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Best Practices for the Prevention of Acute Respiratory Infection Transmission in All Health Care Settings

2nd Revision: April 2025

PIDAC | Provincial Infectious Diseases Advisory Committee

Infection Prevention and Control

Public Health Ontario

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Summary of Revisions

New material in this revision is summarized in the table below. Recommendations in this revision remain the same as those in the October 2024 version.

Date of Implementation	Description of Major Changes	Page
12/02/2024	Reference section was updated to include links to current resources.	83
4/16/2025	Additional name included in Authors/Contributors	10
4/16/2025	Additional information added to Glossary of Terms for Personal protective equipment (PPE)	10
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Disclaimer

This document was developed by the Provincial Infectious Diseases Advisory Committee on Infection Prevention and Control (PIDAC-IPC). PIDAC-IPC is a multidisciplinary scientific advisory body that provides evidence-based advice to Public Health Ontario (PHO) regarding the prevention and control of health care-associated infections. PIDAC-IPC's work is guided by the best available evidence and updated as required. Best practice documents and tools produced by PIDAC-IPC reflect consensus on what the committee deems prudent practice and are made available as a resource to public health and health care providers. PHO assumes no responsibility for the results of the use of this document by anyone.

NOTE: This document is intended to provide best practices only.

Health care settings are encouraged to work towards these best practices in an effort to improve quality of care.

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Abbreviations

ABHR	alcohol-based hand rub
AGMP	aerosol-generating medical procedure
AIIR/AIR	airborne infection isolation room
ARI	acute respiratory infection
BiPAP	bi-level positive airway pressure
CAP	community-acquired pneumonia
CDC	Centers for Disease Control and Prevention
CI	confidence interval
CO_2	carbon dioxide
COVID-19	Coronavirus disease 2019
CPAP	continuous positive airway pressure
CPR	cardiopulmonary resuscitation
CSA	Canadian Standard Association
EMS	emergency medical services
HAI	health care-associated infection
HCW	health care worker
HD	hemodialysis
HEPA	high-efficiency particulate air
HFOV	high-frequency oscillating ventilation
HVAC	heating, ventilation and air conditioning
ICP	infection prevention and control professional
ICU	Intensive care unit
IPAC	infection prevention and control
IRP	infectious respiratory particle
JHSC	Joint Health and Safety Committee
LTC	long-term care
LTCH	long-term care home
MERS	Middle East respiratory syndrome
NHS	National Health Service
NIOSH	National Institute for Occupational Safety and Health
NIV	non-invasive ventilation
OR	odds ratio
OHS	occupational health and safety
OMT	outbreak management team
ORA	organizational risk assessment
PCR	polymerase chain reaction
PCRA	point-of-care risk assessment
PHO	Public Health Ontario
PHU	public health unit
PIDAC-IPC	Provincial Infectious Diseases Advisory Committee on Infection Prevention and Control
PPE	personal protective equipment
RAT	rapid antigen tests
RCT	randomized controlled trial
RR	risk ratio
RSV	respiratory syncytial virus
SARS-CoV-2	severe acute respiratory syndrome coronavirus 2
UV	ultraviolet
UVGI	ultraviolet germicidal irradiation
WHO	World Health Organization

Glossary of Terms

Acute respiratory infection (ARI): Any new onset acute respiratory infection that are spread via respiratory particles and typically presents with symptoms of a fever greater than 38° C and a new or worsening cough or shortness of breath (previously known as febrile respiratory illness, or FRI). It should be noted that elderly people and people with immunocompromising conditions may not have a febrile response to a respiratory infection.

Additional Precautions: Precautions (i.e., Contact Precautions, precautions for acute respiratory infection and Airborne Precautions) that are necessary in addition to Routine Practices for certain pathogens or clinical presentations.[1]

Administrative controls: Measures put in place by the administration of a health care setting to reduce the risk of infection to staff or to patients/residents/clients through policies/procedures that minimize the exposure to the hazard (e.g., screening policies, healthy work place policies, education/training).

Aerosol: Term typically used for very small droplets of moisture that may carry microorganisms. Aerosols may be light enough to remain suspended in the air for prolonged periods of time, allowing inhalation of the microorganism.[1]

Aerosol-generating medical procedure (AGMP): A medical procedure with a greater likelihood of generating infectious respiratory particles which may increase risk of infections to the staff, and other patients/residents/clients based on epidemiological data.[2,3]

Airborne infection isolation room (AIIR/AIR): A room that is designed, constructed and ventilated to limit the spread of airborne microorganisms from an infected occupant to the surrounding areas of the health care setting. This is also known as a negative pressure room. NOTE: The Canadian Standards Association uses the term Airborne Isolation Room, abbreviated AIR.

Airborne Precautions: Used in addition to Routine Practices for patients/residents/clients known or suspected of having an illness transmitted by small infectious respiratory particles that remain suspended in the air and may be inhaled by others. See also Infectious respiratory particles.

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. Alcohol-based hand rubs contain emollients to reduce skin irritation and are less time-consuming to use than washing with soap and water.[4]

Backward contact tracing: The process of retrospectively identifying the source of infection of the case under investigation in order to identify further cases and contacts.[5]

Body fluids: Any fluid in the body. Examples of body fluids to which health care workers might reasonably be exposed include: blood, urine, saliva, sputum, tears, semen, pre-seminal fluid, milk, vaginal secretions, synovial fluid, amniotic fluid, cerebrospinal fluid, pleural fluid, peritoneal fluid, marrow, pericardial fluid, feces, nasal secretions, vomitus, mucus, cervical mucus, phlegm, colostrum, secretions and blood from the umbilical cord.

Breathing zone: Area of a room in which occupants breathe as they stand, sit or lie down.[6]

Caregiver: Any person who provides personal, social, psychological and/or physical support to a patient/resident/client—often a family member, friend or community support but may also be a privately hired caregiver. See also Essential caregiver.

Case: In epidemiology, an individual who is infected or colonized with a particular microorganism.

Case finding: A standard procedure in control of certain contagious diseases whereby diligent efforts are made to identify people who are or may be infected.

Cleaning: The physical removal of foreign material (e.g., dust, soil) and organic material (e.g., blood, secretions, excretions, microorganisms). Cleaning physically removes rather than kills microorganisms. It is accomplished with water, detergents and mechanical action.

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

Cohorting: The assignment of a geographic area such as a room or a patient/resident care area to two or more patients/residents/clients who are either colonized or infected with the same microorganism. See also Staff cohorting.

Contact Precautions: Used in addition to Routine Practices to reduce the risk of transmitting infectious agents via contact with an infectious person or their environment.

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

Direct care: Providing hands-on care (e.g., bathing, washing, turning patient/resident/client, changing clothes, continence care, dressing changes, care of open wounds/lesions, toileting).

Disinfection: The inactivation of disease-producing microorganisms. Disinfection does not destroy bacterial spores. Medical equipment/devices must be cleaned thoroughly before effective disinfection can take place.

Droplet Precautions: Term traditionally used for precautions in addition to Routine Practices for patients/residents/clients known or suspected of having an infection that can be transmitted by large respiratory particles.

Engineering controls: Physical or mechanical measures put in place to reduce the risk of infection to staff or patients/residents/clients (e.g., heating, ventilation and air conditioning systems, room design, placement of hand washing sinks).[1]

Environment of the patient/resident/client: The immediate space around a patient/resident/client that may be touched by the patient/resident/client and may also be touched by the health care worker when providing care. In a single room, the patient/resident/client environment is the room. In a multi-bed room, the patient/resident/client environment is the area inside the individual's curtain. In an ambulatory setting, the patient/resident/client environment is the area that may come into contact with the patient/resident/client within their cubicle. In a nursery/neonatal setting, the patient environment includes the inside of the bassinette or incubator, as well as the equipment outside the bassinette or incubator used for that infant (e.g., ventilator, monitor).[1,4] See also Health care environment.

Essential caregiver: See Caregiver.

Exposure: An exposed person is someone who has been in proximity to a case with a transmissible disease so that transmission is possible. There are various degrees of risk based on the type of exposure or the parameters of the exposure.

Eye protection: A device that covers the eyes and is used by health care workers to protect the eyes when it is anticipated that a procedure or care activity is likely to generate splashes or sprays of blood, body fluids, secretions or excretions, or within two metres of a coughing patient/resident/client. Eye protection includes safety glasses, safety goggles, face shields and visors.

Facial protection: Personal protective equipment that protect the mucous membranes of the eyes, nose and mouth from splashes or sprays of blood, body fluids, secretions or excretions. Facial protection may include a medical mask or respirator in conjunction with eye protection, or a face shield that covers eyes, nose and mouth.

Fit-test: A qualitative or quantitative method to evaluate the fit of a specific make, model and size of respirator on an individual. Fit-testing is required at least every two years and whenever there is a change in respirator face piece or the user's physical condition that could affect the respirator fit.[7-9]

Forward contact tracing: The process of identifying and quarantining contacts who were exposed to a pathogen in order to stop further transmission.[5] Forward contact tracing involves identifying individuals with unprotected exposure to a case during the case's infectious period. See also Backward contact tracing and Quarantine.

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 hygiene includes surgical hand antisepsis.[1,4]

Hand hygiene moment: The point(s) in an activity at which hand hygiene is performed. There may be several hand hygiene moments in a single care sequence or activity.[4]

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

Health care-associated infection (HAI): A term relating to an infection that is acquired during the delivery of health care (historically also referred to as nosocomial infection).

Health care environment: People and items which make up the care environment (e.g., objects, medical equipment, staff, patients/residents/clients) of a health care setting, outside the immediate environment of the patient/resident/client.[1] See also Environment of the patient/resident/client.

Health care facility: A set of physical infrastructure elements supporting the delivery of health-related services. A health care facility does not include a patient's home or physician/dentist/other health offices where health care may be provided.[1]

Health care setting: Any location where health care is provided, including, but not limited to, pre-hospital care, acute care, complex continuing care, rehabilitation facilities, mental health facilities, long-term care (LTC), chronic care, ambulatory care, home health care, community health centres and clinics, physician offices, dental offices, offices of other health-regulated professionals, integrated community health services centres and out-of-hospital premises as well as other locations in the community where health care is provided.[1]

Health care worker (HCW): All persons carrying on activities in a health care setting that have direct contact with patients/residents/clients including but not limited to employees, physicians, nurses, midwifes, contract workers, students, post-graduate medical trainees, researchers and volunteers. See also Staff.

HEPA filter: High efficiency particulate air filter with an efficiency of 99.97% in the removal of airborne particles 0.3 microns or larger in diameter.[10]

High-risk exposure (to a patient/resident/client with acute respiratory infection): High-risk exposures are exposures which, after an assessment of factors that may increase the risk of transmission from an infected case to a susceptible individual (e.g., duration of time in proximity, distance, use of personal protective equipment, occurrence of aerosol-generating medical procedures, direct physical contact or contact with respiratory secretions, hand hygiene), there is considered to be a significant likelihood that the exposed individual will develop an acute respiratory infection.

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

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

Infection prevention and control professional (ICP): Trained individual responsible for a health care setting's infection prevention and control activities including development, implementation, evaluation, and education of infection prevention and control policies, procedures, and practices.[11] Within the first year of practice, a novice ICP should commence formal training in IPAC from an IPAC Canada endorsed program. Once eligible, an ICP should obtain Certification in Infection Control (CIC®) from the Certification Board of Infection Control Board (CBIC) within the first 5 years and maintain it going forward (i.e., recertification every 5 years).

Infectious agent: A microorganism i.e., a bacterium, fungus, parasite, virus or prion which is capable of invading body tissues, multiplying and causing infection.

Infectious respiratory particles (IRP): Pathogens carried in expired airflow from the respiratory tract of infected individuals.[12]

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

Long-range transmission: a mode of transmission involving respiratory particles that remain suspended in the air for longer durations and result in infection through inhalation. Transmission by this mode has traditionally been referred to as airborne transmission.[13,14]

Mask: A device that covers the nose and mouth, is secured in the back and is used by individuals to protect the mucous membranes of the nose and mouth as personal protective equipment. It can also be used to limit the risk of transmission when worn by infectious individuals.

N95 respirator: A respirator is a personal protective device that is worn on the face and covers the nose and mouth to reduce the wearer's risk of inhaling airborne particles. The most common respirator used in health care is an N95 half-face piece filtering respirator. A National Institute for Occupational Safety and Health-certified N95 respirator has a filter efficiency of 95% or more for particles that are 0.3 microns or larger in size and provides a tight facial seal with less than 10% leak.[13]

Novel respiratory infection: An illness that causes respiratory symptoms (e.g., fever, cough) where the etiologic agent and/or epidemiology of the disease have not previously been known or described.

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

Organizational risk assessment (ORA): An evaluation done by the organization or facility in order to implement controls to mitigate identified hazards.

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

Patient/Resident/Client: Any person receiving care within a health care setting.

Personal protective equipment (PPE): Clothing or other equipment worn for protection against hazards.[1] PPE sold for medical purposes in Canada, are classified as medical devices and must comply with the Medical Devices Regulations.[15]

Point-of-care: The place where three elements occur together: the patient/resident/client, the health care worker and care or treatment involving patient/resident/client contact. Point-of-care products e.g., alcohol-based hand rub, personal protective equipment as well as sharp containers should be accessible to the health care worker without the worker leaving the zone of care, so they can be used at the required moment.[1,2,16]

Point-of-care risk assessment (PCRA): An individual and dynamic risk assessment that should be completed by the health care worker before each patient/resident/client interaction or task where is there is a potential risk of being exposed to an infection and for the selection of correct personal protective equipment required in their interaction with the patient/resident/client and the patient/resident/client environment.[1,13]

Precautions: Interventions to reduce the risk of transmission of microorganisms e.g., from patient/resident/client-to-patient/resident/client, patient/resident/client-to-staff, staff-to-patient/resident/client, contact with the environment, contact with contaminated equipment.

Provincial Infectious Diseases Advisory Committee on Infection Prevention and Control (PIDAC-IPC):[17] A multidisciplinary scientific advisory body that provides Public Health Ontario with evidence-based advice regarding multiple aspects of infectious disease identification, prevention and control.

Public Health Ontario (PHO):[18] Public Health Ontario is the operating name for Ontario Agency for Health Protection and Promotion.

Quarantine: The action of separating and restricting the movement of people who were exposed to a communicable disease to see if they become sick.

Respiratory etiquette: Personal practices that help prevent the spread of bacteria and viruses that cause acute respiratory infections (e.g., covering the mouth when coughing, care when disposing of tissues).

Respiratory particles: Particles exhaled by an individual that may be infectious.

Risk assessment: An evaluation of the interaction of the health care worker, the patient/resident/client and the patient/resident/client environment to assess and analyze the potential for exposure to infectious disease.[1] See also Point-of-care risk assessment

Routine Practices: The system of IPAC practices to be used with all patients/residents/clients during all care to prevent and control transmission of microorganisms in all health care settings. For a full description of Routine Practices, refer to PIDAC-IPC's Routine Practices and Additional Precautions for all Health Care Settings.[1]

Seal-check: A procedure that the health care worker must perform each time an N95 respirator is worn to ensure it fits the wearer's face correctly to provide adequate respiratory protection. The health care worker must receive training on how to perform a seal-check correctly.[9]

Short-range transmission: transmission that typically occurs within 1-2 metres of the source. Infection from this mode of transmission can occur from both inhalation as well as deposition on mucous membranes.[13,14]

Staff: Individuals working in a setting where health care is provided, including but not limited to, health care workers. See also Health care worker.

Staff cohorting: The practice of assigning staff to care only for patients/residents/clients known to be colonized or infected with the same microorganism, or for a cohort exposed to an outbreak or other exposures. These staff would not participate in the care of patients/residents/clients who are not part of the cohort. See also Cohorting.

Transmission: The method by which infectious agents spread from one person to another (e.g., contact, respiratory particles).

Visitor: A person coming into a health care setting to see a patient/resident/client, usually for social reasons, who does not provide the type of critical support for the patient/resident/client that is provided by an essential caregiver. See also Caregiver.

Preamble

The protection of patients/residents/clients and staff/health care workers (HCWs) is critical in all settings where health care is provided. This document is created as an extension to Provincial Infectious Diseases Advisory Committee on Infection Prevention and Control (PIDAC-IPC)'s Routine Practices and Additional Precautions in All Health Care Settings[1] and deals specifically with the surveillance, reporting and specific interventions for prevention and control of acute respiratory infections (ARIs) in health care settings across the continuum of care. Health care settings include, but are not limited to, pre-hospital care, acute care, complex continuing care, rehabilitation facilities, mental health facilities, long-term care (LTC), chronic care, ambulatory care, home health care, community health centres and clinics, physician offices, dental offices, offices of other health-regulated professionals, integrated community health services centres and out-of-hospital premises as well as other locations in the community where health care is provided. This document also provides guidance on the recognition and management of ARIs and ARI outbreaks in health care facilities, including high-risk outpatient areas in these facilities [e.g., hemodialysis (HD) units, infusion clinics, emergency departments]. Additional, sector-specific guidance exists for e.g., the management of viral respiratory outbreaks in long-term care homes (LTCHs) and other setting in Ontario.[19]

For guidance regarding management of novel emerging viruses refer to PIDAC-IPC's Best Practices for Prevention, Surveillance and Infection Control Management of Novel Respiratory Infections in All Health Care Settings.[20] For guidance regarding measles refer to Public Health Ontario (PHO)'s Technical Brief: Interim IPAC Recommendations and Use of PPE for Care of Individuals with Suspect or Confirmed Measles and Public Health Agency of Canada's Updated Infection Prevention and Control Recommendations for Measles in Health Care Settings.[21,22]

Recommendations in this document are based on evidence to date on the mode of transmission of ARIs, the data on effectiveness of prevention strategies, epidemiologic reports on outbreak investigations for ARIs, professional guidance for infection prevention and control for ARIs, and expert opinion. As our understanding of ARIs are changing rapidly, these best practice recommendations need to be interpreted in the light of the local context, emerging new evidence, and in consultation with public health, Infection Prevention and Control (IPAC) and Occupational Health and Safety (OHS).

This document is intended for those who have a role in IPAC, patient safety, quality improvement, risk management, OHS, microbiology, administration, clinical work and local public health agencies, and others interested in the prevention and management of ARIs in health care facilities.

Background

The Risks and Impact of Acute Respiratory Infections in Health Care Settings

Acute respiratory infections (ARIs) from viruses such as influenza, respiratory syncytial virus (RSV) or severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) typically result in upper respiratory tract infections but can also result in viral pneumonia. Respiratory viruses are a major cause of illness hospitalizations, and also absenteeism and lost productivity of staff in health care settings and elsewhere. RSV can causes severe infections in those less than 1 year of age,[23] and is the most common cause of bronchiolitis and viral pneumonia in this age cohort.[24] RSV also causes severe disease and hospitalization in people with immunocompromising conditions, the elderly, and others with significant comorbidities.[25-27] Coronavirus disease 2019 (COVID-19) and influenza/community-acquired pneumonia (CAP) remain leading causes of death from infectious diseases in Canada.[28,29] While CAP is typically not considered an ARI and is primarily a bacterial infection, ARIs can increase the risk for CAP. Furthermore, diagnostic methods such as polymerase chain reaction (PCR) suggests that viral aetiologies of CAP may have been historically underestimated, [30-32] and respiratory viruses are often found in combination with bacterial agents such as *Streptococcus pneumoniae*.[33,34] The guidance in these best practices is not limited to the above-mentioned viruses and applies to all respiratory viruses that can be transmitted in health care settings such as e.g., parainfluenza, rhino/enteroviruses, human metapneumovirus, and seasonal coronaviruses.

Health care-associated outbreaks of respiratory viruses can result in substantial morbidity and mortality and interfere significantly with patient/resident/client care, e.g., by affecting patient flow and human resources. ARI outbreaks can and have occurred across the continuum of care of patients/residents/clients from acute care, to complex continuing care/rehabilitation, and LTC settings.[35-68]

Factors that result in increased risk of transmissions of ARIs in health care settings include:

- the number of people (e.g., patients/residents/clients, family members, volunteers, visitors, workers) who come and go in these settings
- the number of people who seek care for or develop ARI in these settings
- the ease with which ARIs can pass from one person to another[69,70]

The risk to HCWs is highest in settings where:

- unscreened people first present with respiratory symptoms (e.g., physicians' offices, community health centres/clinics, emergency departments)
- HCWs perform procedures that present a higher risk of transmissions when in close contact, e.g., aerosol-generating medical procedure (AGMP)

1. Environmental Controls

1.1 Hierarchy of Controls

The application of the hierarchy of hazard controls is fundamental to an OHS framework and is a recognized approach to containment or mitigation of hazards to protect workers, including protection from infectious diseases. The hierarchy of controls contains five control levels and are ordered from the highest level to the lowest level in terms of effectiveness to prevent transmission (see Figure 1).[71] While personal protective equipment (PPE) is at the bottom of the hierarchy and is not sufficient on its own to protect HCWs, it is an active control measure that individuals can employ.

Figure 1. Hierarchy of Controls

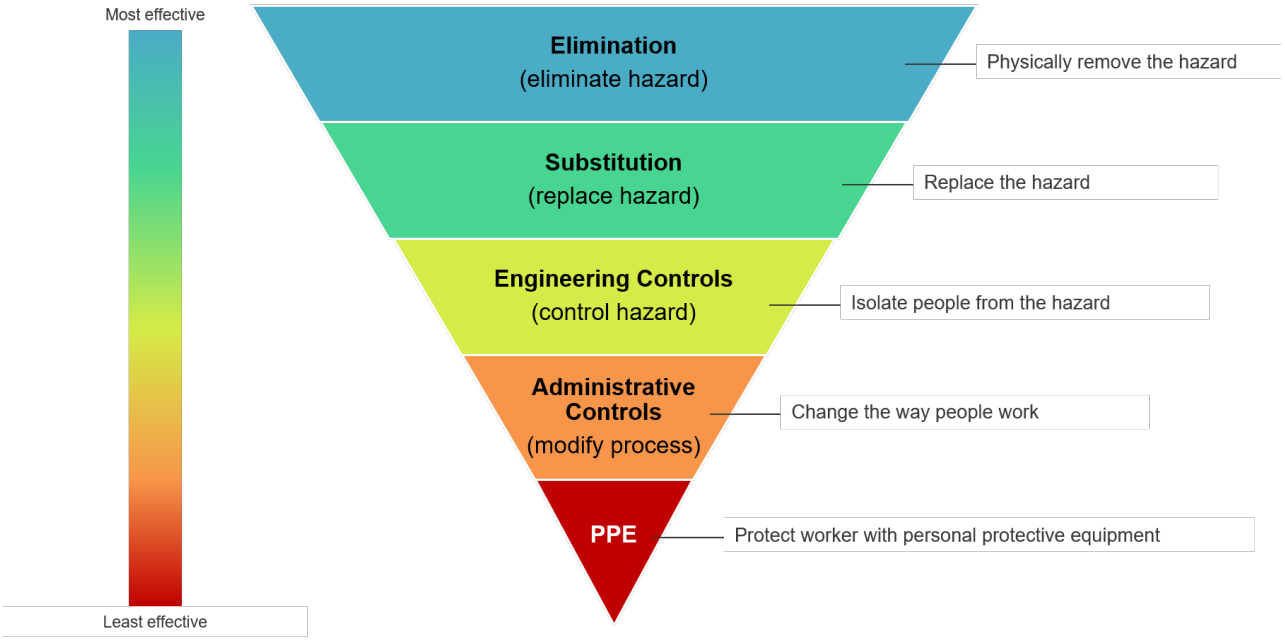


Image source: National Institute for Occupational Safety and Health (NIOSH). About hierarchy of controls. Atlanta, GA: Centers for Disease Control and Prevention; 2024. Available from: https://www.cdc.gov/niosh/hierarchy-of-controls/about/?CDC_AAref_Val=https://www.cdc.gov/niosh/topics/hierarchy/default.html. Hierarchy of controls.

Application of the hierarchy of controls involves a multi-disciplinary approach that includes, but is not limited to, support from Infection Prevention and Control (IPAC), OHS and health care building engineers to provide a comprehensive evaluation and implementation of measures to reduce the risk of HCWs' exposure to pathogens. By doing so, the application of the hierarchy of controls can reduce the risk of infection transmission to patients/residents/clients, HCWs, as well as other staff and visitors, in all settings where health care is delivered. An understanding of the strengths and limitations of each of the controls enables health care organizations to determine how the health care environment (e.g., infrastructure, equipment, processes and practices) increases or decreases the risk of infection.

1.2 Organizational Risk Assessment

An organizational risk assessment (ORA) is a recognition and assessment of the infectious risks present in a workplace and serves to inform how to best mitigate these risks by applying components in the

hierarchy of controls. The ORA is a recommended practice that is central to any health care organization's preparation and planning to prevent ARI transmission. An ORA is a systematic approach to identifying areas of infection risk within the health care facility and assessing the effectiveness of the control measures in place that serve to minimize the risk of exposure to and transmission of microorganisms. Optimally, ORAs are conducted pro-actively on a regular basis (e.g., annually), and are to be re-evaluated when appropriate, such as for a specific infectious disease threat (e.g., pandemic pathogen, seasonal respiratory infection viral surge) in relation to the transmission risk framework (see section 1.3).[13]

Following an ORA, an organization should have a better understanding of the potential risks for infection transmission, and whether mitigation measures are sufficient or if additional control measures are indicated. An organization may adjust control measures currently in place or those specified in their preparedness plan for respiratory season or infectious disease threats. When considering a control measure for implementation/de-implementation, it is important to not only consider its potential benefit, but also associated issues that may result from the changes. Below are some examples of control measures according to their level in the hierarchy of controls:

- Elimination and substitution controls include vaccination status, if sterilizing immunity (i.e., preventing the virus from infecting and replicating in the host) of staff can be achieved in the organization, HCWs staying home when sick and postponement of non-urgent appointments of patients with infectious signs and symptoms.
- Engineering and system control measures include care and maintenance of heating, ventilation and air conditioning (HVAC) systems, physical barriers, re-designed work areas to facilitate physical distancing, access to point-of-care alcohol-based hand rub (ABHR) and controlled entry/exit points.
- Administrative controls include policies and procedures regarding screening, use of private and airborne infection isolation rooms (AIIR/AIR), monitoring the local epidemiology, as well as healthy work place policy, education, training and signage.
- The appropriate selection and use of PPE including the use of a point-of-care risk assessment (PCRA).

