Routine Practices and Additional Precautions:

Preventing the Transmission of Infection in Health Care

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Manitoba

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Introductory Statement

Manitoba Health develops Provincial Infection Prevention and Control Guidelines to provide evidence-based recommendations based on guidance-based recommendations from the national level, The Public Health Agency of Canada (PHAC) and the international level, such as the Centres for Disease Control and Prevention (CDC) and Health Care Infection Control Practice Advisory Committee (HICPAC).

Information for these guidelines was gathered from professionals in Manitoba Health, Manitoba Labour and Immigration, Winnipeg Regional Health Authority, the University of Manitoba and Health Sciences Centre. The principle source for this guideline is the PHAC document of similar title, with modifications appropriate to use in Manitoba.

Although not regulatory in scope, these guidelines may assist in standardizing Infection Prevention and Control practices throughout the province. Regional Health Authorities (RHAs) are expected to develop regional policies and procedures based on these guidelines.

The purpose of this Guideline ***Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*** is to provide a framework for development of policy and procedures to ensure that Routine Practices and Additional Precaution are effectively used.

The guiding principles used in developing these guidelines included:

1. To respond to current challenges in limiting transmission of infection within health care settings.
2. To reaffirm Routine Practices as the foundation for preventing the transmission of microorganisms during patient/ client/resident care in all health care settings.
3. To update the appropriate use, when required, Additional Precautions in addition to Routine Practices.
4. To provide evidence – based and best practice recommendations.

This guideline, whenever possible, has been based on research findings. Where there is insufficient published research, consensus by experts in the field has been used to provide recommendations for specific practices.

The information in this guideline was current at the time of publication. Scientific knowledge and technology are constantly evolving. Research and revisions of these guidelines will be necessary as advances in the field develop.

Although the guidelines will be updated periodically, practitioners are responsible for ensuring that the most recent knowledge is applied for each case.

Abbreviations

ABHR(s)	Alcohol-based hand rub(s)
AIIR(s)	Airborne infection isolation room(s)
AGMP(s)	Aerosol-generating medical procedure(s)
ARI	Acute respiratory infection
ARO(s)	Antibiotic resistant organism(s)
BBPs	Bloodborne pathogens
CDAD	*Clostridium difficile* associated disease
CDI	*Clostridium difficile* infection
CJD	Creutzfeldt-Jakob disease
DIN	Drug identification number
FRI	Febrile respiratory illness
HAI(s)	Health care associated infection(s)
HCW(s)	Health care worker(s)
HVAC	Heating, ventilation and air conditioning
IP&C	Infection prevention and control
ICP(s)	Infection control practitioner/professional(s)
ICU(s)	Intensive care unit(s)
ILI	Influenza –like illness
KPC	*Klebsiella pneumoniae* carbapenemase
LTC	Long Term Care
MRSA	Methicillin-resistant *Staphylococcus aureus*
NDM-1	New Delhi metallo-beta-lactamase-1
NICU(s)	Neonatal intensive care unit(s)
OH	Occupational Health
ORA	Organizational Risk Assessment
PCRA	Point of Care Risk Assessment
PPE	Personal protective equipment
SARS	Severe acute respiratory syndrome
SRI	Severe respiratory infection
SUDs	Single use device(s)
VRE	Vancomycin-resistant Enterococci

Definitions

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 degrees Celsius and a new or worsening cough or shortness of breath (also known as febrile respiratory illness or FRI). It should be recognized that some elderly individuals and people who are immunocompromised may not have a febrile response to a respiratory illness.
Additional Precautions	Additional measures implemented when Routine Practices alone may not interrupt transmission of an infectious agent. • Used in addition to Routine Practices (not in place of). • Initiated based on condition/clinical presentation (syndrome) and on specific etiology (diagnosis).
Aerosols	Solid or liquid particles suspended in the air, whose motion is governed principally by particle size, which ranges from 10µm-100µm. See aerosol-generating medical procedures below. Note: Particles less than 10 µm (i.e. droplet nuclei) can also be found in aerosols; however, their motion is controlled by other physical parameters.
Aerosol-Generating Medical Procedures	Aerosol-generating medical procedures (AGMPs) are medical procedures that can generate aerosols as a result of artificial manipulation of a person's airway. There are several types of AGMPs which have been associated with a documented increased risk of tuberculosis (TB) or SARS transmission: Intubation and related procedures (e.g. manual ventilation, open endotracheal suctioning) Cardiopulmonary resuscitation Bronchoscopy Sputum induction Nebulized therapy Autopsy Non-invasive positive pressure ventilation (CPAP, BiPAP) There is debate whether other medical procedures may result in the generation of aerosols through cough induction and lead to transmission of infection. However, to date there is no evidence of the transmission of respiratory infections, including TB, SARS or influenza, by these methods. Examples of these procedures include: High-frequency oscillatory ventilation Tracheostomy care Chest physiotherapy Obtaining nasopharyngeal swabs or aspirates

