP guidelines.

In long-term care and primary care, ASPs can be tailored to available resources but should include a demonstrated commitment to appropriate antimicrobial prescribing, one or more policies/practices to improve antimicrobial use, monitoring of prescribing with feedback, as well as education and expertise. IPAC specialists may be important partners and advocates in such endeavors, including supporting the significant role of nurses in AMS.[202-205] Recent AMS competencies for nurses in Canada have been published.[206]

STANDARD 77	**IPAC staff shall actively support antimicrobial stewardship in the healthcare organization.**

10 Hand Hygiene Program

Although an integral element of guidelines, education and training, and process surveillance/monitoring/auditing/feedback, hand hygiene is also a stand-alone program within the organization. Hand hygiene protects patients, staff, and visitors from acquiring and transmitting microorganisms. It is considered the single most important and effective IPAC practice to prevent the spread of HAIs.[144,207]

Hand hygiene policy and procedure establish clear standards and expectations for hand hygiene practice.[64,128,144-146,207-208]

The hand hygiene program includes:[64,145,202-204]

- demonstrable senior leadership commitment; and
- written policies, procedures, and protocols that address:
  - barriers to effective hand hygiene (e.g., long fingernails, nail enhancements, hand and arm jewellery and impediments such as splints, dressings, or compression garments);
  - indications for hand hygiene (based on, PHAC HH, PHO's *Four Moments,* WHO's *Five Moments of Care*);[209]
  - IPAC and occupational health staff involvement in selection of hand hygiene agent(s);
  - management of soap and alcohol-based hand rub (ABHR) containers (e.g., no "topping up");
  - hand lotion use;
  - provision and use of ABHR (70-90% alcohol concentration);
  - provision of dedicated hand washing sinks;
  - easy access to hand hygiene agents at point-of-care;
  - ongoing education for staff that includes indications for hand hygiene, proper hand hygiene techniques and necessary hand care;
  - provision of information for patients and visitors on hand hygiene;
  - visible reminders about hand hygiene indications and technique;
  - promotion of hand hygiene by champions and role models;
  - monitoring of hand hygiene compliance with audits practices and feedback to individual employees, management and the Senior Leadership/Board via the Infection Prevention and Control Committee or equivalent;
  - mandatory requirements for compliance reporting; and
  - a hand care program.

STANDARD 78	**The healthcare organization shall have an organization-wide hand hygiene program that includes administrative leadership, policies, procedures, protocols, and support.**

STANDARD 79	**There shall be a multidisciplinary approach to the evaluation, selection, and purchase of hand hygiene agents.**

STANDARD 80	**Hand hygiene resources shall be readily available and accessible at point-of-care.**

STANDARD 81	**Hand hygiene education shall be provided to all individuals within the healthcare organization, including visitors as needed.**

STANDARD 82	**There shall be a process to measure hand hygiene compliance that includes monitoring and feedback.**

10.1 Hand Care Program

There is a proactive hand care program to assess and maintain the skin integrity of healthcare workers who perform frequent hand hygiene.[66,207-210] A hand care protection program for healthcare workers is a key component for improving effective and safe hand hygiene practices to protect the healthcare worker and the patient from infections. If the skin integrity of a healthcare worker cannot be maintained, modified work that does not require frequent hand hygiene is facilitated, where possible.[66]

A hand care program includes:[210,211]

- hand care assessment;
- staff referral to OHS or to own healthcare professional if skin integrity is an issue;
- provision of ABHR that contains moisturizers; and
- hand care moisturizers that will not interfere with ABHR or damage gloves and are approved by the healthcare organization.

IPAC and OHS staff are consulted and involved in all hand hygiene product selection and trials in the healthcare organization. Hand care lotion is readily available to staff free of charge and products chosen do not interfere with glove integrity or interact with other hand hygiene products.[66]

STANDARD 83	**There shall be a hand care program in place for staff in the healthcare organization.**

11 Research: Evidence-based practice quality improvement, and Research Initiatives

Healthcare organizations utilize three inter-related but distinct concepts: the use of research-based evidence in practice, participation in quality improvement projects, and contribution to research initiatives.[212]

Evidence-based Practice

IPAC Programs are planned and developed based on evidence and best practices.[64] Evidence is appraised and may be incorporated into the healthcare organization through policy development, surveillance planning, clinical decision-making, practice, education and/or consultation.[64,66]

ICPs remain current in IPAC evidence and best practices through participation in continuing education; critical appraisal of evidence-based research; and review of consensus documents and other established guidelines.[64,66] ICPs use knowledge translation to ensure that evidence-based infection prevention guidelines are implemented into clinical practice.[213]

Quality Improvement

IPAC Programs have quality improvement (QI) plans in place that are regularly reviewed and updated.[64] QI projects use established methods or tools to solve problems or improve clinical processes[212,213] and are a key element in performance improvement to reduce HAIs.[214] Such initiatives may be driven by a variety of reasons including surveillance or process data, during annual QI plan development and review, in response to an organization's strategic priorities, as well as accreditation or legislated requirements.[214,215] ICPs have a role in identifying opportunities for improvement and may lead or collaborate on multidisciplinary QI initiatives as part of a team.[115,128]

Research

Research is conducted using the scientific method with the goal of creating new knowledge.[212] ICPs may participate in research studies that will result in new knowledge, improved patient care, prevention of infections and advancements in the IPAC field.[66,123]

ICPs collect, collate, analyze, and synthesize qualitative and quantitative data and information using appropriate methods,[115,128] and share this with co-workers and other colleagues to enhance knowledge and drive improvements.[67]

Quality improvement projects and research study results are shared through publications, poster/oral presentations at conferences and other means to contribute to the body of IPAC knowledge.[66]

STANDARD 84	**IPAC staff shall participate in quality improvement initiatives and/or research.**

STANDARD 85	**Results of IPAC Program quality improvement initiatives and/or research shall be shared with relevant parties.**

STANDARD 86	**Results of IPAC Program quality improvement initiatives and/or research shall be incorporated into the IPAC program.**

11.1 Continuous Quality Improvement

Continuous quality improvement is essential for increasing value in programs in every setting.[99] In IPAC, it includes the WHO's sixth core component of monitoring, auditing, and feedback,[3,171] but is broader, incorporating all elements of assessment, planning, implementation/action, and evaluation at all levels (i.e., senior leadership, ICPs, and healthcare workers).

11.2 IPAC Performance Management

Preventing infections in patients is a shared vision and goal throughout healthcare organizations. Teamwork rather than individual intervention relies on leadership adaptability, mutual performance monitoring and support. IPAC-related responsibilities are specified in the job descriptions for all staff, including managers and supervisors. Staff at all levels can explain their role in IPAC and how their IPAC performance is evaluated.

11.2.1 Assessment and Accountability of Senior Leadership

Senior leadership has accountability and responsibility for all IPAC initiatives affecting everyone in the organization. It is the responsibility of senior leadership to ensure that all staff are trained and competent in IPAC practices.[99]

Senior leadership communicate their commitment to the IPAC Program at least annually through compliance monitoring and assessment of staff performance.

There is evidence of regular communication from the Senior Leadership on the organization's expectations in relation to the IPAC Program.[99]

STANDARD 87	**Senior leadership within the organization shall support annual assessment and evaluation of the IPAC initiatives developed by the IPAC team.**

11.2.2 Assessment and Accountability of IPAC Program Staff

ICPs are prepared to be certified in IPAC within the organization's job description. Specific IPAC responsibilities are written into IPAC contracts, job descriptions and program manuals.

Performance reviews for all IPAC Program staff are conducted on a planned basis, e.g., annually. The performance review includes the following components:[143]

- a discussion of achievements and improvement opportunities;
- a plan for additional training, education, and development to enhance the staff member's performance and career opportunities;
- recognition and acknowledgement of IPAC achievements (e.g., re-certification); and
- assurance that IPAC training and competencies are kept up to date.[99,115]

IPAC staff should also evaluate their own IPAC performance and development, using tools such as IPAC Canada's self-appraisal tool for members (https://ipac-canada.org/photos/custom/Members/Tools/tools_ICP_Self-appraisalTool.pdf)

STANDARD 88	**IPAC staff shall demonstrate competence in infection prevention and control.**

11.2.3 Assessment of Staff Knowledge, Accountability, and Adherence to IPAC Principles

A system for monitoring and improving staff compliance with IPAC Program initiatives is developed and implemented at all levels in the healthcare organization. This includes evidence of specific responsibilities reflected in their job descriptions and performance appraisals.[99]

As part of their annual performance review/discussion, employees are evaluated on their individual IPAC performance and adherence to IPAC practices.[66] In addition, individual performance is regularly assessed and documented, e.g.,

through routine audits,[159] and self-assessment for achievement of the knowledge and skills of IPAC Core Competencies.[115] There is evidence that staff are provided with ongoing feedback and support to carry out their IPAC responsibilities, as required.[99]

STANDARD 89	**An IPAC performance management program shall be evident, including an IPAC performance review for all staff.**

11.3 Assessment and Evaluation of the IPAC Program

IPAC Program quality improvements are a strategic priority in healthcare organizations. It is the responsibility of the organization to:[64]

- promote learning from QI results; and
- make decisions informed by research, evidence, individual organizational experiences, and ongoing QI results.

11.3.1 Evaluating the IPAC Program

Internal evaluation of the IPAC Program is done to determine if program resources (financial, material and human) are adequate to meet program goals. Implementing a standardized IPAC Program audit will identify the extent to which the healthcare organization with its partners, is able to achieve its IPAC program goals and objectives.64,66

External evaluation of the IPAC Program may include outside accrediting or government bodies.

STANDARD 90	**There shall be a process to evaluate the quality of the IPAC Program.**

11.3.2 Continuing Improvement in the IPAC Program

Ongoing improvements to the IPAC Program should be informed by the results of the IPAC Program evaluation via an action plan, feedback, and re-audit. Target goals and the strategic plan are reviewed and revised to reflect changing epidemiology and priorities of the healthcare organization.

The ongoing improvements to the IPAC Program include:

- providing dedicated time to reflect on results of audits and program evaluations;
- providing mechanisms for collective feedback and reflection, such as briefings or focus groups;[64]
- developing action plans for improvement with timely but realistic time frames, in partnership with affected parties and based on best practices;
- ensuring senior leadership support for implementation of action plans, including allocation of resources;
- providing opportunities for education; and
- sharing lessons learned with internal and external relevant parties.

STANDARD 91	**The healthcare organization shall make ongoing improvements to its IPAC Program.**

Appendices

A. The Healthcare Environment

Environmental surfaces have been implicated in HAI transmission. Healthcare organizations are accountable for maintaining a clean and safe physical environment.[64,216-220] This includes effective environmental cleaning and safe waste handling. Resources are devoted to environmental cleaning to enable best practices.[217]

IPAC team members shall consult with environmental services (EVS) staff to perform environmental risk assessments based on risk of transmission of microorganisms in each specific area, including information about the types of patients, amount of traffic, type of activities performed, and probability of being exposed to body fluids. This will inform the recommended frequency of cleaning, level of disinfection, and number of staff required to maintain the required level of cleaning.[64,217]

Protocols and procedures for effective environmental cleaning in a healthcare organization include, but are not limited to: [64,217]

- written procedures for cleaning and disinfecting patient rooms and shared equipment that includes standards and frequencies for daily, and discharge/transfer cleaning;
- written procedures for cleaning and disinfecting rooms of patients who are on Additional Precautions;
- orientation and continuing education for EVS staff that incorporate IPAC Program principles;
- increased capacity for outbreak management; and
- ongoing review of procedures, including monitoring, process audits and feedback to staff.

Employees are accountable for maintaining their competency, including in relevant IPAC practice. Feedback becomes part of their performance review.[64,217] When cleaning services are contracted to external providers, the healthcare organization establishes and maintains a contract with each provider that requires consistent levels of quality and adherence to accepted standards of IPAC practice. The quality of services provided shall be monitored by the organization.

Biomedical waste (which includes human tissue, body fluids and contaminated sharps) represents a small proportion of waste generated by healthcare organizations and poses minimal risk if managed according to applicable standard and regulations.[64] Protocols and procedures regarding handling of biomedical waste:[134]

- meet local, regional, provincial/territorial, and national regulations; and
- include IPAC Program input on waste handling issues.

B. Medical Equipment

Medical equipment is non-critical patient care equipment that only comes into contact with a person's intact skin and requires cleaning and low-level disinfection. Examples include blood pressure cuffs, wheelchairs, and imaging equipment.

Policies, procedures, and protocols related to medical equipment include cleaning and disinfection:

- on a regular basis;
- when visibly soiled; and
- between each use on/by an individual.

There is accountability for performing the tasks.

C. Cleaning, Disinfection and Sterilization of Medical Devices

Medical devices are defined as semi-critical or critical and require a higher level of disinfection, sterilization/reprocessing that is conducted in a dedicated area or Medical Device Reprocessing (MDR) department.