Organizations have a responsibility to provide education and training to HCWs regarding the organization's ORA and should engage the Joint Health and Safety Committees (JHSCs) or Health and Safety representatives, as appropriate.[72] Organizations are required to have policies and procedures, and provide education to HCWs around organizational factors that may affect the selection and use of PPE as per sector specific Ontario Regulation 67/93 under the *Occupational Health and Safety Act* and Ontario Regulation 246/22 under the *Fixing Long Term Care Act, 2021*.[73,74]

1.3 Transmission Risk Framework

The risk of transmission of ARIs in health care settings is largely dependent on community incidence of respiratory viruses and as such on the likelihood of introduction into the system. The risk for ARI transmission in health care settings is seasonal and typically increases in fall and winter, when people tend to spend more time indoors. While the peaks of the different viral pathogens vary, in general, ARI activity starts to increase in late September, peaks in December-February and gradually decreases until April-May.

Transmission risk frameworks can be used to escalate or deescalate IPAC and other measures as a function of the transmission risk in a given place and time, and can be used to inform and develop an organizational plan. Timely implementation of multi-layered interventions across the entire hierarchy of controls is key to protecting patients/residents/clients and staff, preventing health care-associated infections (HAIs) and reducing strain on staff and other resources. The transmission risk framework provided below (Table 1) includes two levels of risk periods (i.e., high risk, non-high risk) based on the following factors when assessing the need to adjust IPAC measures:

- Community incidence of circulating respiratory viruses.
- Immunity (immunization and vaccine match and/or natural infection) to the circulating respiratory viruses among HCWs, patients/residents/clients, and visitors.
- Disease severity from the circulating respiratory viruses.

Key metrics to consider in defining community incidence include test positivity rate and wastewater surveillance trends (where available). Indicators such as increasing hospitalizations, HAI rates and outbreaks, staff positivity (where testing is available) and staff absenteeism within health care settings can also be considered as proxies of community incidence.

Table 1. Framework for Transmission Risk Periods

Indicator	High Risk Period	Non-high Risk Period
Respiratory virus outbreaks in health care facilities	Frequent and ongoing	Infrequent or baseline
Hospitalizations and intensive care unit admissions*	High, or moderate and increasing	Low, or stable and not increasing
Community transmission**	High, or moderate and increasing	Low, or stable and not increasing

*Secondary to ARI. May include local or provincial context depending on organization. Metrics to consider as a proxy for disease severity include hospitalized cases or weekly number of hospitalizations per 100, 000 community population.
**Metrics to consider as a proxy for community transmission include:

- Test positivity rates
- Staff metrics including staff positivity rates and/or absenteeism
- Wastewater surveillance trends, where available

Changes in these factors should be sustained and/or anticipated to be sustained over several weeks prior to major adjustments to IPAC measures and policies, as frequent adjustments are associated with implementation challenges. Changes to IPAC measures should also take into consideration ethical implications that may result from these changes.[75]

1.4 Healthy Workplace Policies and Health Care Worker Immunization

Working with patients/residents/clients while having an ARI can result in transmission and can initiate and prolong ARI outbreaks. Therefore, collaboration between IPAC and OHS programs is necessary to decrease the risk of health care-associated ARIs in patients/residents/clients and HCWs.[76]

Attendance management policies should outline when HCWs are to stay home or to leave work with ARI symptoms. It is important to enable HCWs to follow the organizational policy by providing supports such as pay while on short-term sick leave for part-time HCWs. Managers or supervisors that observe staff who are at work with a suspected ARI should refer them to OHS, or when in doubt, send them home.

In general, HCWs should stay home when sick with a suspected or confirmed ARI and can return to work when:

- Fever has resolved
- Symptoms have resolved or have been improving for 24 hours.
- Gastro-intestinal symptoms, such as nausea/vomiting, diarrhea and stomach pain, have resolved for at least 48 hours.

Testing for etiology and clearance is not necessary.

Mild lingering symptoms of cough, mild congestion and/or use of inhalers does not always indicate ongoing infectiveness. If the HCW returns to work before the tenth day post-symptom onset in keeping with improvement of symptoms and in accordance with return to work policies, the HCW should mask upon return to work until 10 days from onset of symptoms or until complete resolution of symptoms (whichever occurs first). Other measures to be considered include taking breaks alone when unmasked and/or be physically distanced by at least two metres and to avoid carpooling.

1.4.1 Health Care Worker Immunization

Immunization against vaccine-preventable diseases is an integral part of a health care OHS program. Immunization helps protect the health of HCWs, and can also (indirectly) protect patients/residents/clients. Vaccines are available to protect from ARIs, including vaccines against influenza, SARS-CoV-2, but also pertussis, which is a bacterial respiratory tract infection. Vaccinations should be up-to-date in order to optimally protect HCWs from community and occupational infection risk. Immunizations can reduce HCW absenteeism and in addition, influenza immunization of HCWs has been shown to reduce the mortality and morbidity of patients/residents under their care.[77-81]

All health care settings should have staff immunization policies in place consistent with the Ontario Ministry of Health Infectious Diseases Protocols and Public Health Agency of Canada recommendations.[82,83] These policies should establish clear standards of best care and set out the steps to protect patients/residents/clients and HCWs, and documentation of each person's immunization status. Furthermore, organizations should adopt comprehensive vaccine programs (e.g., create their own policies and procedures) that facilitate vaccination of HCWs in accordance with up-to-date provincial guidance and statutory requirements or in the absence of other provincial guidance from expert advisory groups such as the National Advisory Committee on Immunization (NACI).[73,81,84-86]

Pertussis is a vaccine preventable disease. Previous immunization against pertussis or a history of natural pertussis infection does not provide lifelong immunity. There is no routine antibody testing available to determine immune status to pertussis. One adult booster dose of tetanus/diphtheria/acellular pertussis (Tdap) is recommended, and should be in place pre-placement or as soon as possible after hire of a HCW, and for residents of LTCH.[87,88]

For more detailed information about influenza immunization requirements for HCWs, see:

- PIDAC-IPC's Best practices for Infection Prevention and Control Programs in All Health Care Settings in Ontario[76]

For further information about immunization refer to:

- Ministry of Health: Ontario Public Health Standards: Requirements for Programs, Services and Accountability (Standards). Infectious Diseases Protocol, Appendix 1: Case Definitions and Disease Specific Information[82]
- Public Health Agency of Canada: Immunization of Workers- Canadian Immunization Guide[83]

1.5 Placement of Patients/Residents with Acute Respiratory Infections

1.5.1 Single Rooms

The risk of infection transmission is higher when multiple patients/residents are placed in one room,[89-94] as these patients/residents share large amounts of time together, breathe the same air, touch the same surfaces, are often in close proximity to each other and share a washroom. They are also exposed to their roommates' visitors. Single rooms with private washrooms are preferred.[3,13,95,96]

Patients/residents who have a cough or other symptoms of an ARI should be placed in a single room with a private washroom, if possible. If a private washroom is not available, dedicated toileting and patient/resident sink is recommended. In addition, equipment should be dedicated to the patient/resident whenever possible.[1] For information about cohorting of patients/residents and Additional Precautions at bedside refer to sections 1.5.2 and 1.5.3, respectively.

Placement of patients/residents with suspected/confirmed ARI in a single room with a private washroom and dedicated equipment is best clinical practice and should be the default.

In health care settings that do not have sufficient single rooms available for all patients/residents with ARIs, a clear prioritization framework for the placement of patients/residents under Additional Precautions should be in place to mitigate the risk of transmission to others. The following ARI patients/residents should be prioritized for single room placement:

- Patients/residents with suspected or confirmed novel respiratory viral infections with unknown or confirmed higher infectivity and/or virulence (e.g., avian influenza, COVID-19 variants of

concern with higher transmissibility, virulence and/or limited cross-immunity, and other respiratory viruses with pandemic potential).[20]

- Patients/residents in high-risk populations such as patients/residents with

  immunocompromising conditions, as well as patients/residents with medical or behavioural conditions that may increase the risk of transmission [e.g., patients/residents unable to stay in their bed space; patients/residents with excessive cough and sputum production; patients/residents with ongoing AGMPs such as continuous positive airway pressure (CPAP), bi-level positive airway pressure (BiPAP)] resulting in increased potential for pathogen dissemination into the environment.

- Patients/residents co-infected with two or more different respiratory viruses should be cared for in private rooms, but cohorting can be considered on a case-by-case basis with involvement and approval by IPAC while considering the patient/resident population and the viruses involved.

1.5.2 Cohorting of Patients/Residents

Cohorting, when feasible, can be used when single rooms are not available or during outbreak situations. The practice of cohorting patients/residents refers to:

- The placement and care of individuals who are colonized or infected (or co-infected) with the same microorganism(s) in the same room or space;

  and/or

- The placement of patients/residents with active ARI with patients/residents who recently recovered (e.g., less than two months) from an infection with the same pathogen.

The decision to cohort is to be made in consultation with IPAC.[1] Cohorting patients/residents with suspected ARIs or mixing patients/residents with suspected and confirmed infections is not recommended until the pathogen(s) is identified in all patients/residents.[97-99] The same applies to patients/residents (suspected to be) infected with subtypes, variants or strains of a respiratory pathogen with lack of reliable cross-immunity (e.g., influenza A and B). The placement in the same room of patients/residents who have been exposed to the same virus should only be considered in consultation with IPAC. When cohorting, each patient's/resident's exposure severity needs to be assessed and considered to ensure transmission risks have been minimized.

Routine Practices and Additional Precautions are to be applied individually for each patient/resident within the cohort.[1] Health care facilities should ensure that all IPAC measures are optimized during cohorting to reduce and mitigate the risk of exposure to infectious agents within the setting. These include the following measures:

- Optimally, a distance of at least two metres is to be maintained between all patients/residents in shared rooms; ensure a barrier (e.g., curtain) is present.[1]

- Patient care equipment is to be dedicated to each patient/resident or cleaned/disinfected between uses.[1]

- Mask and eye protection is to be worn for the care of each patient/resident and should be replaced between patients/residents in most cases.[1] Doffing and donning a new mask and eye protection is not necessary if a) caring for multiple patients/residents within the same cohort, or

b) if masks are used continuously.[1] In either scenario, masks and eye protection are to be discarded if visibly soiled, damp or damaged.

- A gown and gloves are to be worn for the care of each patient/resident and replaced between patients/residents within the cohort.[1]
- Hand hygiene is to be performed after removal and before donning new gloves when caring for another patient/resident in the same room, and at all other appropriate moments in care of the patients/residents.[4]
- Essential caregivers and visitors should comply with all necessary Additional Precautions.

Additional Precautions are to be applied individually for each patient/resident and gloves and gowns are to be replaced between each patient/resident within the cohort.[1]

Facial protection is to be replaced unless a) there are multiple patient/resident encounters within the same cohort in the same room, or b) when masks are worn continuously.[†]

1.5.3 Additional Precautions at the Bedside

When single rooms and cohorting options are exhausted, it may become necessary to place patients/residents with suspected or confirmed ARIs in the same room as patients/residents who do not require Additional Precautions. In general, this practice should be avoided if any of the roommates of the patient/resident with an ARI are vulnerable to the infection due to immunosuppression, unvaccinated status (as applicable) or high-risk co-morbidities. Using Additional Precautions at the bedside may be safer if a patient/resident with an ARI is in the latter part of their period of infectivity, as transmission risk to others decreases.[101] Furthermore, priority for single rooms or cohorting with same pathogen should be given for pathogens that are most relevant in terms of nosocomial spread and impact on patients'/residents' health, e.g., influenza, RSV and SARS-CoV-2.

In this scenario, the patient/resident with the ARI is to be clearly delineated as requiring Additional Precautions at the bedside, with clear signage visible to prompt the appropriate measures when entering the patient's/resident's bed space.[1] The privacy curtain should be drawn to indicate separation between the patient/resident bed spaces. Additional mitigation measures should be put in place to prevent infection transmission:

[†] Due to the potential risk of transmitting viral pathogens through fomites, including contaminated facial protection, doffing facial protection after each patient/resident contact on Additional Precautions for ARI remains a requirement in most cases. The practice of masking and wearing eye protection for the duration of an individuals' shift or visit in a health care setting was introduced during the COVID-19 pandemic. Before this shift in practice, IPAC best practice dictated staff to doff mask and eye protection after each single contact with a patient/resident with an active or suspected ARI. However, with the implementation of wearing a mask (and eye protection) continuously, the requirement to doff facial protection after each contact with a patient/resident was generally waived with no evidence of an increase in risk of transmission as long as there is strict adherence to hand hygiene.[100] Therefore, if facial protection is worn continuously in a health care setting, it is reasonable to not doff and don a new mask and eye protection after caring for a patient/resident on Additional Precautions for ARI. Also, when caring for multiple patients cohorted in the same room, this requirement can be waived. In these situations, the overall risk may be in favour of not replacing the facial protection after each interaction when weighing the risk from repeated risk of self-contamination versus the risk of wearing contaminated facial protection in contact with other patients/residents.

- Ensure the patient/resident with ARI, their visitors and essential caregivers are able to adhere to the necessary Additional Precautions at all times.[13]
- Inform patients/residents of the risk of infection transmission.
- Ensure all occupants of the room and visitors are aware to perform frequent hand hygiene and stay within their designated bed spaces as much as possible.
- Avoid sharing common objects. Dedicate equipment to individual patients/residents whenever possible or clean and disinfect between each use.
- Avoid sharing a toilet by providing a designated commode chair for the patient/resident on Additional Precautions for ARI, or to those patients/residents not on Additional Precautions for ARI.

1.5.4 Considerations for Long-Term Care Homes

In LTC settings, a risk assessment should be made on a case by case basis in consultation with IPAC as the preferred action needs to consider both the risk of ongoing transmission, as well as the risk of displacement of residents from their known environment.

In most cases, for residents who are symptomatic, exposed or confirmed to have an ARI, the best strategy to minimize transmission risk to the roommate is to promptly separate the residents if single rooms are available. It is essential that LTCHs have a plan and process in place to facilitate resident bed moves when necessary, such as:

- Planning ahead for an area prepared to isolate residents with suspected ARIs. For example:
    - Utilizing respite and palliative beds/rooms.
    - Utilizing other rooms as appropriate to help maintain isolation of affected residents.
    - Alternative accommodation to maintain physical distance of two metres, with appropriate set-up for housing residents.
- Transfers to acute care should only occur for clinical reasons or if an AIIR/AIR is necessary.

In some cases, it may be determined that moving the resident is unlikely to significantly reduce risk, such as when the roommate(s) have already been exposed for a prolonged period of time. It may also be determined that moving a resident is associated with other clinical and safety risks. Furthermore, exposed residents should not be moved into a room with another, unexposed, resident as this would increase the risk for further transmission. In these challenging situations, cohorting strategies or isolation of the resident at their bedside may be utilized, with the guidance of IPAC.

1.5.5 Considerations for Hemodialysis Facilities

In hemodialysis facilities, when a separate room is not available to isolate patients with ARIs, those with the same respiratory virus may be cohorted to a specific well-ventilated unit. A distance of at least two metres is to be maintained between all patients in the shared space and/or ensure a barrier (e.g., curtain) is present.[3] Ensure enhanced environmental cleaning occurs to reduce transmission of infection. If tolerated, patients should wear a mask to limit dissemination of infectious respiratory secretions and particles.

1.5.6 Considerations for Dental Facilities

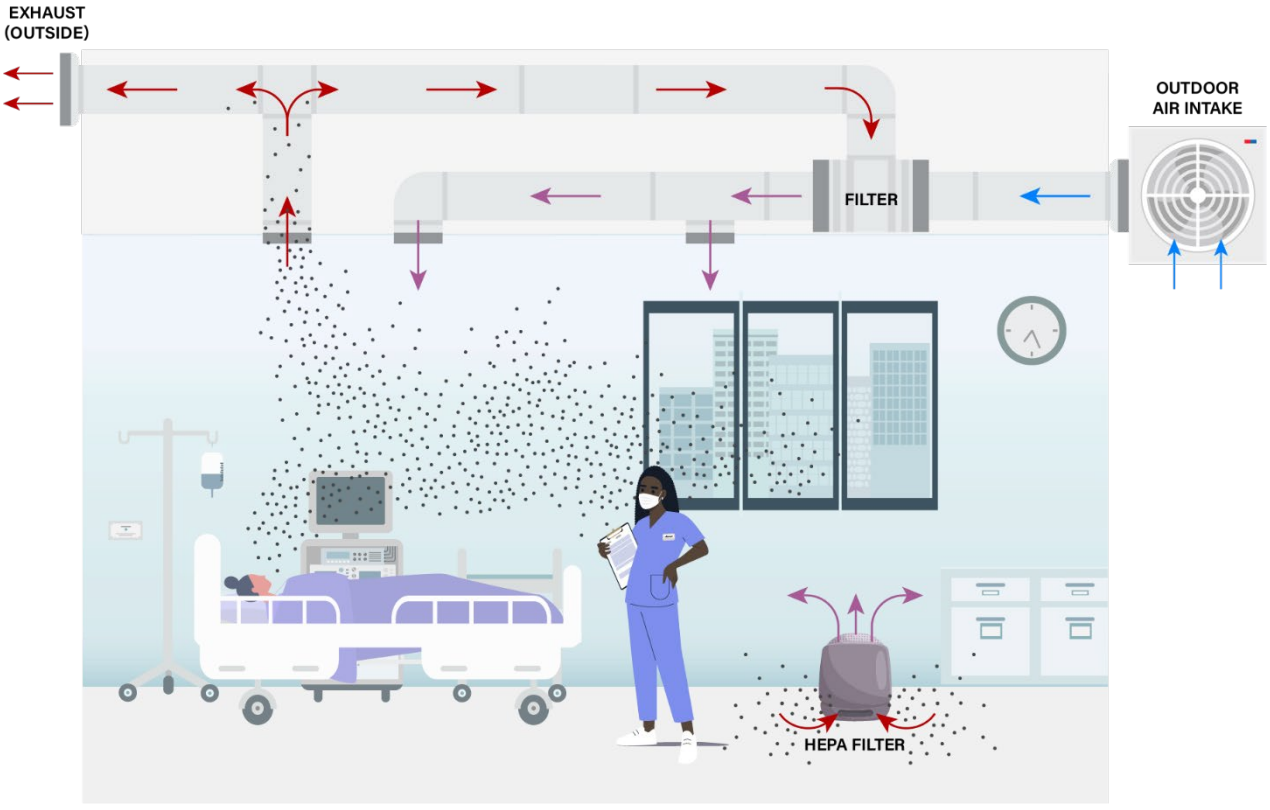
Appointments for clients with ARIs should be postponed until they are no longer infectious to others. For non-elective procedures, please see Section 2.4 Routine Practices for Procedures with Increased Transmission Risk – Aerosol-Generating Medical Procedures.

1.6 Ventilation

Engineering controls are physical or mechanical measures put in place to reduce the risk of infection to staff or to patients/residents/clients. Where infection risks cannot be eliminated or substituted, engineering controls are the preferred next choice for mitigating the risk, because they are built into the facility infrastructure and do not rely on individuals' correct and consistent application of IPAC strategies.[1,13]

Ventilation serves the purposes of controlling air contaminant levels, humidity and temperature within a space. Natural ventilation can be created through physical means (e.g., windows in LTC and similar settings, doors) and by passive infiltration (e.g., drafts from unsealed cracks around windows and walls).[91] Mechanical ventilation is the active process of supplying air to and/or removing air from an indoor space by powered equipment such as motor-driven fans and blowers. Examples include HVAC systems and local (e.g., bathroom, cooking) exhaust fans.[102] Both of these systems can be utilized to improve ventilation. Figure 2 depicts an air handling system where the outdoor air intake pushes air into the ducts and through a filter before venting into the room. At the same time, the particles from the room are pulled up into the exhaust ducts from where they are either exhausted outside or recirculate back into the room through the same filter used for the outdoor air intake. In addition, a portable high-efficiency particulate air (HEPA) filter is depicted, and a window, the latter is to be closed in acute care, but open windows can be used in other setting to improve air flow.

Figure 2. Air Handling System Diagram



1.6.1 Key Role of Ventilation for Prevention of Acute Respiratory Infections in Health Care Settings

Improper or insufficient ventilation has been implicated as a risk factor for outbreaks in non-health care settings during the COVID-19 pandemic.[102] Properly designed and strategically placed ventilation and filtration systems can reduce occupant exposure to infectious respiratory particles (IRPs) by exhausting inside air to the outdoors, recirculating filtered indoor air and diluting indoor air by directly adding fresh outdoor air.[1,13,102,103] Well-functioning ventilation systems can complement other IPAC measures in reducing potential long-range ARI transmission,[103] but ventilation alone is unlikely to prevent transmission of ARIs that are transmitted over short distances and by fomites.

1.6.2 Heating, Ventilation and Air-conditioning System Installation and Maintenance

An HVAC system comprises the equipment, distribution systems and terminals that provide, either collectively or individually, heating, ventilating, or air conditioning to a building or part of a building.[104] Most HVAC systems incorporate the processes of air filtration, indoor air recirculation, outdoor air supply and exhaust in varied proportions.[102] To achieve optimal performance, HVAC systems should be designed, constructed, installed, operated and maintained as per the facility engineering recommendations, the manufacturer's instruction for use and in accordance with relevant regulations and standards.[13,96,105,106] HVAC professionals should be consulted to ensure the system is appropriate for the type of setting, nature of activities carried out therein, occupancy rate and operation time.[107] Whenever feasible, IPAC and OHS should work with facility engineers and HVAC experts to optimize the system and ensure its performance meets Canadian Standard Association (CSA) standards. In addition, regular maintenance of the HVAC system is necessary, including filter changes as per the manufacturer's recommendations, to ensure that all vents and fans are clear. Section 19 of the *Health Care and Residential Facilities Regulation* O. Reg 67/93, under the *Occupational Health and Safety Act,* requires that the mechanical ventilation system of health care facilities be inspected by a qualified professional every six months to ensure it is in good condition (where applicable).[73] All parts of the air handling unit should be easily accessible for inspection, cleaning and disinfection.[96] Furthermore, there should be clear standard operating procedures, rules and responsibilities for preventive maintenance, as well as documentation of checks.

For more information on recommendations for HVAC systems and air exchanges in health care settings refer to:

- CSA Group. CSA Z317.2:19 Special Requirements for Heating, Ventilation, and Air-conditioning (HVAC) Systems in Health Care Facilities.[105]
- ANSI/ASHRAE/ASHE Standard 170, Ventilation of Health Care Facilities.[108]

1.6.3 Improving Ventilation

In principle, strategies to reduce concentrations of IRPs can reduce the risk of transmission.[109,110] However, these strategies are primarily based on airflow models and there is insufficient real world evidence to inform specific minimum ventilation requirements to reduce infection transmission of respiratory viruses.[111] In addition, the minimum number of IRPs inhaled that could cause infection is difficult to determine and the risk of transmission may depend on individual risk factors (e.g., immunocompromised) and/or may differ based on pathogen. Due to these challenges, there is a lack of quality evidence to inform optimal and most efficient ventilation strategies for reducing transmission of

respiratory viruses in health care settings. Improving ventilation can be attained by increasing outdoor air supply to reduce the concentration of IRPs indoors, exhausting indoor air and by filtering recirculated indoor air to remove particles from the airstream.[102] Health care settings should consult an HVAC professional to optimize the efficiency and safety of the existing HVAC system.[107] Manual adjustment of airflow rates to the supply, return or exhaust system should only be carried out by qualified technicians after consulting with an engineer to ensure that airflow and pressure differentials are not compromised.[96]

Some settings such as LTCHs, emergency medical services (EMS) and home health care may make use of natural ventilation (e.g., opening opposite doors or windows to create a cross-breeze when outdoor climate and air quality allow) to help disperse IRPs.[13,102,103] Natural ventilation is particularly useful where sharing the same airspace as an individual with an ARI cannot be avoided.[13] An HVAC professional should be consulted to ensure that the introduction of natural ventilation does not compromise the direction of airflow, the efficiency of a health care setting's HVAC system or indoor humidity.[103] Opening windows and/or doors allows unfiltered air to enter the building. Health care facilities should make sure that having doors or windows open does not pose a risk to the occupants' security or safety. In addition, the use of natural ventilation is weather and season dependent. In the home care setting, running low speed kitchen or bathroom exhaust fans that vent to the outside can also help remove contaminated air without creating significant pressure changes.[107] Likewise, one may consider running the HVAC system fan continuously to increase the supply of clean air and removal of IRPs indoors.

Carbon dioxide (CO_2) is emitted by humans and as such increases in the absence of appropriate ventilation in closed spaces with humans present. As such, CO_2 levels will depend on occupancy, but also on other CO_2 producing indoor activities like cooking/heating, and can be used as a general quality indicator for the level of ventilation. It is important to note that the level of CO_2 is not a direct indicator of ARI transmission risk. Therefore, there are no agreed upon thresholds for CO_2 levels indicating an increased risk of respiratory virus transmission and no specific recommendation can be made for a target CO_2 level nor for the routine use of indoor carbon dioxide monitoring at this time in the health care setting.