Definitions

Airborne exposure	Exposure to aerosols capable of being inhaled.
Airborne infection isolation room (AIIR)	Formerly, negative pressure isolation room. An AIIR is a single occupancy patient care room used to isolate persons with a suspected or confirmed airborne infectious disease. Environmental factors are controlled in AIIRs to minimize the transmission of infectious agents that are usually transmitted from person to person by droplet nuclei associated with coughing or aerosolization of contaminated fluids. AIIRs should provide negative pressure in the room (so that no air flows out of the room into adjacent areas) and direct exhaust of air from the room to the outside of the building or recirculation of air through a HEPA filter before returning to circulation.
Airborne transmission	Transmission of microorganisms via inhaled aerosols that results in an infection in a susceptible host.
Antimicrobial-resistant organisms	A microorganism that has developed resistance to the action of one or more antimicrobial agents of special clinical or epidemiologic significance. Organisms designated antimicrobial resistant vary over time and place. Examples of microorganisms included in this group are MRSA and VRE. Other microorganisms are included when antibiotic resistance is judged to be significant in a specific health care facility or patient population, at the discretion of the IP&C program or local, regional, or national authorities.
Alcohol	An organic chemical containing one or more hydroxyl groups. Alcohols can be liquids, semisolids or solids at room temperature.
Alcohol-based hand rub	An alcohol-containing (60-90%) preparation (liquid, gel or foam) designed for application to the hands to kill or reduce the growth of microorganisms. Such preparations contain one or more types of alcohol with emollients and other active ingredients. (Control Guidelines *Hand Hygiene Practices*).
Asepsis	The absence of pathogenic (disease-producing) microorganisms.
Aseptic technique	The purposeful prevention of transfer of microorganisms from the patient's body surface to a normally sterile body site or from one person to another by keeping the microbe count to an irreducible minimum. Also referred to as sterile technique.
Biomedical waste	Waste means any chemical or biological substance that may create a risk to the safety or health of a worker, including: a) human anatomical waste b) animal anatomical waste c) microbiological laboratory waste d) blood and body fluid waste and e) used or contaminated needles and sharps such as knives, blades, scissors and other items that are capable of causing a cut or puncture refer to http://www.gov.mb.ca/labour/safety/

Definitions

Cleaning	The physical removal of foreign material, e.g. dust, soil, organic material such as blood, secretions, excretions and microorganisms. Cleaning physically removes rather than kills microorganisms. It is accomplished by using water and detergents in conjunction with mechanical action.
Colonization	Presence of microorganisms in or on a host with growth and multiplication but without tissue invasion or cellular injury.
Cohort	Physically separating (e.g. in a separate room or ward) two or more patients exposed to, or infected with, the same microorganism from other patients who have not been exposed to, or infected with, that microorganism.
Cohort staffing	The practice of assigning specific personnel to care only for patients known to be exposed to, or infected with, the same organism. These personnel would not participate in the care of patients who have not been exposed to, or infected with, that organism.
Contact exposure	Transmissions where exposure occurs through physical contact between an infected source and a host or through the passive transfer of the infectious agent to a host via an intermediate object.
Contact transmission (direct or indirect)	Transmission that occurs when exposure leads to an infectious dose of viable microorganisms from an infected/contaminated source resulting in colonization and/or infection of a susceptible host. **Direct contact** The transfer of microorganisms via direct physical contact between an infected or colonized individual and a susceptible host (body surface to body surface). Transmission may result in infection. **Indirect contact** Passive transfer of microorganisms from an infected or colonized individual to a susceptible host via an intermediate object e.g. contaminated hands that are not cleaned between episodes of patient care, contaminated instruments that are not cleaned between patient use or other contaminated objects in the patient's immediate environment.
Cough etiquette	See Respiratory hygiene
Critical items	Instruments and devices that enter sterile tissues, including the vascular system. Reprocessing critical items, such as surgical equipment or intravascular devices, involves meticulous cleaning followed by sterilization.
Decontamination	The removal of microorganisms to leave an item safe for further handling.

