Infection Prevention & Control

Clinical Best Practice Guideline

College of Respiratory Therapists of Ontario
Acknowledgements

This Clinical Best Practice Guideline (CBPG) was first developed in 2008 by a working group of the CRTO’s Patient Relations Committee (PRC) comprised of practising Respiratory Therapists (RTs). The Infection Control Working Group for the first version of this CBPG was also assisted by Dr. Mary Vearncombe, Dr. Allison McGeer and the Infection Control Team at Mount Sinai Hospital.

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Infection Prevention and Control CBPG Review 2011

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Infection Prevention and Control CBPG Review 2016

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Introduction

As a regulated health professional, Respiratory Therapists (RTs) are accountable for providing safe, competent and ethical care to the public in accordance with the standards of the profession. This document has been developed in order to assist RTs in learning how to achieve quality infection prevention and control practices. The SARS epidemic in 2003, the H1N1 Pandemic in 2009, and the MERS and Ebola 2014/2015 outbreaks— as well as the likelihood of another pandemic influenza— suggest it is vital for RTs to remain informed and up to date on current infection prevention and control best practices.

In addition to the public and the CRTO, RTs are accountable to their employer. Employers may have additional policies and procedures related to infection prevention and control. If an employer’s policies and procedures are more restrictive than the CRTO’s description of the standard of practice, Members should abide by their employer’s policies and procedures. Where the employer’s policies and procedures are more permissive than the standard of practice described by the CRTO, Members should adhere to the standard of practice described by the CRTO.

CRTO publications contain practice parameters and standards which should be considered by all Ontario Respiratory Therapists in the care of their patients/clients and in the practice of the profession. CRTO publications are developed in consultation with professional practice leaders and describe current professional expectations. It is important to note that these CRTO publications may be used by the CRTO or other bodies in determining whether appropriate standards of practice and professional responsibilities have been maintained.
RTs are accountable for….

- Knowing how infections are transmitted (i.e., The 6 Links in the Chain of Transmission)

- Adhering to the current infection prevention and control guidelines for their practice setting (e.g., employer policies, OHA Communicable Diseases Surveillance Protocols, Public Health Agency of Canada Best Practice Documents, Public Health Agency of Canada Infection Control Guidelines, MOHLTC Emergency Planning and Preparedness)

- Advocating for best practices in infection prevention and control in their workplace

- Educating and modelling proper infection prevention and control practices for others

- Monitoring changes to infection control practices and updating their practice accordingly (e.g., MOH LTC Health Bulletins).

- Knowing their Immunization Status and keeping their immunisation records up to date

- Ensure that there are processes in place to obtain an accurate travel history from patients/clients
RTs protect their patients/clients – as well as themselves – through…

- Consistent use of Routine Practices, including a Risk Assessment that takes into consideration the client/patient/resident infection status, the characteristics of the client/patient/resident and the type of care activities to be performed (PIDAC, 2012a, p.7)
- Application of Additional Precautions, where indicated
- Hand Hygiene and proper cough etiquette
- Adhering to the principles of good occupational health and hygiene practices and reporting facility outbreaks, where appropriate
- Ensuring appropriate immunizations are obtained
- Avoiding consuming food or beverages in patient care areas (PIDAC, 2012b, p. 48)
- Staying home from work when ill with symptoms of fever, chills, cough, malaise and/or nausea, vomiting or diarrhea

**Scenario**
You wake up at 0400 with fever, chills and a cough. You are scheduled to begin your shift in the NICU at 0700.

**What do you do?**
You should call in sick because going to work puts others (specifically your patients) at risk.

**Organizational Accountabilities:**
All health care settings should establish a clear expectation that staff do not come into work when ill with symptoms that are of an infectious origin, and support this expectation with appropriate attendance management policies. Staff carrying on activities in a health care setting who develop an infectious illness may be subject to some work restrictions (PIDAC, 2012b, p. 22).
Immunizations

Appropriate vaccine use protects the health care provider, colleagues and the patient/client (PIDAC, 2012, p. 23). Examples of vaccines that may be necessary to protect RTs and their patient/clients:

- annual influenza
- measles, mumps, rubella (MMR)
- varicella
- pertussis
- hepatitis A, B
- tetanus/diphtheria

PIDAC states that vaccines appropriate for susceptible health care providers include annual influenza vaccines (PIDAC, 2012b, p.40).

Professional Accountabilities: Health care workers (HCW), including hospital employees, other staff who work or study in hospitals (e.g., students in health care disciplines, contract workers, volunteers) and other health care personnel (e.g., those working in clinical laboratories, nursing homes, home care agencies and community settings) are at risk of exposure to communicable diseases because of their contact with patients/clients (diagnosed or undiagnosed) or their environment. There is also a risk that HCW could transmit an undiagnosed vaccine-preventable disease to others. Some health care institutions and jurisdictions are moving towards making vaccination a condition of employment for HCW.
– Public Health Agency of Canada, 2013

Immunize Canada has an app to assist in recording vaccines information and accessing immunization schedules.
Each link in the chain represents a factor related to the spread of microorganisms. Transmission of infectious agents does not take place unless all six of the elements in the chain of transmission are present. (PIDAC, 2012b, p.1).

The links in the Chain of Transmission can be broken through a careful Risk Assessment and consistent application of Routine and Additional Precautions, where indicated.