1.6.3.1 Ultraviolet Germicidal Irradiation

Ultraviolet germicidal irradiation (UVGI) is an additional measure to potentially decrease IRPs by use of ultraviolet C (UV-C) radiation (wavelength between 100 and 280 nm) with the goal to disinfect the air.[112]

Factors affecting the efficacy of UVGI systems include:

- The dose of UV-C radiation received, which in turn depends on the UV light intensity and duration of exposure.[112]
- The wavelength of UV-C radiation (higher wavelengths require higher doses to achieve the same log reduction for the same virus).[113]
- The position and distance between the UV-C source and the target;[114] the longer the distance, the less UV-C will reach the target.[112]
- Environmental conditions (e.g., air temperature, air velocity, relative humidity).[115-117]
- The concentration and structure of the virus (e.g., thickness and specific protein composition of the capsid; single- or double-stranded genomes; size of the genome).[113,115]

UVGI can be applied through upper-room lamps, in-duct fixtures or portable air cleaning devices. Results from an experimental study of UVGI demonstrated that such systems can decrease the level of

pathogens in an indoor environment to almost the same low level as the outdoors.[118] Modelling studies and case reports also suggested that UVGI may reduce the risk of ARIs, including COVID-19.[119-121] However, it is important to note that the evidence to support the use of UVGI in preventing respiratory viral infection transmission is based on what is known about UV disinfection as a concept rather than data demonstrating real-world effectiveness.[112,115,122-126]

Upper-room UVGI refers to the use of UVGI from a UV source installed in the upper part of the room to disinfect the air in the upper zone of the room.[127,128] Baffles or other types of shielding are used to limit UV exposure to people in the occupied space to prevent skin and eye problems such as photokeratitis.[112] These systems depend on upward air flow in the room (e.g., convective air currents) to move the air past the UV source(s).[127,128] Computational fluid dynamics modelling shows that these devices can reduce viral concentration in the air,[120] but ceiling height and configuration is crucial for upper room UVGI to perform optimally, as that determines the space available for air mixing and UV-C irradiation.[129,130] A minimum ceiling height of 2.6 metres (8.5 feet) is preferred, with some airflow to move air.[127] The use of reflective material in the upper portion of the room may increase the risk of UV exposure to occupants in the lower portion of the room.[130] Thus, proper design, operation and maintenance of the system is important to ensure effectiveness and prevent potential harms.[112] Upper-room UVGI devices are particularly suitable for indoor areas with insufficient or no mechanical HVAC systems, or where natural ventilation cannot be maintained adequately throughout the year.[127] If the setting's HVAC system already allows for efficient filtration or provides outdoor airflow above minimum standard requirements, UVGI systems may not provide added benefit.

In-line or in-duct UVGI systems place the UV source within the HVAC system (e.g., within the enclosed ducts, exhaust vents or other locations along the system), and achieve air disinfection as the air passes by the UV source.[128] Effectiveness of these systems is dependent upon optimal airflow and distance to the UV source. Because in-duct UVGI systems are installed in enclosed spaces, the delivered dose of UV-C can be controlled better than systems installed in non-enclosed spaces (e.g., upper room UVGI systems).[131] In-duct UVGI systems have limited benefit in areas where there is adequate air exchange.[128] Importantly, prior to considering in-duct UVGI technology, health care settings should consult with an HVAC professional or engineer to determine the UV dose based on the geometry of the air handler, the UV-C source location, air velocity, and other specific data for each air handling unit.[132]

Finally, portable UVGI air cleaning devices may inactivate viruses from indoor air, but the effectiveness depends on the placement of the device, contact time and air flow rate.[128] Although increasing the flow rate can improve filtration efficiency, it may also increase convection and subsequently, wider dispersal of IRPs in the area.[133] Furthermore, portable air cleaners including UVGI models that produce ozone should be avoided due to toxicity concerns.[103,134]

First and foremost, CSA standards should be followed whenever possible. If the CSA standards cannot be met due to e.g., old infrastructure, the following are potential considerations for health care settings when weighing the potential risks and costs versus the potential benefits of UVGI systems:[119,120,135]

- What may be some alternative technologies or control operations that are as effective, easier, simpler, or costing less to install, operate and maintain?
- Are there testing reports produced by a third-party laboratory on the system that can be reviewed by qualified engineers or HVAC professionals?
- Does the UVGI system produce harmful by-products, e.g., ozone, other oxidized volatile organic chemicals?

- Does the setting have trained staff to determine the location of the system for optimal performance without creating any risk of exposure to occupants of the area?
- Does the setting have trained staff to install as well as maintain the system for the long term?

In summary, while UVGI systems could be considered an adjunct intervention to supplement other well-established measures to reduce the risk of respiratory virus transmission,[127,136] there is insufficient evidence to recommend these solutions. Further studies are needed to inform which specific UV-C wavelengths and doses can reduce ARI transmission as the targeted outcome.[137] If installation of UVGI is considered for ARI prevention, health care settings should consider the cost-effectiveness (i.e., operating costs relative to performance) of this system to other systems and measures (e.g., increasing airflow through existing mechanical ventilation).[132] In addition, the high capital requirement for installation, operation and maintenance of these systems should be considered as well as the necessary protective measures when using this technology (e.g., prevention of photokeratitis).

1.6.3.2 Portable High-Efficiency Particulate Air Filtration Units

Portable air filtration devices equipped with HEPA filters are effective in capturing IRPs, including some viruses.[103,107] To date, the evidence in support of portable HEPA filters is limited to modelling studies and there is no direct evidence that the independent use of these devices reduces transmission of respiratory viral infection.[111] As such, there is insufficient evidence to recommend these devices for ARI prevention.

When portable air cleaners are being used, health care settings should look for certification by a recognized body such as the Association of Home Appliance Manufacturers.[104] The performance of such devices depends on both airflow and filter efficiency, therefore, health care settings should select devices with a clean air delivery rate high enough for the intended location of use, and follow manufacturer's instructions for appropriate placement to ensure good airflow.[107,134] By ensuring proper placement of the device, airflow being directed from one person to another can be avoided and reduce the potential spread of potentially IRPs.[103,138] The manufacturer's recommendations for operating, maintaining and cleaning the unit, including regular filter changes, are to be followed.[105]

1.6.3.3 Portable Fans and Air Conditioning Units

While there has been no documentation of respiratory viral infection transmission via the HVAC system, there are case reports where unfiltered, recirculated air potentially contributed to transmission.[102] Portable fans or single unit air conditioners (e.g., window air conditioners and indoor portable air conditioners) do circulate air within the room but do not filter, disinfect or exchange air with the outdoor.[103] As such, these cooling devices can increase the risk of transmitting respiratory viral infections by propelling IRPs from the unit towards people well beyond two metres in the area.[139] Health care settings should exercise care in deciding to use these local cooling devices in areas where central air conditioning is unavailable or insufficient. In addition, these type of air conditioning units can serve as reservoirs for waterborne pathogens, such as *Legionella* and gram-negative bacteria. The responsibility for cleaning and disinfecting these devices should be assigned, and manufacturer's instructions for use should be followed for preventive maintenance, in order to minimize the risk of infection transmission. The use of these local cooling devices is not recommended in rooms occupied by persons with confirmed or suspected respiratory viral infections. All other strategies for cooling the area should be pursued prior to using portable air conditioners. Examples of these include:

- Adequate hydration of occupants in the area and staff (e.g., water coolers, popsicles).

- Adequate cooling supplies (e.g., cool washcloths, ice packs, cooling jackets, cooling blankets) and cooling options/areas (e.g., designated cool room, cool showers, fan, a place to bathe hands/forearms or sponging with cool water) are available to support the occupants.
- Blocking out direct sunlight using window awnings, shutters, thermal curtains or blinds, and outdoor umbrellas.
- Increasing air flow by opening windows, provided the humidity outside is low (relative humidity of 30% to 50% is normal).
- Consider using central dehumidification which is effective in areas with high humidity. Note: portable dehumidifiers increase the risk of waterborne infections, and can give off heat and may raise the temperature in the room.
- Consideration of room(s) evacuation if extremely high temperature occurs. This is determined on a case by case basis.
- Refer to CSA Z8004:22 for modified operation of HVAC systems in the LTC settings under extreme temperature conditions.[96]

Where the use of these local cooling devices is unavoidable, health care settings should ensure the following to keep the risk of infection transmission by these devices to a minimum:[139]

- Optimize airflow: Place the fan on a clean surface at the individual's bed level or higher, and direct the airflow upwards while avoiding smoke detectors. Do not place the portable fan at the floor level, and avoid directing airflow towards the entrance of the room, entrance to different rooms, or across environmental surfaces.
- For persons placed in multi-bed rooms, portable fans and air conditioning units should only be considered in consultation with IPAC specialists.
- For air conditioning units with a condensation exhaust system, rather than using the drip pan, drain the collected water vapor to the outside of the building through an exhaust hose.

1.6.4 Fallow Time

Fallow time, also known as dwell time, clearance time or washout period, is a practice used to decrease the concentration of IRPs remaining in the air by having a specified amount of time or number of air changes occur prior to: waiving the need for respiratory PPE protection, using a room or airspace for the next patient/resident/client or conducting terminal cleaning. The rationale is that with time elapsing, IRPs will settle onto surfaces or evaporate. Fallow time guidance has been based on tuberculosis and measles study data, and not on data of other respiratory viruses/pathogens.[140-142]

A comprehensive literature review and international jurisdictional scan was completed (see Appendix A for review methodology) to search the most recent and available evidence to inform IPAC guidance for fallow times in health care settings. No publications answered this question specifically for viral infectious respiratory pathogens and only a limited number of guidance documents spoke to fallow time in general. In these documents where considerations for fallow time were given, they either lacked specific numerical fallow times,[143,144] or those with specific times did not provide supporting references or cited tuberculosis specific literature,[1,13,109,110,145-148] which cannot be generalized to respiratory viruses. Similarly, a technical brief developed by PHO demonstrated the lack of evidence available to provide recommendations for fallow time in health care settings.[3]

While guidance exists for fallow times for tuberculosis or measles, currently, there is no evidence to suggest that a fallow time is necessary after a patient/resident/client with suspect or confirmed respiratory virus infection (including COVID-19) leaves the room or following a high-risk procedure (e.g., AGMP). Therefore, routine application of the fallow time is not recommended for patients/residents/clients with respiratory virus infections.

1.7 Physical Barriers and Physical Distancing

Physical barriers and physical distancing are engineering and administrative control measures, respectively, that can reduce the risk of ARI transmission.[149,150] Physical barriers are structures erected in various settings in order to prevent contact with IRPs. Physical distancing, in comparison, is a behaviour change that can be implemented and discontinued based on the infectious risks of the situation (e.g., during pandemics, as a control measure for an emerging respiratory pathogen).

1.7.1 Physical Barriers

Physical barriers are thought to reduce the risk of ARI transmission by preventing IRPs from reaching susceptible individuals.[1,151]

The effectiveness of physical barriers, albeit evidence is limited, is considered to be primarily dependent upon three key factors:

1. The length and width of the barrier. These factors depend on the height of the barrier's tallest users, the position in which users are expected to take (e.g., sitting vs. standing), and the individuals' breathing zones.[152]
2. Characteristics of the space in which it is implemented. Barriers are commonly used in ambulatory waiting areas, examination areas and sometimes in multi-bed rooms where it is largely unavoidable that potentially infectious people are in close contact with susceptible individuals.[153]
3. The context for use. Physical barriers are more likely to be effective when individuals are face-to-face or in very close proximity to each other and interactions between individuals are short, preventing (in particular smaller) IRPs from accumulating.[154]

Examples of physical barriers and their uses

- Privacy curtains between patient/resident beds.[1,155]
- Room dividers between patient/resident beds if single examination rooms are not available,[156] or in waiting areas where patients/clients presenting with similar symptoms cannot be cohorted in separate spaces.[157]
- Glass or Plexiglass® screens and windows in reception areas or ambulances where staff are exposed to potentially infectious unscreened individuals.[158]
- Cough/sneeze guards in food service areas.[1]

The material of physical barriers should be easy to clean and disinfected regularly and when visibly soiled.[152] Cloth privacy curtains should be removed, cleaned and disinfected on a regular schedule or if they are contaminated with blood or body fluids or visibly soiled. Curtains should also be changed upon discharge/transfer and upon discontinuation of precautions if used for patients/residents/clients on Additional Precautions. When erecting physical barriers, consideration should be made to not impede

the air flow in the space or block a supply or return vent.[149,152,159] Large physical barriers may result in dead space with limited air circulation requiring the HVAC system to be rebalanced to provide the recommended air exchanges.[105] Consideration of OHS standards needs to be taken into account when determining placement of physical barriers (e.g., tripping hazards, fire routes).[160]

1.7.2 Physical Distancing

Physical distancing (historically also referred to as spatial separation) can reduce the risk of ARI transmission,[161] as transmission of respiratory viruses most commonly occurs with close, prolonged, unprotected contact.[162] A pooled analysis suggested a 25% reduction in COVID-19 infections in the presence of physical distancing (risk ratio (RR): 0.75; 95% confidence interval (CI) [0.59 to 0.95]; I^2 = 87%).[163] Importantly, physical distancing does not eliminate the risk of ARI transmission and serves as one of several strategies within the hierarchy of controls to reduce the risk of transmission of ARIs. While physical distancing has been an effective intervention during pandemics and during respiratory viral surges, permanent implementation of physical distancing is not feasible and sustainable in most cases.

The level of protection achieved by physical distancing depends on many factors beyond the distance itself. Factors include, the viral load and activities (e.g., coughing, heavy breathing) of the source, and the ventilation, air humidity and temperature of the setting. Each of these factors influences how far IRPs with viable virus can travel.[164] Evidence suggests a reduction in the risk of ARI transmission with greater distance from the source, with no absolute cut-off. Hence, there is generally no agreed upon optimal distance to prevent ARI transmission. The Public Health Agency of Canada increased physical distancing recommendations for ARI from one to two metres in 2013.[13] Similarly, Ontario's provincial best practice guidance documents recommend two metres.[165] Other entities, such as World Health Organization

(WHO), Centers for Disease Control and Prevention (CDC) and the National Health and Medical Research Council of Australia, recommend a distance of one metre.[166-168] Comparatively, National Health Service (NHS) in England increased their physical distancing recommendation to two metres during the COVID-19 pandemic, but returned to their pre-pandemic distance of one metre to align with pre-pandemic IPAC guidance.[169] Health care facilities need to balance the feasibility of physical distancing against the protective effects physical distancing can provide, and in consideration of other administrative and engineering control measures in place.

1.7.2.1 Strategies to Achieve Physical Distancing

Physical distancing can be primarily achieved through optimizing facility design and workflow and/or by minimizing crowding by reducing the number of individuals within a given space.[170] The former is often limited by pre-existing infrastructure, and the latter has the potential to negatively impact patients/residents/clients access to care and wellbeing. LTCHs, for example, are residents' primary residence and IPAC measures such as physical distancing can negatively impact communal activities (e.g., communal dining, group activities).[171]

Some physical distancing strategies are dynamic and can be implemented and de-implemented with policy changes to suit the epidemiology of ARIs in the community or in a health care facility, while other physical distancing measures are more static (e.g., distance between beds). Implementation of policy changes are typically supported by education and other tools (e.g., signs/posters at facility entrances, reception areas, waiting spaces, exam rooms), that serve to inform and remind those within health care settings to physically distance.[2,149,170,172]

Examples of Strategies to Optimize Facility Layout

The configuration of health care settings can directly impact the three C's commonly associated with increased risk of ARI transmission: Crowded spaces, Close-contact settings and Confined and enclosed spaces.[150] Well-planned space layouts can help improve individuals' ability to properly maintain physical distancing while in these settings.

Strategies that may enable physical distancing include, but are not limited to:

- Utilizing all available space in waiting rooms and common areas, including some suitable unconventional spaces.
- Reconfiguration/moving and removing furniture/seats to prevent close contact while sitting in an area.[149,170,173,174] As an alternative, chairs can be blocked from being occupied in an alternating pattern.[173]
- Seating may be arranged so patients with symptoms of ARI are facing away from other patients (e.g., back-to-back seating).[175]
- Creation of designated overflow waiting areas.[173]
- Directing traffic flow by establishing separate entrances for different patient populations (e.g., for emergency departments, oncology day clinic), allowing for one-way flow and/or dedicating an exam room(s) closest to the entrance for patients with ARI symptoms.[156,176] This will minimize the distance the patient is required to travel and facilitates rapid isolation.
- Modification of staff common areas such as:
    - Ensuring there is sufficient space for staff to eat and drink in a designated area.[177] Alternatively, the number of places identified as break/lunchrooms can be increased if an appropriate space is available.[149]
    - Rearranging furniture placement and limiting the number of tables and chairs in a space to facilitate physical distancing.[149]
- For communal dining, removing or spacing out tables/chairs, reducing the number of patients/residents/clients at the same table(s).[149,174]

Examples of Strategies to Minimize Crowding

Reducing crowding might be necessary based on the epidemiological situation (e.g., during respiratory virus season) to facilitate physical distancing.[157]

Strategies that may enable physical distancing by reducing crowding include, but are not limited to:

- Limiting crowding in waiting rooms by:
    - Scheduling appointments in appropriate intervals to limit the number of patients in waiting rooms or treatment areas.[146]
    - Staggering appointments for in-person visits with virtual appointments in between.
    - Utilizing dedicated home visiting services, in particular for vulnerable patients.[178]

- In settings with communal activities where multiple floors/units share, e.g., dining areas or gyms, activities can be scheduled for different times to a) reduce crowding, and b) prevent different floors/units from mixing.[174]
- Limiting the number of non-essential individuals that may accompany a patient, or the number of social visitors per patient.[162,170,179,180]
- Asking visitors to directly visit the patient/resident/client and exit the setting directly after their visit. Encouraging outdoor visits if weather permits.[172]
- Relocation of outpatient pharmacy or other services to a location outside of the main health care facility.[181]
- Staggering staff breaks to facilitate physical distancing.[2,170,172,174,179]
- Holding multiple, smaller meetings with less attendees could be prioritized over one large meeting (e.g., huddles on a resident care unit).[149,170] Holding virtual meetings is another option.

Settings and situations where physical distancing may be considered, if feasible:

- Physical distancing should be considered when a patient/resident/client is placed on Additional Precautions for ARI, and a single room is not available (in combination with a physical barrier).[1,13,182]
- It can be considered in contact with unscreened populations where physical barriers are not in place. Examples include screening/triage/reception in in-patient facilities, ambulatory and outpatient settings/clinics, in particular during respiratory virus season.[3,175,183]
- And can be considered in waiting room areas, in particular during respiratory virus season for patients with symptoms of ARI, if a separate room or a designated separate area with a physical barrier is not available.[1,3,157,175]

1.7.3 Planning and Preparedness

When designing new health care facilities or planning renovations to existing facilities, an Infection Control Risk Assessment should be undertaken to enhance a health care organization's ability to prevent the transmission of ARIs (and other transmissible diseases). With few exceptions, single patient rooms should be a priority. If multi-bed rooms are necessary, rooms should be large enough to allow at least two metres of space between patients and dedicated toileting facilities should be considered.[153]

Overcrowding in health care facilities can pose risks with respect to transmission of ARIs and other infectious diseases. While facilities are to have surge plans in place, building new facilities with large enough capacity will reduce the risk of overcrowding.[13] Planning considerations for health care facilities should include the need to establish and maintain zones/grouping of rooms in times of outbreak or pandemic. Waiting rooms and other communal setting should be spacious, to prevent crowding .[13,158] There should be a process and designated space for triage, waiting areas and examination rooms to allow swift separation of potentially infectious patients.[153,176] Plans should also take into account design considerations that support surge and pandemic plans such as, control of exits and entrances, storage of outbreak/pandemic supplies and construction of AIIR/AIRs.[153]

Additionally, the health care facility should consider its role in the regional models of care when constructing new facilities or redeveloping existing ones. For example, the placement and number of AIIR/AIRs, would take into account whether as part of the regional plan the health care facility is

expected to manage the patient for an extended period of time or if transportation to a regional care center would be the expectation.

1.8 Requirements and Recommendations for Environmental Control

Legislative Requirements

1. **Organizations are required to have measures and procedures, and provide education to HCWs around organizational factors that may affect the selection and use of PPE.[73,74]**
2. **HVAC systems should be designed, constructed, installed, operated and maintained as per the facility engineering recommendations, the manufacturer's instruction for use and in accordance with relevant regulations and standards, and are required to be inspected by a qualified professional every six months to ensure it is in good condition.[73]**
3. **LTC settings are required to have immunization and screening policies in place and offer required vaccinations for residents. A staff immunization program is to be in accordance with evidence-based practices.[86]**
4. **All health care settings are required to have HCW vaccination policies for staff as well as patients/residents/clients in place that are up-to-date.[73]**

Recommendations

5. **All health care settings are recommended to have all relevant vaccines be easily accessible to HCWs.**
6. **HCWs who develop symptoms of an ARI are to report their condition to their OHS department or delegate and follow organizational policies on reporting illness and work exclusion.**
7. **Patients/residents with suspected or confirmed ARI should be placed in a single room with their own washroom and dedicated equipment whenever possible.**
8. **Cohorting of patients/residents infected with the same pathogen, or with patients/residents recently recovered from the same pathogen, can be considered as the next best alternative.**
9. **Routine Practices and Additional Precautions for ARIs are to be applied individually for each patient/resident within a cohort, and HCWs are to change gowns and gloves when going from one patient/resident to the next within the same cohort.**
10. **Facial protection is to be replaced after contact with a patient/resident/client with suspected or confirmed ARI with two exceptions 1) when attending to other patients/residents within the same cohort in the same room, or 2) if masks are used continuously.**
11. **In LTC settings, residents who are symptomatic, exposed or confirmed to have an ARI should in most scenarios be promptly separated from others in the home.**
12. **In hemodialysis facilities, a separate room is recommended for patients with suspected or confirmed ARIs. A less optimal alternative is physical distancing and/or barriers between a suspected or confirmed ARI patient and other patients.**

13. **The use of local cooling devices such as portable fans and air conditioning units are not recommended in rooms occupied by persons with confirmed or suspected ARI.**
14. **A fallow time is not necessary after a patient/resident/client with suspected or confirmed ARI leaves a room or following an AGMP on a patient/resident/client with suspected or confirmed ARI.**
15. **Broad, universal physical distancing policies should not be considered outside of pandemics or other extraordinary threats. Targeted physical distancing of at least one metre in high-risk environments (such as waiting rooms) should be considered during ARI surges whenever feasible.**

2. Routine Practice and Additional Precautions Considerations during Respiratory Virus Season

Patients/residents/clients/HCWs may potentially have transmittable pathogens, even when asymptomatic and in the absence of confirmation of a transmissible disease. Routine Practices are based on the premise that unprotected interaction with all blood, body fluids, secretions, excretions, non-intact skin, undiagnosed rashes and contact with mucous membranes may result in transmission of pathogens. With this in mind, the same standards of practice are to be used routinely with all patients/residents/clients encountered in any health care setting. The application of Routine Practices will lessen the risk for HCWs as well as the risk of transmissions within the health care setting.

Additional Precautions are used with Routine Practices for patients/residents/clients known or suspected to be colonized or infected with certain microorganisms. Additional Precautions include the use of barriers, PPE and control of the environment that are put in place for encounters with the patient/resident/client or their immediate environment.

2.1 Routine Practices

> Routine Practices are necessary for ALL clinical interactions, independent of any concern for a suspected or confirmed ARI or other transmissible infectious diseases.[1]

Routine Practices refer to IPAC practices to be used with all patients/residents/clients during all care interactions. The risk of transmission of microorganisms involves factors related to the microbe, the source patient/resident/client, the health care environment and the susceptible host.[13] Routine Practices are necessary for all clinical interactions, independent of any concern for the possibility of infectious diseases, and therefore remain important regardless of the respiratory virus transmission risk.

HCWs are to assess the risk of exposure to blood, body fluids, mucous membranes and non-intact skin and identify the strategies that will prevent exposure risk and control transmission of microorganisms in all health care settings. To reduce or remove risk, it is an expectation that all elements of Routine Practices (see Box 1) are incorporated into the culture of each health care setting and into the daily practice of each HCW.

BOX 1: Elements of Routine Practices

Point-of-Care Risk Assessment + Hand Hygiene + Personal Protective Equipment

+

Control of the Environment

(Patient/Resident/Client Placement, Environmental Cleaning, Engineering Controls)

+

Administrative Controls

(IPAC Policies and Procedures, Staff Education, Healthy Workplace Policies, Respiratory Etiquette, Monitoring of Compliance with Audit and Feedback)

Refer to PIDAC-IPC's Routine Practices and Additional Precautions in All Health Care Settings for further descriptions on all the elements that comprise Routine Practices.[1]

2.1.1 Point-of-Care Risk Assessment

Performing a point-of-care risk assessment (PCRA) in an integral part and the first step in Routine Practices. A PCRA includes assessing the exposure risk specific to the patient/resident/client care intervention being performed and duration of the activity. Education and training is to be provided to the HCW on how to effectively perform a PCRA, including information on the efficacy of control measures identified in the ORA relevant to the PCRA. Both the ORA (Section 1.2) and PCRA serve to identify risks and reduce potential exposure to infectious diseases and other health and safety hazards.[72]

PCRAs are dynamic and should be completed by the HCW before each patient/resident/client interaction. A PCRA will enable the HCW to determine whether there is risk of being exposed to a transmissible infection and selection of the correct PPE necessary to protect the HCW in their interaction with the patient/resident/client and their environment.