Definitions

Designated hand washing sink	A sink used only for hand washing.
Disinfectant	Product used on inanimate objects to reduce the quantity of microorganisms to an acceptable level. Hospital-grade disinfectants require a drug identification number (DIN) for sale in Canada.
Disinfection	The inactivation of disease-producing microorganisms with the exception of bacterial spores. Hospital-grade disinfectants are used on inanimate objects and require a drug identification number (DIN) for sale in Canada. **High level disinfection** The level of disinfection required when processing semi-critical items. High level disinfection processes destroy vegetative bacteria, mycobacteria, fungi and enveloped (lipid) and non-enveloped (non-lipid) viruses but not necessarily bacterial spores. **Low level disinfection** The level of disinfection required when processing non-critical items and some environmental surfaces. Low level disinfectants kill most vegetative bacteria and some fungi as well as enveloped (lipid) viruses (e.g. influenza, hepatitis B and C, and HIV). Low level disinfectants do not kill mycobacteria or bacterial spores.
Droplet	Solid or liquid particles suspended in the air whose motion is governed principally by gravity; particle size is greater than 10 µm. Droplets are usually generated by an infected source coughing, sneezing or talking.
Droplet exposure	Droplet exposure may occur when droplets that contain an infectious agent are propelled a short distance (i.e. within 2 metres) through the air and are deposited on the mucous membranes of the eyes, nose or mouth of a host.
Droplet nucleus	A droplet nucleus is the airborne particle resulting from a potentially infectious (microorganism-bearing) droplet from which most of the liquid has evaporated, allowing the particle to remain suspended in the air. Note: droplet nuclei can also be found in aerosols; however, their motion is controlled by physical parameters including gravity and air currents.
Droplet transmission	Transmission that occurs when the droplets that contain microorganisms are propelled a short distance (within 2 metres) through the air and are deposited on the mucous membranes of another person, leading to infection of the susceptible host. Droplets can also contaminate surfaces and contribute to contact transmission (see also contact transmission).

Definitions

Drug identification number	The number located on the label of prescription and over-the-counter drug products that have been evaluated by the Therapeutic Products Directorate and approved for sale in Canada.
Emerging respiratory infections	Acute respiratory infections of significant public health importance, including infections caused by either emergence of new variants of known respiratory pathogens (e.g. novel influenza viruses, SARS) or emergence of as yet unknown pathogens. http://www.phac-aspc.gc.ca/eri-ire/index-eng.php
Exposure	Having contact with a microorganism or an infectious disease in a manner such that transmission may occur.
Facial protection	Facial protection includes masks and eye protection, face shields, or masks with visor attachment.
Facilities	See Health care facility.
Febrile respiratory illness	A term used to describe a wide range of droplet and contact spread respiratory infections, which usually present with symptoms of a fever > 38°C and new or worsening cough or shortness of breath. Neonates, the elderly, and those who are immunocompromised may not have fever in association with a respiratory infection.
Fit check	See Seal check.
Fit testing	The use of a qualitative or a quantitative method to evaluate the fit of a specific manufacturer, model and size of respirator on an individual. See also seal check.
Fomites	Inanimate objects in the environment that may become contaminated with microorganisms and serve as vehicles of transmission.
Hand hygiene	A comprehensive term that applies to hand washing, hand antisepsis and to actions taken to maintain healthy hands and fingernails.
Hand washing	A process for the removal of visible soil/organic material and transient microorganisms from the hands by washing with soap and water; also referred to as hand cleansing.

Definitions

Hand washing sink	See designated hand washing sink.
Hazard	A term to describe a condition that has the potential to cause harm. Work-related hazards faced by HCWs and other staff are classified in categories: biological and infectious, chemical, environmental, mechanical, physical, violence and psychosocial.
Health care associated infection (HAI)	Infections that are transmitted within a health care setting (also referred to as nosocomial) during the provision of health care.
Health care facilities	Include but are not limited to acute care hospitals, emergency departments, rehabilitation hospitals, mental health hospitals, and LTC facilities.
Health care setting	Any location where health care is provided, including emergency care, prehospital care, hospital, LTC, home care, ambulatory care and facilities and locations in the community where care is provided, (e.g. infirmaries in schools, patient or correctional facilities). Note: Some settings provide a variety of care, e.g. chronic care or ambulatory care provided in acute care, complex care provided in LTC, etc. **Prehospital care** Acute emergency patient assessment and care delivered in a variety of settings (e.g. street, home, LTC, mental health) at the beginning of the continuum of care. Prehospital care workers may include paramedics, fire fighters, police and other emergency first responders amongst others. **Acute care** A facility where a variety of inpatient services are provided, which may include surgery and intensive care. For the purpose of this document, acute care also includes ambulatory care settings such as hospital emergency departments, and free-standing ambulatory (day) surgery or other day procedures (e.g. endoscopy) centers. **Ambulatory care** A location where health services are provided to patients who are not admitted to inpatient hospital units including but not limited to outpatient diagnostic and treatment facilities (e.g., bronchoscopy and pulmonary function laboratories, dialysis units), community health centres/clinics, physician offices, dental offices, offices of allied health professionals.