<table>
<thead>
<tr>
<th>Links in the Chain of Transmission are:</th>
<th>Breaking the Chain of Transmission by Assessing:</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFECTIOUS AGENT</td>
<td>the micro-organisms capable of producing infection (e.g., bacteria, viruses)</td>
</tr>
<tr>
<td>RESERVOIR</td>
<td>the places in which the infectious agent lives (e.g., humans, animals, water)</td>
</tr>
</tbody>
</table>
**Links in the Chain of Transmission are:**

<table>
<thead>
<tr>
<th>PORTAL OF EXIT</th>
<th>Breaking the Chain of Transmission by Assessing:</th>
</tr>
</thead>
<tbody>
<tr>
<td>the point where the agent leaves the reservoir (e.g., blood, secretions)</td>
<td>the potential for exposure to blood, body fluids, secretions and excretions (e.g., splashing, patient coughing considering the duration of exposure (e.g., sterile gown for central line insertions))</td>
</tr>
</tbody>
</table>

**MODES OF TRANSMISSION**

<table>
<thead>
<tr>
<th>Contact – which is divided into:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• <strong>Direct Contact</strong> – occurs through touch</td>
</tr>
<tr>
<td>• <strong>Indirect Contact</strong> – occurs when micro-organisms are transferred by contaminated object coming into contact with another surface</td>
</tr>
</tbody>
</table>

| Droplet Transmission – occurs when large droplets exit the respiratory tract of a person when he/she coughs or sneezes. Can also be generated by some procedures (e.g., suctioning). These droplets are projected a short distance of usually < 2m and enter the hosts eyes, nose, mouth or fall onto surfaces. |

| Airborne Transmission – occurs when airborne particles remain suspended in the air, travel on air currents and are then inhaled by others who are nearby or who may be some distance away from the source patient, in a different room or ward (depending on air currents) or in the same room that a patient has left, if there have been insufficient air exchanges. (PIDAC, 2012b, p. 38). |

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*PIDAC, 2012b, p. 38.*
### Links in the Chain of Transmission are:

<table>
<thead>
<tr>
<th>MODES OF TRANSMISSION (continued)</th>
<th>Breaking the Chain of Transmission by Assessing:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parenteral Transmission</strong> – the spread of an agent through intact skin by a sharp (e.g., needle stick injury).</td>
<td></td>
</tr>
<tr>
<td><strong>Common Vehicle Transmission</strong> – the spread of an agent through a common contaminated source (e.g., multi-dose vials)</td>
<td></td>
</tr>
<tr>
<td><strong>Vector Transmission</strong> – occurs when a host is bitten by an animal or insect carrying the infectious agent (e.g., mosquito transmitting West Nile virus)</td>
<td></td>
</tr>
</tbody>
</table>

| PORTAL OF ENTRY | | |
|-----------------|------------------------|
| the point at which the agent enters the host (e.g., non-intact skin, respiratory or GI tract, mucous membranes) | the need for aseptic technique the appropriate catheter and wound care |

| SUSCEPTIBLE HOST | | |
|------------------|------------------------|
| any person at risk of infection (e.g., immunosuppressed patients, burn victims) | the need for appropriate immunization |
Routine Practices

Routine practices must be applied to all patients at all times, in all settings, regardless of diagnosis or infectious status.

The basics of Routine Practices include:

- Hand Hygiene
- Personal Protective Equipment (PPE)
- Needlesticks and Sharps Injuries Prevention & Safe Injection Practices
- Cleaning, Disinfection & Sterilization of Medical Devices
- Waste Disposal
- Performing a Risk Assessment
- Additional Precautions

For any procedure with the potential to generate respiratory droplets or aerosolization (including but not limited to the procedures listed on the next page), Routine Practices require the addition of Droplet Precautions. Proper PPE must be used by staff when within two metres of procedures generating droplets/aerosols on any client/patient/resident, with or without symptoms of an acute respiratory infection, to prevent deposition of droplets/aerosols on staff mucous membranes.

Did you Know?

Droplet Precautions are not required when performing aerosol-generating on stable, afebrile patients/clients without new or worsening cough or shortness of breath [such as those who require routine tracheostomy care at home, or chronic or home use of non-invasive positive pressure ventilators (NIPPV)].

Aerosol-Generating Respiratory Procedures

For any procedure with the potential to generate respiratory droplets or aerosolization (including but not limited to the procedures listed on the next page), Routine Practices require the addition of Droplet Precautions. Proper PPE must be used by staff when within two metres of procedures generating droplets/aerosols on any client/patient/resident, with or without symptoms of an acute respiratory infection, to prevent deposition of droplets/aerosols on staff mucous membranes.

Professional Accountabilities: These precautions may be a departure for many CRTO Members, however, lessons learned during the SARS crisis remind us that strict vigilance to appropriate infection control prevention activities are vital to ensuring a safe environment for both our patients and ourselves. With the emerging threat of an influenza pandemic and other emerging pathogens, it is crucial that RRTs follow the MOHLTC’s recommended infection control guidelines.
Aerosol-Generating Respiratory Procedures (cont’d)

There are certain procedures where there has been confirmed transmission of infectious agents via droplets or aerosols. In other cases, transmission may be possible but not yet proved. The table below illustrates which category many Aerosol-Generating Respiratory Procedures fit into.

