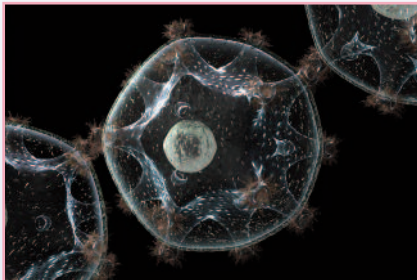


Infection Prevention & Control

CLINICAL BEST PRACTICE GUIDELINE



College 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. College publications are developed in consultation with professional practice leaders and describe current professional expectations. It is important to note that these College publications may be used by the College or other bodies in determining whether appropriate standards of practice and professional responsibilities have been maintained.

JUNE 2011

Acknowledgements

This Clinical Best Practice Guideline (CBPG) was developed in 2008 by a working group of the CRTO's Patient Relations Committee (PRC) comprised of practising Respiratory Therapists. The Working Group reviewed numerous infection control resources, documents and guidelines in their discussion and consideration of the content for this CBPG. Their first-hand experience during the SARS outbreak in 2003 also provided valuable insight into the development of this CBPG.

Additional key resources that formed the foundation for this CBPG were the Ministry of Health and Long-Term Care's (MOHLTC) *Preventing Febrile Respiratory Illness (2006)* and the Federation of Health Regulatory Colleges of Ontario (FHRCO's) *Infection Control for Regulated Professionals*, which was developed by an interprofessional, ad-hoc Infection Control Committee comprised of several health regulatory colleges.

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CBPG Infection Prevention & Control Review 2011

The CRTO is committed to ensuring that our standards and guidelines reflect the most current, evidence based and best practices. Our priorities are to ensure the safety of the public and of our Members. In response to the updates to the Ministry's *Routine Practices and Additional Precautions* (May, 2010) which included the addition of *Annex B: Best Practices for Prevention of Transmission of Acute Respiratory Infection in All Health Care Settings* (May, 2010) to replace *Preventing Febrile Respiratory Illness* (2006), the CRTO underwent a thorough review of this CBPG. One of the most significant findings was the fact that additional droplet precautions must be considered for questionable contacts within **2 meters (2m)** of care. This is stricter than the previous recommendations which were for contacts within 1 meter. The CRTO would like to thank the following Professional Practice Committee and working group members for their participation and expertise that led to the updates to this CBPG.

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Introduction

As a regulated health professional you are accountable for providing safe and ethical care to the public in accordance with the standards of your profession. This document has been developed in order to assist you in learning how to achieve quality infection control practices. The SARS epidemic in 2003, the H₁N₁ Pandemic of 2009 and the likelihood of another pandemic influenza, suggest it is vital that Respiratory Therapists keep well informed and educated regarding infection control best practices.

In addition to the public and your College, you are accountable to your employer. Employers may have additional policies and procedures related to infection control. If an employer's policies and procedures are more restrictive than the College's description of the standard of practice you should abide by the employer's policies and procedures. Where the employer's policies and procedures are more permissive than the standard of practice described by the College you should adhere to the standard of practice described by the College.

This CBPG focuses on both Ontario Ministry of Health and Long-Term Care's (**MOHLTC**) recommendations and the federal recommendations from the [Public Health Agency of Canada \(PHAC\)](#) for infection control and prevention. As of April 1, 2011, the [Ontario Agency for Health Protection and Promotion \(OAHP\)](#) became responsible for the management of [Routine Practices and Additional Precautions for all Health Care Settings \(May 2010\)](#). When cited within the College's CBPG, this document will be referenced as (RPAP, 2010).

There is a vast amount of information available on infection control, therefore you may find the accompanying reference list useful in your own research.

This document has been set up for online use; you will find documents and references linked to the internet. Simply click on [underlined](#) words and phrases to get to the document you would like to research in more detail.

A note about terminology:

The **Public Health Agency of Canada (Health Canada)** uses the terms "**Routine Practices**" and "**Additional Precautions**" to describe the system of infection prevention recommended in Canada to prevent transmission of infections in health care settings. These practices describe prevention strategies to be used **at all times, with all patients in all settings**, and include both:

- **Hand hygiene** before and after any direct contact with a patient; and
- The use of additional barrier precautions (i.e., **Personal Protective Equipment - PPE**) to prevent Health Care Worker's (HCW) contact with a patient's blood and body fluids, non-intact skin or mucous membranes.

The [Best Practices for Prevention of Transmission of Acute Respiratory Infection in All Health Care Settings \(May, 2010\)](#) identifies examples of Respiratory Therapy procedures that generate droplets/aerosols and states that routine practices in these cases includes the use of **PPE** (droplet/contact, which includes eye protection, surgical mask and gloves) for all patients with or without symptoms of Acute Respiratory Illnesses (ARI).

Some other agencies e.g., the US Centers for Disease Control and Prevention (CDC) and the World Health Organization (**WHO**) use the terms "Standard Precautions" instead of "Routine Practices" and "Transmission Based Precautions" instead of "Additional Precautions" to describe the same approach to infection control practice. The terms "Routine Practices" and "Additional Precautions" also **replace** the terms "*Universal Precautions*" and/or "*Body Substance Precautions*".

Guiding Principles of Infection Prevention and Control

The guiding principles are to protect yourself, your patients/clients and others. You are accountable for...

- Knowing what the current infection control guidelines are for your practice setting.
- Assessing risks and knowing how to apply the infection control guidelines in your specific practice.
- Adhering to current infection control programs.
- Educating and modeling infection control practices for others.
- Being aware of what your infection control resources are and where to find more information.
- Advocating for best practices in infection control.
- Ensuring ongoing quality of infection control practices.
- Monitoring changes to infection control practices (for instance - health alerts) and updating your practice accordingly.

Did you know?

“Influenza immunization of health care workers has been shown to reduce the mortality and morbidity of patients under their care and to reduce staff absenteeism during the influenza season (RPAP, 2010, p.5)

Did you know?

In the event of a flu outbreak, the local medical officer of health has the authority to order non-vaccinated staff out of the work place - (section 21/22 of Health Protection, Health Promotion Act.)

Where do you start?

Picture yourself in your practice setting, working with your patients/clients and peers. Consider infection control in terms of:

- **Protecting yourself from infection. Ask yourself:**
 - What immunizations do I need?
 - Do the types of patients I interact with pose a threat of infection to me?
 - Do the activities I perform put me at risk of exposure to microbes that cause infection?
- **Preventing my patients from catching infections from me. Ask yourself:**
 - What immunizations prevent me from passing disease to my patients?
 - When does an illness that I have pose a risk to patients I care for?

The MOHLTC’s *Best Practices for Prevention of Transmission of Acute Respiratory Infection in All Health Care Settings (May, 2010)* states: “in the absence of contraindications to the vaccine, refusal to be immunized against influenza is a failure in staff’s duty of care to patients.” (p.6).

To reference this document on preventing acute respiratory illness, follow link to: www.oahpp.ca/resources/pidac-knowledge/best-practice-manuals/prevention-of-transmission-of-acute-respiratory-infection.html

- **Preventing infections in my patients. Ask yourself:**
 - Who are the people I interact with? How susceptible to infections are they?
 - Does the contact I have with them expose my hands to microbes that cause infection that I can pass on?
 - What activities that I perform increase a patient's risk of infections? What practices can I use to reduce the risk?
- **Preventing the spread of infection by my equipment or environment. Ask yourself:**
 - What are the tools or equipment used in my practice? For example: oximeters, spirometers, stethoscopes.
 - How can these tools contribute to the spread of microorganisms?
 - How should these tools be cleaned and disinfected? Do they need to be **sterilized**? How can I safely store, handle and dispose of them?
 - What are the potential sources for spread of infection in my environment? For example: pens, door knobs, telephones, computer keyboards, toys and other waiting room materials, washrooms, sinks, countertops?
 - How should I clean my working environment?

What to do when you are ill...

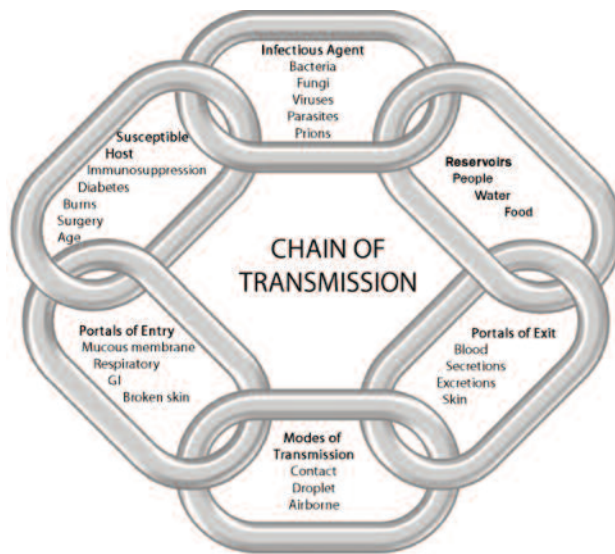
It is in both your best interest and that of your patients to stay away from work when you have an acute illness due to a virus or bacteria that you could spread to patients or colleagues. This includes acute respiratory illness (colds, "the flu"), vomiting and/or diarrhea, conjunctivitis ("pink-eye"), and strep throat. The MOHLTC's document *Routine Practices and Additional Precautions for All Health Care Settings*, 2010, states:

"All health care settings should establish a clear expectation that staff do not come into work when ill with ARI, and support this expectation with appropriate attendance management policies (p.40)."

Provincial regulations about the transmission of other infections are summarized in the Ontario Hospital Association's Communicable Diseases Surveillance Protocols that are available on their website at: www.oha.com/Services/HealthSafety/Pages/CommunicableDiseaseBinder.aspx

You should also be aware of your employer's policies related to potential communicable diseases.

The 6 Links in the Chain of Transmission



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Infectious Agent – micro-organisms capable of producing infection.

Reservoir – a place in which the infectious agent lives.

Portal of Exit - the point where the agent leaves the reservoir.

Portal of Entry - the point at which the agent enters the host e.g., non-intact skin, respiratory or GI tract, mucous membranes.

Susceptible Host - any person at risk of infection. Two examples of factors that protect you from acquiring an infection are the integrity of skin and the immune system.

Modes of Transmission

1. **Contact** – divided into:
 - **Direct Contact** – occurs through touch
 - **Indirect Contact** – occurs when micro-organisms are transferred by contaminated object coming into contact with another surface.
2. **Droplet Transmission** – occurs when large droplets exit the respiratory tract of a person when he/she coughs or sneezes. These droplets can also be generated by some procedures e.g., suctioning. These droplets are projected a short distance of usually < 2m. They may enter the hosts eyes, nose, mouth or fall onto surfaces.
3. **Airborne Transmission** – Occurs when very tiny droplets, <5 microns (PHAC, 1999) exit the respiratory tract when a person talks, coughs or sneezes and then remain suspended in the air. These droplet nuclei must be inhaled by a susceptible host to cause infection e.g., tuberculosis and varicella (chicken pox).
4. **Parenteral Transmission** – the spread of an agent through intact skin by a sharp e.g., needle stick injury.
5. **Common Vehicle Transmission** – the spread of an agent through a common contaminated source e.g., multi-dose vials.
6. **Vector Transmission** – occurs when a host is bitten by an animal or insect carrying the infectious agent e.g., mosquito transmitting and West Nile virus.