The healthcare organization follows reprocessing protocols and procedures for cleaning, disinfection, and sterilization of medical devices which:

- Are developed with input from the IPAC team;
- Are evaluated, monitored and reviewed for the effectiveness of reprocessing processes;[136,221-223]
- Include the use of process monitors/indicators;
- Are based on a recognized classification system, such as Spaulding's[224] criteria, which classifies level of reprocessing according to potential risk of infection;[64,223,225]
- Follow manufacturer's instructions;[221-223]
- Meet IPAC and MDR program protocols, standards, and best practices;[221-223]
- Are in accordance with legislated requirements;[221] and
- Define all steps in the reprocessing process, including:[221-223]
  - handling of contaminated medical devices;
  - point-of-care cleaning;
  - transportation of contaminated medical devices;
  - disassembly/reassembly of devices for cleaning and sterilization as required;
  - cleaning/rinsing (manual or automated);
  - thermal disinfection;
  - drying and reassembly;
  - high-level disinfection or sterilization; and
  - storage.

Protocols and procedures for cleaning, disinfection and sterilization apply to anyone reprocessing medical devices in the organization, including emergency departments, clinical/diagnostic imaging, endoscopy, and clinics and services. This includes foot care and dental care in long-term care settings. If reprocessing activities are contracted to external providers, it is the responsibility of the healthcare organization to verify that each external provider follows accepted standards of practice for reprocessing and monitors the quality of services provided.[64,222,223]

There are also protocols and procedures for:

- management of single-use medical devices;[223]
- loaned, shared, consigned, and leased medical devices;[221,223]
- staff competency and, ideally, certification in MDR from a recognized college certificate program;[64,221-223] and
- management of failures in disinfection and sterilization processes, including ability to track/recall all reprocessed medical devices identified as requiring follow-up measures.[64,223]

Creutzfeldt-Jakob Disease (CJD)

Patients with CJD are cared for using Routine Practices.[226,227] The infection risk from CJD is related to neurological tissues including post-mortem. Policies, procedures, and protocols for CJD are indicated for healthcare organizations that provide neurosurgical and post-mortem services.[64] Protocols and procedures include: [226,227]

- completing a pre-operative assessment for high-risk patients;
- completing a pre-operative assessment for high-risk surgical procedures; and
- having either:
  - a dedicated set of neurosurgical, neuro-endoscopic, and ortho-spine devices to be used when CJD is diagnosed or suspected pre-operatively; or
  - equipment that is quarantined immediately post-surgery and prior to reprocessing until the post-operative diagnosis of CJD is either validated or ruled out.

D. Laundry

Linen and textiles may become contaminated with pathogens and in rare occurrences, have been associated with transmission of microorganisms through their inappropriate management.[228-230] Therefore, the laundry services personnel must handle, store, process, and transport linen in a safe manner to prevent the spread of infection.

Elements of Laundry Services include:

Design

- Ensure laundry area has a dedicated space made of durable materials to withstand the rigors of the laundry area (i.e., water/steam resistant).[230,231]
- The workflow is clearly delineated with a physical barrier between clean and soiled linen
- Soiled linen areas shall be at negative pressure relative to the surrounding areas and the ventilation should not move from soiled processing to clean laundry areas.[232,233]
- Hand hygiene products and hand-washing sinks are located in all laundry work areas.

Processes

Carts, shelves, and folding tables shall be cleaned and disinfected on a regular, daily, and as required, basis.

- Laundry equipment is checked and maintained, including regularly scheduled preventative maintenance, according to organizational policy and manufacturers' instructions. These monitoring activities are documented.
- There is an established procedure to determine where and how laundry is sorted.
- Organizations shall follow manufacturer's recommendations for the washer and dryer, materials to be laundered, and the detergent used.[231]
- The laundry services can out-sourced to a commercial healthcare laundry company or handled in-house using commercial grade washers and dryers. Exemptions for very small facilities to use domestic washers and dryers require local public health approval.
- Published laundry regulations must be followed for in-house laundry.[221,231]

Soiled Laundry

- Laundry Bags:
  - Soiled laundry bags must be strong enough to hold contents and leak-resistant, filled only to 2/3 full and tied securely.
  - Reusable laundry bags are laundered after each use.
  - Disposable laundry bags are not required.
  - Double-bagging is not recommended unless there is a rip or leak in the bag. All linen that is soiled with blood, body fluids, secretions or excretions should be handled using the same Routine Practices, regardless of source (e.g., patients on Additional Precautions) or healthcare setting.[64,217]
- Gross soil (e.g., faeces) shall be manually removed before placing into laundry.

- Bag or otherwise contain soiled laundry at the point-of-care.
- Do not sort or pre-rinse soiled laundry in care areas, hallways, or open access areas.
- Any sharps found in linen shall be reported to management and documented to prevent future incidents from happening.[233]
- Soiled laundry should be handled with minimum agitation.
- Laundry carts or hampers used to collect or transport soiled linen bags do not need to be covered unless required by regulation.
- Containers (including carts, bags, and plastic bins) for collecting, storing, or transporting soiled linen shall be leak-proof, nonporous, and in good repair, and shall be decontaminated after use.
- All carts shall be cleaned and disinfected before being used to transport clean or sterile linen.
- Laundry chutes:
  - Are considered with caution, due to potential for contamination from leaks and torn or open bags, as well as difficulty in cleaning, disinfection, and repairing, potential damage to textiles from sharp edges or leaked fluids, and access control.
  - If used, ensure that they are properly designed, maintained, cleaned, disinfected, and used in a manner that minimizes dispersion of aerosols.
  - Laundry bags are tightly secured before placing into the chute.
  - Loose items shall not be placed in the chute.
  - Laundry chutes should be maintained under negative pressure and discharge into the soiled linen collection area.
  - Laundry chutes should be cleaned and maintained (according to MIFUs) on a regular basis.
- Laundered items should be taken out of the washer as soon as feasible to reduce the risk of contamination and formation of biofilm.[216,233]
- The effectiveness of the laundering process in rendering the laundered items hygienically clean depends on: [231]
  - time and temperature;
  - mechanical action;
  - chemicals used;
  - water quality, including pH level, hardness;
  - rinsing requirements;
  - volume of the load;
  - nature and extent of soiling of items; and
  - model of washers and dryers.
- Using a disinfectant (such as bleach) may not offer additional advantage when soiling is at low levels. However, a disinfectant can be used for heavy soiling, or when resettling of microorganisms onto the laundered items is a concern.[233]

Clean Linen

- Clean laundry should be sorted, packaged, transported, and stored in a manner that prevents inadvertent handling, contamination by dust or debris, and contact with any soiled or contaminated items.[231,233]
- There should be designated areas (e.g., dedicated closet, clean supply room) for sorting and storing clean linen.
- If a closed cart system is used, storage of clean linen carts in an alcove is permitted if it is out of the path of normal traffic and is under staff control.

Laundry Carts

Require:

- Smooth finish, solid bottom to withstand cleaning and disinfection.
- Cleaning, and disinfection after every use if used for soiled laundry.
- Covering during transport and storage if used for clean laundry.

Smaller mobile linen carts should be:

- be filled and used during provision of care for a work shift;
- remain covered and contain only clean linen with no items stored on top; and
- be cleaned daily.

Policies, Procedures, and Protocols (PP&P)

Ensure clear PP&P for:

- soiled laundry (collection, handling, transport, storage);
- hygienically clean textiles (HCT) including handling, transport, and storage;
- use of PPE;
- operation and scheduled maintenance of machines; and
- cleaning and disinfection of machines and each laundry area daily.

Staff Education and Training

Workers are taught:

- laundry PP&P such as handling of soiled linen as well as IPAC and WHMIS training and
- core competencies such as hand hygiene, donning and doffing of PPE, including circumstances in which eye protection must be used.
- Audits of all processes shall be performed. *See Auditing*

E. Dietary / Food Services

Protocols and procedures define mechanisms and processes that are in place to prevent foodborne illnesses in the organization. Standards and regulations for food preparation, handling, and storage are followed. These apply to food prepared in-house or contracted out, as well as for food prepared or dispensed in patient/staff kitchenettes or kitchens.[64]

The organization shall be compliant with the inspection process and implement recommendations on areas for improvement identified by local/provincial inspection process.[64]

F. Materials Management/Product Evaluation

IPAC staff shall be involved in the evaluation, purchase, and procurement of medical equipment, devices, and supplies. The role of the IPAC representative is to assess potential IPAC risks. *See Occupational Health*.

G. Facility Design, Construction and Maintenance

Environmental conditions related to HVAC are established to contain and prevent the transmission of microorganisms.[64,232,234-236] There is a validation process in place to ensure airborne isolation rooms, operating rooms, and protective environments for transplant or severely compromised patients meet standards.[237,238]

IPAC principles are adhered to during design of new facilities or redevelopment of existing facilities and during construction, renovation, and maintenance activities, up to and including commissioning, to provide a safe environment for patients and staff and minimize the risk of HAIs.[66,99,216,237-240] The organization consults with the IPAC team when planning and designing the physical environment, including new construction and/or renovation projects.[64]

Protocols and procedures for facility design, construction and maintenance define the role of the IPAC team and include:[64,66,216,232,237-240]

- involvement in all phases, including planning;
- identifying legislation, national guidance and outcomes/indicators relating to the project;
- identifying staff and the affected patient population that will be impacted by the project;
- determining IPAC-related risks and risk levels associated with the project (e.g., *Aspergillus* and *Legionella*);
- confirming barriers and preventive measures that will be put into place during the project (e.g., hoarding, negative pressure, dust controls);

- ensuring that HVAC systems in the construction area meet current standards;
- identifying cleaning and disinfecting requirements during and following the project;
- confirming safe transportation routes for waste materials, supplies, tools, and people;
- inspecting premises regularly and at completion of the project to ensure that optimal environmental conditions are maintained;
- monitoring compliance with barriers and preventive measures; and
- having authority to halt projects if there is a risk to patient or staff safety.

References

1. World Health Organization (WHO). Core components for infection prevention and control programmes: Report of the second meeting, Informal Network on Infection Prevention and Control in Health Care, Geneva, Switzerland, 26-27 June 2008. World Health Organization; 2009. Available from: https://iris.who.int/bitstream/handle/10665/69982/WHO_HSE_?sequence=1
2. Storr J, Twyman A, Zingg W, Damani N, Kilpatrick C, Reilly J, Price L, Egger M, Grayson ML, Kelley E, Allegranzi B. Core components for effective infection prevention and control programmes: new WHO evidence-based recommendations. Antimicrobial Resistance & Infection Control. 2017 Dec;6:1-8. Available from: https://link.springer.com/article/10.1186/s13756-016-0149-9
3. WHO. Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. World Health Organization; 2016. Available from: https://iris.who.int/bitstream/handle/10665/251730/9789241549929-eng.pdf?sequence
4. WHO. Global report on infection prevention and control. Geneva. 2022 Available from: https://iris.who.int/bitstream/handle/10665/354489/9789240051164-eng.pdf?sequence=1
5. Worrell R, Appleby MC. Stewardship of natural resources: definition, ethical and practical aspects. Journal of agricultural and environmental ethics. 2000 Jan;12:263-77. Available from: https://link.springer.com/article/10.1023/A:1009534214698
6. WHO. Leading health agencies outline updated terminology for pathogens that transmit through the air. 18 April 2024 News release. Available from: https://www.who.int/news/item/18-04-2024-leading-health-agencies-outline-updated-terminology-for-pathogens-that-transmit-through-the-air
7. Morgan DJ, Lomotan LL, Agnes K, McGrail L, Roghmann MC. Characteristics of healthcare-associated infections contributing to unexpected in-hospital deaths. Infection Control & Hospital Epidemiology. 2010 Aug;31(8):864-6. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3528178/
8. Haley RW, Quade D, Freeman HE, Bennett JV, CDC SENIC PLANNING COMMITFEE. Study on the efficacy of nosocomial infection control (SENIC Project): summary of study design. American journal of epidemiology. 1980 May 1;111(5):472-85. Available from: https://pubmed.ncbi.nlm.nih.gov/6246798/
9. Plowman R, Graves N, Griffin MA, Roberts JA, Swan AV, Cookson B, Taylor L. 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. Journal of hospital infection. 2001 Mar 1;47(3):198-209. Available from https://www.sciencedirect.com/science/article/abs/pii/S0195670100908818
10. Gravel D, Bryce E, Goldman C, Johnston L, Loeb M, Ofner M. Nosocomial infections identified during a point-prevalence survey within selected Canadian health care institutions. Society for Healthcare Epidemiology of America (SHEA) 2003. Available from https://ipac-canada.org/photos/custom/Members/CNISPpublications/07-CNISP1.pdf

11. WHO. Improving infection prevention and control at the health facility: Interim practical manual supporting implementation of the WHO Guidelines on Core Components of Infection Prevention and Control Programmes. Geneva: World Health Organization; 2018. Available from: https://www.who.int/publications/i/item/WHO-HIS-SDS-2018.10

12. WHO. Leading health agencies outline updated terminology for pathogens that transmit through the air. 18 April 2024 News release. Available from: https://www.who.int/news/item/18-04-2024-leading-health-agencies-outline-updated-terminology-for-pathogens-that-transmit-through-the-air

13. Niederman MS. Impact of antibiotic resistance on clinical outcomes and the cost of care. Critical care medicine. 2001 Apr 1;29(4):N114-20. Available from: https://journals.lww.com/ccmjournal/abstract/2001/04001/impact_of_antibiotic_resistance_on_clinical.11.aspx