Refer to PIDAC-IPC's Routine Practices and Additional Precautions in All Health Care Settings:[1]

- Appendix B: Performing a Risk Assessment Related to Routine Practices and Additional Precautions, for more information related to risk assessment.
- Table 1: Factors Affecting Risk of Transmission of Microorganism in a Health Care Setting

2.2 Expanding Routine Practices

During times of high respiratory virus transmission (e.g., respiratory viral surge and/or pandemics), health care settings may implement several IPAC measures into existing Routine Practices to help mitigate the spread of respiratory viruses due to transmission of ARIs from unrecognized cases (e.g., asymptomatic, pre-symptomatic). Examples of expanding Routine Practices that have been used in particular during the recent COVID-19 pandemic included physical distancing and reduction of crowding (see Section 1.7 Physical Barriers and Physical Distancing) as well as continuous/universal masking, and continuous eye protection.

These added IPAC measures may be applied in all clinical care areas, in a more targeted manner (e.g., only HCWs and staff but not for visitors, only in patient/resident/client rooms), or in some circumstances more broadly throughout health care settings.

Using the transmission framework (described in Section 1.3), health care settings can adjust components of expanding Routine Practices with the primary goal of preventing harm to vulnerable patients/resident/clients and reducing transmission within the health care facility, in addition to preserving operational capacity. As measures may change through periods of differing transmission risk, change management is critical. This includes communication around the rationale for adjustments using a clear framework for weighing the risks and benefits to patients/residents/clients, HCWs/staff and health care operations.

2.2.1 Continuous Masking Strategies

Medical masks are routinely used as PPE as part of Routine Practice (situational masking) and based on the need for Additional Precautions which is triggered by specific single patient/resident/client encounters. In contrast, continuous masking strategies (targeted and universal masking) involve wearing a mask for prolonged periods serving not only as PPE, but also as a means of source control (see Box 2: Masking Strategies). In interactions between asymptomatic HCWs and among asymptomatic patients/residents/clients, the rationale for continuous masking is to prevent transmission during the pre-symptomatic phase or with asymptomatic infections.

BOX 2: Masking Strategies

Situational Masking: use of masks as PPE based on Point-of-Care Risk Assessment and as required by Routine Practices and Additional Precautions.

Continuous Masking: Wearing a mask over prolonged periods of time and across multiple patient/resident/client interactions, as both, source control and as PPE.

Two types of continuous masking are:

Targeted Masking: a more narrow form of continuous masking where masking is limited to HCW while providing care in an in-patient setting and/or other high-risk environments, only.

Universal Masking: a more extensive form of continuous masking when masking is required for all persons (e.g., staff, patients/residents/clients, visitors, at all times while in a health care facility including administrative roles, shared offices, meeting rooms, and public spaces such as hallways and elevators ("door-to-door masking").*

*Masking strategies can combine targeted masking with components of the universal masking as outlined in more details below.

Prior to the COVID-19 pandemic, continuous masking strategies had not been widely implemented in health care settings, but were adopted in most settings during the COVID-19 pandemic. Utilization of these strategies can continue to be a consideration as an additional transmission mitigation measure under certain circumstances (e.g., unit outbreaks, during the peak of the respiratory virus season). Refer to Section 1.3 Transmission Risk Framework, for additional considerations.

2.2.1.1 Effectiveness of Continuous Masking Strategies

Overall, recent studies on continuous masking strategies have generally been found to be effective at reducing health care-associated ARIs among HCWs and patients.[184-188] Ambrosch et al. found an almost 80% reduction in hospital-associated SARS-CoV-2 infections ($p = 0.026$) with the implementation of a facility-wide universal masking policy.[184] Similarly, after institution of a universal staff and patient masking policy, a reduction in hospital admissions in patients with a suspected COVID-19 infection from HD units (hazard ratio (HR): 0.64; 95% CI [0.44- 0.93]) was also observed in the United Kingdom.[189] Reductions in hospital-associated influenza infection incidence from 0.39 to 0.19 ($p < 0.001$) was observed among patients after implementing a targeted masking policy that included wearing of a medical mask throughout an entire shift when there were greater than three patients with influenza on a given ward.[190]

Among staff with a known workplace exposure, a 67% decrease in positive COVID-19 tests was observed after the implementation of a targeted masking strategy requiring HCWs to wear masks during their shifts.[191] Other studies found an 11.1% decrease in COVID-19 positivity among HCWs post-implementation of universal masking ($p < 0.0001$).[187] One study found a significant decrease in the cumulative incidence rate of health care-associated SARS-CoV-2 infections among HCWs post introduction of universal masking.[185] In Israel, a national policy requiring universal masking was associated with a decrease of 0.2 infections per day in the incidence of COVID-19 infections (95% CI [−0.3 to −0.1]; $p < 0.001$) among HCWs.[192] In another quasi-experimental study, incidence and test positivity of COVID-19 declined in HCWs from 14.3 to 4.3 cases per week, and from 18.4% to 9.0%, respectively, following introduction of universal masking.[193] Several other studies reported on the effect of universal masking on frequency of quarantine or the number of days HCWs were suspended from work, however, these studies are no longer relevant in the current setting.[186,191]

While the data summarized above is consistently in favor of universal masking policies specifically for the prevention of SARS-CoV-2 transmissions and in one study on influenza transmission, it is important to note that these are all observational or quasi-experimental studies, and as such at increased risk for bias and confounding, as well as not necessarily accounting for challenges with implementation and compliance. Furthermore, the evidence does not all point in the same direction, and there are studies that suggest no significant benefit of continuous masking approaches, this includes randomized controlled trials (RCTs) from the pre-COVID era on the use of medical masks.[194,195] An RCT from Japan, did not find a benefit in terms of self-reported respiratory symptoms in the group randomized to continuous use of a medical mask as compared to no continuous mask use among HCWs.[194] Another, cluster RCT conducted in Vietnam found a significantly higher rate of ARIs among HCWs randomized to continuous use of cloth masks versus medical masks, but no statistically significant difference between the continuous medical mask arm and standard practice with no continuous mask use, with wide CIs not ruling out a potential benefit.[195] More recently, a quasi-experimental study showed no negative impact from lifting universal masking after the height of the COVID-19 pandemic (with very wide CI) neither ruling out a clinically important negative nor positive impact in terms of hospital-associated infections.[196]

2.2.1.2 Implementation of Continuous Masking Strategies

In general, the higher the transmission risk (i.e., the absolute risk), the more likely there is a sizeable benefit (i.e., absolute risk reduction) of continuous masking policies. The incremental benefit of a continuous masking policy therefore largely depends on the local ARI activity and the existing immunity in a population against a certain pathogen. While continuous masking can be a tool to mitigate transmission, its use needs to be considered not only in terms of the potential benefits but also in terms

of the negative effects associated with such a policy. Particularly with respect to the impact on human interactions, challenges with non-verbal cues and in communication with those with hearing impairment.[197,198] The decision to implement and de-implement continuous masking policies for all staff should be guided by the organization with input from IPAC, OHS, and other key partners. Expert opinion suggests that proposed factors to guide decisions for implementation and de-escalation include information on the prevalence and rate of hospital-associated infections, ARI outbreak activity, staffing levels, infection rates in the community and among HCWs, but also include consideration of adherence, treatment options, costs and logistics.[199] (See also Section 1.3 Transmission Risk Framework).

There are many possible nuances of continuous masking between the routinely used situational masking and continuous masking that had been deployed over the years that could be considered based on the specific needs of an organization (see Box 2: Masking Strategies). Situational masking based on Routine Practices (informed by PCRA) and if a patient/resident/client is on Additional Precautions for ARI is required at all times. Recommendations and policies on continuous masking, however, should consider transmission risk, on the spectrum from non-high to very high transmission risk periods.

Continuous masking ranging from targeted to universal masking can be considered during high transmission risk periods. Figure 3 depicts the spectrum of masking recommendations from situational masking, to targeted masking, to universal masking, for periods of non-high to very high transmission risk. During high transmission risk periods, targeted masking should be considered for close and prolonged direct patient/resident/client contact due to the resulting risk of transmission and of outbreaks.[200] Considerations should also include the risk profile and vulnerability of the patient/resident/client population (e.g., a lower bar for targeted masking on an oncology or transplant unit). Targeted masking may also be considered in other areas where there may be close, prolonged exposure to a large number of individuals. These areas (e.g., lounges, waiting rooms, in-patient ward areas) can be associated with a higher risk for transmission to both patients/residents/clients and staff in comparison to areas with transient interactions (e.g., hallways). If required given the specific circumstances of an organization, inclusion of these areas in a continuous masking policy can be considered as a next escalation step (e.g., in a dementia unit where residents may be unable to follow directions and may wander, leading to unpredictable exposures to staff and other patients/residents). Continuous masking for essential caregivers and visitors can also be considered, given the nature of prolonged interactions of patients/residents/clients. However, possible compliance issues can make the implementation of continuous masking for essential caregivers and visitors challenging.

Outside of direct patient/resident care, continuous masking can be considered based on both patient/resident/client and staff transmission risk assessments in consideration of factors such as duration, frequency and number of interactions (see Table 2. Scenarios and Considerations for Masking - Ranked in Order of Perceived Highest Impact on Protecting Patients/Residents/Clients and Preventing Outbreaks). Additional factors for staff exposure may be the impact on human resources in the event of multiple staff exposures, burden within the setting (e.g., outbreak unit) and/or high risk unit (e.g., intensive care unit, transplant unit) which in some exceptional circumstance may lead to the implementation of a universal “door-to-door” masking policy for everyone able to tolerate a mask.

When a mask is worn continuously, donning and doffing a new medical mask (and eye protection) for the care of patients/residents/clients on Additional Precautions is not required unless it is manipulated or removed, is visibly soiled, damp, damaged or difficult to breathe through. When a mask is donned or removed, hand hygiene must always be performed. Additionally, masks are not to be re-used (i.e., using the same mask after having removed it) due to the risk of self-contamination. For more information refer to Table 3. Scenarios and Considerations for Continuous Masking and Section 1.5.2 Cohorting of Patients/Residents).

Figure 3. Spectrum of Masking Recommendations for Non-high to Very High Transmission Risk Periods

Adapted from: Ontario Health, Toronto Region Masking Community of Practice Committee; Merkley J, Cass D, Hota S, Johnstone J. TR HOT – changes to masking guidance: summary of assumptions, recommendations & operational guidance. Toronto, ON: King's Printer of Ontario; 2023 Jun 30. Progression of masking policies in clinical areas, p. 5

Table 2. Scenarios and Considerations for Masking – Ranked in Order of Perceived Highest Impact on Protecting Patients/Residents/Clients and Preventing Outbreaks

Masking Scenario	Rationale / Considerations
HCW Masking for direct patient/resident/client care **(Targeted clinical masking)**	To reduce the risk of health care-associated transmission between HCWs and patient/resident/client, especially when there is prolonged, close contact (e.g., during patient/resident/client care activities). In non-high transmission periods, situations where masking may be considered include when providing direct care to high risk patients (e.g., transplant unit), especially when prolonged direct care is provided.
HCW Masking in in-patient/resident/client clinical areas **(Targeted in-patient +/- outpatient unit masking)**	To reduce the risk of health care-associated transmission, including staff to staff transmission, or inadvertently unmasked patient/resident/client contact. Considerations include health care staffing contingency risk assessment in the event of staff exposures, burden within the setting (e.g., outbreak unit), patients in hallways, and/or high risk unit (e.g., transplant unit, hematology/oncology clinic).
Visitor/essential caregiver masking at the bedside or in clinical areas	To reduce the risk of introducing ARIs to patients/residents/clients.

Masking Scenario	Rationale / Considerations
	Note: Essential caregivers who are household contacts rooming in with patients (e.g., parent or labouring partner) or essential caregivers in non-acute care settings (e.g., LTCH, home care), masking of the essential caregiver is recommended only when patient/resident is receiving care by staff (but can be considered at all times).
Asymptomatic patient/resident/client masking[†]	To reduce the risk of transmission among patients/residents/clients. Consider in common areas where there may be close, prolonged exposure to a large number of individuals (e.g., lounges, waiting rooms and protection of patients/residents/clients at high risk for severe disease).*
Masking in meeting rooms, administrative/office areas/non-patient/resident/client facing clinical areas	To reduce the risk of staff to staff transmission. Considerations include health care staffing contingency risk assessment in the event of staff exposures and evidence of increasing illness amongst staff beyond of what would be expected based on community transmission risks alone.
Masking in public spaces including non-clinical areas (i.e., door-to-door continuous masking of all individuals)	To reduce the risk of transmissions to all persons in these lower risk settings. If implemented, recommendations for staff, patients/residents/clients and visitors should align.

[†]Masking is not recommended for individuals 2 years of age or younger, or for any individual unable to tolerate masking.

*****Exceptions may include home-like environments where interactions between smaller groups of patients/residents/clients are considered an important aspect of care (e.g., LTCH).

Table 3. Scenarios and Considerations for Continuous Masking

Scenarios with continuous masking	Any additional PPE in addition to mask?*	Change my mask?	Change my gown, gloves and eye protection?
Direct patient/resident care and no Additional Precautions	No	If wet, contaminated, or hard to breathe through, or removed	If used as part of Routine Practices change upon leaving room.

Scenarios with continuous masking	Any additional PPE in addition to mask?*	Change my mask?	Change my gown, gloves and eye protection?
Direct care (less than two metres) for patient/resident on Additional Precautions for ARI	Yes Requires gown, gloves, eye protection and mask	If wet, contaminated, or hard to breathe through, or removed	Yes, upon leaving the room
Direct care for multiple patients/residents on Additional Precautions for ARI who are in the same ward room or cohort	Yes Requires gown, gloves, eye protection and mask.	If wet, contaminated, or hard to breathe through, or removed	Remove gown, change gloves, and clean hands between each resident
Enter patient/resident room on Additional Precautions for ARI and greater than two metres/transient contact from patient/resident (e.g., drop off meal tray, observe patient or their monitor without direct contact)	Yes Gloves required if touching patient/resident environment	If wet, contaminated, or hard to breathe through, or removed	Yes, upon leaving the room (if PPE required)

Scenarios assume that a personal risk assessment will be conducted before every patient/resident interaction. PPE type is dependent on the risk assessment and/or specified Additional Precautions.

Adapted from: Ontario Agency for Health Protection and Promotion (Public Health Ontario). Universal mask use in health care settings and retirement homes [Internet]. 3rd revision. Toronto, ON: Queen's Printer for Ontario; 2022 [archived; Table, Universal masking scenarios. Available from: https://www.publichealthontario.ca/-/media/documents/ncov/ipac/report-covid-19-universal-mask-use-health-care-settings.pdf?la=en

2.2.2 Continuous Eye Protection

Eye protection includes the use of safety glasses with side protection, face shields, visors and goggles. There is limited evidence suggesting that the continuous use of eye protection reduces transmission of SARS-CoV-2 and other respiratory viruses, outside of recommendations for use for Routine Practices and Additional Precautions during the provision of direct care. A systematic review on the protective effects of eye protection on transmission of SARS-CoV-2 identified five observational studies, four of which suggested an overall protective effect of mandatory eye protection (predominantly face shields) with an odds ratio (OR) ranging from 0.04 to 0.6, however all of the studies were at high risk of bias (primarily due to risk of confounding), and therefore, the certainty of the evidence was deemed to be very low.[201] Therefore, eye protection is recommended as per PCRA when applying Routine Practices and also for patients/residents/clients on Additional Precautions for an ARI. At this time, no recommendation can be made for the continuous use of eye protection in health care settings.

2.3 Additional Precautions for Acute Respiratory Viral Infections

Patients/residents/clients who arrive or reside in a health care setting with symptoms of an ARI are to be managed using Additional Precautions along with Routine Practices, to protect HCWs, patients/residents/clients and others. Upon arrival, symptomatic patients/residents/clients should be asked to perform hand hygiene, wear a mask, practice respiratory etiquette and wait in a separate area, if feasible. If this is not possible they are to keep at least two metre distance from other patients/residents/clients. Patients/residents/clients with ARIs should ideally be cared for in a single room with access to their own toileting facility whenever possible, and cohorting strategies if necessary.[97,159,202] See Section 1.5 Placement of Patients/Residents with Acute Respiratory Infections.

HCWs should maintain an increased awareness that, during respiratory virus season, individuals presenting with a variety of acute cardiopulmonary illnesses (e.g., heart failure, exacerbations of chronic obstructive pulmonary disease or asthma) may have influenza or other respiratory viruses.[203-207] In addition, not every patient/resident/client with an ARI will exhibit fever, which is dependent on host and pathogen factors.[208] Additional Precautions are also indicated for patients/residents/clients with a known high-risk exposure to an ARI during the incubation period including outbreak exposures if moved to a non-outbreak unit or facility.

PPE is an important layer of protection. A PCRA is to be conducted prior to any encounter to support appropriate selection of PPE regardless of the current epidemiology. The most relevant IPAC measures for Routine Practices and Additional Precautions for ARIs include:

- Appropriate PPE including a medical mask (see Section 2.3.1 N95 Respirator and Medical Mask for Protection from Acute Respiratory Infections and Table 4. Summary of PPE Recommendations in Health Care Settings), eye protection (goggles, face shield, visor or safety glasses with side protection), gown and gloves.
- Masking of patient/resident/client with a suspected or confirmed ARI, when outside of their bed space and if tolerated.
    - If masks are not tolerated, patients/residents/clients are to be encouraged to use respiratory etiquette
- Availability of ABHR and PPE, at point-of-care.
- Hand hygiene by HCWs, visitors as well as the patient/resident/client.
- Respiratory etiquette when coughing or sneezing:
    - Turn the head away from others.
    - Cover the nose and mouth with a tissue.
    - Discard tissues immediately after use into waste receptacle.
    - Perform hand hygiene immediately after disposal of tissues.

For patient/resident/client placement and physical distancing requirements see Section 1.5 Placement of Patients/Residents with Acute Respiratory Infections and Section 1.7 Physical Barriers and Physical Distancing, respectively. Table 5 summarizes the elements that comprise Additional Precautions, necessary to manage patients/residents/clients with an ARI in the health care setting.

2.3.1 N95 Respirators and Medical Masks for Protection from Acute Respiratory Infections

Medical masks (also referred to as surgical or procedural masks) and N95 respirators protect against respiratory infections.[195] There is a growing body of studies comparing the effectiveness of masks and N95 respirators in preventing infections by SARS-CoV-2 as well as for influenza in the health care setting. However, the evidence provides mixed results. Pre-pandemic clinical trials data and systematic review evidence suggested no consistent clinically relevant difference in effectiveness between medical masks and N95 respirators in preventing influenza infections, while some studies suggested a potential benefit of N95 respirators.[209-214] Similarly, the body of evidence examining the prevention of SARS-CoV-2 infections demonstrated no convincing difference in effectiveness between these two options; while some observational studies suggested N95 respirators may provide better protection, other studies were inconclusive and did not suggest a relevant or significant difference, or suggested better protection with medical masks.[213,215-226] As often the case with observational studies, this body of evidence has substantial limitations due to high risk of bias and primarily due to and unmeasured confounding.[215] Again, similarly to influenza, there was no sizeable or statistically significant difference in the effectiveness of medical masks as compared to N95 respirators in the prevention of SARS-CoV-2 in an RCT,[227] and similar conclusions were drawn in recent evidence summaries assessing the entire body of evidence on this topic.[211,228] However, a small difference in effectiveness cannot be ruled out, and mechanistic studies suggest a potential benefit for N95 respirators in comparison to medical masks, in particular for smaller infectious respiratory particles due to respirator's ability to filter microparticles and better fit.[229] Similarly, there is a theoretical benefit of a well-fitting versus a loosely fitting mask based on experimental data, but there is a lack of clinical trials data to confirm a clinically meaningful difference.[226] Adverse effects were consistently reported more commonly with N95 respirators than with medical masks; these include headaches, shortness of breath, facial itching and irritation, and pressure-related injuries.[215]

While there is agreement that face coverings are protective during contact with patients/residents/clients with an ARI, there is insufficient clinical evidence at this point of time to preferentially recommend one over the other option and the certainty in the evidence remains low.[225] This uncertainty based on inconsistent findings in the studies comparing medical masks to N95 respirators may explain the remaining difference in recommendations across jurisdictions, in particular for the protection from SARS-CoV-2 infections.[146,230]

Note: For guidance regarding management of novel emerging respiratory viruses refer to PIDAC-IPC's Best Practices for Prevention, Surveillance and Infection Control Management of Novel Respiratory Infections in All Health Care Settings.[20]

Table 4. Summary of PPE Recommendations in Health Care Settings

Health Care Setting	Individual	Activity	Recommended PPE
Patient room (including triage, exam rooms, LTC resident rooms, or home care settings)	HCWs	Providing direct care to patients/residents with suspect or confirmed ARI	Medical mask* Isolation gown Gloves Eye protection
Patient room (including exam rooms, LTC resident rooms, or home care settings)	HCWs	Providing direct care to patients/residents with suspect or confirmed ARI undergoing medical procedures with increased transmission risk (e.g., AGMP)	Medical mask* (or N95 respirator†, fit-tested, seal-checked or equivalent) Isolation gown Gloves Eye protection
Patient room (including exam rooms, LTC resident rooms, or home care settings)	Visitors	Entering the room of a patient/resident with suspect or confirmed ARI	Medical mask* Isolation gown Gloves Eye protection
Patient room (including exam rooms, LTC resident rooms, or home care settings)	Transient activities (e.g., food service delivery, laundry pick-up/drop-off)	Entering the room of a patient/resident with suspect or confirmed ARI	Medical mask* Isolation gown, as per PCRA Gloves, if touching patient/resident environment Eye protection
Triage	HCWs	Preliminary screening not involving direct contact	If able to maintain physical distance of at least two metres or separation by physical barrier, use Routine Practices. If unable to maintain physical distance of at least two metres or separation by physical barrier wear a medical mask.*
Triage	Patient with suspect or confirmed ARI	Any	Maintain physical distance of at least two metres or separation by physical barrier. Provide patient and accompanying caregivers with

Health Care Setting	Individual	Activity	Recommended PPE
			medical mask* if tolerated and not contraindicated.
Waiting room	Patient with suspect or confirmed ARI	Any	Provide medical mask to patient and accompanying caregiver if tolerated and not contraindicated. Immediately move the patient to a single patient room or separate area away from others; if this is not feasible, ensure physical distance of at least two metres from other patients.
Health care facility	Transporting a patient/resident with suspect or confirmed ARI Transporting a patient/resident undergoing procedures with increased transmission risk (e.g., AGMP)	Patient/resident Transport	If transport is necessary, provide medical mask to patient/resident. If patient/resident transport is necessary while undergoing AGMP, provide patient with a non-vented mask with an expiratory viral filter.

*A non-fit tested N95 respirator (or equivalent) is considered an alternative to a medical mask.

†HCW can don an N95 respirator (fit-tested, seal-checked, or equivalent). The selection, use, training and maintenance of PPE such as N95 respirators, must be done in accordance with requirements for a respiratory protection program such as those described in CSA Z94.4-18 (R2023), in Ontario Regulation 246/22 (under *Fixing Long Term Care Act, 2021*), in Ontario Regulation 67/93 (under *Occupational Health and Safety Act*) and/or Ontario Regulation 833 (under *Occupational Health and Safety Act*) as applicable.[7,9,73,231]

For information of cohorting of patients/residents and Additional Precautions at bedside refer to sections 1.5.2 and 1.5.3, respectively.

Table 5. Elements that Comprise Additional Precautions for Acute Respiratory Infections (in Addition to Routine Practices)

<table>
<tr><th>Element</th><th>Acute Care</th><th>Complex Continuing Care</th><th>Long-term Care</th><th>Ambulatory/ Clinic Setting</th><th>Home Health Care</th></tr>
<tr><td rowspan="4">Accommodation</td><td colspan="4">Door may be open</td><td rowspan="4">Not applicable</td></tr>
<tr><td>Single room with dedicated toilet and patient sink preferred</td><td colspan="2">Patient/resident with symptoms of an ARI to remain in room or bed space if feasible, or wear a mask (if tolerated) within two metres of other patients, until no longer infectious</td><td>Triage patient/client away from waiting area to a single room as soon as possible, or maintain physical distance of a minimum of two metres</td></tr>
<tr><td>Cohorting of those who are laboratory-confirmed to have the same infectious agent may be acceptable</td><td colspan="2">Draw privacy curtain</td><td>Patient/client to wear a mask for duration of visit and perform hand hygiene</td></tr>
<tr><td>Remain in room unless necessary to leave for diagnostic, therapeutic or ambulation purposes</td><td colspan="2"></td><td></td></tr>
<tr><td>Signage</td><td colspan="4">Yes</td><td>Not applicable</td></tr>
<tr><td>Facial Protection</td><td colspan="5">Upon entry to room or for all activities within two metres of patient/resident/client</td></tr>
<tr><td>Gloves</td><td colspan="5">For all activities in the room/bed space</td></tr>
<tr><td>Gown</td><td colspan="5">For all activities where skin or clothing will come in contact with the patient/resident/client or the patient/resident/client’s environment</td></tr>
<tr><td rowspan="3">Equipment and Item in the Environment</td><td colspan="5">Dedicate if possible</td></tr>
<tr><td colspan="4">Clean and disinfect shared items</td><td rowspan="2">As per Routine Practices</td></tr>
<tr><td colspan="4">Chart (paper or mobile electronic) should not be taken into the room</td></tr>
<tr><td rowspan="2">Environmental Cleaning</td><td colspan="4">Routine cleaning. Clean frequently touched surfaces in bed space and bathroom daily and before discontinuing precautions of a patient/resident/client with a suspect/confirmed ARI</td><td rowspan="2">Routine household cleaning</td></tr>
<tr><td colspan="3">Remove and launder all curtains (privacy, shower) when visibly soiled and on discharge/transfer cleaning</td><td></td></tr>
</table>

Element	Acute Care	Complex Continuing Care	Long-term Care	Ambulatory/ Clinic Setting	Home Health Care
Transport	Limit transport unless necessary for diagnostic or therapeutic procedures				Not applicable
	Patient/resident/client to wear a mask during transport, if tolerated Transport staff to wear facial protection; gloves and gown added for direct contact with the patient/resident/client during transport Clean and disinfect equipment used for transport after use				
Communication	Effective communication regarding precautions is to be given to patient/resident/client families, other departments, other facilities and transport services prior to transfer				

2.3.2 Duration of Additional Precautions

Additional Precautions are to remain in place until there is no longer a risk of transmission of the microorganism or illness. For patients/residents/clients with known high-risk exposures, Additional Precautions can be discontinued at the end of the incubation period from the day of last exposure (i.e., day 0).