Routine Practices

Routine practices must be applied to **all patients at all times** regardless of diagnosis or infectious status. (See [Appendix land V – Routine Practices](#))

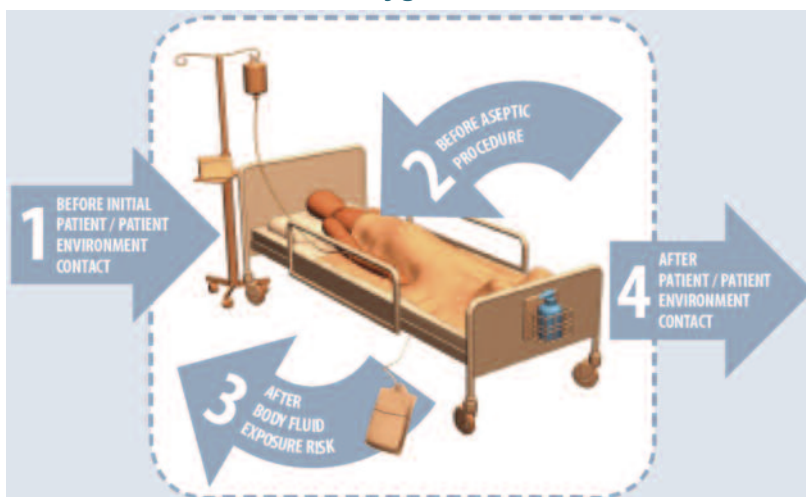
The basics of Routine Practices are:

- Perform a risk assessment;
- Hand hygiene;
- The use of personal protective equipment (e.g., gloves, masks, gowns, eye wear) when handling blood, body substances, excretions and secretions and when performing any procedure that may produce aerosols or droplets;
- Appropriate handling of patient care equipment and soiled linen;
- The prevention of needle stick/sharp injuries;
- Environmental cleaning;
- Appropriate handling of waste;
- Taking care of yourself (e.g., immunization); and
- Not working when you have an acute infection.

Follow the link to the Ontario Agency for Health Protection and Promotion's (OHAPPs) infection prevention and control core competencies modules on routine practices at: www.oahpp.ca/about/whatsnew/201009_1.html

Hand Hygiene

Your **Four Moments for Hand Hygiene** are:



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www.health.gov.on.ca/english/providers/program/pubhealth/handwashing/hw_docs/fs_four_moments_20071019.pdf

The MOHLTC's *Best Practices for Hand Hygiene in All Health Care Settings* (Jan, 2009) is available at:

www.oahpp.ca/resources/pidac-knowledge/best-practice-manuals/prevention-of-transmission-of-acute-respiratory-infection.html

- Hand hygiene is the most effective way of preventing the transmission of infection and thus reducing the incidence of health-care associated infections. (See [Appendix I – Hand Hygiene Techniques](#) & [Appendix II – Hand Hygiene Fact Sheet](#))
- **Alcohol-Based Hand Rubs** (ABHR) are the preferred method of hand hygiene, unless hands are visibly soiled.

The MOHLTC's "Just Clean Your Hands" educational program for health care professionals is available at: www.health.gov.on.ca/en/ms/handhygiene

The MOHLTC's Hand Hygiene Fact Sheet is also available at:

www.oahpp.ca/resources/documents/pidac/2010-12%20BP%20Hand%20Hygiene.pdf (p. 56)

What should you use to clean your hands?

- **Alcohol rubs** e.g., gels, rinses, foams containing **70 - 90%** alcohol, are the preferred agents for hand hygiene. CRTO Members must use the employer-approved product and the product must be compatible with the gloves worn. Most employers purchase hand hygiene products from a compatible product line including soap, gels and lotions. If in doubt about the type of alcohol-based product to use, check with your employer's infection control practitioner. ABHRs should be located at the point-of-care for its use to be optimized.
- **Plain** soap products are recommended for routine hand hygiene and when your hands are visibly soiled.
- Some hospitals use antibacterial soaps because there is evidence that in settings with very high patient infection risk e.g., ICUs, adding an antiseptic agent e.g., 2% chlorhexidine, 1% triclosan, to soap may reduce the transmission of micro-organisms. However, there is some indication that the most important components of hand washing with soap and water are *friction and running water*.

Skin Health

- Skin is the health care provider's (HCP) first line of defence and dry cracked skin increases the risk of HCP infection. It also can make hand hygiene uncomfortable and cause reluctance to practice good hand hygiene.
- Lotions should be used regularly (3 times a day when you are cleaning your hands several times per hour). It is important to ensure that the lotion you use is approved by your organization because some lotions can interfere with the integrity of gloves.
- It is also important to use a hospital-supplied lotion because it is dispensed in pump bottles (to reduce the risk of contamination), and contains small amounts of antibacterial (to protect against any contamination that occurs).

Additional points for consideration:

- CRTO Members providing care to patients (in any practice setting) should not wear artificial or extender nails or nail jewellery, and must keep their natural nails short (no longer than ¼ inches long). Nail polish, if worn, should be fresh and free of cracks or chips. This is particularly important when providing care to patients at high risk such as in NICU, ICU, OR, ER and transplant units.
- Wearing hand jewellery such as rings, bracelets and wrist watches is discouraged, particularly in critical care practice areas or prior to performing a procedure which requires sterile technique because jewellery is hard to clean and may harbour bacteria. Wearing jewellery may increase transmission of infectious agents and risk to patients. Depending on your practice setting, you may be required to adhere to more rigorous policies and procedures for removing all hand/wrist adornments.

Members who are required to perform a surgical scrub must remove hand and arm jewellery prior to performing the surgical scrub, as well as removing all debris from under the fingernails by using a nail cleaner with running water. Surgical scrub time should be 2-6 minutes, depending on time recommended by the manufacturer of the soap.

The MOHLTC has an interactive educational module on hand hygiene called "*Infection Prevention and Control Core Competencies: Hand Hygiene*" that you can complete at:
www.health.gov.on.ca/english/providers/program/pubhealth/handwashing/flash/handhygiene.html

Personal Protective Equipment (PPE)



General Principles

- The use of PPE does not replace the need for proper hand hygiene.
- PPE is used to prevent contact with non-intact skin, blood, body fluid, excretions and secretions.
- PPE is also used to prevent 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. If you don't know how to use PPE correctly, consult your Infection Control Practitioner or Occupational Hygienist.
- Avoid any contact between contaminated (used) PPE and surfaces, clothing or people outside the patient care area.
- Discard used PPE in appropriate disposal bags, and dispose waste appropriately.
- 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.

Did you know?

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.

Prescription eye glasses are not acceptable as eye protection. (RPAP, p.28)

Did you know?

PPE is used to prevent transmission of infectious agents from patient-to-patient and patient -to-staff (RPAP, 2010.p.28).

PPE on its own does not make us any safer: the practice of 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 interprofessional team members.

PPE Risk Assessment

The risk of transmission depends upon the patient, the microorganism, the environment and the interaction between the health care professionals and the patient. When commencing to provide care to a patient, or starting a procedure, **you need to assess whether additional precautions are needed or not**. If not, you need to decide if you are at risk of exposure from blood/body fluids/secretions, and what (if any) PPE is required. **Table 1** is provided as an aid to help you assess the risk of infection, and the selection of appropriate PPE.

Assessing the need for Personal Protective Equipment (PPE) and Additional Precautions

- Survey the situation
 - Use your professional knowledge, skill and judgement to assess the potential routes of transmission in your practice (**contact, droplet and airborne**)
 - Consider whether the situation requires **additional precautions**. You may be the first health care professional to recognize that additional precautions are needed.
 - Assess the risks involved in what you are doing. Consider the procedures you will perform, the tools you use and your environment.
 - Assess the patient and people around you for potential transmission of disease.
 - Consider your own health. Are you at risk of spreading infection to others?
 - Follow government (Ministry of Health and Long Term Care and the Public Health Agency of Canada) recommendations on health alerts, surveillance, screening and reporting of suspected Acute Respiratory Illness (**ARI**) and Influenza-Like Illness (**ILI**).
- Manage the risk
 - Based on your surveillance and assessment, determine if you need additional infection control precautions.
 - Determine what type of Personal Protective Equipment or precautions will you need to achieve adequate infection control.
- Prevent contamination
 - Perform hand hygiene **frequently**. Learn to recognize the four moments for hand hygiene in your practice, and perform hand hygiene at each moment.
 - Have updated infection control programs in place that meet your needs and those of your patients.
 - Have a plan. Be prepared to manage patients with suspected ARI or ILI.
 - Have the appropriate Personal Protective Equipment available.

- Know when and how to use Personal Protective Equipment correctly.
- Educate others about good infection control practices.
- Get the **seasonal** flu shot.
- Keep up to date with your other immunizations.
- Stay home when you have an acute respiratory illness, or are sick with another potentially communicable illness (e.g. Strep throat, conjunctivitis).
- Ensure that you are fit tested for any N95 respirators that you need to use, and that you perform a seal check each time you use one.

The need for PPE is based on your assessment of the risk. (See [*Appendix III – Assessing the Risk*](#))

This assessment should include:

- Determining who is at risk; the patient or yourself;
- The potential **exposure** to blood, body fluids, secretions and excretions (e.g., splashing, patient coughing);
- The potential **duration of the exposure** (taking a blood gas vs. assisting in stabilizing a patient in the ED trauma room);
- Whether there will be contact with **non-intact skin or mucous membranes** during general care/ therapy or whether performing an invasive procedure;
- The potential for handling sharp or contaminated instruments or equipment; and
- The need for manual dexterity and tactile sensitivity.

Table 1: Risk Assessment - The need for PPE and Additional Precautions

Examples of Scenarios	Infection Control Strategy Required
Patient visit in which you remain more than 2m away	<ul style="list-style-type: none"> • Hand hygiene before and after patient visit
Routine patient care; contact with intact skin only; in-patient without acute respiratory symptoms	<ul style="list-style-type: none"> • Hand hygiene before and after patient care. • Hand hygiene if you move from a contaminated patient area e.g., tracheostomy wound to a clean area (arterial line insertion site)
Patient care involving contact with patient’s open wound or non-intact skin; patient has no acute respiratory symptoms	<ul style="list-style-type: none"> • Hand hygiene before donning PPE • Gloves • Gown if soiling of clothes possible • Hand hygiene after removal of PPE
Patient care involving a procedure that may result in splashing, or exposure to droplets from airway, e.g., open suctioning, bronchoscopy.	<ul style="list-style-type: none"> • Hand hygiene before donning PPE • Gloves, surgical mask, eye protection • Gown, if splashing may involve clothes • Hand hygiene, after removal of PPE



Gloves

Gloves can protect both patients and healthcare personnel from exposure to infectious material that may be carried on hands.

General Principles

- The use of gloves does not replace proper hand hygiene.
- Perform hand hygiene.
- Gloves are not required for routine care activities in which contact is limited to intact skin e.g., taking a blood pressure.
- If gloves are ripped or torn, remove them and perform hand hygiene before putting on new gloves.
- Remove gloves and wash hands between patients and before leaving the patient care area.
- Be sure that the outer surface of the gloves does not touch your skin.
- Always use the appropriate technique for removing the gloves and disposing of them.

How do I select a glove?

The type of glove is determined after assessing risk of the task.

Table 2: Glove Selection

Glove Type	Situation and Rationale
Vinyl/ Clean	Used for activities that does not require sterile gloves e.g., changing in-line suction catheter. Protects your hands from contaminants.
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., catheter 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 <i>powder free</i> and have <i>low or reduced protein content</i> .
Nitrile	Used for contact with chemotherapy agents and other hazardous drugs or chemicals. May also be used as a substitute for latex gloves for latex sensitive or allergic staff and patients.
Neoprene	Used for contact with chemotherapy agents and other hazardous drugs or chemicals. May also be used as a substitute for latex gloves for latex sensitive or allergic staff and patients.

When should I wear gloves?

There are four basic indications for the use of gloves:

1. When anticipating contact with blood or body fluids, mucous membranes, non-intact skin and other potentially infectious materials;
2. When anticipating contact with the intact skin of patients who are known to be infected or colonized with a pathogen that can be transmitted by intact skin or the immediate environment of the patient e.g., VRE, MRSA;
3. When handling or touching visible or potentially contaminated environmental surfaces; and
4. As part of outbreak control measures.

Remember...
Gloves protect you, but once contaminated they can transmit pathogens to your skin, clothes or to other patients.

How should I remove gloves?

1. Pull the first glove down and off the wrist with the other gloved hand, being careful not to touch your skin (glove to glove technique).
2. Slip the index finger of the glove-free hand inside the opening of the glove on the wrist of the other hand. Pull the glove off without touching its outer surface.
3. Discard glove in appropriate receptacle.
4. Perform hand hygiene.



Gowns

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.

General Principles

- Gowns should not be reused. Discard immediately after each patient encounter.
- Routine use of gowns, even in high-risk areas (e.g., ICU's), has not been shown to prevent or reduce infections in patients in those areas.