<table>
<thead>
<tr>
<th>Aerosol-Generating Respiratory Procedures with conclusive evidence of transmission</th>
<th>Aerosol-Generating Respiratory Procedures without conclusive evidence of transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endotracheal (ETT) intubation</td>
<td>Nebulized therapies</td>
</tr>
<tr>
<td>Cardio-pulmonary resuscitation (CPR)</td>
<td>High-Frequency Oscillatory Ventilation (HFOV)</td>
</tr>
<tr>
<td>Bronchoscopy*</td>
<td>Tracheostomy insertion, changing and/or care</td>
</tr>
<tr>
<td>Sputum induction*</td>
<td>Chest physiotherapy</td>
</tr>
<tr>
<td>Non-invasive positive pressure ventilation for acute respiratory failure (i.e., CPAP, BiPAP)</td>
<td>Nasopharyngeal swabs and/or aspirates</td>
</tr>
<tr>
<td>High flow oxygen therapy</td>
<td>Chest tube or chest needle insertion</td>
</tr>
<tr>
<td>Open artificial airway suctioning (i.e., ETT, tracheostomy)</td>
<td>Open suctioning (i.e., mouth or nose)</td>
</tr>
<tr>
<td>Other breaches to the integrity of a mechanical ventilation system (e.g., filter changes)</td>
<td></td>
</tr>
</tbody>
</table>

Mask and either protective eyewear or face shield must be used by staff when within two metres of procedures generating droplets/aerosols

* For diagnostic (but not therapeutic) bronchoscopy or sputum induction, must wear an N95 respirator, due to risk from undiagnosed TB (PIDAC, 2012b, p. 16)

PPE should be determined by risk assessment

All units and crash carts should be equipped with:
- a manual resuscitation bag with hydrophobic submicron filter
- in-line suction catheters
- non-rebreather mask that allows filtration of exhaled gases
- PPE (gloves, gowns, masks, eye protection).
Hand Hygiene

Hand hygiene is considered the most important and effective infection prevention and control measure to prevent the spread of health care associated infections (PIDAC, 2012b, p. 9).

There are a number of resources available to assist in the proper application of hand hygiene:

- Public Health Ontario’s *Just Clean Your Hands*, which is a hand hygiene improvement program that includes instructional videos for both acute and long-term care practice settings

- Provincial Infectious Diseases Advisory Committee (PIDAC) *Best Practices for Hand Hygiene in All Health Care Settings, 4th edition* (2014), which is best practice guideline on hand hygiene available through Public Health Ontario

- Public Health Ontario’s *Hand Hygiene for Health Care Settings* Fact Sheet

- Public Health Ontario’s *Your 4 Moments of Hand Hygiene*

**Professional Accountabilities:** An integral part of an effective hand hygiene program is the promotion of hand hygiene by champions and role models within the health care setting. By being role models for best practices, these champions will take personal responsibility and hold others accountable as part of a facility’s internal responsibility system (PIDAC, 2014, p. 9).
The Four Moments for Hand Hygiene

1. BEFORE initial patient/patient environment contact

   WHEN? Clean your hands when entering the patient's environment:
   • before touching patient or
   • before touching any object or furniture

   WHY? To protect the patient/patient environment from harmful germs carried on your hands

2. BEFORE aseptic procedure

   WHEN? Clean your hands immediately before any aseptic procedure; for instance: changing a dressing, oral care, drawing blood, administering IV medication

   WHY? To protect the patient against harmful germs, including the patient's own germs, entering his or her body

3. AFTER body fluid exposure risk

   WHEN? Clean your hands immediately after an exposure risk to body fluids (and after glove removal)

   WHY? To protect yourself and the health care environment from harmful patient germs

4. AFTER patient/patient environment contact

   WHEN? Clean your hands when leaving the patient's environment:
   • after touching patient or
   • after touching any object or furniture

   WHY? To protect yourself and the next patient from harmful patient germs

www.ontario.ca/handhygiene

Adapted with the permission of Public Health Ontario.
Hand Hygiene Considerations

- Ensuring skin integrity (dermatitis, cracks, cuts or abrasions can trap bacteria)
- Use of employer supplied lotions products regularly (3 times a day when cleaning hands several times per hour)
- Things that can reduce the effectiveness of hand hygiene:
  - long nails
  - nail polish
  - artificial nails and nail enhancements
  - hands and arm adornments (associated with poor hand hygiene practices and result in more tears to gloves)

Performing Hand Hygiene

First...

- Remove hand and arm jewellery (watch must be worn above the wrist)
- Clothing or other items that impede frequent and effective hand hygiene should be removed (PIDAC, 2014, p. 16)

Professional Accountabilities: If experiencing skin integrity issues, the Member is required to contact their employee Occupational Health to seek a solution (e.g., alternate skin care products)
Alcohol-Based Hand Rubs (ABHR)
e.g., gels and foams containing 70 - 90% alcohol

- Is the preferred method of hand hygiene for hands that are not visibly soiled
- Has been shown to be less irritating to skin than soap and water and may significantly decrease dermatitis due to emollients in the product (PIDAC, 2014, p.16)
- Must be used with employer-approved products that are compatible with the gloves being used

Handwashing Soaps

- Plain soap is recommended for routine hand hygiene when hands are visibly soiled
- Should be in a liquid format in a dispenser that is discarded when empty (should not be refilled)
  - Bar soaps for hand hygiene must not be used in health care facilities
- Antibacterial soap should be limited to specific settings (e.g., OR, ICU and burn units).
- It has been shown that at least 15 seconds of lathering with soap is required to remove transient flora (PIDAC, 2014, p.21)
- Essential components are soap, friction and lukewarm running water.