Definitions

Health care setting	**Long-term care** A facility that includes a variety of activities, types and levels of skilled nursing care for individuals requiring 24-hour surveillance, assistance, rehabilitation, restorative and/or medical care in a group setting that does not fall under the definition of acute care. **Complex continuing care** The individual's chronic and complex condition requires continuing medical management, skilled nursing, and a range of interdisciplinary, diagnostic, therapeutic and technological services. Chronicity describes the condition or conditions that are assessed to be long-standing, and recurrent or fluctuating through periods of exacerbation. In some cases the condition will be progressive in nature. An acute condition may accompany the chronic condition. Home care is the delivery of a wide range of health care and support services to patients in a variety of settings for health restoration, health promotion, health maintenance, respite, palliation and to prevent/delay admission to long-term patiential care. Home care is delivered where the patient resides (e.g. homes, retirement homes, group homes and hospices).
Health care organizations	The organizational entity that is responsible for establishing and maintaining health care services provided by HCWs and other staff in one or more health care settings throughout the health care continuum.
Health care workers	Individuals who provide health care or support services such as nurses, physicians, dentists, nurse practitioners, paramedics and sometimes emergency first responders, allied health professionals, unregulated health care providers, students, volunteers and housekeeping staff.
Hierarchy of Controls	There are three levels/tiers of IP&C and OH controls to prevent illness and injury in the workplace: engineering controls, administrative controls and PPE.
Immunocompromised	This term refers to patients with congenital or acquired immunodeficiency or immunodeficiency due to therapeutic agents or hematologic malignancies.
Infection	Microorganisms multiply within the body and cause a response from the host's immune defences. Infection may or may not lead to clinical disease.

Definitions

Infection control professional/ practitioner	A health care professional (e.g. nurse, medical laboratory technologist) with responsibility for functions of the IP&C Program. This individual, who must have specific IP&C training, is referred to as an infection control professional/practitioner or ICP.
Infectious agent	Terminology used to describe a microorganism or a pathogen capable of causing diseases (infection) in a source or a host. Synonymous with microorganism for the purposes of this document.
Infectious waste	See Biological waste.
Influenza-like illness	A constellation of symptoms which may be exhibited by individuals prior to the confirmation of Influenza.
Mask	A barrier to prevent droplets from an infected source from contaminating the skin and mucous membranes of the nose and mouth of the wearer, or to trap droplets expelled by the wearer, depending on the intended use. The mask should be durable enough so that it will function effectively for the duration of the given activity. The term "mask" in this document refers to surgical or procedure masks, not to respirators.
Microorganisms	See Infectious agent.
Mode of transmission	Mechanism by which an infectious agent is spread (e.g. via contact, through droplets or aerosols).
N95 Respirator	A disposable, particulate respirator (Note: most respirators used for health care purposes are disposable filtering face pieces covering mouth, nose and chin). Airborne particles are captured from the air on the filter media by interception, inertial impaction, diffusion and electrostatic attraction. The filter is certified to capture at least 95% of particles at a diameter of 0.3 microns; the most penetrating particle size. Particles of smaller and larger size are collected with greater efficiency. The 'N' indicates a respirator that is not oil-resistant or oil-proof. N95 respirators are certified by the National Institute for Occupational Health and Safety (NIOSH –organization based in the United States) and must be so stamped on each respirator (see also Respirator).
Natural ventilation	The use of natural forces to introduce and distribute outdoor air into a building. These natural forces can be wind pressure or pressure generated by the density difference between indoor and outdoor air.

Definitions

Non-critical items	Items that touch only intact skin but not mucous membranes. Reprocessing of non-critical items involves thorough cleaning and/or low level disinfection.
Nosocomial infection	See Health care associated infection.
Occupational Health	For the purposes of this document, this phrase refers to the disciplines of Occupational health medicine and nursing, Occupational Hygiene and Occupational Health and Safety.
Occupational Health and Safety	A legal term that is defined in legislation, regulation and/or workplace (e.g. union) contracts that impact a variety of disciplines concerned with protecting the safety, health and welfare of people engaged in work or employment. The use of the phrase "Occupational Health and Safety" invariably refers back to legislation and or regulation that influence workplace safety practices. The definition and therefore the content encompassed by "OHS" legislation varies between and within jurisdictions in Canada.
Outbreak	An excess over the expected incidence of disease within a geographic area during a specified time period, synonymous with epidemic.
Organizational Risk Assessment	The activity whereby a health care organization identifies: a hazard a. the likelihood and consequence of exposure to the hazard, and b. the likely means of exposure to the hazard c. the likelihood of exposure in all work areas in a facility/office/practice setting; and then e. evaluates available engineering, administrative and PPE controls needed to minimize the risk of the hazard.
Patient	For the purposes of this document, the term "patient" will include those receiving health care, including patients, clients or residents
Patient care environment	Inanimate objects in the proximate environment of the patient that may be a source of or may be contaminated by microorganisms.