If an aetiology in symptomatic patients/residents/clients is identified, Additional Precautions can be discontinued at the end of the period of communicability (if known). See Appendix N: Clinical Syndromes/Conditions with Required Level of Precautions of specific infections requiring Droplet and Contact Precautions in PIDAC-IPC's Routine Practices and Additional Precautions in All Health Care Settings.[1]

If no aetiology is determined in a symptomatic patient/resident/client, reassess daily and discontinue precautions when:

- The typical incubation period has passed from the time of transfer of an asymptomatic patient/resident from unit with a respiratory outbreak, or the outbreak has been declared over (whatever occurs first)
- The patient/resident has a diagnosis other than respiratory infection that accounts for symptoms (e.g., bacteremia, confirmed urosepsis)
- Respiratory symptoms are improving (e.g., cough, shortness of breath, fraction of inspired oxygen (FiO_2) requirements, wheezing, sputum production), fever has been resolved for at least 24 hours.

2.4 Routine Practices for Procedures with Increased Transmission Risk – Aerosol-Generating Medical Procedures

2.4.1 Concept of Aerosol-Generating Medical Procedures

Respiratory viruses are transmitted most frequently and easily at short-range through exposure to infectious respiratory particles in the air, but infection can also occur through deposition of virus on mucous membranes, or by touching mucous membranes with soiled hands contaminated with virus.[14,232] Certain activities and procedures can generate larger volumes of infectious respiratory particles across

the continuous spectrum of particles, including very small particles that may remain suspended in the air for prolonged periods of time (historically referred to as infectious aerosols).[13] Evidence suggests transmission risk of ARIs, especially with respect to long-range transmission, can occur particularly where there is inadequate ventilation and/or highly infectious individual(s) and depend on a variety of factors like room temperature, humidity, airflow, amount and size of respiratory particles involved, as well as the bioburden of viable pathogen in these respiratory particles.[14] The concept of AGMPs implies that an increase in the creation and mobilization of, in particular very small, respiratory particles can result in a higher risk of transmission to staff and patients/residents/clients.[14]

The presence of a larger volume of infectious respiratory particles (IRPs) alone does not necessarily indicate an increased risk of transmission. As such, it is important to not only identify types of medical and dental procedures that may increase the generation of IRPs, but to also examine the available evidence for an increased risk of transmission associated with such procedures. Optimally, the evidence to support different procedures as AGMPs would primarily stem from epidemiologic studies that identified a certain type of procedure as being consistently associated with an increased risk of transmission. The increased risk, however, can be related to either an increase in the volume of small IRPs, or be a function of prolonged close contact regardless of the volume or size of IRPs. The next lower level of evidence that can be considered are studies that used an increase in viable virus in small respiratory particles generated by AGMPs as a surrogate for an increase in risk. However, an increase in those small IRPs in the absence of evidence of an increase in transmission risk or viable virus should not be considered conclusive evidence to determine a procedure to be an AGMP.

2.4.2 History of Aerosol-Generating Medical Procedures

While the concept of aerosol generation from medical intervention has been around for decades, the terminology of AGMPs gained attention after the severe acute respiratory syndrome coronavirus 1 (SARS-CoV-1) pandemic in 2003 – a time period in which IPAC best practices may not have been consistently implemented in health care settings. A systematic review conducted by the WHO in the aftermath of the pandemic assessed the transmission risk to HCWs who carried out procedures on SARS-CoV-1 infected patients and found that being present at a tracheal intubation had the strongest association with an increased risk of SARS-CoV-1 infection.[233] The review also identified lower quality studies that indicated a potentially higher transmission risk with non-invasive ventilation (NIV), tracheotomy and manual ventilation before intubation. Although informed by low quality studies, there was no significant associated SARS-CoV-1 transmission risk from other procedures that had been evaluated.

Recommendations in PIDAC-IPC's Routine Practices and Additional Precautions in All Health Care Settings,[1] were informed by the existing limited evidence of transmission of ARI from procedures that generated an increase in respiratory particles and included procedures such as: endotracheal intubation, cardio-pulmonary resuscitation, open airway suctioning, bronchoscopy, surgery (i.e., of the respiratory tract) and autopsy, sputum induction, NIV for acute respiratory failure [e.g., BiPAP, CPAP, ventilation and high flow oxygen therapy, high-frequency oscillating ventilation (HFOV)]. At that time due to inconclusive or lack of published literature documenting transmission, there was debate whether other medical procedures that may generate an increased amount of respiratory particles could increase the transmission risk. Examples of such procedures included: nebulized therapies, HFOV, tracheostomy or tracheostomy care, chest physiotherapy, collection of nasopharyngeal swabs or nasopharyngeal aspirates, tube or needle thoracostomy.

During the 2019 COVID-19 pandemic the list of AGMPs was further expanded based on limited evidence and by applying the precautionary principle to include those procedures noted above plus: extubation

and related procedures (e.g., manual ventilation and open deep suctioning), tracheotomy/tracheostomy procedures (insertion/open suctioning/removal), certain dental procedures (e.g., high-speed drilling and ultrasonic scalers), HFOV, and high flow oxygen to explicitly include administration through nasal cannula.[3]

2.4.3 Current Definition of Aerosol-Generating Medical Procedures

In order to reconcile and revise the long list of AGMPs, a comprehensive literature review as well as an international jurisdictional scan was completed (see Appendix B to search the most recent and available evidence of infection transmission associated with candidate AGMPs. The evidence around the risks associated with AGMPs, and the effectiveness of control measures is of very low quality with a high likelihood that new evidence may change the assessment, and there is currently no expert consensus. Commonly performed medical procedures that are often considered AGMPs (Box 3) that are (highly likely) associated with an increased risk of transmission based on the existing evidence are summarized below.

BOX 3: Commonly Performed Medical Procedures That Are Often Considered AGMPs

- Intubation, extubation, and related procedures such as manual ventilation and open deep suctioning
- Tracheotomy
- Bronchoscopy, laryngoscopy and nasal endoscopy
- Autopsy and relevant surgical procedures‡
- Non-invasive positive pressure ventilation (e.g., CPAP, BiPAP, HFOV)
- Certain dental procedures (use of ultrasonic scalers, rotary instrument high-speed hand-pieces, 3-way syringes and air polishers in dental procedures

‡Surgery as it relates to procedures in the respiratory tract where large volumes of respiratory particles can be mobilized, e.g., the use of high-speed devices, tracheostomy.

Note: The collection of a nasopharyngeal swab or throat swab is not considered a procedure with increased risk of transmission.[234]

While the list of AGMPs has not been substantiated by an abundance of scientific data, the available published literature regarding this topic has been synthesized in detail in Appendix B. Procedures for which literature was unavailable were not included. In Appendix B: Table B1 (AGMPs Classified by Organizations), a comparison of how different organizations categorize AGMPs can be found. Intubation, extubation, suctioning, manual ventilation, tracheotomy, NIV (e.g., CPAP and BiPAP), surgery and autopsy procedures, bronchoscopy and procedures involving high speed tools like dental procedures have the best consensus amongst organizations to be classified as AGMPs.

2.4.4 PPE Implications for Aerosol-Generating Medical Procedures

To prevent deposit of respiratory particles on mucous membranes and to reduce the risk of self-contamination, PPE including a medical mask, gowns, gloves and eye protection (as detailed in Section 2.3 Additional Precautions for Acute Respiratory Viral Infections) should be used by staff when within two metres of any patient/resident/client with an ongoing AGMP with or without symptoms of an ARI. A fit-

tested, seal-checked N95 respirator may be worn instead as per PCRA. Organizations may also choose to define through their own policies the requirement that N95 respirators be donned for AGMPs on patients/residents/clients with a suspected or confirmed ARI. There is insufficient evidence, however, to universally recommend N95 respirators for these procedures.

Importantly, in situations involving the care of patients/residents/clients where there may be undiagnosed tuberculosis (e.g., during routine care, procedures such as induced sputum, diagnostic bronchoscopy, or other AGMPs) or when novel respiratory pathogens are suspected or confirmed (based on epidemiology, travel history, zoonotic exposure, etc.), organizational policies should require the use of N95 respirators.

- Refer to PIDAC-IPC's Best Practices for Prevention, Surveillance and Infection Control Management of Novel Respiratory Infections in All Health Care Settings.[20]

While cardiopulmonary resuscitation (CPR) itself is not considered an AGMP, PPE (N95 respirator/medical mask, eye protection, gloves, and gowns) should be donned by the HCW prior to responding to these emergent/urgent situations in the event that intubation is necessary. During a cardiac or respiratory arrest, the use of an N95 respirator should be considered as HCWs are unlikely to have time to conduct a fulsome risk assessment to determine if the patient has an infection that may require N95 respirators (e.g., undiagnosed tuberculosis, measles). Additionally, all units and crash carts should be equipped with the following: a manual resuscitation bag with hydrophobic submicron filter, in-line suction catheters, non-rebreather mask that allows filtration of exhaled gases and PPE.[1]

While sputum induction was not found to be associated with an increased risk of ARI transmission, the use of a fit-tested, seal-checked N95 respirator is recommended given that the typical indication for this procedure is obtaining a specimen in a patient with a suspected or confirmed tuberculosis. Additionally, a fit-tested, seal-checked N95 respirator should be worn for diagnostic bronchoscopy and autopsy as these procedures have also been shown to expose staff to previously undiagnosed tuberculosis.[1] As per Routine Practices, facial protection is also routinely required for breaches to the integrity of a mechanical ventilation system (e.g., open suctioning, filter changes), disposal of filters used in mechanical ventilation and cleaning/disposal of bags and filters.

Patients/residents/clients undergoing an AGMP should be placed in a single room with the door closed whenever possible, particularly if they have a suspected or confirmed ARI, in order to reduce the risk of transmission to other patients/residents/clients. Cohorting of patients/residents with the same laboratory-confirmed ARI may be considered regardless of ongoing or planned AGMPs. Additionally, when an ARI is suspected or confirmed, AGMPs should ideally be performed by highly experienced HCWs to further mitigate potential risks and the number of people in the room at the time of the procedure should be minimized. All elective AGMPs should be postponed until the infection in the patient/resident/client has resolved, and only urgent or non-elective AGMPs should be performed on patients/resident/clients with symptoms of an ARI.

2.5 Requirements and Recommendations for Routine Practice and Additional Precautions during Respiratory Virus Season

Legislative Requirements

16. **A program for the selection, use, training and maintenance of PPE including N95 respirators is required in health care settings.**[7,8,73,74,231]

Recommendations

17. **Patients/residents/clients presenting for care in a health care setting who have symptoms of an ARI should be asked to perform hand hygiene and wear a mask, practice respiratory etiquette and wait in a separate area, or if not possible, keep at least a two metre physical distance from other patients/residents/clients, when feasible.**
18. **Health care settings are to ensure that all HCWs who provide care for a patient/resident/client with symptoms of an ARI are aware of the need to initiate and maintain Additional Precautions for ARIs.**
19. **Once the need for Additional Precautions for ARIs has been established, any receiving unit/facility or diagnostic service are to be informed.**
20. **Routine Practices and PCRAs are integral components of IPAC and OHS, and are to be followed and conducted before any encounter, independent of any known concern of a suspected or confirmed ARI.**
21. **Targeted continuous masking should be considered during high transmission risk periods for close and prolonged direct patient/resident/client contact due to the resulting risk of transmission and risk of outbreaks, while also considering the vulnerability of a certain patient/resident/client population.**
22. **When providing direct care to a patient/resident/client with suspected or confirmed ARI, at a minimum, a medical mask in combination with eye protection, gloves and gown are to be used.**
23. **Additional Precautions for ARIs should be discontinued when there is no longer a risk of transmission. For patients/residents/clients exposed to an ARI, Additional Precautions can be discontinued after one incubation period of the respiratory virus to which the person was exposed to has passed.**
24. **For AGMPs (regardless of whether a patient/resident/client may or may not have an ARI), PPE for staff within two metres includes at a minimum a medical mask, gowns, gloves and eye protection.**
25. **A patient/resident/client undergoing an AGMP should be placed in a single room with the door closed whenever possible, in particular if they have a suspected or confirmed ARI.**

3. Surveillance and Respiratory Virus Outbreaks

Early recognition of ARI outbreaks is critical as it allows control measures to be implemented prior to prolonged and widespread exposure of patients/residents/clients and HCWs and before the outbreak can spread to additional units or facilities. All facilities should have surveillance programs in place to identify and track patient/resident/client and HCW cases, and integrate this data to recognize outbreaks.

3.1 Case Finding/Surveillance for Acute Respiratory Infections

ARIs can be introduced into a health care setting by patients/residents/clients, HCWs and/or essential caregivers and visitors. The purpose of case finding/surveillance is to identify individuals with an ARI who may pose a risk to others in order to put preventative measures in place to reduce or eliminate transmission.

The steps required for case finding/surveillance may be incorporated into the creation of a case finding algorithm. See Appendix C: Sample Case Finding/Surveillance Algorithm for Acute Respiratory Infection.

3.1.1 Case Finding For Acute Respiratory Infections in Health Care Facilities

Broadly, there are two types of case finding/surveillance – active and passive (see Box 4. Types of Case Finding/Surveillance Methods). Each health care setting should develop surveillance systems based on these approaches. The decision whether to conduct active or passive case finding/surveillance will depend on the physical set up of the department/resident care areas or office/clinic, the type of care provided and the risk of transmission (e.g., a setting where HCWs have little direct face-to-face contact with patients/residents/clients may choose to use passive case finding/surveillance). Some health care settings may choose to use a passive approach when there are no travel health notices or community influenza/ARI activity, and shift to a more active approach during times when there is more ARI activity.

Many health care settings use a combination of active and passive approaches; e.g., signage that directs patients/residents/clients who have symptoms to take certain precautions, together with follow-up questions by the first HCW contact in the health care setting to confirm the patient/resident/client has read and understood the sign. A combined approach is particularly important where age, language or disability may be a barrier to a patient/resident/client reading a sign and following instructions. Such a combined approach is typically used in emergency departments, acute care in-patient units, LTC, complex continuing care, rehabilitation hospitals, ambulatory care (e.g., clinics, physician offices). Surveillance is typically limited to passive strategies for HCWs/staff and caregivers/visitors. Of note, passive surveillance would also entail situations where information is shared by patients/residents/clients or caregivers/visitors without them being asked for or reminded, e.g., in pre-hospital care (e.g., EMS) or with home care visits.

- Refer to the Ontario Respiratory Virus Tool for information regarding respiratory virus activity in Ontario[235]

Box 4: Types of Case Finding/Surveillance Methods

Active Case Finding/Surveillance Examples

- Patients/residents/clients are asked about possible respiratory symptoms on arrival at points of first contact to a clinical area of a health care setting.

- Patients/residents on in-patient units and resident home areas, are checked daily for respiratory symptoms and a summary report of symptomatic individuals is kept.

➢ Refer to Appendix D, Sample Form for Active Case Finding of Acute Respiratory Infection on Entry to Health Care Settings, for a sample case finding/surveillance form that may be adapted to the health care setting.

➢ Refer to Appendix G, Sample Daily Acute Respiratory Infection Active Surveillance/Reporting Tool for in-patient and resident home areas for a sample summary form for active surveillance that may be adapted to health care facilities.

Passive Case Finding/Surveillance Example

- Signage directs the patient/resident/client or HCWs to self-assess and self-identify if they have respiratory symptoms.

➢ Refer to Appendix E, Sample Signage for Passive Case Finding of Acute Respiratory Infection at Entrance to Health Care Facilities, for sample signage that may be adapted to the health care setting.

➢ Refer to Appendix F, Sample Signage for Visitors to Health Care Facilities for sample signage that may be adapted to the health care setting.

3.1.2 Patient/Resident/Client Surveillance

3.1.2.1 Initial Encounter

It is necessary to assess each patient/resident/client on initial encounter with the health care setting for symptoms of an ARI and to document that the assessment has been completed.

It is preferable that health care settings use an electronic tool to document their case finding/surveillance activities, although a written tool may be used (refer to Appendix D: Sample Form for Active Case Finding of Acute Respiratory Infection on Entry to Health Care Settings). Health care settings should establish a practice of flagging in the patient's/resident's (electronic) chart when a suspected or confirmed ARI has been identified and precautions have been initiated.

3.1.2.2 Ongoing Daily Surveillance for In-patients and Residents

Patients/residents should be screened for ARI symptoms upon admission/arrival and undergo surveillance for ARI symptoms daily and optimally, at least twice daily while admitted (see Appendix C: Sample Case Finding/Surveillance Algorithm for Acute Respiratory Infection and Appendix H: Symptoms

of an Acute Respiratory Infection). Case finding methods may include reports from nursing staff, chart review, face-to-face rounding by IPAC professionals, use of surveillance tools or laboratory reports, treatment review and clinical observations.

- Refer to Appendix G: Sample Daily Acute Respiratory Infection Active Surveillance/Reporting Tool for In-patient and Residential Settings, for a sample chart which may be used to track ARI within the health care facility.

Symptomatic patients/residents/clients should be placed on Additional Precautions and tested for an ARI. Early recognition of patients/residents with symptoms suggestive of an ARI is critical for outbreak prevention and recognition. Additionally, IPAC should be notified of all new patients/residents/clients with symptoms consistent with an ARI. Any new acquisition of an ARI within the health care facility should prompt an investigation. A determination should be made as to whether the infection was likely acquired in the facility and appropriate steps should be taken to contain the transmission and to look for additional cases.

3.1.3 Staff Surveillance

HCWs with symptoms of ARIs should follow an established process of notifying their manager and report to OHS or designate, in accordance with organizational policy and only present to work if in keeping with the institution's return to work policy. Staff members with symptoms should follow the testing recommendations of OHS, if applicable. Supervisors or any other leader who identifies clusters of HCWs with ARIs should report this to OHS and IPAC.

If OHS identifies clusters of ill staff members working in a common area (e.g., several sick staff members having worked on the same shift[s] in the intensive care unit) or in a common discipline (e.g., several sick phlebotomists) they are to notify the leadership and IPAC if an outbreak is suspected. For more details see Section 3.4 Outbreak Recognition.

3.1.4 Case Finding for Acute Respiratory Infections in Home Care

Case finding/surveillance for clients receiving home care should be ongoing and can be done using a number of approaches. For example:

- When patients requiring Additional Precautions are discharged from hospital, the hospital should ensure that the information is communicated to the agency providing home care and ask the patient or a family member to inform the home care provider.
- The agency responsible for managing the care should contact a new client before the first scheduled visit, inquire about the presence of ARIs and ask the client to inform home care providers if they develop respiratory symptoms. If the agency is unable to reach the client by phone, the health care provider should ask the questions before providing services.
- For subsequent visits, the client (or a family member) can be asked to self-assess for symptoms of an ARI and notify home care providers when they arrive at the home, or the health care provider can start each encounter by asking about any symptoms of an ARI.

The type of approach an agency uses will depend on whether the client is a new or long-term client, and on the client's (family's) capacity to self-assess. When home care clients have symptoms of an ARI, home care providers should be equipped with PPE and use suitable preventive practices, including Additional Precautions for ARIs. See Table 5. Elements that Comprise Additional Precautions for Acute Respiratory Infections (in addition to Routine Practices).

3.2 Documenting and Reporting of Acute Respiratory Infections

Reporting ARIs is necessary to ensure that health care settings, IPAC and public health authorities have the information they need to prevent and control the spread of ARIs. Each health care setting should set up a reporting framework to ensure reporting requirements are met.

Physicians and administrators/leadership and/or IPAC are required to notify public health about patients/residents who have, or may have a disease of public health significance as well as:[236]

- unusual clusters or outbreaks of ARIs
- symptomatic single cases with recent travel if relevant or requested for provincial/territorial or federal reporting, or symptomatic contacts of such cases. Travel health notices can help with an assessment of relevant risks.

For more information about travel health alerts see travel health notices from the Public Health Agency of Canada.[237]

Effective communication with public health can assist in early identification of an outbreak. If a health care facility experiences a respiratory outbreak, the outbreak status should be communicated internally and externally whenever a patient/resident is transferred to another health care setting. For more information about the requirements for reporting to public health, see Ontario Regulation 569 under the *Health Protection and Promotion Act.*[236]

For classification of ARI cases and outbreak detection, refer to Section 3.2.2 Determining whether a Case Should be Classified as Health Care-Associated, Section 3.3 Acute Respiratory Infections - Outbreak Considerations and Section 3.4 Outbreak Recognition.

3.2.1 Reporting Health Care Workers with Acute Respiratory Infections

Close liaison between IPAC and OHS is essential to ensure post-exposure and outbreak management, including contact tracing.[76] OHS should report HCW clusters of ARIs in a de-identified/aggregate form to IPAC to protect HCWs right to confidentiality. OHS or a designate is required to notify public health about HCWs who have or may have a disease of public health significance.[238]

The diagnosis of an ARI in a staff member should lead to the notification of key partners (see Section 3.1.3 Staff Surveillance) following the appropriate notification process. Furthermore, the following actions should be considered:

- Ensure the staff member is aware of the diagnosis, is following the return to work policy, and receives appropriate instruction on work self-isolation and how to seek medical care if required.
- Conduct forward and backward contact tracing to identify all patients/residents/clients who may have been exposed or served as the source of transmission to the positive staff and initiate appropriate management of patients/residents/clients who had high-risk exposures.
- Determine if there is a reasonable likelihood that the ARI was health care-associated
- Determine if there are/were other symptomatic staff members or patients/residents in the clinical area or department in which the staff member worked who require investigation.

If an employer is advised by or on behalf of a worker that the worker has an occupational illness or that a claim in respect of an occupational illness has been filed with the Workplace Safety Insurance Board (WSIB), the employer is required to give notice in writing, within four days of being advised, to the Ministry of Labour, Immigration, Training and Skills Development, to the JHSC, and to the trade union, if any. For legislated reporting requirements refer to the *Health Protection and Promotion Act* and the *Occupational Health and Safety Act*.[238,239] For more information on reporting workplace incidents and illness refer to the Ministry of Labour, Immigration, Training and Skills Development.[240]

3.2.2 Determining whether a Case Should Be Classified as Health Care-Associated

In determining whether an infection should be considered health care-associated, the duration from admission to symptom onset (or date of the positive test) in consideration of the incubation period of a specific virus is key. Refer to Table 6. Framework for Classifying Patient/Resident Cases. The longer the patient/resident has been admitted to a health care facility prior to onset of symptoms or a positive test result, the more likely the case is health care-associated. For example, a patient/resident who develops a symptomatic ARI after admission to a health care setting that is outside of the incubation period for a specific ARI virus, would be considered health care-associated. Conversely, a patient/resident who tests positive within one day after admission would be considered community-associated. For routine surveillance purposes, an arbitrary cut-off of 48 hours for onset of symptoms from admission is typically used. However, if the virus and therefore the incubation period is known, a more nuanced approach can be used, for example, looking at the average incubation period.

For patients/residents admitted between the minimal and maximal incubation period at the time of positive test and/or onset of symptoms, judgement and integration of the following factors is required:

- Any known exposures in the community and in the health care facilities to (confirmed) ARIs
- The total number of confirmed health care-associated patient/resident and staff cases currently on the affected unit.
- The level of community transmission. This is most important in determining how to attribute staff cases, but should be considered for patient/resident cases as well (e.g., two or more positive cases are possible due to repeated introduction of a virus into a facility from the community and may not necessarily be due to sustained transmission during the height of the ARI season).

Table 6. Framework for Classifying Patient/Resident Cases

Admission Duration Prior to Symptom Onset or Positive Test[§]	Community Exposure	Hospital Exposure	No Known Exposure
Less than the minimal incubation period since admission	Community-associated	n/a	Community acquired
Between minimal and maximal incubation period since admission	More likely community - associated	More likely health care-associated	In doubt, consider health care-associated if beyond average incubation period
More than the maximal incubation period since admission	n/a[#]	Health care-associated	Health care-associated

[§]Patients who present to hospital with ARI but have been hospitalized within the incubation period of the ARI should also be considered as having possible health care-associated ARI or an ARI attributable to another health care facility.
[#]Best judgment should be used for patients/residents with day passes.
Note: This classification does not apply to outpatients (such as patients on dialysis) who have frequent community exposures.

3.2.3 Initial Investigation of a Single Health Care-Associated Patient/Resident with an Acute Respiratory Infections

The diagnosis of ARI in any patient/resident should lead to the notification of key partners (see Section 3.1.2 Patient/Resident/Client Surveillance) and an immediate investigation should proceed. The purpose of the investigation is to:

- Ensure that the patient/resident is aware of the diagnosis and that measures to prevent further disease transmission are in place (e.g., for hospitalized patients, placement on Additional Precautions in a single room when possible).
- Conduct contact tracing to identify exposed patients/residents or visitors and initiate appropriate management of patients/residents who had an unprotected high-risk exposure to the patient/resident. Examples include patients/residents sharing the same room or patients/residents with exposures to HCWs who provided direct care for the case during their period of infectivity. If the HCW had consistent medical masking, this would generally not be considered a high-risk exposure. Exposed visitors should be notified and not continue to visit the facility except in specific circumstances aligned with the facility's visitor policy and following review by IPAC.
- Determine if there is a reasonable likelihood that the ARI was health care-associated.
- Determine if there are/were other symptomatic patients/residents or staff members in the clinical area who require investigation.