- 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.
- Gowns should always be worn in combination with gloves, and with other PPE when indicated.

How should I select a gown?

Learn what gowns your employer supplies. For each patient encounter, assess the risk and then determine the type of gown you should use. See **Table 3** below for some considerations on choice of gowns.

Table 3: Gown Selection Criteria

Gown type	Situation and Rationale
Cotton/linen, reusable or disposable, long-sleeved isolation gowns	Use if contamination of uniform or clothing is likely or anticipated
Fluid resistant isolation gown or plastic apron over isolation gown	Use if contamination of uniform or clothing from significant volumes of blood or body fluids is likely or anticipated (fluids may wick through non-fluid resistant reusable or disposable isolation gowns)
Fluid impervious gowns e.g., Gortex®	Use if extended contact or large volume exposure (e.g., large volume blood loss during resuscitation of MVA victim or surgical assist)

How should I wear a gown?

Long-sleeve gowns should be worn to protect uncovered skin and clothing when there is likelihood that you may be splashed with blood, body fluids, secretions and excretions.

Table 4: How should I don/remove a gown?

Gown Donning Steps	Gown Removal Steps
<ol style="list-style-type: none"> 1. Hand hygiene. 2. Put gown on, opening to the back. 3. Tie at both the neck and waist. 	<ol style="list-style-type: none"> 1. Unfasten ties & peel gown away from neck. 2. Slip the fingers of one hand under the wrist cuff & pull hand inside. 3. With inside hand, push sleeve off the other hand. 4. Fold gown dirty-dirty & wash hands.

Footwear

Most hospitals have their own policies regarding footwear. Footwear with open heels and/or holes across the top can increase the risk of harm to the person wearing them due to more direct exposure to blood/body fluids or of sharps being dropped for examples.



Masks/Face Protection

Masks provide a barrier that protects the mucous membranes of the mouth and nose which are portals for infection. Droplets/aerosols can carry microbes and other infectious agents and a surgical

mask helps protect you from inhaling respiratory pathogens transmitted by the droplet route. There are **two types of mask available in healthcare settings**:

1. Surgical masks (required to have fluid-resistant properties).
2. Procedure/isolation masks.

*Did you know?
Highest area for exposure is cough/sneeze zone which is 2m surrounding the patient*

General Principles

- Droplets are classified as particles greater than or equal to $5\mu\text{m}$ in size. These droplets do not stay suspended in the air for long periods of time but fall to environmental surfaces;
- Masks should not be confused with particulate respirators e.g., N95, that are used to prevent inhalation of small particles that may contain infectious agents transmitted via the airborne route. (See Airborne Precautions on [page 24](#).)
- Masks may come with an attached visor in order to provide eye protection.
- Masks do not seal to the face and do not protect workers from airborne particles.
- Masks should always be worn when within 2m of a coughing patient.
- Masks need to be removed carefully so that you do not contaminate your face or hands from the external surface of the mask.

How should I select a mask?

The need for a mask during routine practices depends on the task being performed i.e., whether it involves activities that are likely to generate splashes or sprays of blood, body fluids, secretions or excretions. The mask that you will select also depends on what is available at your facility, whether your prefer ties or elastic, and whether you prefer separate face shields/goggles, or visors attached to the mask. Please refer to the information provided by your Infection Prevention and Control personnel.

When should I wear a mask?

There are three infection control purposes for the use of masks in a healthcare setting:

1. to protect the health care workers from contact with potentially infectious material from patients e.g., splashes of blood and respiratory secretions;
2. to protect patients from exposure to infectious agents carried in the HCW's mouth and nose e.g., during invasive procedures; and
3. to protect staff and other patients from the respiratory secretions of patients with acute respiratory infections e.g., worn by acutely infected and coughing patients to contain their respiratory secretions; cough etiquette.

Table 5: How should I don and remove a mask/ face protector?**Mask Donning Steps**

1. Perform hand hygiene;
2. Place mask over the nose and under the chin;
3. Mold the metal piece to your nose bridge;
4. Secure the elastic or ties.

Mask Removal Steps

1. Perform hand hygiene;
2. Untie bottom and then top or grab elastics;
3. Remove mask – bend forward to allow the mask to fall away from the face;
4. Discard mask; and
5. Perform hand hygiene.



Eye Protection

Eye protection comes in several forms. It serves to protect the mucous membranes of the eyes from exposure to sprays and splashes of blood, body fluid, secretions and excretions. There are different types of eye protection e.g., goggles, visors (with/without masks) and face shields.

General Principles

- Face shields should cover the forehead and wrap around the sides of the face to the ears to reduce the likelihood of splashes going around the edge of the shield and into the eyes.
- Personal eyeglasses and contact lenses are NOT adequate eye protection; they may not provide sufficient protection above, below, or around the eyes.
- It is preferable to use disposable eye protection.
- Re-usable eye protection must be disinfected after each use, as per your employer's and/or manufacturer's instructions. It is recommended that these are cleaned by central processing according to your organizations policies and procedures..
- Eye protection should be removed by handling only the portion of it that secures the device to the head e.g., plastic ear pieces, elasticized band. The front and sides of the device should not be touched as these areas may be contaminated.

How should I select goggles/face shields?

The face and eye protection chosen depends on the circumstances of the potential exposure, what other PPE is being worn, and personal vision needs. The advantage of face shields over goggles is that they provide protection of other facial areas. The National Institute for Occupational Safety and Health (NIOSH) states that eye protection must be comfortable, allow for sufficient peripheral vision, and must be adjustable to ensure a secure fit. Some disposable face shield-mask combinations fit loosely and may not provide optimal protection. It is important that you liaise with Infection Control Personnel to ensure that the best possible equipment is available in your facility. For more information go to: www.cdc.gov/niosh/topics/eye/eye-infectious.html

When should I wear goggles/face shields?

Wear a face shield when any patient contact has the potential of introducing infectious agents through the mucous membrane of the eye either directly, e.g., respiratory droplets generated during suctioning, or indirectly e.g., from touching the eye with contaminated fingers or other objects.

How should I remove goggles/face shields?

1. Perform hand hygiene;
2. Remove eye protection using earpiece or band;
3. Lift away from face;
4. Discard (or disinfect if re-usable); and
5. Perform hand hygiene again

Protecting Yourself from the Bacteria and Viruses in Respiratory Secretions

When people breathe, sneeze, and cough, aerosols containing the bacteria and viruses in their respiratory secretions are sprayed into the air around them. Aerosols containing bacteria or viruses can also develop when blood or any body fluid, secretion or excretion is sprayed or splashed.

When do you need to protect yourself from bacteria and viruses in respiratory secretions by wearing a mask, gloves and eye protection?

- During procedures and patient-care activities that are likely to generate aerosols, splashes or sprays of respiratory secretions, blood, or body fluids.
- When you are handling or cleaning contaminated items or linen or handling waste in a way that that may generate aerosol, splashes or sprays, blood, body fluids, secretions or excretions.
- When you are in close contact (<2m) with a person who is suspected of having a communicable disease that is spread by respiratory secretions for example, a patient who is febrile (temperature >38C) and who is coughing or sneezing.
 - It is important to note that the use of non-invasive positive pressure ventilators e.g., CPAP and Bi-level PAP, may extend the droplet exposure zone. Therefore, Members should determine whether these units are in use prior to entering the patient/client room.
- When **droplet** precautions are in place for a patient, or when your Infection Control Practitioner or Public Health Officer requires you to.

Sequence of putting on PPE

1. Hand Hygiene
2. Gown (if required)
3. Mask/Respirator
4. Eye protection
5. Gloves

Sequence of removal of PPE

1. Gloves
2. Gown (if required)
3. Hand Hygiene
4. Eye protection
5. Mask/Respirator
6. Hand Hygiene

Additional Precautions

Some microorganisms that pose a risk to patients and staff in health care institutions can be transmitted by contact with intact skin, contact with the environment, or by the air. Patients who are colonized or infected with these microorganisms require precautions, including personal protective equipment, beyond what is required by Routine Practices.

Your facility will have policies and procedures describing when additional precautions are required, based on the MOHLTC's *Routine Practices and Additional Precautions for All Health Care Settings (2010)* and guidelines from the Public Health Agency of Canada (www.phac-aspc.gc.ca/index-eng.php). In order to protect yourself and your patients from infection, you should know why these policies are recommended and what the precautions are.

In general, **three types of additional precautions** are recommended.

1. **Contact**
2. **Droplet**
3. **Airborne**

Contact Precautions

General Principles

Contact precautions should be used in addition to routine practices when:

- The microorganisms of concern can be transmitted by direct (or inadvertent) contact with the patient's intact skin, the immediate environment or equipment.
- Additional barriers such as gloves and gowns add a layer of protection that prevents contamination of the health care provider's hand, arms and clothes.
- Additional environmental cleaning and restrictions on sharing equipment may be needed for some microorganisms.

Procedure for caring for patients in Contact Precautions

1. Perform Risk Assessment;
2. Hand Hygiene;
3. Routine Practices;
4. Use of gowns and gloves when entering the patient's room or bed space (policies in different institutions or different circumstances may vary);
5. Removal of gown/gloves; and
6. Hand hygiene when leaving the patient room/ bed space.

Did you know?

Common organisms transmitted via contact are **MRSA**, **VRE**, **C-difficile** and **ESBL** producing bacteria.

Did you know?

Effective hand hygiene is essential to limit the spread of *C. difficile* and that Soap and water is theoretically more effective in removing spores than *ABHR* in this case.

Droplet Precautions

General Principles

Droplet precautions should be used in addition to routine practices when:

- The microorganisms of concern can be transmitted by large respiratory droplets exhaled from the patient's respiratory tract.
- Additional barriers e.g., masks and eye protection, are needed to protect the healthcare provider's eyes, nose, and mouth from these respiratory secretions whenever the healthcare provider is within 2m of the patient.

Did you know?
Common organisms transmitted include group A streptococci, meningococcal (the cause of meningococcal meningitis), and influenza.

Procedure for caring for patients in Droplet Precautions

1. Perform Risk Assessment
2. Hand Hygiene
3. Routine Practices
4. Use of a mask and eye protection when entering the patient's room or bed space or coming within 2m of the patient
5. Removal of mask and eye protection and mask
6. Hand hygiene when leaving the patient room/ bed space

Airborne Precautions

Common organisms transmitted via the air (airborne) include:

- *Mycobacterium tuberculosis*
- *Varicella (chickenpox)*
- *Rubeola (measles)*

Did you know?
Whether influenza is airborne is controversial... contact with respiratory secretions and large droplets appears to be responsible for most influenza transmission.

General Principles

Airborne precautions should be used in addition to routine practices when:

- Airborne droplet nuclei (5 micron or smaller) from evaporated droplets and other small particles contain microorganisms are suspected.
- These small particles remain suspended in the air for long periods of time, disperse in air currents, and can be breathed in as they flow with air currents around surgical and procedure masks.

Patients with a known or suspected airborne organism should be cared for in an airborne isolation room with the door closed. The important characteristics of an airborne room are that it be:

- single-patient;
- negative pressure to the corridor/adjacent areas;
- have a minimum of 12 air exchanges/hour (either using the facilities built-in ventilation system, or by using a HEPA filtration system);
- 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.

Most airborne isolation rooms have anterooms to prevent contaminated air from escaping when turbulence is created.

Procedure for caring for patients under Airborne Precautions...

1. Perform risk assessment;
2. Hand hygiene;
3. Routine Precautions; *plus*
4. Airborne isolation rooms (negative pressure + 12 air exchanges + air flow); and
5. N95 Respirator has been fit tested and seal checked.

For more information on the PPE and the care for patients with seasonal influenza and in the case of a pandemic influenza see the Ontario Health Plan for an Influenza Pandemic document (July 2007) - Chapter 7 entitled *Infection Prevention and Control and Occupational Health and Safety* which can be found at:

www.health.gov.on.ca/english/providers/program/emu/pan_flu/ohpip2/plan_full.pdf

For more information on Isolation see [Appendix V - Reference Table on Isolation](#).