The best evidence suggests that antimicrobial soap is equivalent to ABHR in terms of microorganism reduction but is harsher on the hands and more time-consuming to use. (PIDAC, 2014, p.22)

RESOURCES
Techniques for ABHR and Handwashing
Public Health Ontario’s Just Clean Your Hands Educational Videos (ABHR & Handwashing)
Personal Protective Equipment (PPE)

General Principles

- PPE is used to prevent:
  - contact with non-intact skin, blood, body fluid, excretions and secretions
  - the transmission of particular organisms that may be transmitted via the air, or by contact with intact skin (see section on Additional Precautions)
- PPE is only effective in infection control and prevention when applied, used, removed and disposed of properly
- Avoid any contact between contaminated PPE and surfaces, clothing or people outside the patient care area
- Discard used PPE in the appropriate disposal bags
- Do not share PPE
- Remove PPE completely and thoroughly perform hand hygiene each time you leave a patient to attend to another patient or move to a non-patient care area.
- The use of PPE does not replace the need for proper hand hygiene, which needs to be performed both before PPE is applied and after it is removed
- It is essential to perform a risk assessment to determine the PPE needed

RESOURCES

Public Health Ontario’s Risk Algorithm to Guide PPE Use

Professional Accountabilities: Increased knowledge, hand hygiene, appropriate PPE, immunization etc., are all part of a system that provides for the safety of our patient/clients, our Members and other members of the interprofessional team
Gloves must be worn when it is anticipated that the hands will be in contact with:

- mucous membranes
- non-intact skin
- tissue
- blood
- body fluids
- secretions
- excretion
- equipment and environmental surfaces contaminated with the above

**DO**

- Perform hand hygiene **before and after** each glove use/change.
- Remove gloves and clean hands between patients and **before** leaving the patient care area.
- Always use the appropriate technique for removing the gloves and disposing of them.
- Gloves should be worn for specific tasks and discarded immediately following.
- Change gloves if they become heavily soiled during the task.
- Change or remove gloves when moving from a contaminated body site to a clean body site during the same task.

**DON'T**

- Do not use gloves for routine care activities e.g., taking a blood pressure in which contact is limited to intact skin, unless additional precautions are in place.
- Do not use gloves if they are ripped or torn.
- Do not allow the outer surface of the glove to touch your skin.

**REMEMBER**

The use of gloves does **not** replace the need for proper hand hygiene.
## Selection of Glove

<table>
<thead>
<tr>
<th>GLOVE TYPE</th>
<th>SITUATION AND RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl/ Clean</td>
<td>Provides protection for minimal exposure to blood/body fluids/infectious agents and short duration tasks.</td>
</tr>
</tbody>
</table>
| Sterile | Used for activities that involve invasive procedures, or where contact with non-intact skin, blood, body fluids or body substances is sustained or continuous (e.g. arterial line insertion, central line insertion).  

**Please note:** there is increasing evidence of latex sensitivity and allergies amongst healthcare workers. To reduce this risk, latex gloves should only be used when needed and should be **powder free** and have **low or reduced protein content**. |
| Nitrile | Protection for heavy exposure to blood/body fluids/infectious agents and tasks of longer duration. Used when handling chemicals and chemotherapeutic agents and is the preferred replacement for vinyl gloves when a documented allergy or sensitivity is present. |
| Neoprene | Used as a replacement sterile latex glove when a documented allergy or sensitivity occurs. Recommended for contact with acids, bases, alcohols, etc. |

**REMEMBER**

Gloves protect the healthcare professional, but once contaminated they can transmit pathogens to the skin, clothes or to other patients.
Gowns

Gowns are worn in order to protect the health care professional’s arms, exposed body areas, and clothing from contact with blood, body fluids, and other potentially infectious material.

<table>
<thead>
<tr>
<th>DO</th>
<th>DON’T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discard immediately after each patient encounter.</td>
<td>Do not reuse gowns.</td>
</tr>
<tr>
<td>Gowns should fully cover the torso to mid-thigh, fit close to the body, tie in the back and have long sleeves that fit snugly at the wrists.</td>
<td>Do not go from patient to patient wearing the same gown.</td>
</tr>
</tbody>
</table>

**RESOURSE**

Appropriate Gown Use  
*PIDAC 2012b*, p. 13 (Box 3)  
New Criteria for Surgical Gowns  
*AAMI, 2015.*

**Selection of Gowns**

<table>
<thead>
<tr>
<th>GOWN TYPE</th>
<th>SITUATION AND RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cotton/linen, reusable or disposable, long-sleeved isolation gowns.</td>
<td>Use if contamination is anticipated and in contact/droplet precautions.</td>
</tr>
<tr>
<td>Fluid resistant isolation gown or plastic apron over isolation gown.</td>
<td>Use if contamination of uniform or clothing from significant volumes of blood or body fluids is likely or anticipated.</td>
</tr>
<tr>
<td>Fluid impervious gowns (e.g., Gortex®)</td>
<td>Use if extended contact or large volume exposure (e.g. large volume blood loss during resuscitation of an MVA victim or surgical assist).</td>
</tr>
</tbody>
</table>
Facial protection may include a **mask** or **respirator** in conjunction with **eye protection**, or a face shield that covers eyes, nose and mouth. Facial protection is to be used if 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 client/patient/resident (RPAP, 2012, p. 13).

**Masks** provide a barrier that protects the mucous membranes of the mouth and nose which are portals for infection. Droplets can carry microbes and other infectious agents and a surgical mask helps protect you from inhaling respiratory pathogens transmitted by the droplet route.

**Eye protection** used in addition to a mask to protect the mucous membranes of 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; and/or
- providing care within two metres of a coughing client/patient/resident.

Eye protection includes:

- safety glasses
- safety goggles
- face shields
- visors attached to masks

Did you know?