14. Engemann JJ, Carmeli Y, Cosgrove SE, Fowler VG, Bronstein MZ, Trivette SL, Briggs JP, Sexton DJ, Kaye KS. Adverse clinical and economic outcomes attributable to methicillin resistance among patients with Staphylococcus aureus surgical site infection. Clinical infectious diseases. 2003 Mar 1;36(5):592-8. Available from https://academic.oup.com/cid/article/36/5/592/452636?login=false

15. Schwaber MJ, Navon-Venezia S, Kaye KS, Ben-Ami R, Schwartz D, Carmeli Y. Clinical and economic impact of bacteremia with extended-spectrum-β-lactamase-producing Enterobacteriaceae. Antimicrobial agents and chemotherapy. 2006 Apr;50(4):1257-62. Available from https://journals.asm.org/doi/full/10.1128/aac.50.4.1257-1262.2006

16. Baker GR, Norton PG, Flintoft V, Blais R, Brown A, Cox J, Etchells E, Ghali WA, Hébert P, Majumdar SR, O'Beirne M. The Canadian Adverse Events Study: the incidence of adverse events among hospital patients in Canada. Cmaj. 2004 May 25;170(11):1678-86. Available from https://www.cmaj.ca/content/170/11/1678?ct=

17. Stone PW, Larson E, Kawar LN. A systematic audit of economic evidence linking nosocomial infections and infection control interventions: 1990-2000. American journal of infection control. 2002 May 1;30(3):145-52. Available from https://www.sciencedirect.com/science/article/abs/pii/S019665530225141X

18. Burke JP. Infection control-a problem for patient safety. New England Journal of Medicine. 2003 Feb 13;348(7):651-6. Available from https://pubmed.ncbi.nlm.nih.gov/12584377/

19. Fakih, M.G., Bufalino, A., Sturm, L., Huang, R.H., Ottenbacher, A., Saake, K., Winegar, A., Fogel, R. and Cacchione, J., 2022. Coronavirus disease 2019 (COVID-19) pandemic, central-line–associated bloodstream infection (CLABSI), and catheter-associated urinary tract infection (CAUTI): the urgent need to refocus on hardwiring prevention efforts. Infection Control & Hospital Epidemiology, 43(1), pp.26-31. Available from https://pubmed.ncbi.nlm.nih.gov/33602361/

20. Mitchell R, Taylor G, Rudnick W, Alexandre S, Bush K, Forrester L, Frenette C, Granfield B, Gravel-Tropper D, Happe J, John M. Trends in health care–associated infections in acute care hospitals in Canada: an analysis of repeated point-prevalence surveys. Cmaj. 2019 Sep 9;191(36):E981-8. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6733684/

21. Canadian Nosocomial Infection Surveillance (CNISP) Program. Healthcare-Associated Infections & Antimicrobial Resistance: Healthcare-associated infections and antimicrobial resistance in Canadian acute care hospitals, 2016–2020. Canada Communicable Disease Report. 2022 Jul 7;48(7-8):308. Available from: https://www.canada.ca/content/dam/phac-aspc/documents/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2022-48/issue-7-8-july-august-2022/ccdrv48i78a03-eng.pdf

22. CCDR 2017-21: CNISP Program. Healthcare-Associated Infections & Antimicrobial Resistance: Healthcare-associated infections and antimicrobial resistance in Canadian acute care hospitals, 2017–2021. Canada Communicable Disease Report. May 2023;49(5):235. Available from: https://www.canada.ca/content/dam/phac-aspc/documents/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2023-49/issue-5-may-2023/ccdrv49i05a09-eng.pdf

23. Graves N, Weinhold D, Tong E, Birrell F, Doidge S, Ramritu P, Halton K, Lairson D, Whitby M. Effect of healthcare-acquired infection on length of hospital stay and cost. Infection Control & Hospital Epidemiology. 2007 Mar;28(3):280-92. Available from https://pubmed.ncbi.nlm.nih.gov/17326018/

24. Jodra VM, de los Terreros Soler LS, Perez CD, Requejo CM, Farrás NP. Excess length of stay attributable to surgical site infection following hip replacement: a nested case-control study. Infection Control & Hospital Epidemiology. 2006 Dec;27(12):1299-303. Available from https://pubmed.ncbi.nlm.nih.gov/17152026/

25. Birnbaum D. Antimicrobial resistance: a deadly burden no country can afford to ignore. Canada Communicable Disease Report= Releve des Maladies Transmissibles au Canada. 2003 Sep 1;29(18):157-64. Available from https://europepmc.org/article/med/14524197

26. Council of Canadian Academies. When Antibiotics Fail. The Expert Panel on the Potential Socio-Economic Impacts of Antimicrobial Resistance in Canada. Ottawa, ON: CCA; 2019. [Accessed 2021 May 7]. https://cca-reports.ca/wp-content/uploads/2018/10/When-Antibiotics-Fail-1.pdf

27. Strausbaugh LJ, Joseph CL. The burden of infection in long-term care. Infection Control & Hospital Epidemiology. 2000 Oct;21(10):674-9. Available from https://pubmed.ncbi.nlm.nih.gov/11083186/

28. Tchouaket EN, Kruglova K, Beogo I, Sia D, Robins S, Bélanger E, Jubinville M, Séguin C, Kilpatrick K, Boivin S, Létourneau J. Economic evaluation of healthcare-associated infection prevention and control in long-term care: a systematic review protocol. Systematic Reviews. 2022 Dec;11(1):1-1. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9719189/

29. Comas-Herrera A, Zalakaín J, Lemmon E, Henderson D, Litwin C, Hsu AT, et al. Mortality associated with COVID-19 in care homes: international evidence: International Long Term Care Policy Network; 2020. https:// ltccovid.org/wp-content/uploads/2021/02/LTC_COVID_19_internatio nal_report_January-1-February-1-2.pdf. Accessed 15 Jul 2021

30. Canadian Institute for Health Information. COVID-19's impact on long-term care. Available from: https://www.cihi.ca/en/covid-19-resources/impact-of-covid-19-on-canadas-health-care-systems/long-term-care

31. Cohen CC, Choi YJ, Stone PW. Costs of infection prevention practices in long-term care settings: a systematic review. Nursing economic$. 2016 Jan;34(1):16. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC4915220/

32. Zoutman DE, Ford BD, Bryce E, Gourdeau M, Hébert G, Henderson E, Paton S, Canada H, Canadian Hospital Epidemiology Committee, Canadian Nosocomial Infection Surveillance Program. The state of infection surveillance and control in Canadian acute care hospitals. American journal of infection control. 2003 Aug 1;31(5):266-73. Available from https://www.sciencedirect.com/science/article/abs/pii/S0196655303000865

33. Scheckler WE, Brimhall D, Buck AS, Farr BM, Friedman C, Garibaldi RA, Gross PA, Harris JA, Hierholzer WJ, Martone WJ, McDonald LL. Requirements for infrastructure and essential activities of infection control and epidemiology in hospitals: a consensus panel report. Infection Control & Hospital Epidemiology. 1998 Feb;19(2):114-24. Available from https://pubmed.ncbi.nlm.nih.gov/9503113/

34. 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. American journal of infection control. 2004 Feb 1;32(1):2-6. Available from https://www.sciencedirect.com/science/article/abs/pii/S0196655303007351

35. Harbarth S, Sax H, Gastmeier P. The preventable proportion of nosocomial infections: an overview of published reports. Journal of Hospital infection. 2003 Aug 1;54(4):258-66. Available from https://www.sciencedirect.com/science/article/abs/pii/S0195670103001506

36. Haley RW, Culver DH, White JW, Morgan WM, Emori TG, Munn VP, Hooton TM. The efficacy of infection surveillance and control programs in preventing nosocomial infections in US hospitals. American journal of epidemiology. 1985 Feb;121(2):182-205. Available from https://academic.oup.com/aje/article-abstract/121/2/182/113816?login=false

37. Umscheid CA, Mitchell MD, Doshi JA, Agarwal R, Williams K, Brennan PJ. Estimating the proportion of healthcare-associated infections that are reasonably preventable and the related mortality and costs https://cir.nii.ac.jp/crid/1130000798199730560. Infection Control & Hospital Epidemiology. 2011 Feb;32(2):101-14. Available from https://pubmed.ncbi.nlm.nih.gov/21460463/

38. Haley RW. Managing hospital infection control for cost-effectiveness. 1986. Available from https://cir.nii.ac.jp/crid/1130000798199730560

39. Borg MA, Cookson BD, Scicluna E, Group AP. Survey of infection control infrastructure in selected southern and eastern Mediterranean hospitals. Clinical microbiology and infection. 2007 Mar 1;13(3):344-6. Available from https://www.sciencedirect.com/science/article/pii/S1198743X14627610

40. Rosenthal VD, Guzman S, Pezzotto SM. 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. American journal of infection control. 2003 Nov 1;31(7):405-9. Available from: https://pubmed.ncbi.nlm.nih.gov/14639436/

41. Lobo RD, Levin AS, Gomes LM, Cursino R, Park M, Figueiredo VB, Taniguchi L, Polido CG, Costa SF. Impact of an educational program and policy changes on decreasing catheter-associated bloodstream infections in a medical intensive care unit in Brazil. American journal of infection control. 2005 Mar 1;33(2):83-7. Available from https://www.sciencedirect.com/science/article/abs/pii/S0196655304005632

42. Cooper BS, Stone SP, Kibbler CC, Cookson BD, Roberts JA, Medley GF, Duckworth G, Lai R, Ebrahim S. Isolation measures in the hospital management of methicillin resistant Staphylococcus aureus (MRSA): systematic review of the literature. BMJ. 2004 Sep 2;329(7465):533. Available from https://www.bmj.com/content/329/7465/533.short

43. Zafar AB, Gaydos LA, Furlong WB, Nguyen MH, Mennonna PA. Effectiveness of infection control program in controlling nosocomial Clostridium difficile. American journal of infection control. 1998 Dec 1;26(6):588-93. Available from https://www.sciencedirect.com/science/article/abs/pii/S0196655398001175

44. Tomic V, Sorli PS, Trinkaus D, Sorli J, Widmer AF, Trampuz A. Comprehensive strategy to prevent nosocomial spread of methicillin-resistant Staphylococcus aureus in a highly endemic setting. Archives of internal medicine. 2004 Oct 11;164(18):2038-43. Available from: https://jamanetwork.com/journals/jamainternalmedicine/article-abstract/217466

45. Zoutman DE, Ford BD, Canadian Hospital Epidemiology Committee, Canadian Nosocomial Infection Surveillance Program. The relationship between hospital infection surveillance and control activities and antibiotic-resistant pathogen rates. American journal of infection control. 2005 Feb 1;33(1):1-5. Available from: https://www.sciencedirect.com/science/article/abs/pii/S0196655304006054

46. Miller PJ, Farr BM, Gwaltney Jr JM. Economic benefits of an effective infection control program: case study and proposal. Reviews of infectious diseases. 1989 Mar 1;11(2):284-8. Available from: https://pubmed.ncbi.nlm.nih.gov/2704926/

47. Nguemeleu ET, Beogo I, Sia D, Kilpatrick K, Séguin C, Baillot A, Jabbour M, Parisien N, Robins S, Boivin S. Economic analysis of healthcare-associated infection prevention and control interventions in medical and surgical units: systematic review using a discounting approach. Journal of Hospital Infection. 2020 Sep 1;106(1):134-54. Available from: https://www.sciencedirect.com/science/article/pii/S0195670120303327

48. Zoutman DE, Ford BD, Gauthier J. A cross-Canada survey of infection prevention and control in long-term care facilities. American journal of infection control. 2009 Jun 1;37(5):358-63. Available from: https://www.sciencedirect.com/science/article/abs/pii/S019665530800905X

49. 49. Grinspun D, Matthews JH, Bonner R, Moreno-Casbas T, Mo J. COVID-19 pandemic in long-term care: An international perspective for policy considerations. International journal of nursing sciences. 2023 Apr 1;10(2):158-66. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10063321/

50. Betini R, Milicic S, Lawand C. The Impact of the COVID-19 pandemic on Long-Term Care in Canada. Healthcare Quarterly (Toronto, Ont.). 2021 Oct 1;24(3):13-5. Available from: https://europepmc.org/article/med/34792442

51. Flood CM, Thomas B, White K. Excellent Long-Term Care for Canadians and Federal Legislation. Healthcare Papers. 2021 Sep 1;20(1):27-33. Available from https://pubmed.ncbi.nlm.nih.gov/34792458/

52. Public Health Agency of Canada. COVID-19 Infections Among Healthcare Workers and Other People Working in Healthcare Settings. January 2021. Available from: https://www.canada.ca/content/dam/phac-aspc/documents/services/diseases/coronavirus-disease-covid-19/epidemiological-economic-research-data/infections-healthcare-workers-other-people-working-healthcare-settings/covid-19-infections-healthcare-settings-eng.pdf

53. Liu X, Pan H, Lin W, Wang M, Zhang Q. Sustainable Practices and Performance of Resource-Based Companies: The Role of Internal Control. Sustainability. 2024 Feb 7;16(4):1399. Available from: https://www.mdpi.com/2071-1050/15/22/1572858. Canada Health Act. 1985. Available from: https://laws-lois.justice.gc.ca/eng/acts/c-6/page-1.html