N95 Particulate Respirator

General Principles

- National Institute for Occupational Safety and Health (NIOSH) introduced a rating system which identifies the abilities of respirators to remove the most difficult particles to filter, referred to as the most penetrating particle size (MPPS), which is 0.3µm in size.
- The “N” means “Not resistant to oil”.
- N95: captures at least 95% of particles at MPPS.
- N99: captures 99% of particles at MPPS.
- N100: captures 99.97% of particles at MPPS.

Particles at MPPS (0.3µm) when exposed to high relative humidity, such as in the human airway, will typically increase in size, therefore increasing the probability of greater deposition in the airways.

When should I wear an N95 respirator?

- When a patient is in airborne precautions, or outbreak management, recommendations require that you wear one.
- When you are working with a patient with a known or suspected disease transmitted by the airborne route, e.g., tuberculosis (TB).
- When performing a sputum induction because this procedure is most often done when trying to obtain a sputum sample for Acid-Fast Bacillus analysis, i.e., TB culture and sensitivity.
- When transporting a patient who is on airborne precautions .

CRTO Members who may need to use N95 respirators in their practice must be “fit tested” in order to ensure adequate protection from transmission of airborne pathogens. *The Occupational Health and Safety Act, 1990* requires that any staff who may be required to wear an N 95 mask be fit tested a minimum of once every two years.

For more information on N95 respirators visit the Public Health Agency of Canada (PHAC), *Infection Control Guidance for Respirators (Masks) worn by Health Care Workers – Frequently Asked Questions* at: www.phac-aspc.gc.ca/sars-sras/ic-ci/sars-respmasks_e.html

Regardless of the type of N95 respirator being used, CRTO Members must perform a seal check before entering a patient/client room. If you fail the seal check, reposition the mask or obtain a new mask and repeat the seal check.

NIOSH is a U.S. based organization which can be located at:
www.cdc.gov/niosh/homepage.html

All N95 respirators available in Canada are manufactured as **single use** disposable products, and should be used as such i.e., disposed of after each patient visit. In the event that there is a shortage of respirators, reuse may be safe under specific conditions, which your public health unit would inform you about.

Mask Fit-testing

According to the Occupational Health and Safety Regulations a formal fit test is required as per CSA Standard Z94.4-02 "Selection, Use and Care of Respirators".

This testing needs to be done:

1. After you have completed a health assessment and prior to the initial use.
2. Every two years, although some experts recommend it annually.
3. Whenever you may need to use a new type of respirator e.g., from a new supplier.
4. Whenever changes to your physical condition e.g. significant weight change, facial structure change due to injury or major dental work, could affect the respirator fit.

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.

If the seal check fails the mask should be repositioned and the seal check attempted again. If seal checks continue to fail then you must obtain a new mask and repeat the seal check. If repeated attempts at the seal check fail, you must not enter the patient/client room until you are re-fitted with a mask that seals properly.

Donning a Particulate Respirator

1. Select model that you have been fit-tested for.
2. Place over nose, mouth and chin.
3. Fix flexible nose piece over the nose.
4. Secure on head with elastic.
5. Adjust to fit.
6. Perform a seal check.

Removing a Particulate Respirator

1. Lift the bottom elastic first.
2. Then lift the top elastic.
3. Pull mask off the face without touching the mask.

Cleaning and Disinfecting the Environment

ASEPTIC TECHNIQUE

Aseptic technique is undertaken in order to keep patients as free from communicable microorganisms as possible. Only sterile equipment and fluids should be used during invasive procedures. Generally there are two types of asepsis; medical and surgical asepsis. Medical or clean asepsis reduces the number of organisms and prevents their spread. Surgical or sterile asepsis includes procedures to eliminate microorganisms from an area and is practiced in settings such as operating theatres.

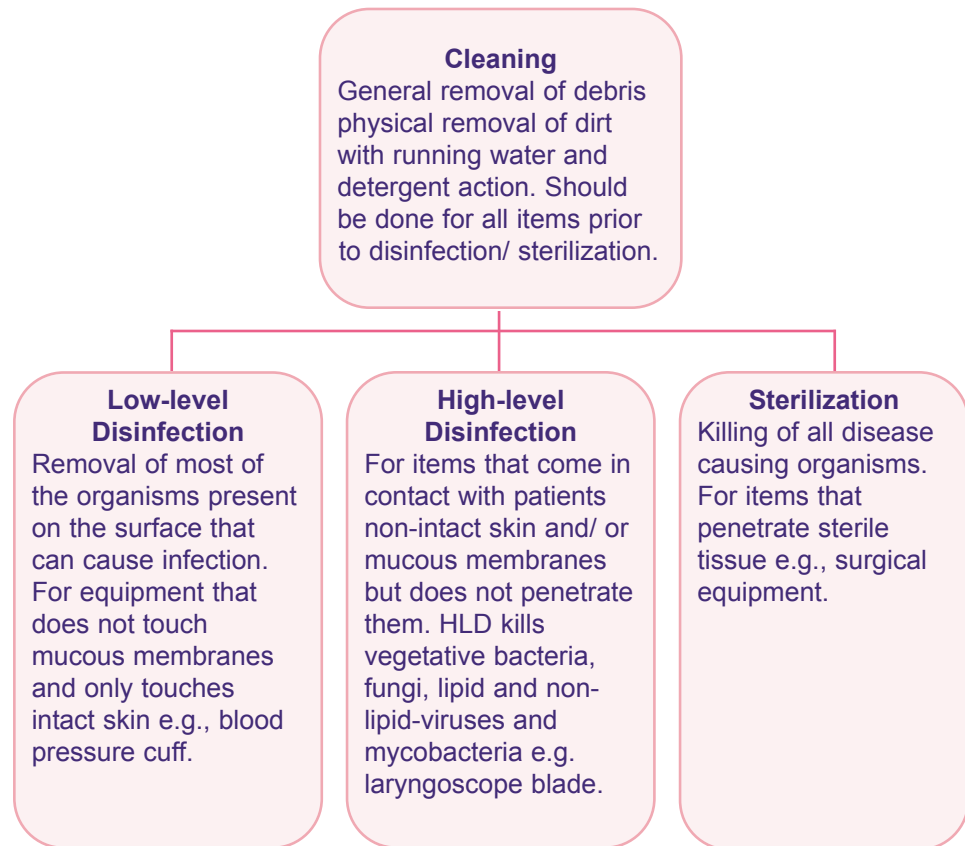
Refer to your facility for standards of aseptic technique that are required for the procedures that you are to perform. For each procedure that you perform be sure that you know the guidelines and your institution's policies about:

- when hand hygiene or surgical scrubs are required;
- when gloves/gowns/caps need to be worn;
- what surfaces and items need to be disinfected before the procedure;
- what type of antiseptic is needed and how to apply it; and
- how to maintain a clean or sterile area as needed.

Adherence to aseptic practice when needed 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). For more information on VAP visit **Safer Health Care Now!** at:

www.saferhealthcarenow.ca/EN/Interventions/VAP/Pages/default.aspx

Cleaning and Disinfection



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*, a classification scheme developed by Dr. Earle H. Spaulding in 1968, assigns the object used to one of three categories and defines levels of decontamination required.

Table 6. The Spaulding Classification

(Please refer to [Appendix VIII Reprocessing Decision Table](#) for more information on levels of precessing/reprocessing)

Classification	Definition	Level of Processing/Reprocessing
Non-critical equipment/ device	Equipment/device that touches only intact skin and not mucous membranes, or does not directly touch the client/patient/resident.	Cleaning followed by low level disinfection (in some cases, cleaning alone is acceptable).
Semi-critical equipment/ device	Equipment/device that comes in contact with non-intact skin or mucous membranes but does not penetrate them.	Cleaning followed by high level disinfection (as a minimum). Sterilization is preferred.
Critical equipment/ device	Equipment/device that enters sterile tissues, including the vascular system.	Cleaning followed by sterilization.

Environmental Surfaces

The following are some examples of items/environmental surfaces that you might use in your practice setting fit into these categories.

Cleaning – surfaces that are unlikely to come in contact with **patients** intact skin e.g., computer workstations, electronic charting keyboards, phones, power cords.

Low-level (non-critical) Disinfection – items that are more likely to come in contact with patients' intact skin but not mucous membranes:

- oximeters
- stethoscopes
- anaesthetic gas machines
- pulmonary function equipment
- capnometers
- ventilators, including high pressure hoses
- blood pressure cuffs
- children's toys in clinics/in-patient areas
- demonstration devices in asthma clinics, pulmonary rehabilitation centres and pulmonary function labs.

(Avoid the use of carpets, draperies and stuffed toys in offices and clinics. These are hard to clean and disinfect. Instead, use non-porous, easily cleanable items with surfaces such as leather, vinyl or plastic.)

Most environmental surfaces require cleaning and a non-critical or **low level** of **disinfection** e.g., stretcher. A rule of thumb is *“the more it is touched (used) the more it needs to be cleaned”*. In health care settings most environmental surfaces and items should be cleaned daily and when visibly soiled (including ventilator surfaces).

Any non-intact surface that cannot be cleaned and disinfected properly should be discarded as per employer policy e.g., stretcher mattress that is cracked or an arm board that has had a dirty needle inserted into it.

Respiratory equipment in the home should be cleaned regularly. There is less concern in the home setting than in an institutional setting, because there is much less risk of transmission to other patients. Commercial white vinegar has been used to disinfect respiratory therapy equipment in the home; a concentration of greater than or equal to 1.25% is required.

Remember...

Items that come in contact with patients, such as stethoscopes, blood pressure cuffs and oximeters should be cleaned between each patient.

How Should I Clean?

Disinfectants and sterilization do not remove debris and do not kill bacteria or viruses in the presence of significant amounts of protein material. Good surface cleaning is essential before sterilization or disinfection; a detergent or an enzymatic cleaner should be used. For example, you must first clean the laryngoscope blade before it is sent to be autoclaved. (For more information see [Appendix VIII – Reprocessing Decision Table](#).) General housekeeping cleaning involves the use of low level detergent disinfectants. Cleaning practices in the health care environment should be audited as a part of the organization's responsibilities to maintaining a clean environment. (RPAP, 2010. p.37)

These agents typically clean and disinfect at the same time and can be used on most objects and surfaces. Some examples are:

- quaternary ammonium compounds;
- 3% hydrogen peroxide-based products;
- phenolic products – use caution as these leave a film and may be toxic to children; and
- household bleach (5.25% to decontaminate, 1:10 dilution can be used for spill control and 1:100 dilution can be used to wipe down surfaces).

Bleach does not really “clean” like a detergent but is a low level disinfectant. A bleach solution can be used to wipe down toys for example. Let the toys air dry afterwards. Disinfect infant and toddler toys more often as small children tend to put toys in their mouths.

Chemical disinfectants used in health care settings are regulated by Health Canada, these disinfectants must have Drug Identification Number (DIN). Be sure to follow the manufacturer's and your employer's instructions in order to ensure safe and efficient disinfecting procedures.

Some disinfectants may be hazardous. Workplace Hazardous Materials Information System (WHMIS) www.hc-sc.gc.ca/ewh-semt/occup-travail/whmis-simdut/index_e.html is a Canada-wide system designed to give employers and workers information about hazardous materials used in the workplace. Under WHMIS, there are **three ways in which information on hazardous materials is to be provided:**

1. Labels on the containers of hazardous materials;
2. Material safety data sheets (MSDS) to supplement the label with detailed hazard and precautionary information; and
3. Worker education programs.

Some basic **principles to remember** about cleaning, disinfecting and sterilizing are:

- Some products work better on certain items; choose the disinfectant accordingly.
- Protect yourself when processing equipment, use Routine Practices, and know when you need added protection from hazardous chemicals.
- Know about the products you are using. Refer to manufacturer's instructions, labels and MSDS.