Personal eyeglasses and contact lenses are NOT adequate eye protection; they may not provide sufficient protection above, below, or around the eyes.
Some studies have demonstrated that protection with a surgical mask against influenza appears to be similar to the N95 respirator. However, this should not be generalized to settings where there is a high risk for aerosolization (such as intubation or bronchoscopy), where use of an N95 respirator is required. (Loeb et al., 2009)

### DO

| Mask should securely cover the nose and mouth. |
| Change mask if it becomes wet. |
| Remove mask correctly immediately after completion of task and discard into an appropriate waste receptacle. |
| Clean hands after removing the mask. |

### DON’T

| Do not touch mask while wearing it. |
| Do not allow mask to hang or dangle around the neck. |
| Do not re-use disposable masks. |
| Do not fold the mask or put it in a pocket for later use. |

### Selection of Masks

<table>
<thead>
<tr>
<th>MASK TYPE</th>
<th>SITUATION AND RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure mask</td>
<td>Protection for minimal exposure to infectious droplets. Used for short duration tasks and</td>
</tr>
<tr>
<td></td>
<td>those that do not involve exposure to blood/body fluids.</td>
</tr>
<tr>
<td>Fluid Resistant Mask</td>
<td>Protection for heavy exposure to infectious droplets or blood/body fluids.</td>
</tr>
<tr>
<td>Surgical Mask</td>
<td>Protection for exposure to infectious droplets or blood/body fluids and for longer duration</td>
</tr>
<tr>
<td></td>
<td>tasks.</td>
</tr>
</tbody>
</table>
Respirators

N95 respirators prevent inhalation of small particles that may contain infectious agents transmitted via the airborne route and must:

- filter 95% of particles of diameter 0.3 microns or larger with less than 10% leak (Public Health Agency of Canada, 2014)
- provide a tight facial seal with less than 10% leak. (PIDAC, 2012, p. 38).
- entering the client/patient/resident’s room or transporting patient/clients who are on Airborne Precautions (e.g., Active TB)
- performing aerosol-generating procedures such as sputum induction and bronchoscopy.

Non-immune staff is required to enter the room of a client/patient/resident with measles or varicella (PIDAC, 2012b, p. 38).

Directed by the medical officer of health (e.g., Novel Respiratory Illnesses) (PIDAC, 2015b)

N95

<table>
<thead>
<tr>
<th>DO</th>
<th>DON’T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergo regular fit testing as part of an approved fit-testing program.</td>
<td>NEVER put an N95 respirator on a patient/client (patient/clients should wear a surgical/procedure mask when outside their room)</td>
</tr>
<tr>
<td>Performing a seal check each time an N95 respirator is used.</td>
<td>Do not use N95 respirator if seal check fails.</td>
</tr>
<tr>
<td>Remove the N95 respirator correctly and discard on removal into an appropriate receptacle.</td>
<td>Do not use N95 respirator if wet or soiled.</td>
</tr>
</tbody>
</table>
Fit Testing involves the evaluation of the fit of a specific respirator on an individual with respects to:

- make;
- model; and
- size

This procedure is to be done periodically, **at least every two years and** whenever there is a change in respirator face piece or the user’s physical condition which could affect the respirator fit (e.g. significant weight change, facial structure change due to injury or major dental work) (PIDAC, 2012b, p. 47)

**Performing a Seal Check for an N95 Respirator**

A Seal Check (also referred to as a ‘fit-check’) must be performed each time an N95 respirator is worn to ensure adequate respiratory protection.

### Positive Pressure Seal Check:
1. Apply mask as per instructions
2. Cover exhalation valve or cup hands around the sides of the mask
3. Exhale gently into the mask – you should feel no leaks around the mask edge and the mask should rise/lift gently from your face

### Negative Pressure Seal Check:
1. Apply mask as per instructions
2. Cover exhalation valve or cup hands around the sides of the mask
3. Gently inhale for 5 seconds – the mask should collapse slightly onto your face without any inward leakage of air around the edges of the mask

**Scenario**

You are unable to pass a seal check with an N95 mask prior to entering an airborne isolation room.

**What do you do?**

You should notify your supervisor that you cannot provide care and ensure that you are mask fit tested as soon as possible.

**Professional Accountabilities:** Members are required to know what size and manufacturer of N95 respirator is appropriate for them and adhere to their employer’s requirement for mask fit testing.
# Eye Protection

## DO

Eye protection must be removed immediately after the task for which it was used and discarded into waste or placed in an appropriate receptacle for cleaning.

Reversible eye protection must be sent to a central area for reprocessing after use.

## DON'T

Prescription eye glasses are not acceptable as eye protection.

## Selection of Eye Protection

<table>
<thead>
<tr>
<th>EYE PROTECTION TYPE</th>
<th>SITUATION AND RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goggles</td>
<td>Provides protection for exposure to infectious droplets or blood/body fluids. However, visibility is often poor.</td>
</tr>
<tr>
<td>Face Shield</td>
<td>Protection for exposure to infectious droplets or blood/body fluids. Provide good visibility.</td>
</tr>
<tr>
<td>Surgical Mask</td>
<td>Protection for minimal exposure to infectious droplets or blood/body fluids.</td>
</tr>
</tbody>
</table>

## RESOURCE

Putting On & Taking Off PPE  
(PIDAC, 2012b, pp. 70 & 71)
Needlestick and Sharps Injuries Prevention & Safe Injection Practices

Needlestick and Sharps (e.g., scalpels, lancets) Injuries can occur at every stage of the use, disassembly, or disposal of sharps, and is a component of the Chain of Transmission (i.e., Parenteral Transmission). Improved equipment design, effective disposal systems and safe handling practices are all part of a Sharps Injury Prevention Program (SIPP). Safe injection practices help prevent the transmission of infections (e.g., Hepatitis B and C).

Elements of a SIPP

- Improved equipment design [i.e., Safety Engineered Medical Sharps (SEMS)]
- Effective Disposal Systems

Sharps containers should always meet or exceed the Canadian Standards Association (CSA) standards. (Z316.6-07 “Evaluation of single-use and reusable medical sharps containers for biohazardous and cytotoxic waste”.)