54. Griffiths H. Infection control and environmental sustainability: focus on practice. Frontline Gastroenterology. 2023 Nov 23. Available from: https://fg.bmj.com/content/early/2023/11/23/flgastro-2023-102475.full

55. WHO. Tonnes of COVID-19 health care waste expose urgent need to improve waste management systems. World Health Organization: Geneva, Switzerland. 2022 Feb. Available from: https://www.who.int/news/item/01-02-2022-tonnes-of-covid-19-health-care-waste-expose-urgent-need-to-improve-waste-management-systems

56. Seven tests and treatments to question in nursing: Infection prevention and control. Choosing Wisely Canada. August 2019. Available from: https://choosingwiselycanada.org/recommendation/nursing/?highlight=nursing

57. Six tests and treatments to question: Occupational Medicine. September 2021. Available at: https://choosingwiselycanada.org/recommendation/occupational-medicine/?highlight=occupational+health

58. Keil M, Viere T, Helms K, Rogowski W. The impact of switching from single-use to reusable healthcare products: a transparency checklist and systematic review of life-cycle assessments. European journal of public health. 2023 Feb 1;33(1):56-63. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9898010/

59. Parveen N, Chowdhury S, Goel S. Environmental impacts of the widespread use of chlorine-based disinfectants during the COVID-19 pandemic. Environmental Science and Pollution Research. 2022 Dec;29(57):85742-60. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8799444/

60. Cubas AL, Moecke EH, Provin AP, Dutra AR, Machado MM, Gouveia IC. The impacts of plastic waste from personal protective equipment used during the COVID-19 Pandemic. Polymers. 2023 Jul 25;15(15):3151. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10421242/

61. World Health Organization. Global report on infection prevention and control. Geneva. 2022 Available from https://iris.who.int/bitstream/handle/10665/354489/9789240051164-eng.pdf?sequence=1

62. Canada Health Act. 1985. Available from: https://laws-lois.justice.gc.ca/eng/acts/c-6/page-1.html

63. Health Canada. Canada's health care system. 2019. Available from: https://www.canada.ca/en/health-canada/services/health-care-system/reports-publications/health-care-system/canada.html

64. Accreditation Canada. Qmentum International: Assessment programs: Infection Prevention and Control Standards. 2019. Available from: https://store.accreditation.ca/collections/standards/products/infection-prevention-and-control-standards

65. Public Health Agency of Canada. Centre for Communicable Diseases and Infection Control. Routine practices and additional precautions for preventing the transmission of infection in healthcare settings. Public Health Agency of Canada.; 2013. Available from: https://www.canada.ca/en/public-health/services/publications/diseases-conditions/routine-practices-precautions-healthcare-associated-infections/part-b.html#B.I

66. Ontario Agency for Health Protection and Promotion. Provincial Infectious Diseases Advisory Committee. Best practices for infection prevention and control programs in all health care settings, 3rd edition. Toronto, ON: Queen's Printer for Ontario; May 2012. Available from: https://www.publichealthontario.ca/-/media/documents/B/2012/bp-ipac-hc-settings.pdf

67. Bubb TN, Billings C, Berriel-Cass D, Bridges W, Caffery L, Cox J, Rodriguez M, Swanson J, Titus-Hinson M. APIC professional and practice standards. American Journal of Infection Control. 2016 Jul 1;44(7):745-9. Available from: https://www.sciencedirect.com/science/article/abs/pii/S0196655316001553

68. Friedman C, Curchoe R, Foster M, Hirji Z, Krystofiak S, Lark RL, Laxson L, Ruppert MJ, Spaulding L. APIC/CHICA-Canada infection prevention, control, and epidemiology: professional and practice standards. American journal of infection control. 2008 Aug 1;36(6):385-9. Available from https://www.ajicjournal.org/article/S0196-6553(08)00460-4/fulltext

69. College of Registered Nurses of British Columbia. Professional Standards: Introduction. 2024. Available from https://www.bccnm.ca/RN/ProfessionalStandards/Pages/Introduction.aspx

70. Bryce EA, Scharf S, Walker M, Walsh A. The infection control audit: the standardized audit as a tool for change. American journal of infection control. 2007 May 1;35(4):271-83. Available from https://www.sciencedirect.com/science/article/pii/S0196655306010121

71. Melinkovich P, Hammer A, Staudenmaier A, Berg M. Improving pediatric immunization rates in a safety-net delivery system. The Joint Commission Journal on Quality and Patient Safety. 2007 Apr 1;33(4):205-10. Available from https://www.sciencedirect.com/science/article/abs/pii/S1553725007330249

72. Bialachowski A, Clinker K, LeBlanc M, McDonald S. The audit process: part I pre-audit preparation. Canadian Journal of Infection Control. 2010 Mar 1;25(1). Available from https://pubmed.ncbi.nlm.nih.gov/20469658/

73. Millward S. P17. 31 Using Infection Control (IC) Link Practitioners to audit IC standards in the Independent Healthcare sector and provide robust evidence of practice. Journal of Hospital Infection. 2006(64):S91. Available from https://journals.scholarsportal.info/details/01956701/v64inone_s1/s91_puiclpapreop.xml

74. Millward S, Barnett J, Thomlinson D. A clinical infection control audit programme: evaluation of an audit tool used by infection control nurses to monitor standards and assess effective staff training. Journal of hospital infection. 1993 Jul 1;24(3):219-32. Available from https://www.sciencedirect.com/science/article/abs/pii/019567019390051Z

75. Sawyer M, Weeks K, Goeschel CA, Thompson DA, Berenholtz SM, Marsteller JA, Lubomski LH, Cosgrove SE, Winters BD, Murphy DJ, Bauer LC. Using evidence, rigorous measurement, and collaboration to eliminate central catheter-associated bloodstream infections. Critical care medicine. 2010 Aug 1;38:S292-8. Available from https://journals.lww.com/ccmjournal/abstract/2010/08001/using_evidence,_rigorous_measurement,_and.4.aspx

76. Auditor General. Report of the Auditor General of Alberta. July. Available from https://www. oag. ab. ca/webfiles/reports/OAG% 20March. 2015 Mar;20:2015.

77. Seto WH, Otaíza F, Pessoa-Silva CL. Core components for infection prevention and control programs: a World Health Organization network report. Infection Control & Hospital Epidemiology. 2010 Sep;31(9):948-50. Available from https://pubmed.ncbi.nlm.nih.gov/20636135/

78. Houghton C, Meskell P, Delaney H, et al. Barriers and facilitators to healthcare workers' adherence with infection prevention and control (IPC) guidelines for respiratory infectious diseases: a rapid qualitative evidence synthesis. Cochrane Database Syst Rev. 2020;4(4):CD013582. doi:10.1002/14651858.CD013582

79. Brannigan ET, Murray E, Holmes A. Where does infection control fit into a hospital management structure? Journal of Hospital Infection. 2009 Dec 1;73(4):392-6. Available from: https://www.sciencedirect.com/science/article/abs/pii/S019567010900185651

80. Griffiths P, Renz A, Hughes J, Rafferty AM. Impact of organisation and ISQ management factors on infection control in hospitals: a scoping review. Journal of Hospital Infection. 2009 Sep 1;73(1):1-4. Available from https://www.sciencedirect.com/science/article/abs/pii/S0195670109001972

81. Jarvis WR. The United States approach to strategies in the battle against healthcare-associated infections, 2006: transitioning from benchmarking to zero tolerance and clinician accountability. Journal of Hospital Infection. 2007 Jun 1;65:3-9. Available from https://www.sciencedirect.com/science/article/abs/pii/S019567010760005X

82. Vandijck D, Cleemput I, Hellings J, Vogelaers D. Infection prevention and control strategies in the era of limited resources and quality improvement: a perspective paper. Australian Critical Care. 2013 Nov 1;26(4):154-7. Available from https://www.sciencedirect.com/science/article/abs/pii/S1036731413001604

83. Healthcare Excellence Canada. Effective governance for quality and patient safety. n.d. Available from: https://www.patientsafetyinstitute.ca/en/toolsResources/GovernancePatientSafety/Pages/default.aspx

84. Haque M, Sartelli M, McKimm J, Bakar MA. Health care-associated infections–an overview. Infection and drug resistance. 2018 Nov 11:2321-33. Available from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6245375/

85. Weaver SJ, Lubomksi LH, Wilson RF, Pfoh ER, Martinez KA, Dy SM. Promoting a culture of safety as a patient safety strategy: a systematic review. Annals of internal medicine. 2013 Mar 5;158(5_Part_2):369-74. Available from: https://www.acpjournals.org/doi/full/10.7326/0003-4819-158-5-201303051-00002

86. WHO. Patient safety. 2023. Available from: https://www.who.int/news-room/fact-sheets/detail/patient-safety

87. Braun BI, Chitavi SO, Suzuki H, Soyemi CA, Puig-Asensio M. Culture of safety: impact on improvement in infection prevention process and outcomes. Current infectious disease reports. 2020 Dec;22:1-41. Available from: https://link.springer.com/article/10.1007/s11908-020-00741-y

88. Bombard Y, Baker GR, Orlando E, Fancott C, Bhatia P, Casalino S, Onate K, Denis JL, Pomey MP. Engaging patients to improve quality of care: a systematic review. Implementation Science. 2018 Dec;13:1-22. Available from: https://link.springer.com/article/10.1186/s13012-018-0784-z

89. Kossek E, Lewis S, Hammer LB. Work—life initiatives and organizational change: Overcoming mixed messages to move from the margin to the mainstream. Human relations. 2010 Jan;63(1):3-19. Available from: https://journals.sagepub.com/doi/abs/10.1177/0018726709352385

90. Canadian Standards Association. CAN/CSA-Z1003-13/BNQ 9700-803/2013 (R2022), Psychological health and safety in the workplace. Available from: https://www.csagroup.org/article/can-csa-z1003-13-bnq-9700-803-2013-r2022-psychological-health-and-safety-in-the-workplace/

91. Harrington B. 2015 Moving work life forward: Increasing our relevance and impact. Boston College. N.d. Available from: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwj-ib3ypf2DAxUNg2oFHQDFCi8QFnoECBgQAQ&url=https%3A%2F%2Fwww.bc.edu%2Fcontent%2Fdam%2Ffiles%2Fcenters%2Fcwf%2Fresearch%2Fpublications%2Fresearchreports%2FMoving%2520Work-Life%2520Forward_Increasing%2520our%2520Relevance%2520and%2520Impact&usg=AOvVaw3N1H9gc3FWHXpytFcoPR4t&opi=89978449

92. Stoewen DL. Wellness at work: Building healthy workplaces. The Canadian veterinary journal. 2016 Nov;57(11):1188. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5081153/

93. Edmondson A. Psychological safety and learning behavior in work teams. Administrative science quarterly. 1999 Jun;44(2):350-83. Available from: https://journals.sagepub.com/doi/abs/10.2307/2666999

94. Harvey JF, Johnson KJ, Roloff KS, Edmondson AC. From orientation to behavior: The interplay between learning orientation, open-mindedness, and psychological safety in team learning. Human Relations. 2019 Nov;72(11):1726-51. Available from: https://journals.sagepub.com/doi/abs/10.1177/0018726718817812

95. Delizonna L. High-performing teams need psychological safety. Here's how to create it. Harvard Business Review. 2017 Aug 24;8:1-5. Available from: https://duxlex.com/wp-content/uploads/2020/10/High-Performing-Teams-Need-Psychological-Safety.-Heres-How-to-Create-It.pdf

96. Saint S, Kowalski CP, Banaszak-Holl J, Forman J, Damschroder L, Krein SL. The importance of leadership in preventing healthcare-associated infection: results of a multisite qualitative study. Infection Control & Hospital Epidemiology. 2010 Sep;31(9):901-7. Available from https://pubmed.ncbi.nlm.nih.gov/20658939/

97. Topea J, Brand C, Roberts C. A national stakeholder review of Australian infection control programs. 2008. Available from https://www.researchgate.net/profile/Joanne-Tropea/publication/237278813_A_national_stakeholder_review_of_Australian_infection_control_programs/links/56eccbb208aea35d5b985b5f/A-national-stakeholder-review-of-Australian-infection-control-programs.pdf

98. Freedman DB. Clinical governance—bridging management and clinical approaches to quality in the UK. Clinica chimica acta. 2002 May 21;319(2):133-41. Available from https://www.sciencedirect.com/science/article/abs/pii/S0009898102000347

99. National Institute for Health and Clinical Excellence (NICE). Infection prevention and control. Quality improvement guide. 2019. Available from https://www.nice.org.uk/guidance/ph36

100. Canadian Institute for Health Information. Patient harm in Canadian hospitals? It does happen. 2023. Available from https://www.cihi.ca/en/patient-harm-in-canadian-hospitals-it-does-happen.