Definitions

Personal Protective Equipment (PPE)	One element in the Hierarchy of Controls. Personal protective equipment consists of gowns, gloves, masks, facial protection (i.e. masks and eye protection, face shields or masks with visor attachment) or respirators that can be used by a HCW or other staff to provide a barrier that will prevent potential exposure to infectious microorganisms.
Plain soap	Basic detergent products that do not contain antimicrobial agents, or contain very low concentrations of antimicrobial agents which are effective solely as preservatives.
Point of care	Refers to place where a patient receives health care from a HCW or other staff. Point of care incorporates three elements being present at the same time: the patient, the HCW and an interaction that could result in transmission of an infectious agent.
Point of Care Risk Assessment (PCRA)	A PCRA is an activity whereby a HCW (in any health care setting across the continuum of care): 1) Evaluates the likelihood of exposure to an infectious agent a. for a specific interaction b. with a specific patient c. in a specific environment (e.g. single room, hallway) d. under available conditions (e.g. no designated hand washing sink) 2) Chooses the appropriate actions/PPE needed to minimize the risk of exposure for the specific patient, other patients in the environment, the HCW, other staff, visitors, contractors etc.
Precautions (including source control measures)	Interventions to reduce the risk of transmission of microorganisms between persons in health care settings including patient to patient, patient to HCW, and HCW to patient.
Respirator	A device to protect the user from inhaling a hazardous atmosphere. The most common respirator used in health care is a N95 half-face piece filtering respirator. The term respirator refers to a half-face non-powered air purifying respirator. It is a personal protective device that fits tightly around the nose and mouth of the wearer, and is used to reduce the risk of inhaling hazardous airborne particles and aerosols, including dust particles and infectious agents. N95 respirators are specifically for use in health care. See also N95 Respirator, Respiratory Protection, Fit testing, Seal check.
Respiratory hygiene/cough etiquette	A combination of measures to be taken by an infected source designed to minimize the transmission of respiratory microorganisms e.g. influenza.

Definitions

Respiratory protection	Respiratory protection requires the use of a respirator with NIOSH-approved N95 or higher filtration to prevent inhalation of airborne microorganisms.
Risk	The probability of an event and its consequences.
Routine Practices	A comprehensive set of IP&C measures, that have been developed for use in the routine care of all patients at all times in all health care settings. Routine Practices aim to minimize or prevent HAIs in all individuals in the health care setting including patients, HCWs, other staff, visitors, contractors, etc.
Severe acute respiratory syndrome	Refers to a specific disease caused by SARS coronavirus.
Seal check	A procedure the wearer performs each time a respirator is worn. This procedure is performed immediately after putting on the respirator to ensure that there is a good facial seal. Seal check has been called "fit check" in other IP&C documents. Refer to Appendix A of CSAZ94.4-02 Selection, Use and Care of Respirators. (See also Fit Test).
Semi-critical items	Items that come in contact with non-intact skin or mucous membranes but ordinarily do not penetrate them. Reprocessing semi-critical items involves thorough cleaning followed by high level disinfection.
Severe respiratory infection	Reportable SRI case – must meet criteria in each of four categories for (A) Hospitalized or (B) Deceased, including: I. respiratory symptoms + II. severity + III. unknown diagnosis + IV. epidemiological exposure, as detailed in : http://www.phac-aspc.gc.ca/eri-ire/pdf/02-SRI-Surveillance-Protocol_e.pdf
Source	The person, animal, object or substance that may contain an infectious agent/microorganism that can be passed to a susceptible host.
Source control measures	Methods to contain infectious agents from an infectious source including signage, separate entrances, partitions, triage/early recognition, AIIRs, diagnosis and treatment, respiratory hygiene (including masks, tissues, hand hygiene products and designated hand washing sinks) process controls for AGMPs and spatial separation.
Sterile technique	See aseptic technique.

Definitions

Sterilization	The destruction of all forms of microbial life including bacteria, viruses, spores and fungi.
Susceptible host	An individual without sufficient resistance against a particular infectious agent to prevent contracting infection or disease when exposed to the agent (synonymous with non-immune).
Terminal cleaning	Terminal cleaning refers to the process for cleaning and disinfection of patient accommodation undertaken upon discharge of any patient or on discontinuation of contact precautions. The patient room, cubicle, or bed space, bed, bedside equipment and environmental surfaces and sinks and bathroom should be thoroughly cleaned before another patient is allowed to occupy the space. The bed linens should be removed before cleaning begins.
Transmission	The process whereby an infectious agent passes from a source and causes infection.
Utility sink	A sink used for non clinical purposes and not appropriate to use for hand washing.
Virulence	The ability of the infectious agent to cause severe disease (e.g. Ebola: high; rhinovirus: low).

Part A – Overview of Routine Practices and Additional Precautions

A. Introduction

Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care represent the consistent IP&C practices to be used in all health care settings in Manitoba and the expected processes and practices of care. The objective of this guideline is to identify and promote IP&C practices and precautions for preventing the transmission of infection in all health care settings. This guideline is designed primarily for use by infection control professionals (ICPs). Where individuals who lack IP&C expertise are required to implement this guideline, it is recommended they seek the expertise of ICPs in their region.