- Safe Handling Practices
  - Used needles should be discarded immediately after use and not recapped
  - The contents of the sharps container must not exceed the fill line
- Safe Injection Practices
  - Use of a new needle and syringe with each injection of a patient/client
  - Using medication vials for one patient/client only

**RESOURCES**

**Canadian Centre for Occupational Health & Safety**

Whenever possible, multi-dose medication vials are not to be used. (PIDAC, 2015b, pp. 36 & 89)
Effective cleaning, disinfection and sterilization is an essential part of breaking the chain of transmission of infectious pathogens. Reusable medical equipment must be cleanable and be able to be disinfected or sterilized as appropriate for the equipment.

**CLEANING**
General removal of debris physical removal of dirt with running water and detergent action. Should be done for all items prior to disinfection/ sterilization.

**STERILIZATION**
Killing of all disease causing organisms. For items that penetrate sterile tissue. (e.g., surgical equipment)

**HIGH-LEVEL DISINFECTION**
For items that come in contact with patients non-intact skin and/or mucous membranes but does not penetrate them. HLD kills vegetative bacteria, fungi, lipid and non-lipid-viruses and mycobacteria. (e.g. laryngoscope blade)

**LOW-LEVEL DISINFECTION**
Removal of most of the organisms present on the surface that can cause infection. For equipment that does not touch mucous membranes and only touches intact skin (e.g., blood pressure cuff)

**RESOURCE**
Reprocessing Medical Equipment
(PIDAC, 2015b, p. 49)
Deciding whether an item needs to be cleaned disinfected or sterilized depends on the type of item involved and how it is used. The Spaulding Classification medical equipment/devices into three categories, based on the potential risk of infection involved in their use (PIDAC, 2013, p. 25).

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>DEFINITION</th>
<th>LEVEL OF PROCESSING / REPROCESSING</th>
<th>EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NON-CRITICAL equipment/device</td>
<td>Equipment/device that touches only intact skin and not mucous membranes, or does not directly touch the client/patient/resident</td>
<td>Cleaning followed by low-level disinfection (in some cases, cleaning alone is acceptable)</td>
<td>• ECG machines</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Oximeters</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Stethoscopes</td>
</tr>
<tr>
<td>SEMI-CRITICAL equipment/device</td>
<td>Equipment/device that comes in contact with non-intact skin or mucous membranes but does not penetrate them</td>
<td>Cleaning followed by high-level disinfection (as a minimum). Sterilization is preferred.</td>
<td>• Anaesthesia equipment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Most respiratory therapy equipment</td>
</tr>
<tr>
<td>CRITICAL equipment/device</td>
<td>Equipment/device that enters sterile tissues, including the vascular system</td>
<td>Cleaning followed by sterilization</td>
<td>• Surgical instruments</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Biopsy instruments</td>
</tr>
</tbody>
</table>
Biomedical waste is contaminated, infectious waste that requires careful disposal, and includes:

- human anatomical waste
- human cultures or specimens (excluding urine and faeces)
- human blood and blood products

Waste should be segregated into either a plastic bag or rigid container with a non-removable lid according to the categories listed in the table below.

<table>
<thead>
<tr>
<th>WASTE CATEGORY</th>
<th>COLOUR CODE</th>
<th>EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANATOMICAL WASTE</td>
<td>Red</td>
<td>Tissues, organs, body parts</td>
</tr>
<tr>
<td>MICROBIOLOGIC WASTE</td>
<td>Yellow</td>
<td>Diagnostic specimens, cultures, vaccines</td>
</tr>
<tr>
<td>FLUID WASTE</td>
<td>Yellow</td>
<td>Drainage collection units and suction container contents, blood, blood products, bloody body fluids</td>
</tr>
<tr>
<td>GENERAL WASTE</td>
<td>Green, Black or Clear</td>
<td>Dressings, sponges, PPE, empty IV bags and tubing, catheters, empty specimen containers, Isolation waste from Contact, Droplet and Airborne Precautions rooms</td>
</tr>
</tbody>
</table>
Performing a Risk Assessment

A risk assessment is essential for determining

Risk Presented by the Task
- risk of exposure to:
  - blood and body fluids
  - mucous membranes
  - non-intact skin
  - contaminated equipment
  - splash/spray,
  - cough or sneeze

Risk Presented by the Patient/Client
- patient/client has a known infection
- patient/client has symptoms of an undiagnosed infection

Other Considerations
- Practice setting-specific factors (e.g., long-term care facility, home care)
- Government and related agency (e.g., Ministry of Health and Long-Term Care, Public Health Ontario, Public Health Agency of Canada) health alerts, surveillance, screening and reporting of suspected illness such as:
  - Acute Respiratory Illness (ARI)
  - Influenza-Like Illness (ILI)
  - Novel Respiratory Illness (NRI)

RESOURCE

Routine Practices Risk Assessment Algorithm for All Client/Patient/Resident Interactions
(PIDAC 2012b, p. 58)

Professional Accountabilities: Members are expected to consider their own health status and whether they are at risk to spread infection to others.
Additional Precautions

Additional Precautions are interventions used in addition to Routine Practices when necessary. The need for Additional Precautions is based on the mode of transmission of microorganisms (e.g., MRSA, VRE, *C. difficile*).

Categories of Additional Precautions:

1. Contact Precautions
2. Droplet Precautions
3. Airborne Precautions

**Organizational Accountabilities:**

Additional Precautions must be instituted as soon as symptoms suggestive of a transmissible infection are noted, not only when a diagnosis is confirmed. Each health care setting should have a policy authorizing any regulated health care professional to initiate the appropriate Additional Precautions at the onset of symptoms and maintain precautions until laboratory results are available to confirm or rule out the diagnosis (*PIDAC, 2012b*, p. 29).