101. Healthcare Excellence Canada. Resources. 2024. Available from: https://www.healthcareexcellence.ca/en/resources/

102. Denham CR, Angood P, Berwick D, Binder L, Clancy CM, Corrigan JM, Hunt D. The chasing zero department: making idealized design a reality. Journal of Patient Safety. 2009 Dec 1:210-5. Available from https://www.jstor.org/stable/26636617

103. Zoutman DE, Ford BD. A comparison of infection control program resources, activities, and antibiotic resistant organism rates in Canadian acute care hospitals in 1999 and 2005: pre- and post-severe acute respiratory syndrome. American journal of infection control. 2008 Dec 1;36(10):711-7. Available from https://www.sciencedirect.com/science/article/pii/S0196655308005543

104. Morton A. Hospital safety and hospital acquired infection. Australian Infection Control. 2006 Mar 1;11(1):3-5. Available from https://www.sciencedirect.com/science/article/abs/pii/S1329936016300517

105. Smith PW, Bennett G, Bradley S, Drinka P, Lautenbach E, Marx J, Mody L, Nicolle L, Stevenson K. SHEA/APIC guideline: infection prevention and control in the long-term care facility. Infection Control & Hospital Epidemiology. 2008 Sep;29(9):785-814. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3319407/

106. Ontario Ministry of Long-Term Care. Infection prevention and control (IPAC) standard for long-term care homes. 2022. Available from: https://ltchomes.net/LTCHPORTAL/Content/12.%20IPAC%20Standard%20-%20EN.pdf

107. Lautenbach E, Woeltje K, Malani P, Society of Healthcare Epidemiology of America. Informatics for infection prevention. In Practical healthcare epidemiology. 3rd ed. Woeltje K, editor. Chicago: University of Chicago Press; 2010.

108. Woeltje KF. Moving into the future: electronic surveillance for healthcare-associated infections. Journal of Hospital Infection. 2013 Jun 1;84(2):103-5. Available from https://www.journalofhospitalinfection.com/article/S0195-6701(13)00129-1/fulltext

109. Alberta Employment and Immigration. Audit Instrument Package. 2009. Available from http://www.mtpinnacle.com/pdfs/WHS-PS_audinst.pdf

110. Pogorzelska-Maziarz M, Gilmartin H, Reese S. Infection prevention staffing and resources in US acute care hospitals: results from the APIC MegaSurvey. American Journal of Infection Control. 2018 Aug 1;46(8):852-7. Available from: https://www.ajicjournal.org/article/S0196-6553(18)30428-0/fulltext

111. Mitchell BG, Hall L, MacBeth D, Gardner A, Halton K. Hospital infection control units: staffing, costs, and priorities. American Journal of Infection Control. 2015 Jun 1;43(6):612-6. Available from: https://www.sciencedirect.com/science/article/abs/pii/S0196655315001121

112. Knighton SC, Engle J, Berkson J, Bartles R. A narrative review of how infection preventionist (IP) staffing and outcome metrics are assessed by health care organizations and factors to consider. American Journal of Infection Control. 2023 Nov 16. Available from: https://www.sciencedirect.com/science/article/pii/S0196655323004984

113. Bartles R, Dickson A, Babade O. A systematic approach to quantifying infection prevention staffing and coverage needs. American journal of infection control. 2018 May 1;46(5):487-91. Available from: https://www.sciencedirect.com/science/article/abs/pii/S0196655317312300

114. Crnich CJ. Reimagining infection control in US nursing homes in the era of COVID-19. Journal of the American Medical Directors Association. 2022 Dec 1;23(12):1909-15.

115. IPAC Canada. Core competencies for infection prevention and control professionals (ICPs). Updated consensus document. September 2022. Available from https://ipac-canada.org/photos/custom/pdf/IPAC_CoreCompetencies_ICPs_2022_revised.pdf

116. Benner P. From novice to expert. AJN The American Journal of Nursing. 1982 Mar 1;82(3):402-7.

117. Bush K, Leal J, Acorn L, Cordoviz M, Cundict F, Devine A, Edwards CL, Fletcher P, Gable Y, Gagnon H, Gallinger S. Developing a competency framework for all staff roles in an infection prevention and control program. Canadian Journal of Infection Control/Revue Canadienne de Prévention des Infections. 2022 Dec 1;37(4). Available from https://openurl.ebsco.com/EPDB%3Agcd%3A11%3A10881643/detailv2?sid=ebsco%3Aplink%3Ascholar&id=ebsco%3Agcd%3A161807408&crl=c

118. Infection Prevention and Control Canada. IPAC Canada Statement on Certification. 2023. Available from: https://ipac-canada.org/infection-control-certification

119. Madeo M, Owen E, Baruah J. The management of Clostridium difficile infection: using small-scale audit to indicate the knowledge of nursing and medical staff in an acute hospital setting. British Journal of Infection Control. 2008 May;9(3):12-7. Available from https://journals.sagepub.com/doi/abs/10.1177/1469044607089620

120. Ellis S. Role of emergency nurses in controlling infection. Emergency Nurse. 2012 Dec 6;20(8). Available from https://journals.rcni.com/emergency-nurse/role-of-emergency-nurses-in-controlling-infection-en2012.12.20.8.16.c9479

121. Aziz AM. Can education and training for domestic staff increase awareness of infection control practices and improve cleanliness within hospitals? Journal of Infection Prevention. 2009 Sep;10(5):171-7. Available from https://journals.sagepub.com/doi/abs/10.1177/1757177409106778

122. Holliday AJ, Murdoch S. Nursing homes infection control audit. Health Bulletin. 2001 Nov 1;59(6):356-63. Available from https://europepmc.org/article/med/12661385

123. Southworth SL, Henman LJ, Kinder LA, Sell JL. The journey to zero central catheter–associated bloodstream infections: culture change in an intensive care unit. Critical Care Nurse. 2012 Apr 1;32(2):49-54. Available from: https://aacnjournals.org/ccnonline/article-abstract/32/2/49/20418/The-Journey-to-Zero-Central-Catheter-Associated?redirectedFrom=fulltext

124. Pincock T, Bernstein P, Warthman S, Holst E. Bundling hand hygiene interventions and measurement to decrease health care-associated infections. Am J Infect Control. 2012 May;40(4 Suppl 1):S18-27.

125. Duffy J, Sievert D, Rebmann C, Kainer M, Lynfield R, Smith P, et al. Effective state-based surveillance for multidrug-resistant organisms related to health care-associated infections. Public health reports. 2011 Mar-Apr;126(2):176-85. Available from: https://pubmed.ncbi.nlm.nih.gov/21387947/

126. Jain M, Miller L, Belt D, King D, Berwick DM. Decline in ICU adverse events, nosocomial infections and cost through a quality improvement initiative focusing on teamwork and culture change. Quality & safety in health care. 2006 Aug;15(4):235-9.

127. The Association for Professionals in Infection Control and Epidemiology (APIC) and Infection Prevention and Control Canada (IPAC Canada). Ethical Infection Prevention and Control (EIPAC) Decision-Making Framework. May 2024. Available from: https://ipac-canada.org/photos/custom/Members/pdf/2024-03-EthicsFramework-FINAL.pdf

128. Burnett E. Outcome competences for practitioners in infection prevention and control: infection Prevention Society and Competency Steering Group. Journal of Infection Prevention. 2011 Mar;12(2):67-90. Available from https://journals.sagepub.com/doi/pdf/10.1177/1757177410395797

129. National Institute for Healthcare Excellence (NICE). Quality standard: Infection prevention and control. [QS61] 6: Educating people about infection prevention and control. 17 April 2014. Available from https://www.nice.org.uk/guidance/qs61/chapter/quality-statement-6-educating-people-about-infection-prevention-and-control

130. Kuhar DT, Carrico RM, Cox K, de Perio MA, Irwin KL, Lundstrom T, Overholt AD, Roberts KT, Russi M, Steed C, Sen S. Infection control in healthcare personnel: infrastructure and routine practices for occupational infection prevention and control services. October 2019. Available from: https://stacks.cdc.gov/view/cdc/82043

131. Government of Canada. National Advisory Committee on Immunization (NACI): Statements and publications. Available from: https://www.canada.ca/en/public-health/services/immunization/national-advisory-committee-on-immunization-naci.html

132. Gruben V, Siemieniuk RA, McGeer A. Health care workers, mandatory influenza vaccination policies and the law. CMAJ. 2014 Oct 7;186(14):1076-80. Available from: https://www.cmaj.ca/content/186/14/1076.short

133. Transport Canada. Transportation of dangerous goods act. Available from https://laws-lois.justice.gc.ca/eng/acts/t-19.01/

134. Canadian Standards Association. Z317.10-21. Handling of health care waste materials. Rexdale, Ont. Canadian Standards Association; 2021. Available from https://www.csagroup.org/store/product/CSA%20Z317.10%3A21/

135. Ontario. Occupational health and safety act. Ontario Regulation 474/07. Needle Safety. 2022. Available from https://www.ontario.ca/laws/regulation/070474

136. Ontario Agency for Health Protection and Promotion, Provincial Infectious Diseases Advisory Committee. Routine Practices and Additional Precautions in All Health Care Settings. 3rd edition. Toronto, ON: Queen's Printer for Ontario; November 2012. Available from https://www.publichealthontario.ca/-/media/Documents/B/2012/bp-rpap-healthcare-settings.pdf?rev=97a9a0d61f7848e3bc721a119a0f8f63&sc_lang=en

137. Canadian Standards Association. CAN/CSA Z94.4-18. Selection, use, and care of respirators: Occupational health & safety. Toronto. 2018. Available from https://www.csagroup.org/store/product/2701639/

138. Pessoa-Silva CL, Posfay-Barbe K, Pfister R, Touveneau S, Perneger TV, Pittet D. Attitudes and perceptions toward hand hygiene among healthcare workers caring for critically ill neonates. Infection Control & Hospital Epidemiology. 2005 Mar;26(3):305-11. Available from https://pubmed.ncbi.nlm.nih.gov/15796285/

139. Lankford MG, Zembower TR, Trick WE, Hacek DM, Noskin GA, Peterson LR. Influence of role models and hospital design on the hand hygiene of health-care workers. Emerging infectious diseases. 2003 Feb;9(2):217. Available from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2901948/

140. Whitby M, Pessoa-Silva CL, McLaws ML, Allegranzi B, Sax H, Larson E, Seto WH, Donaldson L, Pittet D. Behavioural considerations for hand hygiene practices: the basic building blocks. Journal of Hospital Infection. 2007 Jan 1;65(1):1-8. Available from https://www.sciencedirect.com/science/article/abs/pii/S0195670106004634

141. Damschroder LJ, Banaszak-Holl J, Kowalski CP, Forman J, Saint S, Krein SL. The role of the "champion" in infection prevention: results from a multisite qualitative study. Quality & safety in health care. 2009 Dec 1;18(6):434. Available from https://pubmed.ncbi.nlm.nih.gov/19955453/

142. Cole M. Patient safety and healthcare-associated infection. British Journal of Nursing. 2011 Sep 21;20(17):1122-6. Available from https://www.magonlinelibrary.com/doi/abs/10.12968/bjon.2011.20.17.1122

143. The International Society for Quality in Health Care (ISQua). International Accreditation Standards for Healthcare External Evaluation Organisations. 2022. Available from https://ieea.ch/

144. Tromp M, Huis A, de Guchteneire I, van der Meer J, van Achterberg T, Hulscher M, Bleeker-Rovers C. The short-term and long-term effectiveness of a multidisciplinary hand hygiene improvement program. American journal of infection control. 2012 Oct 1;40(8):732-6. Available from https://www.sciencedirect.com/science/article/abs/pii/S0196655311012429

145. World Health Organization. WHO guidelines on hand hygiene in health care. World Health Organization; 2009. Available from https://iris.who.int/bitstream/handle/10665/44102/978?sequence=1

146. Larson EL, Early E, Cloonan P, Sugrue S, Parides M. An organizational climate intervention associated with increased handwashing and decreased nosocomial infections. Behavioral Medicine. 2000 Jan 1;26(1):14-22. Available from https://www.tandfonline.com/doi/abs/10.1080/08964280009595749

147. Pittet D. The Lowbury lecture: behaviour in infection control. Journal of hospital infection. 2004 Sep 1;58(1):1-3. Available from https://www.sciencedirect.com/science/article/abs/pii/S0195670104002282

148. Bearman G, Stevens MP. Pushing beyond resistors and constipators: implementation considerations for infection prevention best practices. Current infectious disease reports. 2014 Jan;16:1-7. Available from https://link.springer.com/article/10.1007/s11908-013-0388-3

149. 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. Infection Control & Hospital Epidemiology. 2002 Dec;23(S12):S3-40. Available from https://pubmed.ncbi.nlm.nih.gov/12418624/

150. White CM, Statile AM, Conway PH, Schoettker PJ, Solan LG, Unaka NI, Vidwan N, Warrick SD, Yau C, Connelly BL. Utilizing improvement science methods to improve physician compliance with proper hand hygiene. Pediatrics. 2012 Apr 1;129(4):e1042-50. Available from https://publications.aap.org/pediatrics/article-abstract/129/4/e1042/32371/Utilizing-Improvement-Science-Methods-to-Improve

151. Conly JM, Hill S, Ross J, Lertzman J, Louie TJ. Handwashing practices in an intensive care unit: the effects of an educational program and its relationship to infection rates. American Journal of Infection Control. 1989 Dec 1;17(6):330-9. Available from https://www.sciencedirect.com/science/article/abs/pii/0196655389900023

152. Kenneley I. APIC Text. Chapter 3: Education and training. 2014. Online. Available from https://text.apic.org/toc/overview-of-infection-prevention-programs/education-and-training

153. Mayhall CG. Hospital epidemiology and infection control. 4th ed. Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins; 2012.