3.3 Acute Respiratory Infections - Outbreak Considerations

With circulation of respiratory viruses in the community, repeated introduction of ARIs into health care facilities occur, either because a patient/resident was admitted during the incubation of a community-associated infection, or due to introduction and transmission from a HCW, essential caregiver or visitor, or other individuals that do not reside in the facility. In the absence of further transmissions, these remain single cases that are not uncommon while respiratory viruses circulate. In the setting of unexplained transmission within a facility the declaration of an outbreak and implementation of outbreak measures are required.

Transmission in the health care setting is even harder to recognize amongst HCWs and in outpatient populations, such as dialysis patients, who move continuously between health care and community settings. Judgment is required in deciding whether an ARI outbreak should be declared, as there are also potential harms to patient/resident care that may result from outbreak-related disruptions. Implementing control measures during outbreaks should consider the balance of harms and risk to patient/resident care with the physical, psychological, emotional and spiritual needs of patients/residents. Education should be provided for patients/residents (and their families) on the rationale and scope of precautions once Additional Precautions are initiated.

A case definition should be developed for each individual outbreak and modified if necessary to ensure that the majority of cases are captured by the definition.

Refer to the Ministry of Health:

- Appendix 1: Case Definitions and Disease-Specific Information. Disease: Respiratory Infection Outbreaks in Institutions and Public Hospitals[241] (access under “R” of the Infectious Diseases Protocol section)
- Recommendations for Outbreak Prevention and Control in Institutions and Congregate Living Settings[19]

Box 5: Acute Respiratory Infections Outbreak

When to suspect an ARI outbreak*:

Two or more patients/residents with a laboratory confirmed ARI with the same virus (from a PCR test, rapid molecular test or rapid antigen test (RAT) within a specified area (unit/floor/service), with onset of symptoms within a 48 hour period where at least two cases could have reasonably been acquired in the specified area of the health care setting. [241]

Or

At least three cases with onset of symptoms within a 48 hour† period within a specified area of the health care setting if timely testing is not available and cases cannot be lab-confirmed.

Considerations when an ARI outbreak is suspected:

Where there is IPAC expertise available, this definition in isolation of other information should not dictate whether or not an outbreak needs to be declared. Instead, in discussion with the Outbreak Management Team (OMT) and the public health unit (PHU) consideration should be given to the risk of sustained transmission in the specified area. If sustained transmission is suspected, an ARI outbreak is to be declared.

Where IPAC expertise is not available, the case numbers outlined above are to be used for outbreak declaration.

The Medical Officer of Health has the ultimate authority in case of a disagreement.

*Testing of patients/residents with multiplex respiratory virus PCR testing is preferred.

†Under certain circumstances (e.g., viruses with longer incubation periods) more than 48 hours may elapse between cases, and this may still indicate sustained transmission and necessitate the declaration of an outbreak.

For suspect outbreaks, appropriate control measures should be implemented in a step-wise approach. In the event of an ARI outbreak, health care settings should initiate all appropriate control measures and are required to contact their local PHU (see Section 3.2 Documenting and Reporting ARIs) and follow appropriate outbreak management procedures.

For guidance in the prevention, detection and management of outbreaks of respiratory infections in LTC and other settings refer also to:

- Ministry of Health: Recommendations for Outbreak Prevention and Control in Institutions and Congregate Living Settings [19]

Ontario Regulation 569 under the *Health Protection and Promotion Act*, sets out clearly the type of information that hospitals and other health care institutions are required to report in relation to respiratory infection outbreaks.[236]

3.4 Outbreak Recognition

When clusters of symptomatic patients/residents are recognized (refer to Section 3.1 Case Finding/Surveillance for Acute Respiratory Infections in Health Care Facilities) within a given unit or with another epidemiological association (e.g., outpatient departments) test results should be expedited if

possible. If an outbreak is suspected, notification of the leadership of the affected area, OHS, and public health (typically by IPAC if available) is to occur. Immediate action is required based on a single ARI case where health care-associated transmission is possible. (See Section 3.5.1 Overview of Immediate Actions.)

3.4.1 Clusters of Staff Cases

Most ARI outbreaks involve a combination of patient/resident/client and staff cases within a given clinical area or unit. It can be difficult to determine if an outbreak is occurring based solely on a small number of staff cases. Clusters of staff cases not associated with patient/resident cases can occur via several scenarios:

- A unit-based outbreak of ARI where patient/resident cases have not yet been identified, or tests are pending.
- Transmission at the work place, but exclusively from staff to staff (e.g., transmission in break rooms).
- Staff-to-staff transmission in common areas of the facility not linked to a specific unit (e.g., transmission in shared offices associated with a specific professional group).
- Staff-to-staff transmission outside the facility (e.g., staff car-pooling, meetings or social gatherings, staff who live together).
- Coincidental identification of two or more unrelated staff cases working in a single clinical area during a time of increased community ARI activity.

Contract tracing to identify exposed patients/residents/clients is critical to ensure that staff cases have not and will not result in sustained transmission. However, staff cases with an ARI in the absence of patients/resident/client cases typically do not require the declaration of an outbreak in light of other steps that are taken to prevent potential sustained transmission (see Section 3.3 Acute Respiratory Infections - Outbreak Considerations). However, identification of unusual staff clusters should be shared with the PHU and prompt investigation for potential patient/resident cases should occur. Staff cases associated with outbreaks should be reported to the PHU, and listed on the outbreak line list. Refer to Section 3.1.3 Staff Surveillance for management of staff cases of ARIs.

3.4.2. Clusters of Acute Respiratory Infections Cases within Multi-bed Rooms

Declaration of an outbreak may not be required with clusters limited to a single multi-bed room even if exceeding the numerical outbreak thresholds (e.g., one of the patients/residents with delayed diagnosis of a community-acquired ARI or exposure to an infectious visitor or staff member with transmission to roommates but not beyond the affected room). Likewise, detection of a small number of potentially health care-associated cases during high activity of ARI transmission in the community may not necessarily be linked to sustained transmission in the facility and the declaration of an outbreak may not be required.

A framework for classifying patient/resident cases surveillance can be found in Table 6. As outlined in Section 3.3, identification of two health care-associated cases should not automatically trigger the declaration of an outbreak, but even one single health care-associated case should trigger an investigation.

3.5 Outbreak Investigation and Management

If a potential ARI outbreak is identified within a health care facility, key partners are to be notified—including (as applicable) health care setting leadership, IPAC, OHS, JHSC, and microbiology. Health care settings are required to notify their local PHU if they have a suspect or confirmed outbreak in a timely manner (i.e., optimally the same day, or as soon as possible).[19] In addition, LTCHs are required to immediately report confirmed ARI outbreaks to the Ministry of Long-Term Care using the Critical Incident System requirements in section 115 of Ontario Regulation 246/22 under the *Fixing Long-Term Care Act, 2021*.[231]

For further guidance in the LTC and other settings refer to:

- Ministry of Health: Recommendations for Outbreak Prevention and Control in Institutions and Congregate Living Settings[19]

Investigation and management for an ARI outbreak should proceed simultaneously. Timely testing of all symptomatic patients/residents, is the cornerstone of the initial investigation (i.e., to determine the extent of the outbreak) and control (i.e., to ensure positive patients/residents are isolated and symptomatic staff members are not working until cleared by OHS). Essential caregivers who stay on the unit with patients/residents should also be included in the outbreak investigation (e.g., pediatric units) but are not routinely tested.

The key goals of the outbreak response are to:

- Interrupt transmission in the involved areas.
- Prevent transmission to new areas.
- Ensure continued provision of clinical care.
- Identify and correct causes that contributed to the outbreak.

3.5.1 Overview of Immediate Actions

As soon as a suspected outbreak is identified, the following actions should proceed immediately:

- Close the unit to admissions (if possible and appropriate).
- Restrict staff to the unit as much as possible to limit transmission to other units/patients/residents.
- Whenever possible, place all positive patients/residents on Additional Precautions in single rooms, or cohort with other lab-confirmed cases, and ensure that signage indicates the type of Additional Precautions.
- Assess all patients/residents in the outbreak area for symptoms of ARIs. IPAC should be notified of all symptomatic patients/residents and they should be placed on Additional Precautions in a single room with access to their own toileting facility, where possible and tested for an ARI. Exposed patients/residents from different rooms should not be cohorted together, whenever possible because of the risk that if one develops an ARI as a result of the initial exposure they will (re-) expose all the current roommates. Refer to Section 1.5 Placement of Patients/Residents with Acute Respiratory Care for further details on cohorting.

- Contact tracing of patients/residents – placement of all exposed patients/residents (e.g., roommates of positive cases, prolonged exposures to infectious and unmasked staff) on Additional Precautions preferentially in single rooms, whenever possible.
- Staff should self-monitor for symptoms, and symptomatic staff should follow OHS's return to work policy. OHS should assess exposed staff as needed and should be managed in keeping with facility policies and procedures (usually requiring self-monitoring). If the HCW was consistently masked, this would generally not be considered a high-risk exposure.
- IPAC should notify OHS about new patient/resident cases and OHS should notify IPAC about new staff cases to ensure early outbreak recognition and allow prompt contact tracing of patients/residents and staff.
- In general, patients/residents should be restricted to their rooms except for medically essential tests and procedures. Consideration of the risk/benefit of pausing activities (e.g., communal dining and group therapy or activities), should be made in consultation and at the discretion with the OMT/PHU. Factors in the decision to pause activities should include: ability to cohort, impact on patient/resident mental health and well-being, extent and dynamic of the outbreak.
- Pause admissions and transfers to the impacted area whenever possible until the situation is reviewed by the OMT.
- Restrict visitors as per the facilities outbreak policy. In general, access of essential caregivers should not be restricted.
- Schedule an OMT meeting ideally within 24 hours or on the following business day of initial recognition of an outbreak. (See Section 3.5.2 Outbreak Management Team Meeting)
- Optimally, exposed visitors and essential caregivers should be notified and not continue to visit the facility except in specific circumstances aligned with the facility's visitor policy and following review by IPAC.

3.5.2 Outbreak Management Team Meeting

Necessary outbreak measures are to be initiated immediately and the OMT should meet shortly after recognition of an outbreak (on the next business day at the latest). All relevant key partners should be included. Facilities may differ in the composition of an OMT but in general the OMT meeting should include: medical and administrative leadership from the affected areas including nursing and physician leadership, IPAC, OHS, public health, microbiology, communications and environmental services. Consideration should also be given to include engineering/facilities management, risk management, pharmacy (for prophylaxis in case of influenza outbreaks) and potentially other relevant key partners.

The role of the OMT is to review the epidemiological, clinical and microbiological data, and to confirm the outbreak status of the unit. The OMT will also determine what additional investigations are required, recommend control measures, review the outbreak situation as it evolves, modify control measures as required based on their effectiveness in preventing transmission, declare the outbreak over and conduct a debrief and root cause analysis to identify key learnings, if applicable.

Meetings should continue to occur at a frequency dictated by the course of the outbreak, with meetings as required over the initial phase of the outbreak and until the outbreak comes under control. For outbreaks with no further transmission after identification, follow-up outbreak meetings are often not required.

At each OMT meeting the following may be reviewed:

- The epidemic curve and/or line list and other epidemiological investigations and tools that may be relevant (e.g., bed maps, results on contact tracing that show links between cases).
- New confirmed positive, new symptomatic patient/resident and staff cases and new patient/resident exposures.
- The clinical status of patient/resident and staff cases including deaths.
- Planned patient/resident discharges, transfers, and admission if closing unit is not possible, or is no longer deemed necessary.
- Availability of PPE and other consumable supplies (e.g., ABHR, signage).
- Unit staffing and how the outbreak is impacting clinical care.
- OHS and IPAC practices (e.g., review results of hand hygiene and PPE compliance, environmental cleaning and equipment disinfection practices) and provide education to ensure best practices are in place.
- Diagnostic or surveillance errors (e.g., failure to recognize typical or atypical ARI symptoms, failure to report symptoms, laboratory error, misinterpretation of laboratory tests, etc.).
- Staff vaccination rates (if applicable, e.g., influenza and COVID-19 outbreaks).
- Patient/resident/client-specific factors (e.g., non-compliant patient/resident/client, ill visitors on unit, wandering symptomatic patient/resident, low vaccination rates among patients/residents).
- Environmental factors (e.g., overcapacity and patients in unconventional bed spaces, multi-bed rooms with beds less than one metre apart, poor ventilation, crowded and cluttered environments).
- Status of action items from previous meetings (if applicable).
- Integration of the above data and consideration of evidence received from practice audits and from staff feedback regarding how, where and why transmission is occurring and the effectiveness of measures implemented.
- Additional proposed actions relating to investigation or control of the outbreak (e.g., enhanced environmental cleaning, visitor restrictions).[242]
- The communications plan.
- The criteria to declare the outbreak over and the earliest possible end date of the outbreak (i.e., in the absence of additional cases).

When an outbreak is suspected but not (yet) confirmed, some of the above measures may be considered for implementation. Communication with targeted key partners (e.g., unit leadership and senior management) should occur to determine which outbreak measures are to be implemented.

3.5.3 Communication

Effective communication is a core element of the outbreak response. Clear and transparent internal communications within the outbreak area and in other areas of the health care facility are essential to maintaining staff trust, reducing anxiety related to the outbreak and ensuring the outbreak measures

are understood and implemented by staff. At times, external communication to community partners may be necessary.

ARI outbreaks also cause anxiety in patients/residents and families. Clear communication to patients/residents and families, and essential caregivers, visitors e.g., through development of a patient/resident letter or frequently asked questions (FAQs) document, is important.

Prominent and clear signage should be placed at all entrances to the outbreak unit to ensure all visitors, essential caregivers, and staff from other units and departments are aware of the outbreak and the measures in place on the unit.

3.6 Interrupting Transmission on the Outbreak Unit

All patients/residents and staff on an outbreak unit can be considered to have an increased risk of contracting an ARI. Contact tracing related to positive patients/residents and staff cases should be conducted quickly in collaboration by IPAC and OHS. It is important to quickly identify high-risk patient/resident contacts (e.g., roommate contacts of a confirmed case, or those with prolonged exposures to infectious staff while not masked). These individuals are to be placed on Additional Precautions for ARI as they are at the highest risk of developing an ARI and may already have a symptomatic or asymptomatic ARI (forward contact tracing), and/or may have been transferred to other units or facilities that need to be notified. When prioritizing the optimal placement of high risk patient/resident contacts on Additional Precautions for ARI, consideration may be given to the conversion rate of roommates with respect to various respiratory viruses. Additionally, contact tracing should also seek to identify, where possible, the index case or chain of transmission that introduced the ARI onto the unit (backward contact tracing) to best understand that period of risk, identify other possible cases and exposures, and to address deficiencies in policy or practice that may have contributed to the outbreak.

Monitoring for new cases through ongoing surveillance for symptomatic patients/residents and symptomatic staff is essential. Ideally all patients/residents should be reviewed for ARI symptoms twice daily. If symptoms develop, patients/residents should be promptly tested and placed on Additional Precautions for ARI, optimally in a private room with dedicated toileting facilities. Consider daily active screening of essential caregivers staying on the unit (e.g., pediatric units) for symptoms.

In addition, auditing and careful review of IPAC and OHS practices on the unit is important to determine deficiencies in policies or practices that may have contributed to transmission. During outbreaks, consideration may be given to reviewing HVAC systems in health care settings with building services/facilities to ensure proper functioning. Refer to Section 1.6 Ventilation for more details.

Although contact is not the primary mode of ARI transmission, adequate cleaning and disinfection should be ensured. This includes cleaning and disinfection of shared equipment (and dedicating equipment to ARI positive patients/residents), of patient/resident care areas and of common areas and staff only spaces (e.g., staff lounges, eating areas or locker rooms).[242] It may be necessary to increase environmental service staffing to ensure appropriate environmental cleaning and disinfection of outbreak units.[242]

Refer to:

- PIDAC-IPC's Best Practices for Hand Hygiene in All Health Care Settings[4]

- PIDAC-IPC's Best Practices for Environmental Cleaning for Prevention and Control of Infections in All Health Care Settings[242]
- PHO's Supporting Resources for Implementing PPE Auditing Programs[243]

3.7 Role of Testing During Outbreaks

Rapid identification of the responsible virus for a given ARI outbreak is crucial to determine additional actions and to minimize the duration of an outbreak. Surveillance for and testing of all symptomatic patients/residents in the affected area is essential and PCR testing should be available to all patients/residents, when indicated, to quickly understand the scope of the outbreak (see Section 3.7 Role of Testing During Outbreaks). Testing of asymptomatic individuals is not routinely recommended. However, in particular with COVID-19 outbreaks, it may be considered in exceptional situations, e.g., with ongoing unexplained transmission despite fully implemented outbreak measures. Patients/residents that are tested despite being asymptomatic do not need to be placed on Additional Precautions due to low pre-test probability.

The list of preferred specimen types for molecular testing is available through Public Health Ontario Laboratory Services.[244] Swabs should ideally be collected from patients/residents as soon as possible after they develop symptoms.

- All symptomatic patient/residents/clients with acute respiratory symptoms are recommended to be tested for multiple respiratory viruses such as using a multiplex respiratory virus PCR (MRVP) panel, or the more limited FLUVID panel, depending on availability.
- During outbreaks, multiplex testing for respiratory viruses is only indicated when the pathogen is unknown, or for symptomatic patients/resident/clients if other respiratory viruses are suspected (e.g., mixed outbreak).
- Rapid antigen tests (RATs) have a significantly lower sensitivity than molecular tests and should not be used for patients/residents/clients. Results of RATs (positive or negative) should not change the management plan for a symptomatic patients/residents/clients (i.e., cases are to be isolated and be treated as a suspect case until their molecular test results are known).
- While a nasopharyngeal swab (NPS) is the preferred collection method, other specimen collection methods, including combined oral and nasal swabbing, may be used to support access to testing and maximize testing uptake.

3.7.1 Interpreting Positive COVID-19 Results in Asymptomatic Cases

Testing of asymptomatic patients/residents is not routinely recommended. A positive PCR test in an asymptomatic patient/resident can be difficult to interpret. In asymptomatic individuals a positive COVID-19 test result can represent:

- A pre-symptomatic case that will go on to develop symptoms and may be highly infectious.
- A new asymptomatic case that may be infectious.
- A previous positive case that is still shedding viral RNA and is no longer infectious. Asymptomatic individuals can test positive for weeks to months after their acute infection.

- A false-positive case that is not infectious.[245,246]

For further details refer to:

- PHO's Focus On: An Overview of Cycle Threshold Values and their Role in SARS-CoV-2 Real-Time PCR Test Interpretation[246]

An outbreak based on asymptomatic cases should not be declared.

3.8 Antiviral Prophylaxis during Influenza Outbreaks

During a confirmed influenza outbreak, prophylactic antiviral medication (e.g., oseltamivir or zanamivir) should be recommended to all patients/residents in the outbreak-affected area who are not already ill with influenza, regardless of their vaccination status. Guidance on duration of prophylaxis varies with limited evidence on optimal duration. At a minimum, prophylaxis should be continued for 7 days or for the duration of the outbreak (whichever is longer). Oseltamivir prophylaxis is most effective when administered to patients/residents as early as possible.[247,248] Health care settings should have established workflows and processes in place to facilitate the timely administration of oseltamivir in outbreak scenarios (e.g., through a medical directive).

Antiviral prophylaxis is not generally recommended for staff vaccinated for a given influenza season. However, HCWs who have not been immunized should be taking antiviral prophylaxis for the duration of the outbreak, and if they refuse to do so, consideration should be given to exclude them from work.[81] During a confirmed influenza outbreak, when the circulating strain is not well-matched by the vaccine, antiviral prophylaxis may be recommended to all staff regardless of vaccination status, as determined by the OMT and in consultation with the Medical Officer of Health or designate. Antiviral prophylaxis should not replace annual influenza immunization.

To ensure guidance related to the use of antivirals reflects the most up-to-date seasonal antiviral medication use recommendations, health care facilities should be aware of the Association of Medical Microbiology and Infectious Disease (AMMI) Canada's current guidelines for the use of antiviral drugs.[249]

Other recommendations regarding influenza antiviral prophylaxis:

- In healthy adults, it takes two weeks to develop antibodies to the influenza virus after receiving the influenza vaccine. Staff who have been vaccinated for less than two weeks at the time the influenza outbreak is declared should take antiviral prophylaxis for two weeks after vaccination or until the prophylaxis on the outbreak unit is discontinued (whichever comes first). Note: Antiviral medications do not interfere with the immune response to vaccine.
- If a patient/resident is transferred to another (non-outbreak) unit or facility, they should continue antiviral prophylaxis for at least the duration of one incubation period (i.e., minimum seven days) from the last exposure to the outbreak.
- Regardless of outbreak status, antiviral prophylaxis should be offered to contacts (e.g., roommates) of influenza positive patients/resident for a minimum of seven days.

In LTC and similar settings where there is a high-risk the outbreak may have already spread beyond one unit/area once the outbreak is identified (e.g., due to communal activities), facility-wide administration of antiviral prophylaxis can be considered. The advantages and disadvantages of providing antiviral prophylaxis to the outbreak unit(s) only or to the whole facility may be evaluated based on the specific

characteristics of the outbreak and the design of the facility, as well as on the experience from previous ARI outbreaks at the facility.

3.8.1 Antiviral Prophylaxis in Non-Influenza Acute Respiratory Infection Outbreaks

In general, there is no role for antiviral prophylaxis for other ARIs during an outbreak. Nirmatrelvir/ritonavir failed to show a benefit if used as post-exposure prophylaxis, and there is no data suggesting the duration or impact of outbreaks can be mitigated by prophylactic use of this or other antivirals for COVID-19 outbreaks.[250] However, patients/residents/clients who test positive for COVID-19 should be assessed as soon as possible to determine if COVID-19 therapeutics are indicated.

3.8.2 Immunization in Response to Acute Respiratory Infection Outbreak

Similarly, there is no role for immunization campaigns for any of the ARIs during an outbreak as a means to mitigate the outbreak. However, such an event can be used to remind staff and patients/residents/clients of the importance of vaccines as outbreak mitigation strategies if administered prior to transmission events, and could be used to leverage better uptake of the existing vaccines, i.e., influenza, COVID-19, as well as the newer RSV vaccines.

3.9 Personal Protective Equipment Considerations

Outbreak preparedness includes ensuring sufficient PPE is available and that all HCWs and volunteers/essential caregivers are trained on IPAC protocols, including appropriate selection and use of PPE and, for staff, how to perform a PCRA. Health care settings are responsible to have sufficient PPE on stock for day-to-day use and in the case of outbreaks. The supply should be monitored frequently to identify product expiry and stock depletion.

When providing care to a patient/resident/client on Additional Precautions for an ARI, either due to exposure, symptoms, or with a confirmed infection, or interacting within two metres of a patient/resident/client with a suspect or confirmed ARI, the appropriate PPE should be used at all times (Refer to Section 2.3 Additional Precautions for Acute Respiratory Viral Infections). Expanded Routine Practices Precautions (i.e., universal masking) should be implemented in the outbreak area, as described in Section 2.2 Expanding Routine Practices. Gloves and gowns are to be changed between patients/residents/clients and hand hygiene should be performed before and after wearing gloves.

Patients/residents with suspected or confirmed ARIs, who are able to independently and consistently wear a mask, are able to leave their room for walks in the immediate area with a staff person wearing appropriate PPE. They should, however, not join communal activities where they would need to remove their mask.

3.10 Staff Cohorting

The outbreak area(s) of a health care setting is defined by the number and location of ARI cases and the movement of HCWs and patients/residents within the facility and the layout. The outbreak area(s) should be separated from the non-outbreak area(s). Non-outbreak areas are those where there is

neither evidence nor suspicion of sustained transmission and with no shared communal activities with outbreak floors/units.

Health care settings should try to dedicate staff to the outbreak unit and HCWs should not work outside of the outbreak unit or facility whenever possible. Staff members who work in other health care settings, in addition to the outbreak facility, should notify OHS at all settings where they work about their exposure to the outbreak unit.

Workflow should be organized so care to the cohort (e.g., cohort exposed to an outbreak) is grouped together, to minimize repeated visits to the same cohort. Workflow for individual patients/residents should also consider bundling tasks to minimize multiple visits (e.g., organize bathing, bed linen change and medication into one visit). When unavoidable, if staff are needed to work on multiple units on a shift, they should move from the lowest risk unit/cohort to the highest risk unit/cohort. On outbreak units, visitors and essential caregivers should not visit other patients/residents and should be instructed in the use of PPE, hand hygiene and how to seek care and how to get tested (if indicated) for an ARI if they were to become symptomatic.

3.11 Admissions during an Acute Respiratory Infection Outbreak

Outbreak areas of a health care setting should be closed to admissions except in circumstances where both the OMT and the PHU agree the potential harm related to a unit closure outweighs the potential benefit of not exposing additional individuals to a given outbreak. If the unit is kept open to admissions, this should be done only in consultation with public health after the scope of the outbreak has been determined and new admissions should not be mixed with the outbreak cohort. Admission of the most vulnerable patients/residents should be avoided, and priority should be given to those who recently recovered from the same ARI, or those with an active infection with the same ARI. For patients/residents not meeting these criteria, consideration should be given to create an unaffected section within the outbreak unit, optimally with dedicated staff.

Patients/residents who were transferred off the outbreak unit to other units or facilities should remain on Additional Precautions for the typical incubation period from their last exposure to the outbreak. A review of transfers that occurred prior to declaration of the outbreak is also important and other units and facilities should be notified of patients/residents who were on the units during the period where suspected transmission may have been occurring, but prior to declaration of the outbreak (e.g., 48 hours before onset of symptoms in first case, or when sustained transmission is deemed to have started).