*Did you know?
If you don't follow
manufacturer's
guidelines,
equipment can be
damaged and
warranties may
not be honoured by
manufacturer.*

It is up to you to classify the tools and equipment you use in your practice and to determine what level of disinfection is necessary. Follow manufactures instructions, employer policies and refer to the MOHLTC best practices for cleaning, disinfection, and sterilization. (see [Appendix VIII – Reprocessing Decision Table.](#))

Health Canada's *Medical Devices Reprocessing Concerns & Recommendations of the Scientific Advisory Panel on Reprocessing of Medical Devices* at
www.hc-sc.gc.ca/dhp-mps/md-im/activit/sci-consult/reproc-retraite/saprmmd_table_gcsrmm_tableau_2006-10-12-13_e.html

The Provincial Infectious Disease Advisory Committee (PIDAC) has an updated [best practice guideline](#) entitled *Best Practice for Cleaning, Disinfection and Sterilization in all health care settings*
www.oahpp.ca/resources/documents/pidac/2010-02%20BP%20Cleaning%20Disinfection%20Sterilization.pdf

MOHLTC's *Testing, Surveillance and Management of Clostridium difficile in all health care settings*
www.oahpp.ca/resources/documents/pidac/RPAP%20Annex%20C%20Testing%20Surveillance%20Management%20of%20C%20diff.pdf

MOHLTC's *Screening, Testing and Surveillance for Antibiotic-Resistant Organisms (AROs) in All Health Care Settings*
www.oahpp.ca/resources/documents/pidac/2010-02%20BP%20Cleaning%20Disinfection%20Sterilization.pdf

Best Practices for Cleaning, Disinfection and Sterilization in All Health Care Settings February, 2010
www.oahpp.ca/resources/documents/pidac/2010-02%20BP%20Cleaning%20Disinfection%20Sterilization.pdf

Best Practices for Environmental Cleaning for Infection Prevention and Control in All Health Care Settings, December 2009
www.oahpp.ca/resources/documents/pidac/Best%20Practices%20for%20Environmental%20Cleaning.pdf

Waste Management



- This is the symbol for bio-hazardous waste.
- “Domestic waste” is exempt from the definition of hazardous waste. Domestic waste includes human body waste, toilet or other bathroom waste, waste from other showers or tubs, liquid or water borne culinary or sink waste or laundry waste. Medical waste that is generated by individuals such as diabetics in their homes, is not considered to be hazardous waste, and is not regulated by the Ministry of the Environment.
- The Ministry of the Environment endorses the proper disposal of sharps. The Ministry encourages residents to make use of the Public Waste Depot Programs that have been established in various retail pharmacies across Ontario for the disposal of sharps and pharmaceutical waste.
- If your practice generates large quantities of bio-hazardous waste, you may have to partner with a medical waste management company in order to dispose of the waste safely.
- Bio-hazardous waste includes both anatomical and non-anatomical waste. Hazardous anatomical waste includes human tissues, blood, and body fluids but excludes teeth, hair, nails, urine and feces. You may throw out a diaper in the regular waste, for example. Hazardous non-anatomical waste includes needles, blades and sharps that have come into contact with blood or body fluids.
- Waste handlers should use routine practices and appropriate PPE to manage their risk when handling medical waste (RPAP, 2010. p. 38).
- Waste handlers that may be exposed to medical waste should be offered Hepatitis B Immunization (RPAP, 2010. p. 38).
- The disposal of bio-hazardous waste is regulated by the Ministry of the Environment. This means that bio-hazardous waste must be transported and disposed of properly. Refer to: *GUIDELINE C-4 The Management of Biomedical Waste in Ontario* www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/std01_079528.pdf
- You can also contact the Ministry of the Environment at: www.ene.gov.on.ca/en/contact/index.php for more information.

Management of Contaminated Needles and Sharps

- Never use sharps if a safe and effective alternative is available.
- Always use safety needles, if available.
- Never recap used needles.
- Collect and store used needles and sharps in sharps containers. Sharps containers should not permit penetration of sharps through the walls, should not allow retrieval of needles that have been disposed of, and should not permit injury when a sharp is being disposed of. They should meet or exceed the CSA standard. Canadian Standards Association (CSA) number Z316.6-07 "*Evaluation of single-use and reusable medical sharps containers for biohazardous and cytotoxic waste*"
- The sharps container must be marked with the universal biohazard symbol displayed in Section 8 and labelled "Biomedical Waste/Déchets Biomédicaux".

For specific requirements under Ontario's needle safety legislation see the Occupational Health and Safety Act, O. Regulation 474/07, Needle Safety, 63 available at:

www.e-laws.gov.on.ca/Download?dDocName=elaws_regs_070474_e.

Spills

- Protect yourself, using gloves, masks, eye protection and/or a gown if necessary.
- Do not wear open toed shoes or sandals.
- Remove obvious organic material using disposable towels. Dispose of towels in a plastic lined container.
- Apply a low level detergent/disinfectant.
- Rinse the area and dry the area using disposable towels.
- Dispose of your personal protective equipment and wash your hands immediately.
- Dispose of waste in a plastic lined container.
- The Clinical and Laboratory Standards Institute (CLSI) guideline M29-A3 recommends allowing the disinfectant to remain in contact for at least 2-3 minutes before rinsing and drying. However, it should be noted that the Hepatitis B virus may take 10 minutes to inactivate.

Respiratory Therapy Specific Infection Control Issues

ROUTINE PRACTICES: Aerosol-generating Respiratory Procedures

For any procedure with the potential to generate respiratory droplets or **aerosolization**, (including but not limited to the procedures listed in [Table 7](#)), Routine Practices require the use of droplet precautions as indicated below. These procedures pose a higher risk for transmission to RRTs and others in the area when performed. **The exceptions to this are procedures performed routinely on stable, afebrile patients without new or worsening cough or shortness of breath such as those who require routine tracheostomy care at home, or chronic/home use of non-invasive positive pressure ventilators (NIPPV), such as CPAP/Bi-level NIPPV for sleep disorders and/or chronic ventilatory failure.**

We recognize 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 best practices.

Please note:

- Aerosol/droplet generating respiratory procedures include any procedures that have the potential to generate aerosolized droplets.
- The aerosol-generating RT procedures itemized in the following table are not limited to those listed and include any additional procedures identified as potentially high risk for generating aerosols/droplets.
- If a private room is not possible, the patient's bed should be a minimum of 2m away from other patients with the curtains drawn.
- In the case of performing aerosol-generating RT procedures on patients with ARI the following **additional precautions** should be implemented:
 - procedures should be done by experienced staff in a single room with the door closed;
 - the number of people present in the room should be kept to a minimum;
 - use equipment and techniques that minimize exposure to respiratory pathogens; and
 - removal of masks must be outside the patient's room after other PPE has been removed and after the door has been closed.

“Humidity therapy involves adding water vapour and (sometimes) heat to the inspired gas” (Egan, 2003, p. 738). The size of water vapour molecules are too small to carry infectious agents however, “aerosol and ventilator condensate from ventilator circuits are known sources of bacterial colonization” (as cited in Egan, 2004, p. 749). Condensation that forms in ventilator circuits may be contaminated by infectious agents in patient’s secretions. Ventilator circuit condensate should be handled appropriately to avoid local contamination and the potential transmission of contaminated droplets. Ventilator circuits that are intended to limit or eliminate circuit condensate should be considered.

Table 7: Routine Practices and Additional Precautions Required for Aerosol-Generating RT Procedures*

Legend: ✓ = PPE required ✓ = may be necessary

Procedure	Hand Hygiene	Gloves	Mask	Eye protection	Gowns	Room type	Additional Precautions
Nebulized Therapies	✓	✓	✓	✓		Private, if possible	✓
Aerosol humidity (high concentration O ₂)	✓	✓	✓	✓		Private, if possible	
NIPPV for acute respiratory failure	✓	✓	✓	✓		Private, if possible	
Bag/valve ventilation	✓	✓	✓	✓	✓	Private, if possible	
Transfer of an intubated, ventilated patient	✓	✓	✓	✓	✓		
ETT intubation /extubation	✓	✓	✓	✓	✓	Private, if possible	Consider sedation +/- paralysis (intubation only)
Open suctioning, circuit changes, HME(F) changes	✓	✓	✓	✓	✓		✓
Tracheostomy Care (insertion, tube change, decannulation)	✓	✓	✓	✓			
Bronchoscopy (or other upper airway endoscopy)	✓	✓	✓ N-95 for diagnostic**	✓	✓	Private, if possible	Non-essential personnel >2m from patient
Thoracostomy (tube or needle)	✓	✓	✓	✓	✓		✓
Sputum Induction	✓	✓	✓ N-95 for diagnostic**	✓		Negative pressure room	
HFO	✓	✓	✓	✓	✓	Private, if possible	✓
Spirometry, PFTs	✓	✓ disassembly of equipment	✓ If <2m from patient	✓	✓	Private, if possible	Non-essential personnel >2m from patient
Inhaled medication delivery instruction, including PEF and MDI/spacer	✓	✓ If <2m from patient	✓ If <2m from patient	✓ If <2m from patient			
CPR	✓	✓	✓	✓	✓		✓
Surgery/Autopsy	✓	✓	✓	✓	✓		✓

*This list is by no means complete and there may be other procedures that potentially generate aerosols. Exercise extra caution until ARI has been ruled out and follow Routine Practices at all times.

**Note: These procedures should be performed with a Particulate Respirator e.g., N95 and in an airborne isolation room if the investigation is for TB.

Filters

During the SARS outbreak in 2003, respiratory therapy/breathing system filters became a topic for discussion and debate among CRTO Members. What became evident early on in the crisis was the high degree of confusion and frustration that Respiratory Therapists experienced while attempting to meet the evolving infection control directives issued by the MOHLTC.

Since that time, Respiratory Therapists have attempted to disseminate the information surrounding the issue of filters and comply with Provincial and Federal guidelines to prevent the spread of infectious agents. **In North America there are currently no regulations or guidelines for the testing of filters used in respiratory/breathing systems.** Clearly, more research is needed and there is an urgent need for manufacturers of filters to standardize testing to ensure that our patients, and the health care professionals who care for them, are protected.

Since SARS, the lack of guidance by government and manufacturers has created much confusion amongst end-users. In this section the CRTO will try to highlight some of the important points of consideration when choosing a Breathing System (Bacterial/viral) Filter, Heat-Moisture-Exchanger (HME) or Heat-Moisture-Exchanger-Filter (HMEF). We recognize, however, that much of the available information that is currently available provides conflicting advice (Thiessen, 2006a).

For a more complete understanding of how filters work we recommend the following reading: *Filtration of Respired Gases: Theoretical Aspects* by Ron R Thiessen RRT [see reference list].

Filter Standardization:

While there is an internationally recognized standard (ISO 23328-1) for testing the efficiency of Breathing System filters, “the *Salt Test Method*”, it is another accepted standard. Filters are often reported as having an efficiency $\geq 99.99\%$ when tested with organisms or particles $\leq 0.1\mu\text{m}$ in size. However particles of this size or smaller are actually easier to filter than particles of $0.3\mu\text{m}$ in size. The $0.3\mu\text{m}$ particle size is referred to as the **Most Penetrating Particle Size** (MPPS). It is this particle size that is the most difficult to filter and it is the standard to which all filters should be tested (Thiessen, 2006a).

Other Considerations:

Features to consider when choosing a filter are: **Deadspace and Weight of Filter, Resistance, Break-through Pressure and Disposable vs. Reusable.**

- **Deadspace and Weight:** are usually not problematic unless you are placing the filter between the patient and the ventilator circuit wye.
- **Resistance across the filter:** should be considered especially when the filter is being used in the breathing/ventilator circuit or pulmonary function equipment. If the filter becomes wet its resistance will increase, making it more difficult to breathe through. In the case of pulmonary function studies, filters need to be effective against microorganisms and reduce incidence of infection without compromising test results.
- **Break-Through Pressure:** Most filtering medium will either break or tear if exposed to high pressures. Usually these breakthrough pressures are beyond normal ventilating pressures but may be within ventilator capabilities e.g., high pressures that may occur with a blocked or occluded circuit. If this occurs the user may not be aware of it and the filter efficiency will be significantly decreased.
- **Disposable vs. Reusable:** One must be aware that anything that a filter traps will remain within the filter. Autoclaving the filter will kill the micro-organisms but the “dead-bugs” will remain in the filter. These trapped bugs will also increase the resistance of the filter. Autoclaving will also affect the medium that holds the filtering material to the filter housing, which in turn could result in break-through. Most reusable filters will have specifications as to how they can be re-cycled and how many times it can be re-cycled. When using a re-usable filter one should adopt a method of testing its efficiency before each re-use. Refer to manufacturer’s guidelines.