154. Bryant KA, Harris AD, Gould CV, Humphreys E, Lundstrom T, Murphy DM, Olmsted R, Oriola S, Zerr D. Necessary infrastructure of infection prevention and healthcare epidemiology programs: a review. infection control & hospital epidemiology. 2016 Apr;37(4):371-80. Available from: https://pubmed.ncbi.nlm.nih.gov/26832072/

155. Lopes H, McKay V. Adult learning and education as a tool to contain pandemics: The COVID-19 experience. International review of education. 2020 Aug;66(4):575-602. Available from: https://link.springer.com/article/10.1007/s11159-020-09843-0

156. Chiarelli L, Edwards P. Building healthy public policy. Canadian Journal of Public Health/Revue Canadienne de Santé Publique. 2006 May 1:S37-42. Available from https://www.jstor.org/stable/41995826

157. U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. (2015). Health Literacy Online: A guide to simplifying the user experience. Available from https://health.gov/healthliteracyonline/

158. Poitras ME, Bélanger E, Vaillancourt VT, Kienlin S, Körner M, Godbout I, Bernard-Hamel J, O'Connor S, Blanchette P, Khadhraoui L, Sawadogo J. Interventions to improve trainers' learning and behaviors for educating health care professionals using train-the-trainer method: A systematic review and meta-analysis. Journal of Continuing Education in the Health Professions. 2021 Jul 1;41(3):202-9. Available from: https://journals.lww.com/jcehp/abstract/2021/04130/interventions_to_improve_trainers__learning_and.8.aspx

159. Ontario Agency for Health Protection and Promotion (Public Health Ontario), Provincial Infectious Diseases Advisory Committee. Best practices for surveillance of health care-associated infections in patient and resident populations. 3rd ed. Toronto, ON: Queen's Printer for Ontario; 2014. Available from https://www.publichealthontario.ca/-/media/documents/b/2014/bp-hai-surveillance.pdf

160. Ahuja S, Peiffer-Smadja N, Peven K, White M, Leather AJ, Singh S, Mendelson M, Holmes A, Birgand G, Sevdalis N. Use of feedback data to reduce surgical site infections and optimize antibiotic use in surgery: a systematic scoping review. Annals of surgery. 2022 Feb 1;275(2):e345-52. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8746888/

161. Public Health Agency of Canada: Canadian Nosocomial Infection Surveillance Program. Surveillance definitions. Available from: https://ipac-canada.org/cnisp-publications#:~:text=The%20Canadian%20Nosocomial%20Infection%20Surveillance,Infection%20Control%20(CCDIC)%20of%20the

162. Centers for Disease Control and Prevention (CDC). CDC/NHSN surveillance definitions for specific types of infections. 2024. Available from https://www.cdc.gov/nhsn/pdfs/pscmanual/17pscnosinfdef_current.pdf

163. Happe J, Agnihotri N, Clark J, Conrod D, Duran K, Elford BA, Ferenc S, Gable Y, Gambeta K, Giese D, Johnson R. Surveillance definitions for infections in Canadian long-term care homes: 2023 update. Canadian Journal of Infection Control. 2023 Jun 1;38(43):139-46. Available from https://www.cjic.ca/images/Surveillance_definitions_for_infections_in_Canadian_long-term_care_homes-_2023_update.pdf

164. MUMS Health. Anti-infective Review Panel. 2019. Anti-infective guidelines for community-acquired infections. Available from https://www.mumshealth.com/guidelines-tools/anti-infective

165. Mant J. Process versus outcome indicators in the assessment of quality of health care. International journal for quality in health care. 2001 Dec 1;13(6):475-80. Available from https://academic.oup.com/intqhc/article/13/6/475/1807682?login=false

166. Ontario Health. Reporting and data. Available from https://www.ontariohealth.ca/public-reporting

167. Health Canada. Healthcare acquired infections currently under surveillance. Available from https://www.canada.ca/en/public-health/services/infectious-diseases/nosocomial-occupational-infections/healthcare-acquired-infections-currently-under-surveillance.html

168. CDC. National Healthcare Safety Network (NHSN). Reports. Available from http://www.cdc.gov/nhsn/datastat/index.html

169. The Canadian Nosocomial Infection Surveillance Program. Health InfoBase. Available from: https://health-infobase.canada.ca/cnisp/index.html

170. IPAC Canada. Long-term care surveillance toolkit. 2023 Update. Available from https://ipac-canada.org/photos/custom/Members/pdf/IPAC_LTCSurveillanceToolkit2023Update_Sept2023.pdf

171. WHO. Minimum requirements for infection prevention and control. Geneva: World Health Organization. 2019. Available from: https://iris.who.int/bitstream/handle/10665/330080/9789241516945-eng.pdf?sequence=1

172. Åhlin P, Almström P, Wänström C. When patients get stuck: a systematic literature review on throughput barriers in hospital-wide patient processes. Health Policy. 2022 Feb 1;126(2):87-98.

173. Health Canada. COVID-19: Guidance on indoor ventilation during the pandemic. 2022. Available from https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/guide-indoor-ventilation-covid-19-pandemic.html

174. Harrison M, Lancaster K, Rhodes T. The fluid hospital: On the making of care environments in COVID-19. Health & Place. 2023 Sep 1;83:103107. Available from: https://www.sciencedirect.com/science/article/pii/S1353829223001442

175. Capolongo S, Gola M, Brambilla A, Morganti A, Mosca EI, Barach P. COVID-19 and healthcare facilities: a decalogue of design strategies for resilient hospitals. Acta Bio Medica: Atenei Parmensis. 2020;91(9-S):50. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8023092/

176. Government of Canada. Health portfolio emergency response plan. 2023. Available from https://www.canada.ca/en/public-health/services/publications/health-risks-safety/health-portfolio-emergency-response-plan.html

177. Government of Canada. Canadian Centre for Occupational Health and Safety. Health and safety programs - Emergency planning. June 2023. Available from https://www.ccohs.ca/oshanswers/hsprograms/planning.html

178. WHO. A checklist for respiratory pathogen pandemic preparedness planning. 2023. Available from https://www.who.int/publications/i/item/9789240084513

179. Public Health Ontario. Emergency preparedness. Available from: https://www.publichealthontario.ca/en/Health-Topics/Emergency-Preparedness

180. Government of Canada. Canadian pandemic influenza preparedness: Planning guidance for the health sector. 2018. Available from: https://www.canada.ca/en/public-health/services/flu-influenza/canadian-pandemic-influenza-preparedness-planning-guidance-health-sector.html

181. Public Health Agency of Canada. The Canadian pandemic influenza plan for the health sector. Annex F: Prevention and control of influenza during a pandemic for all healthcare settings. 2011. Available from https://www.canada.ca/content/dam/phac-aspc/migration/phac-aspc/cpip-pclcpi/assets/pdf/ann-f-eng.pdf

182. Rebmann T, English JF, Carrico R. Disaster preparedness lessons learned and future directions for education: results from focus groups conducted at the 2006 APIC Conference. American journal of infection control. 2007 Aug 1;35(6):374-81. Available from https://www.sciencedirect.com/science/article/pii/S0196655306012363

183. Rebmann T, 2008 APIC Emergency Preparedness Committee. APIC State-of-the-art Report: The role of the infection preventionist in emergency management. American Journal of Infection Control. 2009 May 1;37(4):271-81. Available from https://www.sciencedirect.com/science/article/pii/S0196655309000455

184. Apisarnthanarak A, Mundy LM, Khawcharoenporn T, Mayhall CG. Hospital infection prevention and control issues relevant to extensive floods. Infection Control & Hospital Epidemiology. 2013 Feb;34(2):200-6. Available from https://pubmed.ncbi.nlm.nih.gov/23295568/

185. Naylor CD, Chantler C, Griffiths S. Learning from SARS in Hong Kong and Toronto. Jama. 2004 May 26;291(20):2483-7. Available from https://jamanetwork.com/journals/jama/article-abstract/198780

186. CDC. Personal Protective Equipment Use Tracking Tools. PPE burn rate calculator. May 2023. Available from https://www.cdc.gov/niosh/topics/pandemic/ppe.html

187. Lawton RM, Fridkin SK, Gaynes RP, McGowan JE. Practices to improve antimicrobial use at 47 US hospitals the status of the 1997 SHEA/IDSA position paper recommendations. Infection Control & Hospital Epidemiology. 2000 Apr;21(4):256-9. Available from https://pubmed.ncbi.nlm.nih.gov/10782587/

188. Nowak MA, Nelson RE, Breidenbach JL, Thompson PA, Carson PJ. Clinical and economic outcomes of a prospective antimicrobial stewardship program. American Journal of Health-System Pharmacy. 2012 Sep 1;69(17):1500-8. Available from https://academic.oup.com/ajhp/article-abstract/69/17/1500/5111997?login=false

189. Drew RH. Antimicrobial stewardship programs: how to start and steer a successful program. Journal of Managed Care Pharmacy. 2009 Mar;15(2 Supp A):18-23. Available from https://www.jmcp.org/doi/abs/10.18553/jmcp.2009.15.s2.18

190. Barlam TF, Cosgrove SE, Abbo LM, MacDougall C, Schuetz AN, Septimus EJ, Srinivasan A, Dellit TH, Falck-Ytter YT, Fishman NO, Hamilton CW. Implementing an antibiotic stewardship program: guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America. Clinical infectious diseases. 2016 May 15;62(10):e51-77. Available from: https://academic.oup.com/cid/article/62/10/e51/2462846

191. Wu JH, Langford BJ, Daneman N, Friedrich JO, Garber G. Antimicrobial stewardship programs in long-term care settings: a meta-analysis and systematic review. Journal of the American Geriatrics Society. 2019 Feb;67(2):392-9. Available from: https://agsjournals.onlinelibrary.wiley.com/doi/full/10.1111/jgs.15675

192. Marcelin JR, Chung P, Van Schooneveld TC. Antimicrobial stewardship in the outpatient setting: A review and proposed framework. Infection Control & Hospital Epidemiology. 2020 Jul;41(7):833-40. Available from: https://pubmed.ncbi.nlm.nih.gov/32342826/

193. Moody J, Cosgrove SE, Olmsted R, Septimus E, Aureden K, Oriola S, Patel GW, Trivedi KK. Antimicrobial stewardship: a collaborative partnership between infection preventionists and healthcare epidemiologists. Infection Control & Hospital Epidemiology. 2012 Apr;33(4):328-30. Available from https://pubmed.ncbi.nlm.nih.gov/22381221/

194. Baur D, Gladstone BP, Burkert F, Carrara E, Foschi F, Döbele S, Tacconelli E. Effect of antibiotic stewardship on the incidence of infection and colonisation with antibiotic-resistant bacteria and Clostridium difficile infection: a systematic review and meta-analysis. The Lancet Infectious Diseases. 2017 Sep 1;17(9):990-1001. Available from: https://pubmed.ncbi.nlm.nih.gov/28629876/

195. McNeil V, Cruickshank M, Duguid M. Safer use of antimicrobials in hospitals: the value of antimicrobial usage data. Medical journal of Australia. 2010 Oct;193:S114-7. Available from: https://pubmed.ncbi.nlm.nih.gov/20955139/

196. Australasian College for Infection Prevention and Control. Position Statement: The role of the infection control practitioner in antimicrobial stewardship. Brisbane, Qld. 2017. Available from https://www.acipc.org.au/wp-content/uploads/2017/07/20170622_ACIPC_Position_Statement-_AMS_-Final.pdf

197. Morris AM, Rennert-May E, Dalton B, Daneman N, Dresser L, Fanella S, Grant J, Keynan Y, Le Saux N, McDonald J, Shevchuk Y. Rationale and development of a business case for antimicrobial stewardship programs in acute care hospital settings. Antimicrobial Resistance & Infection Control. 2018 Dec;7(1):1-6. Available from: https://aricjournal.biomedcentral.com/articles/10.1186/s13756-018-0396-z

198. Leung V, Langford BJ, Ha R, Schwartz KL. Metrics for evaluating antibiotic use and prescribing in outpatient settings. JAC-Antimicrobial Resistance. 2021 Sep 1;3(3):dlab098. Available from: https://academic.oup.com/jacamr/article/3/3/dlab098/6323557

199. Sanchez GV, Fleming-Dutra KE, Roberts RM, Hicks LA. Core elements of outpatient antibiotic stewardship. Morbidity and Mortality Weekly Report: Recommendations and Reports. 2016 Nov 11;65(6):1-2.Core elements of outpatient antibiotic stewardship. Available from: https://www.jstor.org/stable/24904408

200. Cornish NE. The role of the laboratory in diagnostic and antibiotic stewardship: Introduction. Available from: https://www.cdc.gov/cliac/docs/november-2023/13_Intro_LDandAS.pdf