3.12 When to Declare Outbreaks Over

The criteria for declaring an outbreak over should be established in collaboration with the local PHU and with the Medical Officer of Health having the ultimate authority in case of disagreement. In general, an ARI outbreak can be declared over by the OMT in consultation with the PHU when transmission has been interrupted and no further patient/resident cases deemed to be have been acquired on the unit have occurred for one incubation period and one period of communicability (or two incubation periods). Where patients/residents can be effectively isolated (e.g., acute care setting), a shorter duration of one incubation period plus one day from the last case is reasonable. (See Table 7. Overview of Incubation Periods of Acute Respiratory Infections).

In the case that a given facility was unable to identify the pathogen responsible for a given outbreak, the duration of the outbreak should be at a minimum 8 days from the last case. This is based on the period of communicability (5 days) and an incubation period (3 days) for influenza and is typically generalized to outbreaks with unknown respiratory pathogens. While laboratory confirmation is strongly recommended for all symptomatic patients/residents during an outbreak, patients/residents presenting with ARI symptoms after a period of no new cases should always be tested so as not to unnecessarily extend an outbreak based on syndromic surveillance, only. If laboratory results are pending, the outbreak should continue until these outstanding tests are confirmed negative.

If the last case was a patient/resident with a known exposure and is on Additional Precautions, the outbreak would only be extended by the day from when the patient/resident was put in appropriate Additional Precautions. If the last case was a patient/resident discharged from the ward prior to the diagnosis of an ARI, their last day on the ward can be used instead of the date of symptom onset or test positivity. When community ARI activity is high, new introduction of a given virus is possible and may not necessarily indicate sustained transmission. These cases should not extend the duration of outbreaks. After the outbreak is declared over, a debrief should be conducted to review the outbreak and its management and to conduct a root cause analysis. Where one or more factors contributed to the outbreak, measures should be put in place to prevent similar future outbreaks.

Further information on declaring the outbreak over can be found in the Ministry of Health protocols:

- Appendix 1: Case Definitions and Disease-Specific Information. Disease: Respiratory Infection Outbreaks in Institutions and Public Hospitals[241] (access under "R" of the Infectious Diseases Protocol section) Institutional/Facility Outbreak Management Protocol, 2023.[251]

Table 7. Overview of Incubation Periods of Acute Respiratory Infections

Outbreak Organism	Usual Incubation Period[252]
Influenza A&B	1-4 days
RSV	3-7 days
Parainfluenza	2-6 days
Rhinovirus/Enterovirus	2-4 days
Metapneumovirus	3-6 days
Adenovirus	4-8 days
Seasonal Coronavirus	2-5 days
SARS Cov-2	4-7 days[253,254]

3.13 Management of Outbreaks in High-Risk Outpatient Areas

ARI outbreaks can also occur in outpatient settings such as hemodialysis (HD).[255-261] Although the general principles of outbreak management provided for outbreaks in institutional settings outlined above are applicable to outpatient ARI outbreaks, there are some critical differences related to patient populations, patient flow and infrastructure that require consideration. Although it is beyond the scope of this document to review outbreaks in all outpatient settings, some general principles are summarized below based on the example of HD units.

3.13.1 Hemodialysis Units

ARIs can be introduced into these outpatient facilities more easily than in-patient units as patients may move back and forth between the community and the outpatient setting multiple times per week. Additionally, patients may move back and forth between different health care settings, e.g., from LTCHs or rehabilitation facilities to a HD unit, or internally from medical and surgical units to a HD unit. This movement creates the potential for the introduction of an ARI into the facility from another health care setting where an outbreak is occurring or vice-versa.

Once an ARI is introduced into HD units, the physical infrastructure and patient flow can provide ample opportunities for transmission and rapid amplification of cases. Dialysis settings typically involve large numbers of patients located at HD stations in open concept areas, are often crowded with limited physical distancing and without physical barriers between patients. This creates the risk for patient-to-patient transmission of diseases that spread via IRPs. As staff move back and forth between many patients, the potential of missed hand hygiene opportunities and other lapses, such as a failure to change gloves or other PPE, and the use of shared medical equipment that has not been properly cleaned and disinfected, can contribute to transmission. HD patients often use health care transport services to get to and from HD, with multiple patients in the same vehicle and there are often waiting areas and bathrooms used by many HD patients prior to, during or after HD. These situations provide opportunity for transmission of ARIs between HD patients, including those not located near each other within the HD setting or even between patients on different shifts if mixing occurs between patients at the end of one session and the beginning of another in waiting areas. Finally, gaps in environmental cleaning between patients can create a risk for transmission related to ineffective cleaning and disinfection of the HD station or of other shared equipment.

All of these factors should be considered in developing a program to prevent ARIs in HD facilities and as it happens in in-patient areas, screening of patients upon arrival to the facility and ongoing monitoring for symptoms of ARIs during HD sessions is critical to identify potential outbreaks early. All symptomatic HD patients should be tested for ARIs and clusters of cases in patients or staff should be reported immediately to the HD unit leadership and to IPAC. It is also important to ensure that patients understand the purpose of screening, and that access to HD will not be denied regardless of symptoms or ARI status.

The ARI outbreak definition in Section 3.3 can be used to define a suspected outbreak in the HD setting. Similarly, to in-patient units, this definition in isolation should not dictate whether or not an outbreak needs to be declared. Instead, consideration should be given to the likelihood of sustained transmission in order to determine outbreak status, in discussion with PHUs.

A challenge with the ARI outbreak definition, is in the interpretation of whether the infection could have

"reasonably" been acquired in the HD unit or a similar outpatient setting given the ongoing exposure to ARIs in the community. In HD units, temporal and spatial clustering should be investigated, e.g., two cases on the Mon/Wed/Fri noon dialysis shift in the same pod is more likely an outbreak; one case on the evening shift Mon/Wed/Fri and one case on the noon shift Tues/Thu/Sat is more likely due to community transmission.

Control measures in a dialysis unit and similar settings may involve accommodating some of the unique attributes of the setting and include special considerations about environmental cleaning, cohorting patients from the same dialysis sessions, as well as continuous masking of patients/caregivers and staff on the unit. For patients on Additional Precautions this may include utilization of isolation spaces within the unit, employing end of the day dialysis/treatment and dialysing in-patients in their in-patient rooms on the units rather than in the HD unit.

3.14 Requirements and Recommendations for Surveillance and Respiratory Virus Outbreaks

Legislative Requirements

26. **Physicians and administrators/leadership and/or IPAC are required to notify public health about patients/residents who have, or may have a disease of public health significance. The same applies to OHS or designate for staff cases.[239]**

27. **Employers are required to report any occupationally-acquired infection to the WSIB, the Ministry of Labour, Immigration, Training and Skills Development and the JHSC health and safety representative, as well as the trade union representative, if any.[239]**

Recommendations

28. **Health care settings should have well established processes for case finding/surveillance for patients/residents/clients for ARIs and have the ability to detect clusters or outbreaks. Assessment for symptoms of an ARI should be done at first point of contact and as part of a daily patient/resident/client assessment. This can be done through an active, passive or a combined approach.**

29. **Health care facilities should have established procedures and policies outlining the communication between IPAC and OHS about clusters of ARIs in either HCWs or patients/residents.**

30. **Clusters of health care-associated ARI cases should trigger outbreak investigations, consideration of implementation of outbreak measures and a declaration of an outbreak if sustained transmission is suspected.**

31. **When an outbreak is declared, outbreak measures are to be initiated immediately and the OMT should meet shortly after recognition of the outbreak.**

32. **Whenever possible, outbreak units should be closed to admissions and non-urgent transfers while there is evidence or a concern of sustained transmission of ARIs.**

33. **Patients/residents who require urgent transfer to another unit for medical reasons/higher level of care should be transferred in and remain on Additional Precautions for ARI for the typical incubation period from their last day on the outbreak unit.**

34. **IPAC, in collaboration with OHS, should conduct forward and backward contract tracing of all ARI cases to allow rapid identification and management of exposed patients/residents/clients to identify the source of the outbreak.**
35. **If patients/residents were transferred during the period of transmission on the unit but prior to recognition of the outbreak (e.g., 48 hours before onset of symptoms in the first case), the receiving unit or facility should be notified.**
36. **Facilities should try to dedicate staff to the outbreak unit whenever possible.**
37. **Staff members working on an outbreak unit who work at other facilities are to notify OHS at those facilities about their exposure to the outbreak unit.**
38. **Review of IPAC and OHS practices on the unit should be conducted through audits of PPE and hand hygiene adherence as well as through discussions with unit leadership, unit educators, and front-line staff from all professional groups as required (e.g., nursing, allied health, environmental services, etc.).**
39. **All patients/residents should be assessed twice daily for ARI symptoms. When patients/residents are recognized as having new ARI symptoms, testing for ARIs should be conducted, Additional Precautions initiated, and IPAC informed immediately.**
40. **Visitors should be restricted as per facility's outbreak policy. In general, restrictions for essential caregivers should be avoided.**
41. **Communication of outbreak measures should at a minimum include staff on the unit, patients/residents and their families, and visitors.**
42. **Signage should be present upon entrance to the unit to notify anyone entering about the outbreak and the measures in place.**
43. **Oseltamivir should be recommended to all patients/residents in an influenza outbreak-affected area, and be administered as early as possible.**
44. **The OMT, in collaboration with the PHU, can declare an outbreak over when sustained transmission has been interrupted.**

Summary of the Legislative Requirements and Recommendations

This table provides a summary of the legislative requirements and recommendations PIDAC-IPC provides in their document, *Best Practices for the Prevention of Acute Respiratory Infection Transmission in All Health Care Settings*.

In addition, this table includes three columns that can be used to identify the legislative requirements and recommendations a health care facility are compliant, partial compliance and noncompliant with

Table 8. Summary of the legislative requirements and recommendations

Legislative Requirement/Recommendation	Compliant	Partial Compliance	Noncompliant
Chapter 1. Environmental Controls			
Legislative Requirements			
1. Organizations are required to have measures and procedures, and provide education to HCWs around organizational factors that may affect the selection and use of PPE.[73,74]			
2. HVAC systems should be designed, constructed, installed, operated and maintained as per the facility engineering recommendations, the manufacturer's instruction for use and in accordance with relevant regulations and standards, and are required to be inspected by a qualified professional every six months to ensure it is in good condition.[73]			
3. LTC settings are required to have immunization and screening policies in place and offer required vaccinations for residents. A staff immunization program is to be in accordance with evidence-based practices.[86]			
4. All health care settings are required to have HCW vaccination policies for staff as well as patients/residents/clients in place that are up-to-date.[73]			
Recommendations			
5. All health care settings are recommended to have all relevant vaccines be easily accessible to HCWs.			
6. HCWs who develop symptoms of an ARI are to report their condition to their OHS department or delegate and follow organizational policies on reporting illness and work exclusion.			

Legislative Requirement/Recommendation	Compliant	Partial Compliance	Noncompliant
7. Patients/residents with suspected or confirmed ARI should be placed in a single room with their own washroom and dedicated equipment whenever possible.			
8. Cohorting of patients/residents infected with the same pathogen, or with patients/residents recently recovered from the same pathogen, can be considered as the next best alternative.			
9. Routine Practices and Additional Precautions for ARIs are to be applied individually for each patient/resident within a cohort, and HCWs are to change gowns and gloves when going from one patient/resident to the next within the same cohort.			
10. Facial protection is to be replaced after contact with a patient/resident/client with suspected or confirmed ARI with two exceptions 1) when attending to other patients/residents within the same cohort in the same room, or 2) if masks are used continuously.			
11. In LTC settings, residents who are symptomatic, exposed or confirmed to have an ARI should in most scenarios be promptly separated from others in the home.			
12. In hemodialysis settings, a separate room is recommended for patients with suspected or confirmed ARIs. A less optimal alternative is physical distancing and/or barriers between a suspected or confirmed ARI patient and other patients.			
13. The use of local cooling devices such as portable fans and air conditioning units are not recommended in rooms occupied by persons with confirmed or suspected ARI.			
14. A fallow time is not necessary after a patient/resident/client with suspected or confirmed ARI leaves a room or following an AGMP on a patient/resident/client with suspected or confirmed ARI.			
15. Broad, universal physical distancing policies should not be considered outside of pandemics or other extraordinary threats. Targeted physical distancing of at least one metre in high-risk environments (such as waiting rooms) should be considered during ARI surges whenever feasible.			
Chapter 2. Routine Practices and Additional Precautions Considerations during Respiratory Virus Season			

Legislative Requirement/Recommendation	Compliant	Partial Compliance	Noncompliant
Legislative Requirements			
16. **A program for the selection, use, training and maintenance of PPE including N95 respirators is required in health care settings.**[7,8,73,74,231]			
Recommendations			
17. Patients/residents/clients presenting for care in a health care setting who have symptoms of an ARI should be asked to perform hand hygiene and wear a mask, practice respiratory etiquette and wait in a separate area, or if not possible, keep at least a two metre physical distance from other patients/residents/clients, when feasible.			
18. Health care settings are to ensure that all HCWs who provide care for a patient/resident/client with symptoms of an ARI are aware of the need to initiate and maintain Additional Precautions for ARIs.			
19. Once the need for Additional Precautions for ARIs has been established, any receiving unit/facility or diagnostic service are to be informed.			
20. Routine Practices and PCRAs are integral components of IPAC and OHS, and are to be followed and conducted before any encounter, independent of any known concern of a suspected or confirmed ARI.			
21. Targeted continuous masking should be considered during high transmission risk periods for close and prolonged direct patient/resident/client contact due to the resulting risk of transmission and risk of outbreaks, while also considering the vulnerability of a certain patient/resident/client population.			
22. When providing direct care to a patient/resident/client with suspected or confirmed ARI, at a minimum, a medical mask in combination with eye protection, gloves and gown are to be used.			
23. Additional Precautions for ARIs should be discontinued when there is no longer a risk of transmission. For patients/residents/clients exposed to an ARI, Additional Precautions can be discontinued after one incubation period of the respiratory virus to which the person was exposed to has passed.			
24. For AGMPs (regardless of whether a patient/resident/client may or may not have an ARI), PPE for staff within two metres includes at a minimum a medical mask, gowns, gloves and eye protection.			

Legislative Requirement/Recommendation	Compliant	Partial Compliance	Noncompliant
25. A patient/resident/client undergoing an AGMP should be placed in a single room with the door closed whenever possible, in particular if they have a suspected or confirmed ARI.			
Chapter 3. Surveillance and Respiratory Virus Outbreaks			
Legislative Requirements			
26. Physicians and administrators/leadership and/or IPAC are required to notify public health about patients/residents who have, or may have a disease of public health significance. The same applies to OHS or designate for staff cases.[239]			
27. Employers are required to report any occupationally-acquired infection to the WSIB, the Ministry of Labour, Immigration, Training and Skills Development and the JHSC or health and safety representative as well as the trade union representative, if any.[239]			
Recommendations			
28. Health care settings should have well established processes for case finding/surveillance for patients/residents/clients for ARIs and have the ability to detect clusters or outbreaks. Assessment for symptoms of an ARI should be done at first point of contact and as part of a daily patient/resident/client assessment. This can be done through an active, passive or a combined approach.			
29. Health care facilities should have established procedures and policies outlining the communication between IPAC and OHS about clusters of ARIs in either HCWs or patients/residents.			
30. Clusters of health care-associated ARI cases should trigger outbreak investigations, consideration of implementation of outbreak measures and a declaration of an outbreak if sustained transmission is suspected.			
31. When an outbreak is declared, outbreak measures are to be initiated immediately and the OMT should meet shortly after recognition of the outbreak.			
32. Whenever possible, outbreak units should be closed to admissions and non-urgent transfers while there is evidence or a concern of sustained transmission of ARIs.			
33. Patients/residents who require urgent transfer to another unit for medical reasons/higher level of care should be transferred in and remain on			

Legislative Requirement/Recommendation	Compliant	Partial Compliance	Noncompliant
Additional Precautions for ARI for the typical incubation period from their last day on the outbreak unit.			
34. IPAC, in collaboration with OHS, should conduct forward and backward contract tracing of all ARI cases to allow rapid identification and management of exposed patients/residents/clients to identify the source of the outbreak.			
35. If patients/residents were transferred during the period of transmission on the unit but prior to recognition of the outbreak (e.g., 48 hours before onset of symptoms in the first case), the receiving unit or facility should be notified.			
36. Facilities should try to dedicate staff to the outbreak unit whenever possible.			
37. Staff members working on an outbreak unit who work at other facilities are to notify OHS at those facilities about their exposure to the outbreak unit.			
38. Review of IPAC and OHS practices on the unit should be conducted through audits of PPE and hand hygiene adherence as well as through discussions with unit leadership, unit educators, and front-line staff from all professional groups as required (e.g., nursing, allied health, environmental services, etc.).			
39. All patients/residents should be assessed twice daily for ARI symptoms. When patients/residents are recognized as having new ARI symptoms, testing for ARIs should be conducted, Additional Precautions initiated, and IPAC informed immediately.			
40. Visitors should be restricted as per facility's outbreak policy. In general, restrictions for essential caregivers should be avoided.			
41. Communication of outbreak measures should at a minimum include staff on the unit, patients/residents and their families, and visitors.			
42. Signage should be present upon entrance to the unit to notify anyone entering about the outbreak and the measures in place.			
43. Oseltamivir should be recommended to all patients/residents in an influenza outbreak-affected area, and be administered as early as possible.			
44. The OMT, in collaboration with the PHU, can declare an outbreak over when sustained transmission has been interrupted.			

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Appendix A: Literature Review Methodology

PHO provided support to PIDAC-IPC by completing literature reviews for the following research questions.

Research Question 1

What is the evidence for or against the extended use of facial protection when providing care to patients infectious with same pathogen or those who have recently recovered (within 3 months of infection) within the same cohort and if in an acute care setting, same room (e.g., SARS-CoV-2, seasonal influenza)?

To identify relevant evidence, PHO Library Services conducted searches of scientific literature, limited to English articles from 2003 onwards, due to team language capacity and resource constraints. Library Services searched for key scientific journal literature in the following databases: MEDLINE (Ovid), Embase (Ovid), CINAHL (EBSCOhost), and in the NIH iSearch COVID-19 Portfolio for preprints. The searches were conducted on July 11, 2023. Reference lists of included studies were hand-searched, and corresponding authors and PHO experts were contacted for additional studies.

Screening involved one stage with independent reviewers using manual screening for databases. Disagreements were resolved with a third reviewer. Inclusion and exclusion criteria are available upon request.

Research Question 2

What are the recommendations around fallow time after a patient/client/resident with a confirmed acute viral respiratory infection transfers out of a room/discharged?

To identify relevant evidence, PHO Library Services conducted searches of scientific literature, limited to English articles from 2012 onwards, due to team language capacity and resource constraints. Library Services searched for key scientific journal literature in the following databases: MEDLINE (Ovid), Embase (Ovid), CINAHL (EBSCOhost), and in the NIH iSearch COVID-19 Portfolio for preprints. The searches were conducted between May 12 and 15, 2023.

For grey literature, an international jurisdictional scan was completed in April-May of 2023 to identify and build a database of IPAC guidelines for acute viral respiratory infections. From this database, guidelines were identified for screening if they refered to fallow time or the concept of fallow time.

Reference lists of included studies were hand-searched, and corresponding authors and PHO experts were contacted for additional studies. Full strategies are available upon request.

Screening involved two stages with independent reviewers using Covidence for databases and manual screening for the grey literature. Disagreements were resolved with a third reviewer. Inclusion and exclusion criteria are available upon request.

Research Question 3

What are the masking strategies/mandates/policies being used for the prevention of acute respiratory infections (e.g., during periods of non-high to high transmission risk) when following extended/expanded/enhanced routine practices/standard precautions?

- **What is the efficacy rate of these masking strategies/mandates/policies in various health care settings?**

- **What factors should be considered when implementing or de-escalating masking strategies/mandates/policies?**

To identify relevant evidence, PHO Library Services conducted searches of scientific literature, limited to English articles from 2019 onwards, due to team language capacity and resource constraints. Library Services searched for key scientific journal literature in the following databases: MEDLINE (Ovid), Embase (Ovid), and CINAHL (EBSCOhost). The primary database search was conducted in MEDLINE on October 5, 2023. The search was then adapted to supplementary databases and subsequently searched on October 18, 2023.

Reference lists of included studies were hand-searched, and corresponding authors and PHO experts were contacted for additional studies. Full strategies are available upon request.

Screening involved one stage with independent reviewers using Covidence for databases. Disagreements were resolved with a third reviewer. Inclusion and exclusion criteria are available upon request.

Research Question 4

Does N95 or any comparable respirators provide better protection than surgical mask while using during care Individuals with suspected or confirmed COVID-19?

To identify relevant evidence, PHO Library Services designed and executed database search strategies to retrieve new evidence on effectiveness of respirators compared to surgical mask to prevent transmission of COVID-19 to the HCWs and patients in health care settings. PHO Library Services conducted searches of scientific literature, limited to English articles from 2022 onwards, due to team language capacity and resource constraints. Library Services searched for key scientific journal literature in the following databases: MEDLINE (Ovid), Embase (Ovid), CINAHL (EBSCOhost), and in the NIH iSearch COVID-19 Portfolio for preprints. The searches were conducted on July 5, 2023.

Screening involved one stage with independent reviewers using manual screening for databases. Disagreements were resolved with a third reviewer. Inclusion and exclusion criteria are available upon request.

Research Question 5

What medical and dental procedures are high risk for respiratory virus transmission to health care workers?

- **What risk factors do these procedures have in common?**
- **Umbrella question: What risk factors are associated with transmission of respiratory viruses during medical and dental procedures i.e., PPE and environment?**

To identify relevant evidence, PHO Library Services conducted searches of scientific and grey literature, limited to English articles from 2012 onwards, due to team language capacity and resource constraints. Scientific database Library Services searched for key scientific journal literature in the following databases: MEDLINE (Ovid), Embase (Ovid), and CINAHL (EBSCOhost). The primary MEDLINE search was executed on October 19, 2023. The search strategy was adapted into supplementary databases and these searches were executed on October 23, 2023.

For grey literature, PHO Library Services adapted the MEDLINE strategy for web searches with a 50-result limit per query. The research team then ran the search strings in the WHO, PAHO, CDC and European Union websites, in the general Google search engine, and in the following custom search

engines: Canadian Health Departments and Agencies, US State Government, and International Public Health Resources. Full strategies are available upon request.

Screening involved two stages with independent reviewers using manual screening for databases and a web browser for internet results. Disagreements were resolved with a third reviewer. Inclusion and exclusion criteria are available upon request.

Appendix B: Risk of Transmission for Various Procedures

A comprehensive literature review as well as an international jurisdictional scan was completed to search the most recent and available evidence of infection transmission associated with candidate aerosol-generating medical procedures (AGMPs). A literature search was conducted to include publications from the COVID-19 pandemic searching for evidence of transmission associated with candidate AGMPs as detailed in Appendix A. A total of 1408 publications were screened with 42 articles meeting the eligibility criteria. Of the included documents, 11 included were systematic reviews, 7 were observational studies and 24 were lower quality documents such as non-systematic reviews and guidance documents. Additionally, 12 grey literature documents were considered of interest.

B.1 Intubation and Extubation

Intubation is associated with a higher risk of transmission of acute respiratory infections (ARIs) and guidelines are in agreement that this procedure should as such be considered an AGMP.[262] Tian et al. (2022) found in the most recent systematic review on this topic that health care workers (HCWs) performing intubation had a higher rate of infection from various respiratory viruses including SARS-CoV-2, Middle East Respiratory Syndrome (MERS), SARS CoV-1, influenza A H1N1 and influenza A H5N1 as compared to those not involved in intubation procedures (OR: 4.72; 95% CI [2.71-8.24]; $p < 0.001$).[263] Similarly, another systematic review published by Leal et al. in the same year demonstrated that six out of the seven studies reviewed reported a statistically significant increase in risk of SARS-CoV-1 transmission to HCWs performing intubation.[264] A systematic review conducted by Wilson et al. (2021) also demonstrated an increased risk of SARS CoV-2 transmission associated with intubation, however, nasogastric tube insertion was not found to be associated with increased risk of infection transmission.[265] Endotracheal intubations was also found to significantly increase the odds of SARS-CoV-1 or SARS-CoV-2 infection in HCWs (OR: 6.69; 95% CI [3.81–11.72]; $p < 0.001$).[266] Kay et al. (2020) came to the same conclusion in their systematic review.[267] One study included in this review showed a 30 fold increase in the risk of infection after intubation (OR: 30.79; 95% CI [7.91-119.84]) while two studies reported a more moderate effect with relative risks ranging from 2.85 to 4.20. The same seems to be true for non-coronaviruses where a study by Cournoyer et al. (2021) concluded that intubation was associated with a higher risk of transmission to HCWs not only for SARS-CoV-2, SARS-CoV-1, and MERS, but also for seasonal and emerging/pandemic influenza such as H1N1 (OR: 5.34; 95% CI [2.44-11.68]).[268] The authors concluded that intubation was the procedure with the highest risk for transmission compared to other procedures such as NIV, high-flow nasal cannula, bag-valve-mask ventilation and face mask with or without reservoir and nasal cannula.[268] Older systematic review came to the same conclusion: Tran et al. (2012) also demonstrated that tracheal intubation presented an increased risk of SARS-CoV-1 transmission to HCWs (OR: 6.6; 95% CI [2.3-18.9]).[262]

B.2 Suctioning

Suctioning may pose an increased ARI transmission risk to HCWs. Leal et al. (2022) included a cohort study in their review that found that the risk ratio of contracting COVID-19 after participating in airway suctioning was 1.67 ($p = 0.04$).[264] However, one study included in their review reported a lower risk of SARS CoV-2 transmission associated with open airway suctioning (aOR: 0.48; 95% CI [0.25–0.90]). One systematic review demonstrated an increased risk of SARS-CoV-1 transmission associated with suctioning prior to intubation (RR: 4.2; 95% CI [1.58–11.4]; $p = 0.04$).[265]

B.3 Manual Ventilation

Based on the evidence capture in four systematic reviews and one guidance document there is potential increased risk of ARI transmission to HCW if involved in manual ventilation. Therefore, manual ventilation should be considered an AGMP. Leal et al. (2022) identified one cohort study that reported a risk ratio of 3.1 (p = 0.008) for contracting COVID-19 for those involved in manual ventilation.[264] Additionally, Cournoyer et al. (2021) concluded that bag-valve-mask ventilation was associated with a higher risk of transmission of SARS-CoV-2, SARS-CoV-1, MERS, and emerging or pandemic influenza in HCWs (OR: 2.70; 95% CI [1.31-5.56]).[268] Wilson et al. (2021) also demonstrated an increased risk of SARS-CoV-1 transmission associated with manipulation of oxygen mask (RR: 9.0; 95% CI [1.25–64.9]; p < 0.01).[265] Likewise, a systematic review conducted by Tran et al. (2012) concluded that manual ventilation before intubation presented an increased risk of ARI transmission to HCWs (OR: 2.8; 95% CI [1.3-6.4]).[262]

B.4 Tracheotomy

The majority of the evidence implies that tracheotomy poses an increased risk for ARI transmission to HCWs. One review reported a non-significant increase in SARS CoV-2 transmission risk to HCWs performing tracheotomies based on three studies with one study having identified a significant increase of SARS-CoV-1 infections.[264] Tran et al. (2012) also conducted a meta-analysis and found that tracheotomy presented an increased risk of SARS-CoV-1 transmission to HCWs (OR: 4.2; 95% CI [1.5-11.5]).[262] Likewise, Thamboo et al. (2020) performed a rapid review in that supported the notion that tracheostomy may be an AGMP.[269] The authors included a retrospective study that reported SARS-CoV-1 was transmitted during tracheostomy to six out of 17 HCWs with unknown personal protective equipment (PPE) use, which resulted in an odds ratio of 4.15 (95% CI [1.50 to 11.50]; p < 0.01).