**RESOURCE**

Clinical Syndromes/Conditions with required level of precautions

(*PIDAC, 2012b*, p. 29)
Contact Precautions

Contact transmission is the most common route of transmission of infectious agents. There are two types of contact transmission:
1. **Direct** – transmission of microorganisms via touching contaminated individual
2. **Indirect** – transmission of microorganisms via contact with contaminated objects

Droplet Precautions

Droplet transmission occurs when droplets carrying an infectious agent exit the respiratory tract of a person. Droplets can be generated when a patient/ client talks, coughs or sneezes and through some procedures performed on the respiratory tract (e.g., suctioning, bronchoscopy or nebulized therapies). **Droplets do not remain suspended in the air and usually travel less than two metres.**

Airborne Precautions

Airborne transmission occurs when airborne particles remain suspended in the air and are then inhaled by others who are nearby or who **may be some distance away from the source.**

Common organisms transmitted via the air (airborne) include:
- Mycobacterium tuberculosis
- Varicella (chickenpox/disseminated shingles)
- Rubella (measles)

Patients with a known or suspected airborne organism should be cared for in an **Airborne Infection Isolation Room (AIIR)** with the door closed. The important characteristics of an airborne room AIIR are that it be:
- single-patient
- negative pressure to the corridor/adjacent areas with audiovisual alarms
- have a minimum of 12 air exchanges/hour (either using the facilities ventilation system or by using HEPA filtration of the air in the room)
- have air flow that is designed to move air from the area of the patient’s head/face away from the likely position(s) of health care workers

Even after a patient has left the room everyone entering the room must wear an N95 respirator for the time period specified in your employer’s policy.

**RESOURCE**

**Time required for Airborne Infection Isolation Room to Clear M Tuberculosis.**
(PIDAC 2012b, Appendix D)
Essential Elements of Additional Precautions

- **Special Accommodation Considerations** (e.g., a single room with private toileting facilities is highly recommended)
- **Signage** (i.e., that lists the required precautions)
- **Dedicated equipment**, whenever possible
- **Appropriate PPE**
- **Additional cleaning measures**
- **Transportation considerations** (e.g., restricted patient/client movement outside of their room)
- **Effective Communication** with all members of the healthcare team (e.g., patient/client, their family members, other healthcare providers)

Equipment and supplies that are required for the interaction (and cannot be left in the room) should be assembled first and brought into the room after PPE has been put on. ([PIDAC, 2012b, p. 27](https://www.pdac.on.ca))
## Additional Precautions in an Acute Care Setting

<table>
<thead>
<tr>
<th></th>
<th>CONTACT</th>
<th>DROPLET</th>
<th>AIRBORNE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Special accommodation considerations</strong></td>
<td>Single room with dedicated toilet and patient sink – door may be open</td>
<td>Single room with dedicated toilet and patient sink – door may be open</td>
<td>AIIR</td>
</tr>
<tr>
<td><strong>Signage (examples)</strong></td>
<td><img src="image" alt="Contact Precautions" /></td>
<td><img src="image" alt="Droplet Precautions" /></td>
<td><img src="image" alt="Airborne Precautions" /></td>
</tr>
<tr>
<td><strong>Dedicated equipment</strong></td>
<td>Dedicated equipment if possible</td>
<td>Dedicated equipment if possible</td>
<td>As per Routine Practices</td>
</tr>
<tr>
<td><strong>Appropriate PPE</strong></td>
<td>Gloves at all times Gown if skin or clothing will come in contact with the patient/client environment</td>
<td>Facial protection within 2 meters of patient/client</td>
<td>Only immune staff for measles, varicella (no N95 required) Don N95 fit tested respirator and do seal check prior to entry Doff N95 respirator outside patient room.</td>
</tr>
<tr>
<td><strong>Additional cleaning measures</strong></td>
<td>VRE and <em>C diff</em> rooms require special cleaning (routine cleaning for all others)</td>
<td>Routine Cleaning</td>
<td>Routine Cleaning</td>
</tr>
<tr>
<td><strong>Transportation considerations</strong></td>
<td>Transport staff to wear gloves and gown for direct contact with patient/client during transport</td>
<td>Patient/client to wear a surgical (procedure) mask during transport Transport staff to wear the appropriate mask during transport Limit transport unless required for diagnostic or therapeutic purposes</td>
<td>Patient/client to wear a surgical (procedure) mask during transport Transport staff to wear an N95 during transport Limit transport unless required for diagnostic or therapeutic purposes</td>
</tr>
</tbody>
</table>

For more information on Additional Precautions in Complex Continuing Care, Long-Term Care, Ambulatory Settings and Home Care, please see PIDAC, 2012b, pp. 34 – 35, 37 & 41.
Ventilator-Associated Pneumonia (VAP)

Ventilator-associated pneumonia (VAP) is the leading cause of death among hospital-acquired infections. Hospital mortality of ventilated patients who developed VAP is 46% compared to 32% for ventilated patients who do not develop VAP (Canadian Patient Safety Institute).

VAP Diagnostic Criteria

In a patient who has been invasively mechanically ventilated for greater than 48 hours, the diagnostic criteria for VAP are as follows:

- New, worsening or persistent infiltrate consolidation or cavitation on CXR compatible with pneumonia and 1 of:
  - White Blood Cells ≥ 12,000 or < 4,000
  - Temperature greater than 38 degrees Celsius or less than 36 degrees Celsius with no other recognized cause

and both of the following:

- New onset of purulent sputum, or change in character of sputum, or increase in respiratory secretions or increase in suctioning requirements
- Worsening gas exchange (e.g., increasing oxygen requirements, worsening PaO2/FiO2 ratio, increasing in minute ventilation)

and

- The patient is being treated with antibiotics for ventilator-associated pneumonia

VAP Bundles are a variety of evidence-based practices that, when implemented together, have the potential to result in dramatic reductions in the incidence of VAP.