This guideline promotes the consistent application of Routine Practices and Additional Precautions across the continuum of care and outlines modifications of the application of Additional Precautions outside of acute care. This guideline should be used to develop specific recommendations for use within the RHAs, taking into consideration local conditions such as the type of facilities available, risk of acquisition of infection, type of health care setting, type of care, and level of education and awareness of the HCWs providing the care. Included in this document are the principles necessary to prevent transmission of microorganisms from patient to patient, patient to HCW and HCW to patient across the continuum of care. For the purposes of this document, the term "patient" will be used to include those receiving health care and are traditionally/routinely referred to as patients, clients or residents. Principles of transmission as well as Routine Practices and Additional Precautions are outlined for acute care, LTC, ambulatory care, prehospital care and home care settings. For the purpose of this document, acute care also includes ambulatory care settings such as emergency departments, hospital-based and stand-alone clinics and ambulatory surgery centres.

Part A – Overview of Routine Practices and Additional Precautions

A. Principles upon which this Document is Based

This document recognizes certain principles:

- Consistent application of Routine Practices is expected for the care of all patients at all times across the continuum of care.
- Adherence to Routine Practices can reduce the transmission of microorganisms in all health care settings.
- Individual components of Routine Practices are determined by a risk assessment (i.e. an assessment of the task/care to be performed, the patient's clinical presentation, physical state of the environment and the health care setting).
- Microorganisms may be transmitted from symptomatic and asymptomatic individuals, emphasizing the importance of adhering to Routine Practices at all times for all patients in all health care settings.
- Additional Precautions are required for patients with suspected or known infections or colonization with microorganisms for which Routine Practices are insufficient to prevent transmission.
- Patients known or suspected to be infected or colonized with certain microorganisms will require Routine Practices and Additional Precautions based on the modes of transmission of these microorganisms.
- Additional Precautions should be used empirically, based on clinical presentation. These may need to be modified or discontinued once the specific microorganism is identified.
- The primary goal of IP&C programs is to reduce the risk of acquiring a HAI to a minimum level; zero risk is not attainable in every circumstance but should nevertheless be the ultimate goal. The consequences of cross-transmission of microorganisms must be balanced against the consequences (adverse effects and cost) of precautions taken.
- Application of Additional Precautions may vary between acute care, LTC, ambulatory care, prehospital care and home care settings. Local epidemiology should be considered in the application of Additional Precautions.

Major changes with this revision include:

- Expecting HCWs to use ABHR at the point of care as the preferred method of hand hygiene.
- Preferring single inpatient rooms with toilet and designated HCW handwashing sink rather than multipatient rooms with designated private toilets and patient sinks and accessible designated HCW hand washing sinks.
- Implementing Respiratory Hygiene, a strategy involving a combination of measures designed to minimize the transmission of respiratory pathogens, across the continuum of care.
- Changing the preferred spatial separation between a patient with a suspected or confirmed droplet transmissible respiratory infection who is coughing (infected source) and a patient without that infection (susceptible patient) from one metre to two metres apart. One metre may be sufficient for young children and others whose cough is not forceful enough to propel the droplets as far as two meters.
- Implementing strategies to reduce aerosols when performing AGMPs on patients with signs and symptoms of suspected or confirmed Tuberculosis, SARS or other emerging respiratory infections for which the means of transmission are not yet known. (See Part A, Section II, Section C, 2. discussion on AGMPs. See Part B, Section IV, sub-section (iii), 1(b) for Strategies to Reduce Aerosol Generation). Routine Practices are required for AGMPs on other patients.
- Changing to a recommendation that adult patients with known or suspected viral respiratory infections are to be placed on contact and droplet precautions (which is the current practice in paediatrics).
- Reaffirming the recommendation that HCWs follow aseptic technique for invasive procedures and in the handling and delivery of parenteral medications and intravenous systems.
- Expecting health care organizations to perform an ORA, i.e., evaluating the health care environment to identify the risk of exposure to microorganisms and implementing appropriate control measures (e.g. health care facility design and, cleaning, disinfection

and sterilization of patient care equipment).

- Emphasizing the expectation that HCWs perform a PCRA prior to each patient interaction taking into consideration the patient, patient environment and nature of the interaction.

B. Routine Practices

Routine Practices are the IP&C practices for use in the routine care of ALL patients at ALL times in ALL health care settings and are determined by patient characteristics, the environment and the task to be performed.

Performing an ORA (see Part A, Section III, B, below) and addressing any deficiencies identified provides the framework to ensure that appropriate components in the Hierarchy of Controls related to Routine Practices are in place to minimize the risk of exposure to and transmission of microorganisms within health care settings.

A PCRA is performed by HCWs to determine the appropriate control measures required to provide safe patient care (i.e., protect the patient from transmission of microorganisms) and to protect the HCW from exposure to microorganisms (e.g., from sprays of blood, body fluids, respiratory tract or other secretions or excretions and contaminated needles and other sharps).

Routine Practices include:

- Point of Care Risk Assessment.
- Hand hygiene (including point of care ABHR).
- Source control (triage, early diagnosis and treatment, respiratory hygiene, spatial separation).
- Patient accommodation, placement and flow.
- Aseptic technique.
- Use of personal protective equipment.
- Sharps safety and prevention of bloodborne transmission.
- Management of the patient care environment:
  - > Cleaning of the patient care environment.
  - > Cleaning and disinfection of non-critical patient care equipment.
  - > Handling of waste and linen.
- Education of patients, families and visitors.
- Visitor management.