B.5 Bronchoscopy

The available evidence demonstrates that bronchoscopy is not a high risk AGMP to HCWs, but may pose some transmission risk due to related procedures, as well as the risk of exposure to previously undiagnosed tuberculosis. Saha et al. (2022) reported only one case of COVID-19 in one bronchoscopist of 1034 bronchoscopies included in their review and concluded that bronchoscopies are not high risk procedures.[270] Another systematic review also concluded there was no significant risk of SARS CoV-2 or SARS-CoV-1 transmission to HCWs performing bronchoscopies.[264] Similarly, another study reported that the procedure was not found to significantly increase the odds of SARS-CoV-1 and SARS-CoV-2 infection (OR: 2.04; 95% CI [0.58–7.15]; p = 0.2778).[266] Kay et al. (2020) echoed that bronchoscopy did not significantly increase the risk of SARS-CoV-1 and SARS-CoV-2 transmission to HCWs based on two studies (RR: 2.14; 95% CI [0.46-9.90] and RR: 1.10; 95% CI [0.07-16.92]).[267] Another study also found no significant increase in risk of SARS-CoV-1 transmission from patient to HCW during the procedure (pooled OR: 1.3; 95% CI [0.5-14.2]).[271] However, they highlighted that bronchoscopy involves suctioning and the movement of air currents across liquid surfaces that can generate an increase in respiratory particles, therefore, it is reasonable to consider bronchoscopy an AGMP with potentially increased risk of transmission of respiratory viruses.

B.6 Laryngoscopy

One systematic review tried to assess the impact of laryngoscopy on ARI transmission in HCWs but did not find any articles studying the association between exposures to flexible fiberoptic laryngoscopy and SARS-CoV-1 and SARS-CoV-2 transmission risk.[267] Consequently, the ARI transmission risk to HCWs associated with laryngoscopy cannot be determined and further research is needed to fill this knowledge gap. However, in the interim, it seems reasonable to treat laryngoscopy similar to endonasal endoscopy and bronchoscopy and as such a procedure with increased risk of transmission of respiratory viruses given significant manipulation of the airways occurs.

B.7 Nasal Endoscopy

There is no convincing evidence that endoscopic procedures per se are associated with an increased risk for ARI transmission risk to HCWs. Kosugi et al. (2022) evaluated the role of endoscopic nasal procedures as an AGMP in the context of COVID-19.[272] While no data on increased transmission risk was reported, high-speed drilling and use of the electrocautery were associated with an increase in mobilizing respiratory particles. However, the use of suctioning in tandem with these tools in the nasopharynx helped evade the aerosol generation. Additionally, cold-steel instrumentation and microdebridement with concurrent ultrasonic suctioning reduced the potential for generation of respiratory particles.

B.8 Non-invasive Ventilation

Non-invasive ventilation (NIV) may pose an ARI transmission risk to HCWs. One systematic review reported that HCWs involved in NIV (eg. BiPAP and CPAP) had higher odds of SARS-CoV-1, SARS-CoV-2 and MERS infection (OR: 3.65; 95% CI [1.86–7.19]; $p < 0.001$).[266] However, one study with no events was excluded from meta-analysis. Cournoyer et al. (2021) also associated NIV with higher risk of SARS-CoV-2, SARS-CoV-1 and MERS transmission (OR: 3.96; 95% CI [2.12-7.40]),[268] and another study concluded that the procedure presented an increased risk of SARS-CoV-1 transmission to HCWs (OR: 3.1; 95% CI [1.4-6.8]),[262] while one systematic review found no evidence of increased airborne pathogen dispersion related to the procedure.[273]

B.9 Dental Procedures

Based on studies measuring respiratory particles, the use of ultrasonic scalers, high-speed hand-pieces, three-way syringes and air polishers in dental procedures could pose an increased risk of ARI transmission to oral health care workers.[274] In a literature review that compiled and evaluated dental guidelines, the most frequently identified putative AGMPs in dentistry were the use of high-speed hand-pieces and 3-in-1 syringes accounting for 56% of the AGMPs, powered (sonic/ultrasonic) scalers for 43%, slow-speed hand-pieces for 29% and surgical hand-pieces account for 22% of the AGMPs.[275] The evidence assessing the risk associated with these procedures is very limited, though. In a retrospective study, oral health care professionals did not have a higher risk of SARS-CoV-2 infections than the general public, however, those practicing in periodontology which typically involves the routine use of ultrasonic and other devices considered potential AGMPs had a higher odds of presenting with COVID-19-related symptoms in multivariate analysis (OR: 1.35; 95% CI [1.06–1.70]; $p = 0.014$).[276]

B.10 Cardiopulmonary Resuscitation

The limited evidence available on cardiopulmonary resuscitation (CPR) including chest compression and defibrillation (but in the absence of AGMPs listed above) does not suggest an increased risk of transmission. A scoping review that focused on chest compressions and/or defibrillation found that the

evidence for risk of SARS-CoV-2 and SARS-CoV-1 transmission was inconclusive.[277] Similarly, Leal et al. (2022) also found mixed results; while four studies reported there was no significant association between SARS-CoV-2 transmission risk and cardiopulmonary resuscitation, two studies found there was a significant risk of SARS-CoV-1 transmission to HCWs performing the procedure.[264] Importantly, this association can well be explained by intubation which is highly correlated, and in the one study that attempted to separate intubation from CPR in their multivariate analysis, a significant correlation was only found for intubation but not for CPR.[278]

B.11 Sputum Induction

At this point of time, there is no evidence that confirms an increased transmission risk with sputum induction. A meta-analysis concluded that while the studies were heterogeneous, there was no significant risk of SARS-CoV-1, SARS-CoV-2 and MERS transmission in association with the procedure (OR: 0.61; 95% CI [0.33–1.14]).[266]

B.12 Nebulized Therapy

Data available pertaining to this topic is limited and inconsistent, but overall, nebulized therapy was not found to be associated with an increased risk of transmission as summarized in a recently published systematic review.[264] However, one out of four studies that assessed the risk associated with SARS-CoV-2 reported that performing or assisting with nebulizer treatments was more common among HCWs who developed COVID-19 compared to those who did not in a non-adjusted analysis ($p = 0.04$). Another study in their review demonstrated a non-significant increase in risk of SARS-CoV-1 transmission to HCW performing nebulized administration. Another recently published systematic review that included two studies mentioned above concluded that nebulized therapy was associated with a higher risk of transmission while not having considered the negative trials that had no events in their meta-analysis.[266]

B.13 High Flow Nasal Oxygen (High Flow Therapy via Nasal Cannula)

It is difficult to determine if high flow nasal oxygen poses an ARI transmission risk to HCWs due to a knowledge gap in the research. In one systematic review no evidence of higher SARS-CoV-2 airborne pathogen dispersion was found in relation to the procedure.[273] Likewise, oxygen therapy did not increase the odds of SARS-CoV-1 or SARS-CoV-2 transmission amongst HCWs (OR: 2.20; 95% CI [0.44–11.11]; $p = 0.34$).[266] In contrast, Cournoyer et al. (2021) were unable to conduct a meta-analysis due to inconsistency in the results, but reported that they cannot rule out a potential risk given increased dispersion of respiratory particles.[268]

B.14 Other Medical Procedures

In addition to the literature above, some additional papers about medical procedures were found but not included in this synthesis. Non-systematic reviews and guidance documents lower in quality that reiterated results from sources captured in the systematic reviews above were not summarized in this document.

Table B1. Jurisdictional Scan: AGMPs Classified by Organizations

Procedures	Current PIDAC-IPC	Previous PIDAC-IPC & PHO[1,3,20]	WHO[181]	CDC[146]	NHS England/ UKAHS[169,279]	PHAC[280]	INSPQ[281]	HS[282]	BCCDC[283]
Intubation, extubation, and related procedures e.g., manual ventilation and open deep suctioning	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Probable *Airway suctioning (deep suction and open tracheal suctioning) is often associated with procedures that are more likely to be AGMPs, however on its own it is not an AGMP.*
Tracheotomy	Yes	Yes	Yes	No	Yes	No	Possible	Yes	Possible
Cardiopulmonary resuscitation	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Possible
Bronchoscopy	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Probable
Sputum induction using nebulized hypertonic saline	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Probable
Surgery and autopsy procedures	Yes	Yes	Yes	No	High speed cutting/drilling likely to produce aerosol from the respiratory tract (upper or	Yes	Surgical interventions via the nasopharynx or oropharynx,	Yes	Probable

Procedures	Current PIDAC-IPC	Previous PIDAC-IPC & PHO[1,3,20]	WHO[181]	CDC[146]	NHS England/ UKAHS[169,279]	PHAC[280]	INSPQ[281]	HS[282]	BCCDC[283]
					lower) or sinuses		and thoracic surgery		
Dental procedures	Yes	Yes	Yes	N/A	Use of high speed or high frequency devices, for example ultrasonic scalers/high speed drills, high speed air rotor (or electric rotor that is greater than 60,000 rpm), piezo surgical Handpieces and air polishers	N/A	N/A	Aerosol-generating Dental Instruments Such As: 3-In-1 Water/Air Syringe; Polishing Rotary Equipment, Rotary Instruments/Handpieces (All Speeds), Trimming Handpieces	N/A
Nebulized therapy	No	Yes	No	Uncertain	No	Yes	Potential Risk Undocumented	Yes	Possible
Non-invasive positive pressure	Yes	Yes	Yes	Yes	No	Yes	Possible	Yes	Probable

Procedures	Current PIDAC-IPC	Previous PIDAC-IPC & PHO[1,3,20]	WHO[181]	CDC[146]	NHS England/ UKAHS[169,279]	PHAC[280]	INSPQ[281]	HS[282]	BCCDC[283]
ventilation (CPAP, BiPAP)									
Awake* ear, nose, and throat (ENT) airway procedures that involve respiratory suctioning	N/A	N/A	No	No	Yes	No	No	No	No
Awake* upper gastro-intestinal endoscopy	N/A	N/A	No	No	Yes	No	Potential Risk Undocumented	No	Possible
Respiratory tract suctioning**	N/A	N/A	No	No	Yes	No	No	No	No
High-Frequency Oscillating Ventilation (HFOV)	Yes	Yes	No	No	No	No	No	Yes	No
High flow nasal oxygen (high flow therapy via nasal cannula)	No	Yes	No	Uncertain	No	No	Possible	Oxygen Devices with Total Delivered Flow Greater Than 30 LPM, Including Flush Flow (e.g., Venturi Devices, Or Combination of Interfaces)	Possible

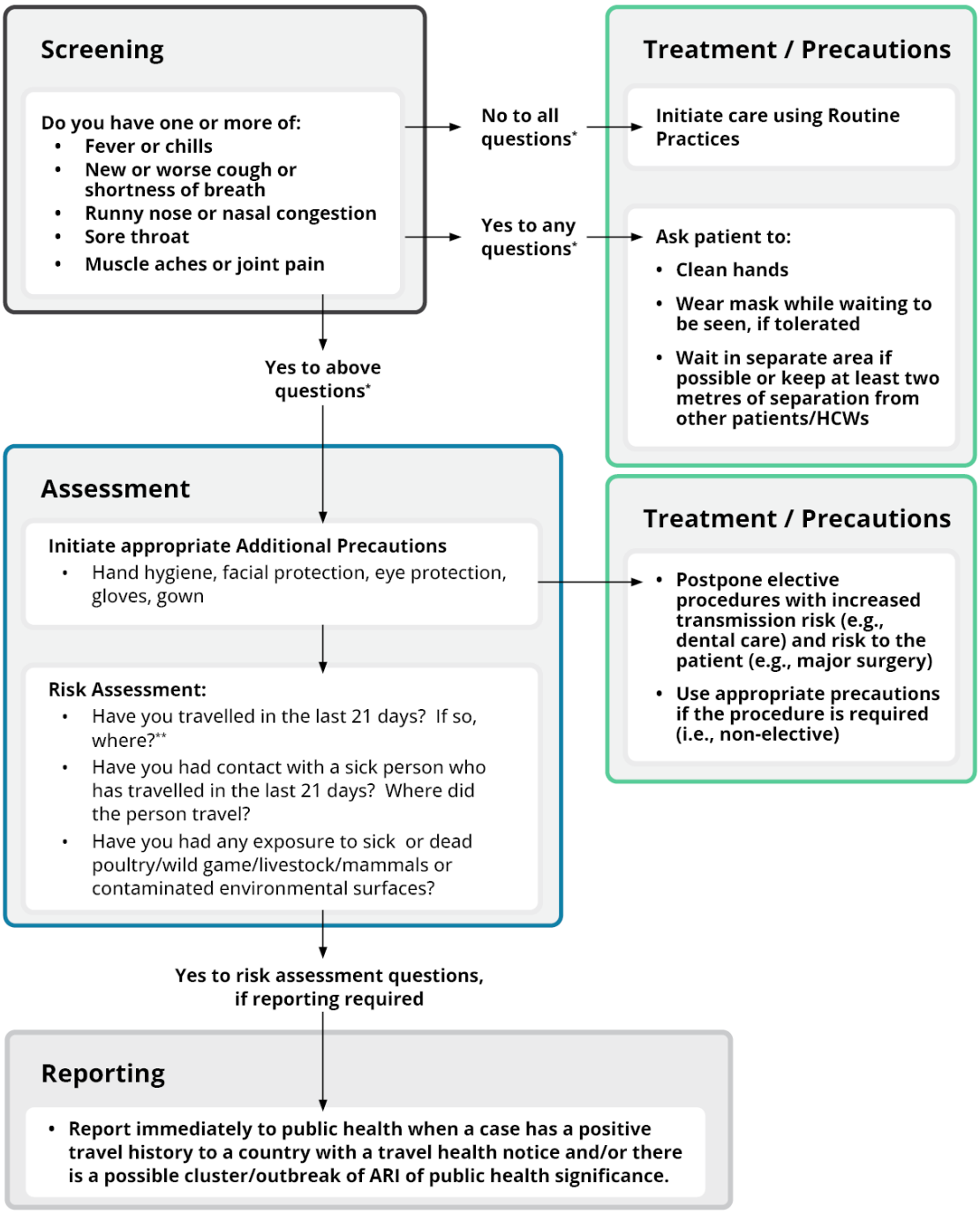
Procedures	Current PIDAC-IPC	Previous PIDAC-IPC & PHO[1,3,20]	WHO[181]	CDC[146]	NHS England/ UKAHS[169,279]	PHAC[280]	INSPQ[281]	HS[282]	BCCDC[283]
								Oxygen, Flush Flow, Regardless of Device Used Oxygen, Heated Humidified High Flow (HHHFO) (e.g., AIRVO, Optiflow or Vapotherm) Oxygen, Less Than & Including 15 LPM, Filtered Mask (e.g., FLO2max) - with nebulizer/aerosolized medication administration Oxygen / Oxygen Systems (dry) with Total Flow Greater Than 30 LPM including Flush Flow (e.g., venturi devices, mask over nasal cannula, dry cold nebulizer)	
Nasopharyngeal aspirate (NPA) in children	N/A	N/A	No	No	No	No	Yes	No	Possible

Procedures	Current PIDAC-IPC	Previous PIDAC-IPC & PHO[1,3,20]	WHO[181]	CDC[146]	NHS England/ UKAHS[169,279]	PHAC[280]	INSPQ[281]	HS[282]	BCCDC[283]
Laryngoscopy	Yes	N/A	No	No	No	No	Yes	Yes	Probable

**Other procedures mentioned by organizations: AHS mentioned Lung Volume Recruitment Maneuvers (LVRM), Supraglottic Airways (i.e., LMA, King LT, iGel Used Pre-Hospital), Transsphenoidal Surgery, Use of Propellant (e.g., Compressed Gas Delivery Method) Anesthetic Freezing Sprays on Mucosal Surfaces, such as Oral Lidocaine, VQ Scan with Aerosol-Based Ventilation Agents.[282] BCCDC mentioned Mastoidectomy and Methacholine challenge (i.e., bronchoprovocation test) as Possible AGMPs.[283]

Acronyms: World Health Organization (WHO), Centers for Disease Control and Prevention (CDC), National Health Service (NHS), England, UK Health Security Agency (UKHSA) , Public Health Agency of Canada (PHAC), Public Health Ontario (PHO), , Institut national de santé publique du Québec (INSPQ), Alberta Health Services (AHS), BC Centre for Disease Control (BCCDC)

Appendix C: Sample Case Finding/Surveillance Algorithm for Acute Respiratory Infection



* Elderly people and people with immunocompromising conditions may not have a febrile response to a respiratory infection, so the presence of new onset cough/shortness of breath may be enough to trigger further precautions. HCW should maintain an increased awareness that, during respiratory season, individuals presenting with acute cardiopulmonary illnesses or asthma in the absence of symptoms of respiratory infection may have ARI.

** Refer to Public Health Agency of Canada for a list of travel health notices[236]

Appendix D: Sample Form for Active Case Finding of Acute Respiratory Infection on Entry to Health Care Settings

Case Finding/Surveillance Questionnaire for Acute Respiratory Infection

(i) Do you have one of more of the following?

- fever or chills,
- new or worse cough or shortness of breath
- runny nose or nasal congestion,
- sore throat,
- muscle aches or joint pain

☐ If 'no', take temperature; if >38° C, continue with next questions, otherwise stop (no further questions)

☐ If 'yes', take temperature and continue with next questions

***NOTE: Some people, such as the elderly and people with immunocompromising conditions may not develop a fever.**

If the answer to above questions is 'yes' initiate Additional Precautions for Acute Respiratory Infection and notify Infection Prevention and Control

(ii) Is either of the following true?

☐ Have you traveled within the last 21 days? Where**?

☐ Have you had contact in the last 21 days with a sick person who has traveled? Where**?

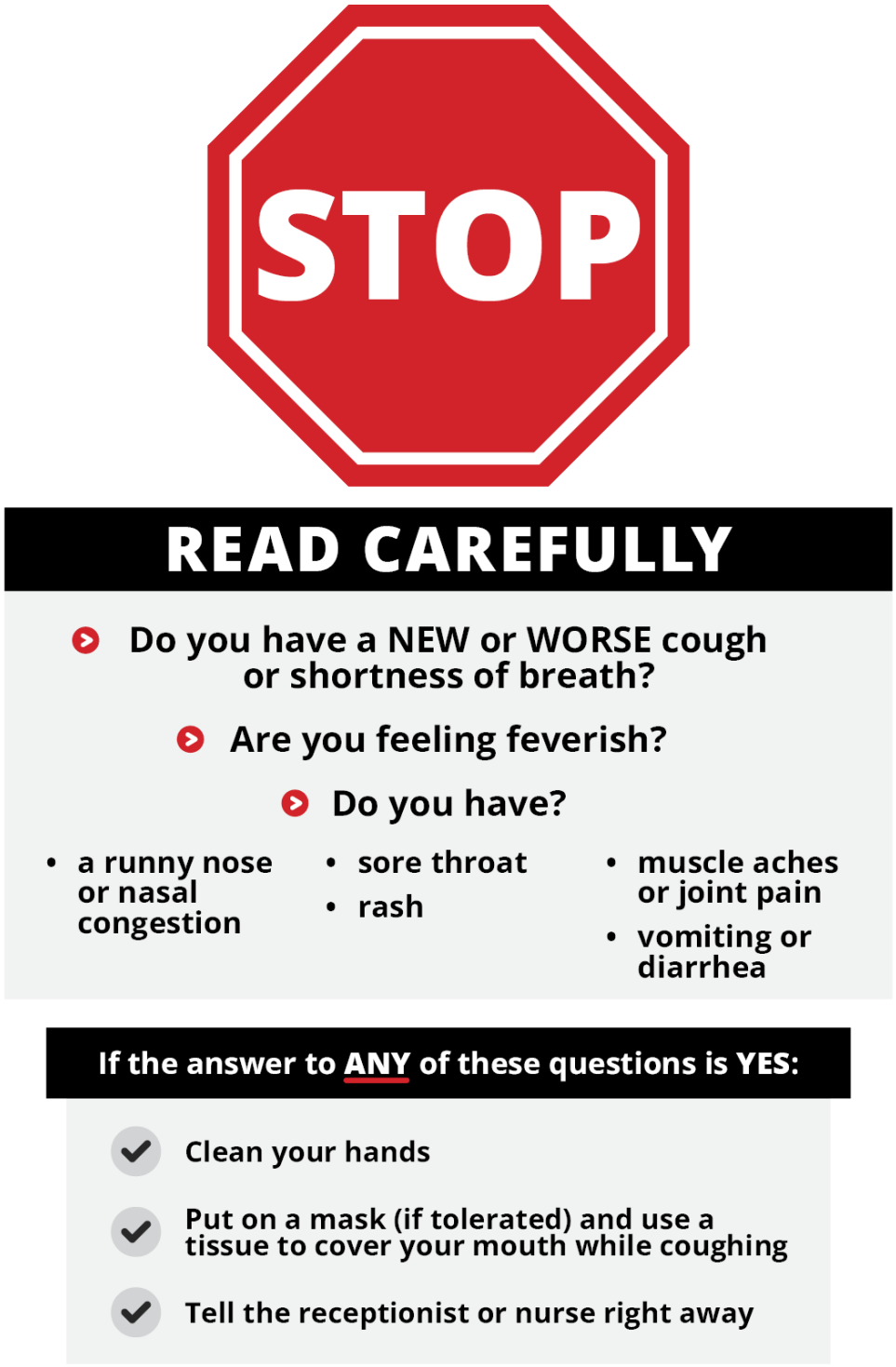
☐ Have you had any exposure to sick or dead poultry/wild game/livestock/mammals or contaminated environmental surfaces?

****Refer to Public Health Agency of Canada for a list of travel health notices[237]**

For additional information please consult with your local public health unit.

Infection Prevention and Control should notify Public Health when a case has a positive travel history to a country with a travel health notice and/or there is a possible cluster/outbreak of ARI of public health significance.[236]

Appendix E: Sample Signage for Passive Case Finding of Acute Respiratory Infection at Entrance to Health Care Facilities



Appendix F: Sample Signage for Visitors to Health Care Facilities

ATTENTION VISITORS

This facility is experiencing an outbreak of respiratory illness.

Do NOT visit if you are ill

If you have a cold or flu-like symptoms such as:

- fever
- cough
- sore throat
- rash
- muscle aches or joint pain
- runny nose or nasal congestion
- vomiting or diarrhea

Please DO NOT VISIT until your symptoms are gone.

Clean your hands

- Clean your hands before and after your visit.
- Alcohol hand rub is conveniently located for your use.

Wear a mask if asked

Check in on arrival

Appendix G: Sample Daily Acute Respiratory Infection Active Surveillance/Reporting Tool for Inpatient and Residential Settings

Date: _____ Patient Unit: _____ Page ____ of _____

Each shift is to update this form.

Any NEW onset of symptoms of fever*AND cough or shortness of breath, and/or NEW clinical/radiologic diagnosis of pneumonia in patients/residents must be reported to the attending physician and Infection Prevention and Control.

Name/ Hospital File Number/Roome No.						
Admission Date						
Date of new onset symptoms/diagnosis						
Fever 38 C						
Cough						
Shortness of Breath						
Hypoxia						
Vomiting Diarhhea						
Additional Precautions (Yes or No)						
Actions						
Initials						

Appendix H: Symptoms of Acute Respiratory Infection

The most common symptoms of ARI include:

- fever or chills
- cough
- shortness of breath
- runny nose or nasal congestion
- sore throat
- muscle aches or joint pain
- gastrointestinal symptoms (such as vomiting or diarrhea)

Refer to the Ministry of Health:

- Protection from COVID-19 and other respiratory illnesses[284]
- The Flu Facts[285]
- Respiratory Syncytial Virus[286]

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