**Adult VAP**

1. Elevate the head of the bed to 45° when possible; otherwise, attempt to maintain the head of the bed at more than 30°
2. Evaluate readiness for extubation daily
3. Use endotracheal tubes with subglottic secretion drainage
4. Conduct oral care and decontamination with chlorhexidine
5. Initiate safe enteral nutrition within 24–48 hours of ICU admission

**Pediatric VAP Bundle**

1. Elevate the head of the bed
2. Properly position oral or nasal gastric tubes
3. Perform oral care
4. Eliminate the routine use of instil for suctioning

**RESOURCE**

Canadian Patient Safety Institute’s [Ventilator-Associated Pneumonia (VAP) Tools and Resources](#)

**Aseptic Practice**

When needed, adherence to **aseptic practice** is critical in protecting patients from common and serious hospital-acquired infections such as line-associated tissue and blood stream infections as well as ventilator-associated pneumonia (VAP).

**RESOURCE**

Centers for Disease Control and Prevention’s [Central Line-associated Bloodstream Infections: Resources for Patients and Healthcare Providers](#)

Critical Care Secretariat’s [Ventilator Associated Pneumonia and Central Line Infection Prevention Toolkit](#)
Ventilator-Associated Pneumonia (VAP)

In-line (closed) suction systems are ideal as they contribute to the reduction of environmental contamination and prevent exposure to respiratory pathogens. Most published clinical practice guidelines for the reduction in ventilator-associated pneumonia (VAP), suggest that in-line catheters do not require routine changes (Hess, 2003). **Breaking the ventilator circuit to change an in-line catheter places patients, RRTs and other health care providers at risk.** The controversy, therefore, lies in the fact that it is preferable, for infection control purposes, to only change the in-line suction catheter when needed (i.e., visibly soiled, not functioning appropriately) and not routinely breaking the circuit. However, certain manufacturers of in-line suction catheters/systems are now recommending that all in-line suction systems be changed every 24 hours.

Standards related to the practice of routine replacement of in-line suction catheters for mechanically ventilated patients appear to have discrepancies depending on the source being used to support the practice. Most in-line suction products state in their literature that the catheter requires changing every 24 hours. Public Health Agency of Canada (PHAC) does not address the specific issue of routine suction catheter changes. PIDAC suggests that facial protection is routinely required for breaches to the integrity of a mechanical ventilation system which would include changing in-line suction catheters (PIDAC, 2012b, p. 16).
Powered Air Purifying Respirators (PAPR)

A PAPR is a battery operated unit consisting of a half or full facepiece, breathing tube, battery-operated blower, and particulate filters (HEPA only). A PAPR uses a blower to pass contaminated air through a HEPA filter, which removes the contaminant and supplies purified air to a facepiece.

A PAPR may be selected when performing high-risk aerosol-generating procedures if:

- The appropriate N95 respirator does not fit or is not available
- Facial hair or facial deformity interferes with an adequate mask-to-face seal.

Novel Respiratory Infections (NRI)

In the previous decade, we have seen the emergence of a number of NRIs (also called Emerging Respiratory Pathogens), such as:

- SARS
- pH1N1
- H7N9 avian influenza A
- MERS-CoV

An NRI is an illness that causes respiratory symptoms (e.g., fever, cough) where the etiologic agent and/or epidemiology of the disease are not yet known.

RESOURCES

Centers for Disease Control and Prevention’s PAPR Donning & Doffing Instructional Videos

PIDAC’s Best Practices for Prevention, Surveillance and Infection Control Management of Novel Respiratory Infections in All Health Care Settings
MERS-CoV is a viral respiratory illness that is new to humans. It was first reported in Saudi Arabia in 2012 and has since spread to several other countries. Most people infected with MERS-CoV developed severe acute respiratory illness, including fever, cough, and shortness of breath. The virus does not seem to pass easily from person to person unless there is close contact, such as occurs when providing unprotected care to a patient/client. No vaccine or specific treatment is currently available. Treatment is supportive and based on the patient’s clinical condition. (WHO MERS – CoV Fact Sheet).

RESOURCES

PIDAC’s Tools for Preparedness: Triage, screening and patient management of Middle East Respiratory Syndrome Coronavirus (MERS-CoV) infections in acute care settings

Public Health Agency of Canada’s Summary of Assessment of Public Health Risk to Canada Associated with Middle East Respiratory Syndrome Coronavirus (MERS-CoV)
The rationale for producing this Clinical Best Practice Guideline (CBPG) on Infection Prevention and Control is twofold:

1. to provide a one-stop infection control resource for CRTO Members that contains RT-specific infection control guidance; and
2. to remind Ontario Respiratory Therapists of their responsibility and obligation in preventing and controlling the spread of infection in their practice settings.

CRTO Members are expected to keep informed regarding current infection control procedures and to advocate for infection control best practices in their practice environment. This CBPG is a “living document” and will evolve as the practice standards change. In addition to this practice guideline, there are new infection, prevention and control documents being published on an ongoing basis by numerous government and external agencies (e.g., PIDAC Best Practice Documents).

RESOURCES

For information on continuing education for infection control and the certification process to become a Certified Infection Control Practitioner, please see Infection, Prevention and Control Canada.
References


This Clinical Best Practice Guideline will be updated as new evidence emerges or as practice evolves. Comments on this guideline are welcome and should be addressed to:

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