C. Additional Precautions

Additional Precautions are applied when the natural transmission characteristics or impact of infection with a specific microorganism means Routine Precautions may not be sufficient to prevent transmission. [e.g. microorganisms with a low infectious dose such as *Shigella* spp., microorganisms spread by the droplet route such as respiratory syncytial virus (RSV), epidemiologically significant microorganisms such as antibiotic resistant organisms (AROs)]. Additional precautions may also be required when medical procedures increase the risk of transmission of a specific agent (e.g. AGMPs) or because of the clinical situation (e.g. care of the young child, incontinent adult or cognitively impaired individual). The application of Additional Precautions is specific to the care setting: acute care, ambulatory care, prehospital care, LTC and home care.

Additional Precautions are conventionally divided into:

- Contact precautions, for microorganisms of low infective dose or situations where heavy contamination of the patient's environment is anticipated.
- Droplet precautions, for microorganisms primarily transmitted by the large droplet route.
- Airborne precautions, for microorganisms transmitted by small particles through the air over extended time and distance.

Some infections can be transferred by more than one route and require a combination of Additional Precautions. The application of Routine Practices always continues even with the use of Additional Precautions.

Ensure Health Care Workers are made aware of the Organizational Risk Assessment.

Performing an ORA (see Part A, Section III, B, below) and addressing deficiencies provides the framework to ensure that appropriate components in the Hierarchy of Controls (see Part A, Section III, A, below) related to Additional Precautions are in place to minimize the risk of exposure to and transmission of infectious agents within health care settings.

D. Changing Populations and Health Care Delivery Systems

Over the past decade, health care systems have undergone continued restructuring. The patient

population in acute care hospitals continues to shift towards a group at higher risk for HAIs. New technologies and aggressive treatments, many of which compromise host defences, have permitted patients with previously fatal diseases to survive. Organ and hematopoietic stem cell transplants, HIV, and an aging population have increased the number of high-risk patients. This has resulted in: i) increased acuity of illness in acute care facilities, ii) increased level of acuity in LTC (providing complex care such as intravenous therapy, hemodialysis or ventilation therapy), iii) performance of invasive procedures and complex treatments in day treatment or outpatient settings exposing this population to the risk of HAIs, and iv) transfer of care for many similar conditions or treatments to the home or outpatient settings. In addition, an aging population which is living longer and who are increasingly reliant on prosthetic and indwelling devices has increased the demand for health care services.

HAI occurs across the continuum of care, from prehospital care to acute care hospitals, rehabilitation centers, LTC facilities, nursing homes, adult residential care, ambulatory care centres and home care. Transfers of patients between facilities and across different levels of care within facilities, as well as transfers back to Canada of patients exposed to infectious agents in foreign countries, such as injured returning soldiers or patients with hospitalization while in a foreign country, are frequent and increase the risk for transmission of antimicrobial resistant microorganisms.

E. Burden of Health Care Associated Infections

Health care associated infections (e.g. surgical site infections, intravascular catheter-associated blood stream infections) result in a substantial burden of disease in Canadians and are an important public health problem. They are also an important burden on Canada's health care system and a barrier to timely access to care for all Canadians.

There has been no comprehensive survey of the occurrence of HAIs in Canada. However, it is estimated that 5-10% of hospitalized Canadians will develop a HAI. A survey of sentinel Canadian hospitals in February 2002, by Gravel *et al.* found that 10.5% of adult inpatients and 9.1% of paediatric inpatients had an HAI during the survey. In a repeat survey in 2009, including a similar hospital group, Gravel *et al.* found that 12.3% of adult patients and 7.2% of paediatric patients had a HAI on the survey day. Between the two surveys, a 12% increased prevalence of HAI (from 11.1% to 12.4%) was noted and the number of patients on isolation precautions had nearly doubled from 7.7% to 14.8% largely due to the impact of *Clostridium difficile* infection (CDI) and AROs [Personal Communication, CNISP 2010]. Extrapolating from US data, Zoutman *et al* estimated that approximately 220,000 HAIs occur annually in Canada and more than 8,000 deaths occur each year attributable to HAIs. **This translates into approximately 285 deaths per year in Manitoba**. Health care associated infections vary in type, frequency and severity. For example, health care associated urinary tract infections (UTI) are amongst the most common of all HAIs but result in less serious patient impact. In contrast ventilator associated pneumonia (VAP) is less common, but has a case mortality rate exceeding 10%.

Health care associated infections are also costly to treat. In the US, it is estimated that the attributable cost of treating HAIs range from US $1,257 for UTI to US $9,986 for VAP. In a study to determine the incremental cost attributable to methicillin-resistant *Staphylococcus aureus* (MRSA) in a Canadian hospital, patient specific hospitalization costs for a cohort of patients with hospital acquired MRSA and a matched comparison group of uninfected patients were investigated. The median total hospitalization cost per nosocomial MRSA patient (colonized and infected) was $14,841, while the corresponding cost for those in the uninfected comparison group was $5,844, an incremental cost of $8,997 per nosocomial MRSA patient.