Active Heated Humidity (HH) vs. Heat-Moisture Exchangers (HMEs) vs. Heat-Moisture Exchangers-Filters (HMEFs)

One must not confuse the use of HME and Filters. While filters may have some HME qualities and HMEs will provide some filtration, they should not be used for purposes that they weren't intended. HMEFs however, do combine the properties of both into one unit.

There is some conflicting evidence regarding the use of HMEFs and the reduction of Ventilator Associated Pneumonia (VAP). While some articles support the use of HMEF to reduce the risk of VAP, HMEFs do have their limitations:

- When minute volumes are high (>15 Lpm), HMEFs are less effective at providing adequate heat and humidity to the patient.
- HMEF's will add dead space to the ventilator circuit, which in turn will increase the minute ventilation requirements of the patient.
- Even when HMEF's are new there will be an increase circuit resistance, resulting in an increase in work of breathing (WOB) both on inspiration, difficulty triggering the ventilator, and exhalation possibly leading to auto-PEEP.
- Over time as the HME/HMEF becomes wet the resistance will increase. While this increase in WOB may be insignificant in most patients it may be very significant in others. In order to reduce this increase in WOB the HME/HMEF must be changed at regular intervals, generally every 24hrs or less. Follow manufacture's recommendations.
- The changing of the HME/HMEF requires one to break the ventilator circuit. This activity is considered high risk and appropriate PPE must be employed.
- Pathologies/conditions that result in an increase of secretion production will require an increase in the frequency of HME/HMEF changes.

Furthermore, when medications are aerosolized (nebulized or via metered-dose inhaler (MDI)), the HMEF will filter-out the aerosol medication, thus possibly decreasing the effectiveness of the treatment and increasing the resistance of the filtering material. Connectors for MDI administration should be placed proximal to the patient to avoid unnecessary circuit disconnections.

A recent randomized controlled trial by Lorente et al, (2006) showed a decrease in the incident of VAP in patients ventilated greater than five days when a HH circuit was used compared to a circuit with a HME. However in this study circuits with heated wires and closed auto-feed humidifiers were compared to HMEs. HMEFs were not used. All of these factors may be important and further studies are required.

It is also important to acknowledge that the use of HME/HMEFs do not apply to the paediatric and neonatal populations due to the size of the ventilator circuits and the resultant increase in resistance and work of breathing. In these patient populations, heated humidity is the recommended standard for humidification.

Whichever humidification system is used, it is important to maintain the ventilator circuit integrity and reduce the number of times that a circuit is broken, thereby reducing the potential spread of aerosolized droplets, and the potential for contamination of the circuit by the hands of healthcare workers. One possible way of achieving this is to use heated humidity with heated wire circuits and a heated expiratory filter. There are a limited number of ventilators on the market that offer heated expiratory filters, therefore Members are encouraged to inquire whether external, add-on options for heated expiratory filters are available that could be incorporated with an existing fleet of ventilators. Finally, when purchasing new ventilators the goal should be to use a system that requires minimal breaks in the ventilator circuit in order to reduce the spread of aerosolized droplets. This can be best accomplished by purchasing a ventilator with a heated expiratory filtration system.

In-line (closed) suction systems

In-line (closed) suction systems are ideal as they contribute to reducing environmental contamination and prevent exposure of 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 et al, 2003). If in-line suction systems are used for patients with FRI, routine precautions/practices may be used by RRTs. (PIDAC/MOHLTC, August 2006). **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. The Health Protections Branch authorizes the sale of medical products in Canada. 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. The MOHLTC's *Routine Practices and Additional Precautions in all Health Care Settings (May, 2010)* suggests that facial protection is routinely required for breaches to the integrity of a mechanical ventilation systems which would include changing in-line suction catheters.

Final Comments and Recommendations

The rationale for producing this Clinical Best Practice Guideline (CBPG) on Infection Prevention and Control are twofold:

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

This CBPG is not meant to be the last resource you will need to access. We have provided you with links to other important resources that you may need to access in order to obtain required information. Web sites will change and we encourage you to let us know if you are unable to access any of the Web sites that we have provided. This is a “living document” and will have to change as the practice standards change.

We encourage all CRTO members to be active in infection control matters and to continue to advocate for infection control best practices in your practice environment. During the SARS crisis, CRTO Members were sought out for their knowledge and expertise surrounding infection control matters related to mechanical ventilation and oxygen therapy.

There is still a great deal of research that needs to be conducted surrounding issues such as filtration, and infection control in PFT labs and home care. We encourage Members to take the lead on such initiatives. Our patients/clients will benefit from increased evidence surrounding many of the controversial issues that we have discussed in this Clinical Best Practice Guideline.

We encourage you to incorporate learning activities in infection control into the CRTO's Quality Assurance (QA) professional portfolio using PORT. Follow the link to the OAHPP's educational modules on the core competencies of Routine Practices at:
www.oahpp.ca/about/whatsnew/201009_1.html

You may also want to consider a future as an Infection Control Professional/ Practitioner (ICP). More and more Respiratory Therapists are taking their knowledge and expertise one step farther and becoming certified as ICPs. Our learning during the SARS crisis reminds us that it is vital that RTs be involved in infection control and remind employers and authors of infection control guidelines/directives of the important role and knowledge that RTs have to offer.

For more information on continuing education for infection control and the certification process to become a Certified Infection Control Practitioner you may wish to visit the Community and Hospital Infection Control Association (CHICA) – Canada Web site:
www.chica.org/educ_education.html).

In the event of a pandemic influenza or another SARS or SARS-like infection control crisis in Ontario, it is possible that these guidelines will be superseded by directives issued by the provincial and/or federal government, the College or another organization. It is therefore imperative that Members keep informed of what is happening locally and refer to our Web site frequently.

If you haven't done so already, please share your email address with the College so that we can provide up-to-date information to you in the event of a health emergency in the province.

Appendix I: Hand Hygiene Technique

Techniques for Performing Hand Hygiene

To clean hands properly, rub all parts of the hands and wrists with an alcohol-based hand rub or soap and water. Pay special attention to fingertips, between fingers, backs of hands and base of the thumbs.

- Keep nails short and clean
- Remove bracelets
- Do not wear artificial nails
- Remove chipped nail polish
- Make sure that sleeves and watches are pushed up and do not get wet

- Clean hands for minimum 15 seconds
- Clean wrists and forearms if they are likely to have been contaminated
- Dry hands thoroughly
- Apply lotion to hands frequently

Cleaning with alcohol-based hand rub



Hand washing with soap and water



Appendix II: Hand Hygiene Fact Sheet

PIDAC'S Hand Hygiene Fact Sheet for Health Care Settings

In health care settings, hand hygiene is the single most important way to prevent infections.

Hand hygiene is the responsibility of the organization and all individuals involved in health care. Hand hygiene is a core element of client/patient/resident safety for the prevention of health care-associated infections and the spread of antimicrobial resistance. There are two methods of performing hand hygiene:

1. ALCOHOL-BASED HAND RUB (ABHR)

Alcohol-based hand rub is the preferred method for decontaminating hands. Using ABHR is better than washing hands (even with an antibacterial soap) when hands are not visibly soiled:

- ABHRs provide for a rapid kill of most transient microorganisms
- ABHRs contain a variety of acceptable alcohols in concentrations from 60 to 90%, 70 to 90% is preferred for health care settings
- ABHRs are not to be used with water
- ABHRs contain emollients to reduce hand irritation
- ABHRs are less time-consuming than washing with soap and water
- If running water is not available, use moistened towelettes to remove the visible soil, followed by ABHR

2. HAND WASHING

Hand washing with soap and running water must be performed when hands are visibly soiled. Antimicrobial soap may be considered for use in critical care areas but is not required and not recommended in other care areas. Bar soaps are not acceptable in health care settings except for individual client/patient/resident personal use.

YOUR 4 MOMENTS FOR HAND HYGIENE

- 1. Before initial client/patient/resident or environment contact**

When? Clean your hands when entering:

 - before touching client/patient/resident or
 - before touching any object or furniture in the client/patient/resident's environment.

Why? To protect the client/patient/resident and their environment from harmful germs carried on your hands.
- 2. Before aseptic procedure**

When? Clean your hands immediately before any aseptic procedure.

Why? To protect the client/patient/resident from harmful germs, including his/her 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 client/patient/resident germs.
- 4. After client/patient/resident or environment contact**

When? Clean your hands when leaving:

 - after touching client/patient/resident or
 - after touching any object or furniture in the client/patient/resident's environment.

Why? To protect yourself and the health care environment from harmful client/patient/resident germs.

FACTORS THAT REDUCE THE EFFECTIVENESS OF HAND HYGIENE

The following factors reduce the effectiveness of hand hygiene.

- **Condition of the skin:** See Section 4, "Hand Care", for information about maintaining skin integrity.
- **Nails:** Long nails are difficult to clean, can pierce gloves and harbour more microorganisms than short nails. Nails must be kept clean and short.
- **Nail polish:** Only nail polish that is fresh and free of cracks or chips is acceptable.
- **Artificial nails or nail enhancements** are not to be worn by those giving care.
- **Jewellery:** Hand and arm jewellery hinder hand hygiene. Rings increase the number of microorganisms present on hands and increase the risk of tears in gloves. Arm jewellery, including watches, should be removed or pushed up above the wrist before performing hand hygiene.
- Products must be dispensed in a disposable pump container that is not topped-up, to prevent contamination.

Appendix III: Assessing the Risk¹








Table 3: Assessing the Risk

Situation	Infection Control Strategy (escalating)
Routine Patient Care No physical contact Communication with patient >2 metre away.	Routine Practices <ul style="list-style-type: none"> • Hand hygiene • Respiratory etiquette (cover mouth nose when coughing or sneezing, followed by proper hand washing)
Physical contact with patient intact skin	Routine Practices <ul style="list-style-type: none"> • Hand hygiene
Physical contact with patient, you or patient has infected or open wound, non intact skin, no respiratory concerns.	Contact Precautions <ul style="list-style-type: none"> • Hand hygiene • PPE <ul style="list-style-type: none"> - Gloves - Gowns if contamination is likely • Proper removal and disposal of gloves followed by hand hygiene
Contact with patient, procedure may involve body fluids, splashing (droplets)	Droplet Precautions <ul style="list-style-type: none"> • Hand hygiene • PPE <ul style="list-style-type: none"> - Gloves - Surgical Mask - Eye protection - Gowns • Proper removal and disposal of PPE followed by hand hygiene
Close contact with patient, respiratory symptoms with or without fever <ul style="list-style-type: none"> • All aerosol generating procedures [see Table 7, p. 35] 	Droplet/Contact Precautions <ul style="list-style-type: none"> • Hand hygiene • Respiratory etiquette (cover mouth nose when coughing or sneezing, followed by proper hand hygiene) • PPE <ul style="list-style-type: none"> - Gloves - Gowns - Surgical mask for you and/or your patient - Eye protection • Follow health alerts if applicable
Contact with patient with known airborne infection e.g., active TB	Airborne Precautions <ul style="list-style-type: none"> • Hand hygiene • PPE <ul style="list-style-type: none"> - Gloves - Gown • N95 respirator fit tested and seal checked • Room <ul style="list-style-type: none"> - Private - At least 12 air exchanges per hour, - Negative pressure room
Health Alert in effect	Follow MOHLTC guidelines

¹ Please refer to *Routine Practices and Additional Precautions in all Health Care Settings (2010)* Appendices E- K (p.80-86) for PIDAC's Fact Sheets that further depict these infections control strategies.