201. Patterson JE, Hardin TC, Kelly CA, Garcia RC, Jorgensen JH. Association of antibiotic utilization measures and control of multiple-drug resistance in Klebsiella pneumoniae. Infection Control & Hospital Epidemiology. 2000 Jul;21(7):455-8. Available from https://pubmed.ncbi.nlm.nih.gov/10926395/

202. CDC. Core elements of antibiotic stewardship for nursing homes. 2021. Available from: https://www.cdc.gov/antibiotic-use/core-elements/nursing-homes.html

203. Olans RN, Olans RD, DeMaria Jr A. The critical role of the staff nurse in antimicrobial stewardship—unrecognized, but already there. Clinical Infectious Diseases. 2016 Jan 1;62(1):84-9. Available from: https://academic.oup.com/cid/article/62/1/84/2462624

204. Van Huizen P, Kuhn L, Russo PL, Connell CJ. The nurses' role in antimicrobial stewardship: a scoping review. International journal of nursing studies. 2021 Jan 1;113:103772.Available from: https://www.sciencedirect.com/science/article/abs/pii/S0020748920302583

205. Gotterson F, Buising K, Manias E. Nurse role and contribution to antimicrobial stewardship: an integrative review. International journal of nursing studies. 2021 May 1;117:103787. Available from: https://www.sciencedirect.com/science/article/abs/pii/S002074892030273X

206. Canadian Nurses Association. Antimicrobial stewardship competencies: A Pan-Canadian framework for nurses. 2023. Available from: https://cna.informz.ca/cna/pages/AMS_framework_landing_page

207. Public Health Agency of Canada. Hand hygiene practices in healthcare settings. Centre for Communicable Diseases and Infection Control. Ottawa. 2012. Available from https://publications.gc.ca/collections/collection_2012/aspc-phac/HP40-74-2012-eng.pdf

208. Ontario Agency for Health Protection and Promotion (Public Health Ontario), Provincial Infectious Diseases Advisory Committee. Best Practices for Hand Hygiene in All Health Care Settings. 4th ed. Toronto, ON: Queen's Printer for Ontario; January 2014. Available from https://www.publichealthontario.ca/-/media/documents/B/2014/bp-hand-hygiene.pdf

209. World Health Organization. Hand hygiene in outpatient and home-based care and long-term care facilities: a guide to the application of the WHO multimodal hand hygiene improvement strategy and the "My Five Moments For Hand Hygiene" approach. Available from https://www.who.int/publications/i/item/9789241503372

210. IPAC Canada. Practice Recommendations: Hand hygiene in healthcare settings. October 2022. Available from: https://ipac-canada.org/photos/custom https://www.who.int/publications/i/item/9789241503372/Members/pdf/22Nov11_Hand%20Hygiene_Practice%20Recommendation.pdf

211. Public Health Ontario. Just clean your hands: Hand care program. N.d. Available from: https://www.publichealthontario.ca/-/media/documents/j/2009/jcyh-hand-care-program.pdf?la=en

212. Grys CA. Evidence-based practice, quality improvement, and research: A visual model. Nursing2022. 2022 Nov 1;52(11):47-9. Available from: https://pubmed.ncbi.nlm.nih.gov/36259907/

213. Adams D. Quality improvement; part 1: introduction and overview. BJA education. 2018 Mar;18(3):89. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7807853/

214. Flanagan P. Current standards for infection control: audit assures compliance. British Journal of Nursing. 2009 Sep 10;18(16):970-5. Available from https://www.magonlinelibrary.com/doi/abs/10.12968/bjon.2009.18.16.43963

215. Ward KA. Education and infection control audit. Journal of Hospital Infection. 1995 Jun 1;30:248-52. Available from https://www.sciencedirect.com/science/article/abs/pii/0195670195900268

216. Sehulster L, Chinn RY; CDC, HICPAC. Guidelines for environmental infection control in health-care facilities. Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC). MMWR Recomm Rep. 2003;52(RR-10):1-42. Available from: https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm Updated 2017 https://www.cdc.gov/infectioncontrol/pdf/guidelines/environmental-guidelines-P.pdf

217. Ontario Agency for Health Protection and Promotion, Provincial Infectious Diseases Advisory Committee. Best Practices for Environmental Cleaning for Prevention and Control of Infections in All Health Care Settings.2018. Available from https://www.publichealthontario.ca/-/media/Documents/B/2018/bp-environmental-cleaning.pdf?rev=5dfe8f638f01400ea2640910902d789d&sc_lang=en

218. Munoz-Price LS, Birnbach DJ, Lubarsky DA, Arheart KL, Fajardo-Aquino Y, Rosalsky M, Cleary T, DePascale D, Coro G, Namias N, Carling P. Decreasing operating room environmental pathogen contamination through improved cleaning practice. Infection Control & Hospital Epidemiology. 2012 Sep;33(9):897-904. Available from https://pubmed.ncbi.nlm.nih.gov/22869263/

219. Ragan K, Khan A, Zeynalova N, McKernan P, Baser K, Muller MP. Use of audit and feedback with fluorescent targeting to achieve rapid improvements in room cleaning in the intensive care unit and ward settings. American journal of infection control. 2012 Apr 1;40(3):284-6. Available from https://www.sciencedirect.com/science/article/abs/pii/S0196655311003233

220. Mulvey D, Redding P, Robertson C, Woodall C, Kingsmore P, Bedwell D, Dancer SJ. Finding a benchmark for monitoring hospital cleanliness. Journal of Hospital Infection. 2011 Jan 1;77(1):25-30. Available from https://www.sciencedirect.com/science/article/abs/pii/S0195670110003774

221. Canadian Standards Association. CAN/CSA Z314:23. Canadian medical device reprocessing in all health care settings. Toronto. 2023. Available from https://www.csagroup.org/store/product/CSA%20Z314%3A23/

222. Alberta Health. Reusable & single-use medical devices standards: standards for the reprocessing of reusable medical devices and for the use of single-use medical devices in all health care facilities and settings. 2019. Available from https://open.alberta.ca/publications/9781460145470

223. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Provincial Infectious Diseases Advisory Committee. Best practices for cleaning, disinfection and sterilization of medical equipment/devices. 3rd ed. Toronto, ON: Queen's Printer for Ontario; May 2013. Available from https://www.publichealthontario.ca/-/media/Documents/B/2013/bp-cleaning-disinfection-sterilization-hcs.pdf?rev=7a36d8e526644eb794a9ef066d97a120&sc_lang=en

224. Spaulding EH. The role of chemical disinfection in the prevention of nosocomial infections. In: PS Brachman and TC Eickof (Ed). Proceedings of International Conference on Nosocomial Infections, 1970. Chicago, IL: American Hospital Associations; 1971:254-74

225. Rutala WA, Weber DJ. Guideline for disinfection and sterilization in healthcare facilities, 2008. Update: May 2019. Available from https://stacks.cdc.gov/view/cdc/134910

226. Public Health Agency of Canada. Classic Creutzfeldt-Jakob Disease in Canada: Quick reference guide. 2007. Available from: https://www.canada.ca/en/public-health/services/infectious-diseases/nosocomial-occupational-infections/creutzfeldt-jakob-disease/infection-control-guidelines.html

227. Public Health England's Creutzfeldt-Jakob disease (CJD): guidance, data and analysis, available at: https://www.gov.uk/government/collections/creutzfeldt-jakob-disease-cjd-guidance-data-and-analysis.

228. Palmer R. Bacterial contamination of curtains in clinical areas. Nursing Standard (through 2013). 1999 Sep 29;14(2):33. Available from: https://pubmed.ncbi.nlm.nih.gov/10786579/

229. Weinstein SA, Gantz NM, Pelletier C, Hibert D. Bacterial surface contamination of patients' linen: isolation precautions versus standard care. American Journal of Infection Control. 1989 Oct 1;17(5):264-Available from: https://pubmed.ncbi.nlm.nih.gov/2817514/

230. Rotter ML. Special problems in hospital antisepsis. Principles and practice of disinfection, preservation and sterilization. 4th ed. Oxford: Blackwell Publishing. 2004 Jan 1:540-2. Available from: https://onlinelibrary.wiley.com/doi/book/10.1002/9780470755884#page=546

231. CSA Group. CSA Z314.10.2-15: Laundering, maintenance, and preparation of multiple-use gowns, drapes, and wrappers in health care facilities. Toronto, ON: CSA Group; 2015. Available from: https://www.csagroup.org/store/product/Z314.10.2-15/

232. Canadian Standards Association. CAN/CSA Z317.2-19 Special requirements for heating, ventilation, and air conditioning (HVAC) systems in health care facilities. Toronto: Canadian Standards Association; 2019. Available from https://www.csagroup.org/store/product/2701348/

233. Sehulster LM. Healthcare laundry and textiles in the United States: review and commentary on contemporary infection prevention issues. Infection control & hospital epidemiology. 2015 Sep;36(9):1073-88. Available from: https://pubmed.ncbi.nlm.nih.gov/26082994/

234. Sutton PM, Nicas M, Harrison RJ. Tuberculosis isolation comparison of written procedures and actual practices in three California hospitals. Infection Control & Hospital Epidemiology. 2000 Jan;21(1):28-32. Available from https://pubmed.ncbi.nlm.nih.gov/10656351/

235. Saravia SA, Raynor PC, Streifel AJ. A performance assessment of airborne infection isolation rooms. American journal of infection control. 2007 Jun 1;35(5):324-31. Available from https://www.sciencedirect.com/science/article/abs/pii/S0196655307000491

236. Fuss EP, Israel E, Baruch N, Roghmann MC. Improved tuberculosis infection control practices in Maryland acute care hospitals. American journal of infection control. 2000 Apr 1;28(2):133-7. Available from https://www.sciencedirect.com/science/article/abs/pii/S0196655300900221

237. Canadian Standards Association. CAN/CSA Z8000:18 (R2023). Canadian health care facilities. Toronto. 2023. Available from https://www.csagroup.org/store/product/Z8000/

238. Canadian Standards Association. CAN/CSA Z317.13:22. Infection control during construction, renovation, and maintenance of health care facilities. Toronto. 2022. Available from https://www.csagroup.org/store/product/CSA%20Z317.13%3A22/

239. 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 Jul;27 Suppl 2:1-46. Available from https://publications.gc.ca/collections/Collection/H12-21-3-27-2E.pdf

240. Canadian Standards Association. CAN/CSA-Z8001-13 (R2023). Commissioning of health care facilities. Toronto. 2023. Available from https://www.csagroup.org/store/product/2700052/

SUMMARY OF IPAC PROGRAM STANDARDS

1 Enabling Environment: A Culture of Safety

1.1 IPAC Culture

STANDARD 1	**The healthcare organization's leaders and staff shall communicate, role model and be actively involved, engaged, and committed in developing and maintaining a culture of infection prevention throughout the organization.**
STANDARD 2	**IPAC Program activities and awareness campaigns shall be developed through partnership and collaboration with relevant parties.**

1.2 IPAC Program Mission, Vision, and Values

STANDARD 3	**There shall be a clear vision for the healthcare organization's IPAC Program, supported by the Board/governing body/senior management.**

1.3 Patient Safety

STANDARD 4	**Patient safety related to the IPAC Program shall be a strategic priority for the healthcare organization.**

1.4 Work-Life in Relation to IPAC

STANDARD 5	**The healthcare organization shall demonstrate commitment to strategies for the prevention of staff exposures to organisms and resulting infections.**

STANDARD 6	The healthcare organization shall demonstrate commitment to work-life strategies to actively support staff's mental well-being and psychological safety.
STANDARD 7	The healthcare organization shall demonstrate commitment to diversity, equity, and inclusion in the workplace.

2 IPAC Program: Foundational Framework

2.1 IPAC Governance and Leadership

STANDARD 8	The IPAC Program shall be an essential part of governance and maintain a high clinical and management profile.
STANDARD 9	The Board/Senior Leadership shall identify the IPAC Program as a critical component of the healthcare organization's strategic plan.
STANDARD 10	The IPAC Program shall be positioned in the organization such that there is an effective reporting conduit to senior leadership.
STANDARD 11	The organization shall have a structured process for mitigating infectious disease risks.

2.2 IPAC Program Administration

STANDARD 12	**The IPAC Program shall be developed in collaboration with relevant parties within the healthcare organization.**
STANDARD 13	**IPAC Program deliverables shall be based on organizational priorities, legislative requirements, the complexity of the healthcare facility, characteristics of the population served, and the needs of the community.**
STANDARD 14	**IPAC Program goals shall be evidence-based and have measurable objectives that are reviewed/revised at least annually.**
STANDARD 15	**There shall be a multidisciplinary IPAC Committee that supports the IPAC Program, and reports to senior leadership.**
STANDARD 16	**The IPAC Committee shall review annual goals, advocate for resources to accomplish the goals, review quality improvement initiatives and provide input to program deliverables.**
STANDARD 17	**The IPAC Program's information management protocols and plans shall meet current needs and anticipate future needs to enhance IPAC Program performance.**
STANDARD 18	**The use of confidential patient information for IPAC Program purposes shall comply with federal (PIPEDA) and provincial/territorial legislation (including for retention and storage) and ethical standards of privacy and confidentiality.**

STANDARD 19	**The healthcare organization shall regularly review the resources needed to support the IPAC Program.**
STANDARD 20	**The IPAC Program shall have the support of an accredited microbiology laboratory.**
STANDARD 21	**There shall be financial resources allocated to meet the IPAC Program needs.**
STANDARD 22	**The IPAC Program shall have sufficient support staff to meet their needs and goals.**
STANDARD 23	**The organization shall dedicate and protect ICP hours for the IPAC Program appropriate to the acuity and volume of care.**
STANDARD 24	**ICPs shall be supported to achieve and maintain competency in IPAC practice.**
STANDARD 25	**ICPs shall be certified in infection prevention and control when eligible and maintain certification while functioning as an ICP.**
STANDARD 26	**The organization shall have access to a qualified IPAC physician to provide input into the IPAC Program.**

STANDARD 27	IPAC staff shall have access to required intellectual resources.
STANDARD 28	IPAC staff shall be equipped with current electronic tools to support the program and collaborate with partners.
STANDARD 29	IPAC staff shall have electronic access to internal and external communication resources for the purpose of collaboration and education.

3 IPAC Program Linkages: Scope

3.1 IPAC Program Impact, Collaboration and Engagement

STANDARD 30	The IPAC needs of internal and external relevant parties are identified, assessed, evaluated, and reassessed on a regular basis.
STANDARD 31	The IPAC Program shall collaborate and liaise with internal and external program relevant parties.
STANDARD 32	The IPAC Program shall use an ethical framework to guide complex decision-making.
STANDARD 33	The IPAC Program shall have a communications process to disseminate timely and/or critical IPAC information to internal and external program relevant parties.

3.2 Guidelines: IPAC Program Policies, Procedures, and Protocols

STANDARD 34	**The organization shall have IPAC Program policies, procedures, and protocols that are current, based on local/provincial/territorial regulations, evidence, and best practices, including resource stewardship, in accordance with the organization's priorities, and accessible to all persons who work within the organization.**
STANDARD 35	**IPAC Program policies, procedures, and protocols are linked to educational programs with action plans and clearly defined accountability for implementation and sustainability.**
STANDARD 36	**The organization's services/clinics/departmental policies, procedures, and protocols shall include IPAC staff input and interventions to prevent and control IPAC risks.**

3.3 Role of Occupational Health in the IPAC Program

STANDARD 37	**The healthcare organization's leaders shall provide support for IPAC- related health and safety requirements as a strategic priority within the organization and ensure that IPAC Program policies, procedures, and protocols are incorporated in the work environment.**
STANDARD 38	**Health and safety protocols relating to the IPAC Program comply with relevant OHS legislation, and IPAC standards, guidelines, and best practices.**
STANDARD 39	**The IPAC component of the OHS Program shall be developed jointly by Occupational Health and Safety and IPAC staff. If OHS and IPAC are not separate, the organization will ensure both elements are resourced.**

STANDARD 40	**There shall be an OHS process for evaluating healthcare workers for communicable diseases at hire, following exposure and additionally as required.**
STANDARD 41	**There shall be an OHS process to evaluate potential IPAC risks to staff in the workplace and to ensure that controls are in place to manage the risk(s).**
STANDARD 42	**There shall be an OHS vaccination policy, procedure, and protocol, for healthcare workers, which includes a means to maintain documentation of immune status and immunization history.**
STANDARD 43	**There shall be an OHS policy to prevent staff from working while ill with a communicable disease.**
STANDARD 44	**The healthcare organization shall provide counselling, follow-up and work restriction recommendations for IPAC-related injuries/illnesses resulting from exposure to infectious agents.**
STANDARD 45	**There shall be an OHS sharps injury prevention program in place.**
STANDARD 46	**Personal protective equipment (PPE) shall be readily available and easily accessible.**
STANDARD 47	**The healthcare organization shall provide training in the appropriate selection, use, removal, and disposal of PPE.**

STANDARD 48	**There shall be a respiratory protection program.**

4 Education and Training

4.1 IPAC Culture of Learning

STANDARD 49	**There shall be a culture of learning that supports IPAC education for all staff, physicians, and volunteers.**

4.2 IPC Program Champions and Role Models

STANDARD 50	**IPAC shall be promoted through the engagement of staff, physicians, volunteers, champions, and role models.**

4.3 IPAC Education

STANDARD 51	**An IPAC education program shall be provided at minimum for orientation, annually, and periodically as required, for all within the organization.**
STANDARD 52	**An IPAC education program shall meet the priorities of the healthcare organization.**

STANDARD 53	**IPAC education programs shall include IPAC core competencies based on roles and responsibilities of those within the organization.**
STANDARD 54	**IPAC professionals shall participate in the development of the healthcare organization's IPAC educational programs using the principles of adult teaching and learning.**
STANDARD 55	**The healthcare organization shall support continuing professional development and provide resources for continuing learning for infection control professionals.**
STANDARD 56	**The healthcare organization shall provide relevant information about minimizing infection risks to patients, caregivers, and visitors.**
STANDARD 57	**IPAC education shall be evaluated regularly, and the education program revised accordingly.**

5 Surveillance: The IPAC Surveillance Program

STANDARD 58	**The healthcare organization shall have an IPAC surveillance program that addresses the organization's population at risk.**
STANDARD 59	**The surveillance program shall be adequately resourced and managed by trained staff with dedicated time and tools to carry out the program.**

STANDARD 60	**The healthcare organization shall track targeted outcome indicators of significance to the organization's services. Legislated requirements shall be fulfilled.**
STANDARD 61	**The healthcare organization shall use data collection methods to promptly detect HAI trends.**
STANDARD 62	**Standardized definitions for HAIs shall be used for internal outcome surveillance and for comparisons with internal trends and external benchmarks.**
STANDARD 63	**The healthcare organization shall follow targeted process indicators of significance to the organization. Legislated requirements shall be fulfilled.**
STANDARD 64	**The healthcare organization shall apply epidemiological principles to surveillance data to investigate the source/cause of HAIs, identify risk factors for infection, analyze trends, identify clusters and outbreaks, and make recommendations for improvement based on findings.**

6 Patient Flow

STANDARD 65	**The healthcare organization shall share surveillance information in a timely manner.**

7 Outbreak Management

STANDARD 66	**IPAC staff shall be involved in decision-making when patient placement, accommodation, and flow is restricted by the presence of infectious disease.**
STANDARD 67	**The healthcare organization shall have policies, procedures, and protocols for outbreak detection, identification, investigation, response, and control.**
STANDARD 68	**The healthcare organization shall identify outbreaks of infectious diseases in a timely manner.**
STANDARD 69	**Outbreaks shall be managed by a multidisciplinary team that includes IPAC Program representation and organizational leadership.**
STANDARD 70	**ICPs shall be involved in the analysis and evaluation of outbreaks in the healthcare organization.**
STANDARD 71	**Access to timely microbiology laboratory reports shall be provided, especially during an outbreak.**
STANDARD 72	**There shall be a communications strategy in place during an outbreak that includes dissemination of timely information and outbreak status both internally and externally.**

STANDARD 73	The healthcare organization shall use the results of outbreak investigations to make improvements.

8 Emergencies, Disasters, and Major Incidents

STANDARD 74	There shall be a written response plan with IPAC input to address IPAC-related issues in emergencies, disasters, and incidents.
STANDARD 75	There shall be IPAC involvement in emergency management.
STANDARD 76	The emergency response plan shall include IPAC-related emergency response training and exercises for all staff.

9 Antimicrobial Stewardship

STANDARD 77	IPAC staff shall actively support antimicrobial stewardship in the healthcare organization.

10 Hand Hygiene Program

STANDARD 78	**The healthcare organization shall have an organization-wide hand hygiene program that includes administrative leadership, policies, procedures, protocols, and support.**
STANDARD 79	**There shall be a multidisciplinary approach to the evaluation, selection, and purchase of hand hygiene agents.**
STANDARD 80	**Hand hygiene resources shall be readily available and accessible at point-of-care.**
STANDARD 81	**Hand hygiene education shall be provided to all individuals within the healthcare organization, including visitors as needed.**
STANDARD 82	**There shall be a process to measure hand hygiene compliance that includes monitoring and feedback.**

10.1 Hand Care Program

STANDARD 83	**There shall be a hand care program in place for staff in the healthcare organization.**
STANDARD 84	**IPAC staff shall participate in quality improvement initiatives and/or research.**

11 Continuous Quality Improvement

STANDARD 85	**Results of IPAC Program quality improvement initiatives and/or research shall be shared with relevant parties.**
STANDARD 86	**Results of IPAC Program quality improvement initiatives and/or research shall be incorporated into the IPAC Program.**

11.1 IPAC Performance Management

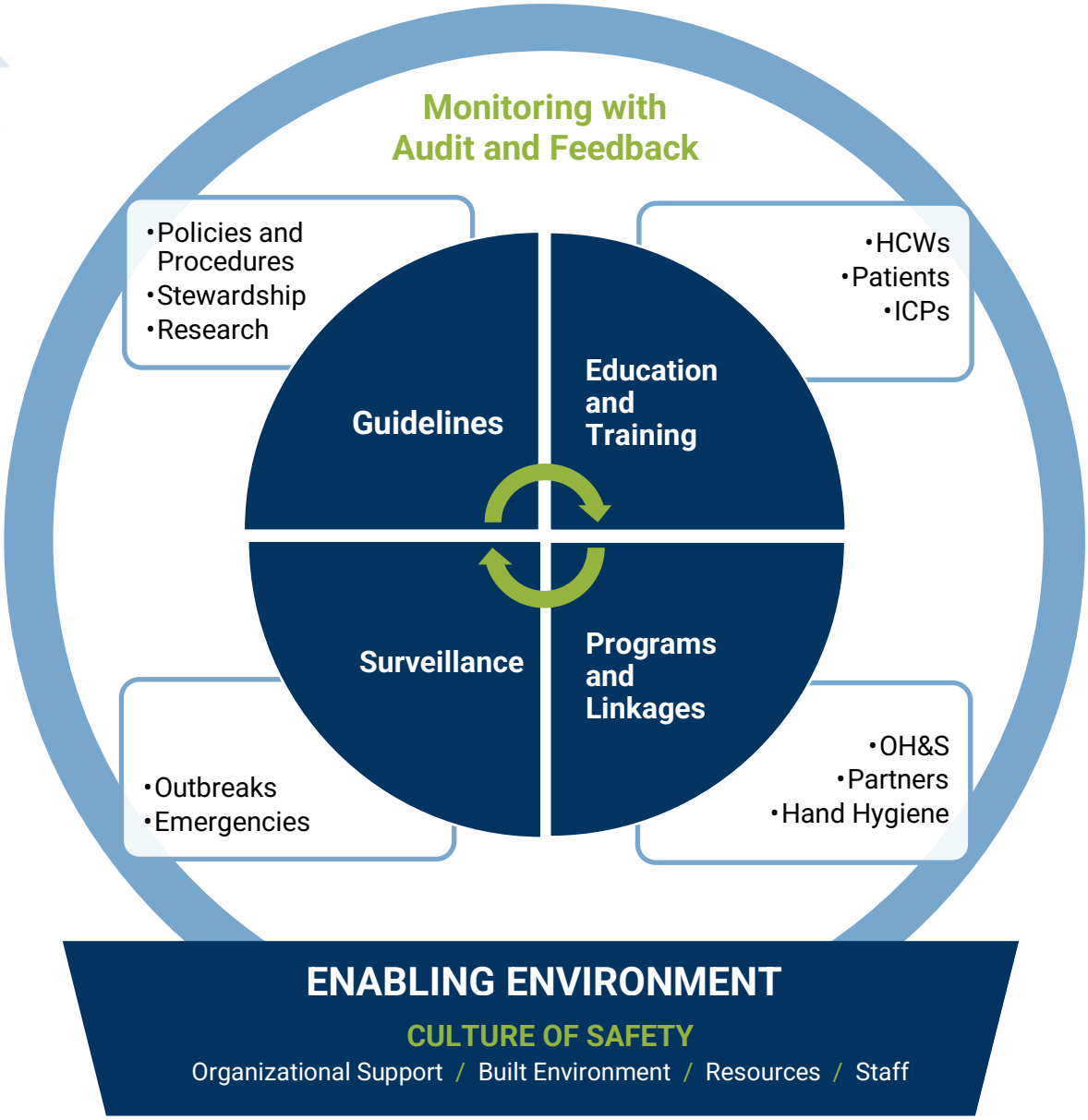
STANDARD 87	**Senior leadership within the organization shall support annual assessment and evaluation of the IPAC initiatives developed by the IPAC team.**
STANDARD 88	**IPAC staff shall demonstrate competence in infection prevention and control.**
STANDARD 89	**An IPAC performance management program shall be evident, including an IPAC performance review for all staff.**

11.2 Assessment and Evaluation of the IPAC Program

STANDARD 90	**There shall be a process to evaluate the quality of the IPAC Program.**

STANDARD 91	**The healthcare organization shall make ongoing improvements to its IPAC Program.**

IPAC Program Standards Model 2024



Model adapted from WHO core components of infection prevention programs.[9]

IPAC Programs use multimodal strategies, within an enabling environment with organizational support; guidelines to inform policies, procedures, protocols, stewardship, and research; ongoing best practice; and a strong hand hygiene program.