Appendix IV: Routine Practices

PIDAC's Routine Practices Fact Sheet for All Health Care Settings

 ROUTINE PRACTICES to be used with ALL PATIENTS	
	<p>Hand Hygiene</p> <p>Hand hygiene is performed using alcohol-based hand rub or soap and water:</p> <ul style="list-style-type: none"> ✓ Before and after each client/patient/resident contact ✓ Before performing invasive procedures ✓ Before preparing, handling, serving or eating food ✓ After care involving body fluids and before moving to another activity ✓ Before putting on and after taking off gloves and PPE ✓ After personal body functions (e.g., blowing one's nose) ✓ Whenever hands come into contact with secretions, excretions, blood and body fluids ✓ After contact with items in the client/patient/resident's environment
 	<p>Mask and Eye Protection or Face Shield [based on risk assessment]</p> <ul style="list-style-type: none"> ✓ Protect eyes, nose and mouth during procedures and care activities likely to generate splashes or sprays of blood, body fluids, secretions or excretions ✓ Wear within two metres of a coughing client/patient/resident. <p>Gown [based on risk assessment]</p> <ul style="list-style-type: none"> ✓ Wear a long-sleeved gown if contamination of skin or clothing is anticipated.
	<p>Gloves [based on risk assessment]</p> <ul style="list-style-type: none"> ✓ Wear gloves when there is a risk of hand contact with blood, body fluids, secretions, excretions, non intact skin, mucous membranes or contaminated surfaces or objects ✓ Wearing gloves is NOT a substitute for hand hygiene. ✓ Remove immediately after use and perform hand hygiene after removing gloves.
	<p>Environment and Equipment</p> <ul style="list-style-type: none"> ✓ All equipment that is being used by more than one client/patient/resident must be cleaned between clients/patients/residents ✓ All high-touch surfaces in the client/patient/resident's room must be cleaned daily.
	<p>Linen and Waste</p> <ul style="list-style-type: none"> ✓ Handle soiled linen and waste carefully to prevent personal contamination and transfer to other clients/patients/residents. <p>Sharps Injury Prevention</p> <ul style="list-style-type: none"> ✓ NEVER RECAP USED NEEDLES. ✓ Place sharps in sharps containers. ✓ Prevent injuries from needles, scalpels and other sharp devices. ✓ Where possible, use safety engineered medical devices
	<p>Patient Placement/Accommodation</p> <ul style="list-style-type: none"> ✓ Use a single room for a client/patient/resident who contaminates the environment. ✓ Perform hand hygiene on leaving the room.

Appendix V: Reference Table of Isolation Precautions

Infection Control Procedure	All Patients	MRSA	VRE / C. difficile	Other Multiple Drug Resistant Organisms (MRO) e.g., ESBL, E.Coli	Airborne Organisms (e.g., TB)	Chickenpox / Disseminated Shingles
Level of Precautions?	Routine	Contact + Droplet if in sputum and/or coughing	Contact	Contact	Airborne	Airborne/Contact
Hand washing or Alcohol hand washing	4 Moments of Hand Hygiene	4 Moments of Hand Hygiene	4 Moments of Hand Hygiene	4 Moments of Hand Hygiene	4 Moments of Hand Hygiene	4 Moments of Hand Hygiene
Gloves	Based on Risk Assessment If contact with blood, body fluids, respiratory secretions and/or excretions	Wear gloves when entering patient room or bed space.	Wear gloves when entering patient room or bed space.	Wear gloves when entering patient room or bed space.	Based on Risk Assessment If contact with blood, body fluids, respiratory secretions and/or excretions	Wear gloves when entering patient room or bed space
Gown	Based on Risk Assessment Worn if likely to be splashed or sprayed with blood, body fluids, secretions, excretions	Based on Risk Assessment When entering patient's room or bed space if coming into direct contact with patient or patient's environment	Based on Risk Assessment When entering patient's room or bed space if coming into direct contact with patient or patient's environment.	Based on Risk Assessment When entering patient's room or bed space if coming into direct contact with patient or patient's environment	Based on Risk Assessment When entering patient's room or bed space if coming into direct contact with patient or patient's environment	Based on Risk Assessment When entering patient's room or bed space if coming into direct contact with patient or patient's environment
Face Mask with eye protection (goggles/face shield)	Worn if face may be splashed with blood, body fluids, secretions, excretions. Wear within 2m of coughing patient/client/resident	Worn if face may be splashed with blood, body fluids, secretions, excretions	Worn if face may be splashed with blood, body fluids, secretions, excretions	Worn if face may be splashed with blood, body fluids, secretions, excretions	N95 fit tested mask required Wear eye protection based on risk assessment if face may be splashed with blood, body fluids, secretions, excretions	N 95 fit tested mask required Wear eye protection based on risk assessment if face may be splashed with blood, body fluids, secretions, excretions
Accommodation/Room Type	Single room	Single room	Single room	Single room	Airborne isolation room	Airborne isolation room
Additional Precautions						Only staff immune to chickenpox should enter the room

References: Based on *Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*, HEALTH CANADA, 1999 and reproduced with permission from Mount Sinai Hospital, Toronto.

Appendix VI: Recommended Core Competencies in Infection Control for the Canadian Health Care Worker

Canadian Chapter of the Community and Hospital Infection Control Association (CHICA) Self-Assessment Checklist

Self-assessment ✓	Category	Competency
	Basic Microbiology	<ul style="list-style-type: none"> Do you understand basic microbiology and how infections can be transmitted in health care settings?
	Hand hygiene	<ul style="list-style-type: none"> Do you understand the importance of hand hygiene/hand washing?
	Routine practices and transmission-based precautions	<ul style="list-style-type: none"> Do you understand the activities of routine practices/standard precautions and understand transmission-based precautions (additional precautions: why and when they are used)?
	Personal Protective Equipment	<ul style="list-style-type: none"> Do you select appropriate Personal Protective Equipment (PPE) for your job and demonstrate appropriate use of PPE?
	Personal safety	<ul style="list-style-type: none"> Do you know how to appropriately manage sharps, blood and body fluids, and recognize the appropriate first aid activities for exposures to blood and body fluids? Do you understand the role of vaccines in preventing certain infections including annual influenza immunizations for health care workers? Do you know the infectious conditions that require absence from work or work restrictions?
	Sterilization and disinfection	<ul style="list-style-type: none"> Do you recognize that reusable equipment that has been in direct contact with a patient should be cleaned and reprocessed before used in the care of another patient? Do you appreciate the differences between clean, disinfected (low, medium and high-level) and sterile items? Do you know the difference between regular and biohazard wastes?
	Critical assessment skills	<ul style="list-style-type: none"> Do you have critical assessment skills related to exposure to infectious agents? Are you staying aware of local outbreaks and current use of infectious disease specific protocols?

* CRTO Members are encouraged to incorporate this self-assessment checklist into their QA Professional Portfolio and develop any necessary learning goals if required.

Appendix VII: Transporting a Ventilated Patient in contact precautions (multi-person transfer, patient stays in bed)

When transporting a ventilated patient, ideally two people should be assigned as “clean” that will push and steer the bed/stretchers. These two people must not be the individuals who are either ventilating (transport ventilator or manual resuscitator) the patient, managing the transport ventilator and providing patient care. The patient caregivers i.e., RTs and/or nurses, are the assigned caregivers and must not touch clean areas of the bed, the elevator buttons and equipment in receiving department/area.

1. Notify receiving department e.g., diagnostic imaging, of patient transfer and isolation requirements.
2. Gather necessary equipment for the transport. (O2 cylinder, transport ventilator, manual resuscitation bag, portable ECG monitor etc.)
3. Perform hand hygiene.
4. Don appropriate PPE prior to entering patient’s room. Due to increased risk of circuit disconnection during transport, routine practices and droplet precautions are recommended.
5. Use hospital-grade disinfectant to wipe area(s) on the bed that will provide a clean area for hands that will push the bed/stretchers. Remove gloves and gown and perform hand hygiene.
6. Place clean sheet over the patient to provide a clean surface/cover.
7. Place appropriate isolation sign on chart and place chart in clear plastic bag.
8. Patient should be transported with one of the following:
 - Manual resuscitation bag with exhalation valve filter; or
 - Transport ventilator with filter.
9. The RT who is the patient caregiver must don clean PPE prior to entering the patient room and leave the PPE on for the entire transport. The RT who is managing the ventilator/airway management and providing patient care must NOT touch the clean areas of the bed, elevator buttons, and equipment in the receiving area.
10. Remove gloves once patient is out of your care.
11. Perform hand hygiene.
12. Remove remaining PPE.
13. Perform hand hygiene.

Appendix VIII: Reprocessing Decision Table

Table 5: Reprocessing Decision Chart

Please note: Single-use devices should not be reprocessed

Level of Processing/ Reprocessing	Classification (Spaulding) of Equipment/Devices	Respiratory Therapy Examples	Products (some common examples)
<p>Cleaning: Physical removal of soil, dust or foreign material. Usually involves soap and water, detergents or enzymatic cleaners. Thorough cleaning must occur before disinfection or sterilization may take place.</p>	All reusable equipment/ devices.	<p>All RT reusable equipment/devices e.g.:</p> <ul style="list-style-type: none"> • Cylinder regulators • Laryngoscope blade and handle • Bronchoscope • Manual resuscitation bags, exhalation valves • Ventilators • Oximeters <p>And everything listed below...</p>	<p>Concentration and contact time are dependent on manufacturer's instructions</p> <ul style="list-style-type: none"> • Soap and water • Detergents • 0.5% accelerated hydrogen peroxide
<p>Cleaning followed by:</p> <p>Low-level disinfection: Kills most vegetative bacteria and some fungi & enveloped (lipid) viruses. Does not kill mycobacteria or bacterial spores.</p>	Non-critical equipment/devices	<p>Environmental surfaces touched by staff during procedures involving skin, parenteral or mucous membrane contact</p> <ul style="list-style-type: none"> • Stethoscopes • BP cuffs • Oximeters, TcPO₂/PCO₂ probes, cables • ECG machines/leads/cups • CPR training mannequins • PFT equipment/spirometers 	<p>Concentration and contact time are dependent on manufacturer's instructions</p> <ul style="list-style-type: none"> • 3% hydrogen peroxide (10 min) • 60-95% alcohol (10 min) • 0.5% AHP • Phenolics – should not be used with the neonatal population
<p>Cleaning followed by:</p> <p>High-level disinfection: Destroys vegetative bacteria, mycobacteria, fungi and enveloped (lipid) and non-enveloped (non-lipid) viruses, but not necessarily bacterial spores</p>	Semi-critical equipment/ devices	<p>Equipment that comes into contact with mucous membranes, but does not enter sterile cavities or tissues:</p> <ul style="list-style-type: none"> • Bronchoscopes, excluding biopsy forceps and brushes* (sterilization is preferred) • Laryngoscope blades • RT equipment such as nebulizers, ventilator circuits, anaesthesia equipment, ETs, CPAP/BiPAP masks 	<p>Concentration and contact time are dependent on manufacturer's instructions</p> <ul style="list-style-type: none"> • 2% Glutaraldehyde (20 minutes at 20°C) • 6% hydrogen peroxide (30 min) • Pasteurization (30 min @ 75°C) • 7% accelerated hydrogen peroxide (20 min)
<p>Cleaning followed by:</p> <p>Sterilization Results in destruction of all forms of microbial life including bacteria, viruses, spores and fungi</p>	Critical equipment/devices	<ul style="list-style-type: none"> • Bronchoscopes • Bronchoscope brushes, biopsy forceps • Surgical equipment 	<p>Concentration and contact time are dependent on manufacturer's instructions</p> <ul style="list-style-type: none"> • Dry heat • 100% ethylene oxide • 2.5 – 3.5% Glutaraldehyde (2%) 10 hrs @ 20°C

Glossary²

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

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

Aerosol: Small droplet of moisture that may carry microorganisms. Aerosols may be light enough to remain suspended in the air for short periods of time, allowing inhalation of the microorganism

Aerosolization: The process of creating very small droplets of moisture that may carry microorganisms. The aerosolized droplets may be light enough to remain suspended in the air for short periods of time, allowing inhalation of the micro-organism.

Airborne infection: The infection usually occurs when small airborne (aerosol) particles are inhaled (infectious particles < 5: μm in diameter).

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. ABHRs contain emollients to reduce skin irritation and are less time-consuming to use than washing with soap and water.

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

Antimicrobial agent: A product that kills or suppresses the growth of microorganisms.

Antiseptics: Chemicals that kill microorganisms on living skin or mucous membranes. Antiseptics should not be used in housekeeping.

Biomedical waste: Defined by the CSA (210) as waste that is generated by human or animal health care facilities, medical or veterinary settings, health care teaching establishments, laboratories, and facilities involved in the production of vaccines.

Colonization: The presence and growth of a microorganism in or on a body with growth and multiplication but without tissue invasion or cellular injury or symptoms.

² Definitions have been reproduced directly from *Routine Practices and Additional Precautions in all Health Care Settings* (2010).

Community and Hospital Infection Control Association of Canada (CHICA): A professional organization of persons engaged in infection prevention and control activities in health care settings. The CHICA Web site is located at www.chica.org

***Clostridium difficile* (C-diff):** Is a gram positive, spore forming anaerobic bacillus. It is widely distributed in the environment and is a known cause of health care associated (nosocomial) diarrhea. Spread of *C. difficile* occurs due to inadequate hand hygiene and environmental cleaning.

Cleaning: The physical removal of foreign material, e.g., dust, soil, organic material such as blood, secretions, excretions and microorganisms. Cleaning physically removes the foreign matter rather than killing the microorganisms. Killing the microorganisms would be accomplished with water, detergents and mechanical action. The terms “decontamination” and “sanitation” may be used for this process in certain settings, e.g., central service or dietetics. Cleaning reduces or eliminates the reservoirs of potential pathogenic organisms. Cleaning agents are the most common chemicals used in housekeeping activity.

Contact transmission: Micro-organisms that are transmitted by direct contact with hands/ equipment or indirect contact between an infected or colonized patient and a healthcare worker or susceptible patient.

Clinical Waste: Also known as “infectious waste” includes waste directly associated with blood, body fluids secretions and excretions, and sharps. Infectious waste is suspected to contain pathogens (bacteria, viruses, parasites, or fungi) in sufficient concentration or quantity to cause disease in susceptible hosts. It also includes laboratory waste that is directly associated with specimen processing, human tissues, including instruments, material or solutions containing free-flowing blood, and animal tissue or carcasses used for research. Sharps are items that could cause cuts or puncture wounds, including needles, hypodermic needles, scalpel and other blades, knives, infusion sets, saws, broken glass, and nails. Whether or not they are infected, such items are usually considered as highly hazardous health-care waste.

Critical items: Instruments and devices that enter sterile tissues, including the vascular system. Critical items present a high risk of infection if the item is contaminated with any microorganisms, including bacterial spores. Reprocessing critical items involves meticulous cleaning followed by sterilization.

Decontamination: The removal of disease-producing microorganisms to leave an item safe for further handling.

Direct Care: Providing hands-on care (e.g., bathing, washing, turning client/patient/resident, 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. Disinfectants are used on inanimate objects; antiseptics are used on living tissue. Disinfection usually involves chemicals, heat or ultraviolet light. Levels of chemical disinfection vary with the type of product used.

Droplet infections: Large droplets carry the infectious agent (>5: m in diameter).

Droplet Nuclei: Microscopic particles of < 5 microns that are the residue of evaporated droplets and are produced when a person coughs or sneezes.

Environment: The immediate space around a client/patient/resident that may be touched by the client/patient/resident and may also be touched by the health care provider when providing care. The client/patient/resident environment includes equipment, medical devices, furniture (e.g., bed, chair, and bedside table), telephone, privacy curtains, personal belongings (e.g., clothes, books) and the bathroom that the client/patient/resident uses. In a multi-bed room, the client/patient/resident environment is the area inside the individual's curtain. In an ambulatory setting, the client/patient/resident environment is the area that may come into contact with the client/patient/resident within their cubicle. In a nursery/neonatal setting, the patient environment is the isolette or bassinet and equipment outside the isolette/bassinet that is used for the infant.

Eye Protection: A device that covers the eyes and is used by health care providers 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 2m of a coughing client/patient/resident. Eye protection includes safety glasses, safety goggles, face shields and visors.

Extended Spectrum Beta-Lactamase (ESBL): Beta-lactamase (β -lactamase) is an enzyme produced by some bacteria that inactivates the β -lactam class of antibiotics (e.g., penicillins, cephalosporins, carbapenems). Extended-spectrum β -lactamase acts on all cephalosporins, including third-generation cephalosporins such as cefotaxime, ceftriaxone and ceftazidime, as well as the monobactam aztreonam.

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 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.

Fomites: Those objects in the inanimate environment that may become contaminated with microorganisms and serve as a vehicle of transmission.

Germicide: An agent that destroys microorganisms, especially pathogenic organisms.

Hand Hygiene: A process for the removal of visible soil and removal or killing of transient microorganisms from the hands. This can be accomplished by using either alcohol-based hand rub (when hands are not visibly soiled) or soap and running water (for removal of visible soil).

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

Health care worker/professional: Any person working in a health care facility, for example a respiratory therapist, medical officer, nurse, physiotherapist, cleaner, psychologist, etc..

Health care facility: Organization that employs health care workers and cares for patients/clients.

Heavy microbial soiling: The presence of infection or high levels of contamination with organic material, e.g., infected wounds, feces.

High Efficiency Particulate Air (HEPA) Filter: This type of filter can remove at least 99.9% of airborne particles 0.3 micrometres in diameter. Particles this size are the most difficult to filter and thus are they most penetrating particle size (MPPS). Particles that are larger or smaller are filtered with even higher efficiency.

High level disinfection: Level of disinfection required when processing semi-critical items. High level disinfection processes destroy vegetative bacteria, mycobacterium, fungi and enveloped (lipid) and non-enveloped (non lipid) viruses, but not necessarily bacterial spores. High level disinfectant chemicals (also called chemosterilants) must be capable of sterilization when contact time is extended. Items must be thoroughly cleaned prior to high level disinfection.

Influenza-like illness (ILI): Is a non-specific respiratory illness characterized by fever, fatigue, cough and other symptoms. The majority of ILI is not caused by influenza but by other viruses (e.g., rhinoviruses and respiratory syncytial virus (RSV), adenoviruses and parainfluenza viruses).

Infection control program: Incorporates all aspects of infection control, e.g., education, surveillance, environmental management, waste management, outbreak investigation, standard and additional precautions, cleaning, disinfection and sterilisation, employee health, quality management in Infection Control.

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

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

Intermediate level disinfection: Level of disinfection required for some semi-critical items. Intermediate level disinfectants kill vegetative bacteria, most viruses and most fungi but not resistant bacterial spores.

ISO Standards: The International Organization for Standardization is a standard-setting body composed of representatives from various national standards organizations. It is a non-governmental organization but it sets standards that often become law.

Low level disinfection: Level of disinfection required when processing noncritical items or some environmental surfaces. Low level disinfectants kill most vegetative bacteria and some fungi as well as enveloped (lipid) viruses (e.g., hepatitis B, C, Hantavirus, and HIV). Low level disinfectants do not kill mycobacterium or bacterial spores. Low level disinfectants-detergents are used to clean environmental surfaces.

Mask: A device that covers the nose and mouth, is secured in the back and is used by health care providers to protect the mucous membranes of the nose and mouth.

Most Penetrating Particle Size (MPPS): Refers to the particles that achieve maximum penetration of the filter medium. Particles that are smaller or larger than the most penetrating size exhibit a lower rate of penetration; the reduced penetration of the smaller particles is due to diffusion mechanisms, while for the larger particles it is due to interception and inertial factors. The most penetrating size is a function of the structure of the filter medium, the velocity of the airflow through the filter, and the physical and chemical nature of the particles.

Methicillin-Resistant Staphylococcus Aureus (MRSA): This is a strain of a *S. aureus* and is resistant to all of the beta-lactam classes of antibiotics, such as penicillin. MRSA has been associated with health-care associated infections (nosocomial infections) and outbreaks.

N95 Respirator: 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. A NIOSH-certified N95 respirator filters particles one micron in size, has 95% filter efficiency and provides a tight facial seal with less than 10% leak.

NIOSH: The National Institute for Occupational Safety and Health (NIOSH) is the federal agency, in the United States, responsible for conducting research and making recommendations for the prevention of work-related injury and illness. NIOSH is part of the [Centers for Disease Control and Prevention \(CDC\)](#) in the [Department of Health and Human Services](#). They are currently working on revising current approval requirements for all particulate-filter and air-purifying respirators.

NIPPV: Non-invasive Positive Pressure Ventilation (includes continuous positive airway pressure (CPAP) and bi-level positive airway pressure (BiPAP)) delivered with a mask instead of an invasive endotracheal tube.

Non-critical items: Those that either touch only intact skin but not mucous membranes or do not directly touch the patient. Reprocessing of noncritical items involves cleaning and/or low level disinfection.

Plain or non-antimicrobial soap: Detergent-based cleansers in any form (bar, liquid, leaflet, or powder) used for the primary purpose of physical removal of soil and contaminating microorganisms. Such soaps work principally by mechanical action and have weak or no bactericidal activity. Although some soap contains low concentrations of antimicrobial ingredients, these are used as preservatives and have minimal effect on colonizing flora.

Personal Protective Equipment (PPE): Includes gloves, gowns, caps, masks – (surgical and N95), and overshoes. These items are used to protect the health care worker from splashes of blood, body fluids, excretions and excretions or from droplets or aerosolization of organisms from the respiratory tract. It is the responsibility of the health care worker to put on the appropriate Personal Protective Equipment in any situation that is likely to lead to exposure of blood, body fluids, excretions and secretions.

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

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

www.health.gov.on.ca/english/providers/program/infectious/pidac/pidac_mn.html

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

Reprocessing: The steps that are taken to make an instrument or equipment that has been used (contaminated) ready for reuse again.

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).

Risk Assessment: An evaluation of the interaction of the health care provider, the client/patient/resident and the client/patient/resident environment to assess and analyze the potential for exposure to infectious disease.

Routine Practices: The system of infection prevention and control practices recommended by the Public Health Agency of Canada to be used with all clients/ patients/ residents during all care to prevent and control transmission of microorganisms in health care settings.

Sanitation: A process that reduces microorganisms on an inanimate object to a safe level e.g., dishes and eating utensils are sanitized.

Seal-Check: A procedure that the health care provider 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 provider is to receive training on how to perform a seal-check correctly.

Severe Acute Respiratory Syndrome (SARS): Is a respiratory disease in humans which is caused by the SARS coronavirus. There has been one major outbreak to date, between November 2002 and July 2003, with 8,096 known cases of the disease and 774 deaths.

Semi-critical items: Devices that come in contact with non-intact skin or mucous membranes but ordinarily do not penetrate them. Reprocessing semi-critical items involves meticulous cleaning followed preferably by high-level disinfection (level of disinfection required is dependent on the item, see Table 6). Depending on the type of item and its intended use, intermediate level disinfection may be acceptable.

Sharps: Needles, syringes, blades, laboratory glass or other objects capable of causing punctures or cuts.

Sterilization: The destruction of all forms of microbial life including bacteria, viruses, spores and fungi. Items must be cleaned thoroughly before effective sterilization can take place.

Sputum Induction: Is used to obtain respiratory secretions from patients with symptoms of active tuberculosis (TB) infection. Because of the risk of exposure to TB during this procedure, health care settings must use appropriate airborne precautions. See the Canadian Tuberculosis Standards – 5th edition at dsp-psd.pwgsc.gc.ca/Collection/H49-146-2000E.pdf

Terminal Cleaning: The cleaning of a client/patient/resident room or bed space following discharge or transfer of the client/patient/resident, in order to remove contaminating Page 11 of 110 pages Routine Practices and Additional Precautions in All Health Care Settings May, 2010 microorganisms that might be acquired by subsequent occupants. In some instances, terminal cleaning might be used once some types of Additional Precautions have been discontinued. Terminal cleaning methods vary, but usually include removing all detachable objects in the room, cleaning lighting and air duct surfaces in the ceiling, and cleaning everything downward to the floor. Items removed from the room are disinfected before being returned to the room. Refer to the Ministry of Health and Long-Term Care's 'Best Practices for Environmental Cleaning in All Health Care Settings'⁶ for more information about terminal cleaning.

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

Waste management system: All the activities, administrative and operational, involved in the production, handling, treatment, conditioning, storage, transportation and disposal of waste generated by health-care establishments.

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