Patients with HAIs have prolonged hospital stays (e.g. health care acquired surgical site infections prolong hospital stay by a mean of 25.7 days) and investigation and treatment of these infections consumes other health care resources. Health care associated infections are therefore a significant barrier to access to care for other health conditions of Canadians.

All health care interventions have potential risks, including risk of infection, as well as potential benefits. Currently not all HAIs are preventable. However HAIs are not inevitable; systematic approaches to HAI prevention are highly effective in reducing their frequency. The gap between HAIs that can be prevented and those that are currently being prevented is attributable to a lack of awareness and implementation of prevention strategies by front line HCWs and

inadequate prioritization of HAI prevention strategies by health care managers and administrators.

Application of *Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care* is an important component of a comprehensive approach to HAI prevention. By adopting the recommendations in this document across the continuum of care, the burden of HAIs in Manitoba can be reduced.

F. Balancing Risk and Benefit in Preventing Cross-Transmission

Ideally, care should be provided in a manner that maximizes the probability that all transmission of potential microorganisms from all patients asymptomatically colonized as well as symptomatic in all health care settings will be prevented. However, transmission of microorganisms in the health care setting cannot always be prevented, and attempts to do so would entail additional costs and restrictive measures that interfere with the quality of life for the patient or restrict beneficial medical procedures or interventions. Thus, IP&C practices must be tailored to the level of care that is being provided and the inherent risk to the individual and the population if infection occurs. Precautions that may be justified in terms of risk-benefit in an intensive care unit (ICU) or acute care ward may not be of equal benefit or indicated for a patient in LTC.

Unnecessary use of Additional Precautions is to be avoided. Isolation practices can be stigmatizing and psychologically damaging which may adversely affect the quality of health care delivered (e.g. medical errors). Furthermore, unnecessary isolation practices are expensive and consume scarce health care resources that could be used for other purposes to benefit other patients. Consequently, only IP&C isolation practices clearly indicated in the care setting should be implemented, and these should be discontinued as soon as appropriate.

In most instances, the precautions to apply are clear-cut, based on the evidence available. In other situations, certain measures may need to be modified for different types of health care settings, based on assessment of risks and benefits. The benefit of reducing risk of transmission must be balanced against the cost (in quality of life, adequacy of medical care, and monetary outlay) of the precautions required to achieve this reduction in risk.

II. Principles of Transmission of Microorganisms

A. Chain of Infection

Epidemiologic analysis helps prevent disease by describing the distribution of illness (in terms of person, place and time) and identifying modifiable factors that affect its occurrence and outcomes. It provides the rationale for control measures to minimize transmission of microorganisms, and ultimately to reduce the incidence of HAIs in patients and occupational infections in HCWs.

Transmission of microorganisms may result in transient carriage or long term colonization, asymptomatic infection or clinical disease. The presence of microorganisms in or on a host, with growth and multiplication but without tissue invasion or cellular injury is referred to as colonization. Infection is the condition in which microorganisms multiply within the body, resulting in a response from the host's immune defences. Infection may or may not lead to clinical disease (symptomatic infection). The establishment of infection involves complex interrelationships between the source of the infectious agent (microorganism), the susceptible host, and the environment and requires the transmission of microorganisms from the source to a susceptible host. One framework for understanding this complex relationship is the Chain of Infection, which can have six links (Figure 1a), the infectious agent, reservoir, portal of exit, mode of transmission, portal of entry and susceptible host. Breaking any one of the links in the Chain of Infection will prevent infection from occurring (Figure 1b).

A brief explanation of each link follows:

1. Infectious Agents (microorganisms)

These are bacteria, viruses, fungi, parasites and prions and can be either endogenous flora (i.e. patient's own microorganisms) or exogenous flora (i.e. microorganisms external to the patient, for example from other individuals, plants, or inanimate objects). Regardless of source they are transient if they are temporarily carried by the patient. (See Part A, Section II, B). Antimicrobials, disinfectants and hand hygiene with ABHRs kill microorganisms, thereby breaking this link in the Chain of Infection. The characteristics of a particular microorganism affect the ease of its transmission. Microorganisms that can survive environmental conditions and remain viable on inanimate objects, such as patient care equipment, are more likely to be transmitted.

2. Reservoirs in Health Care

Humans, animals and the environment are reservoirs of infectious agents (microorganisms) relevant to health care. Hand hygiene following contact with individuals or their environment, preoperative skin preparation and cleaning the environment all reduce numbers of microorganisms present in a reservoir, breaking this link in the Chain of Infection. (See Part A, Section II, B)

Figure 1a and 1b Chain of Infection

Figure 1a

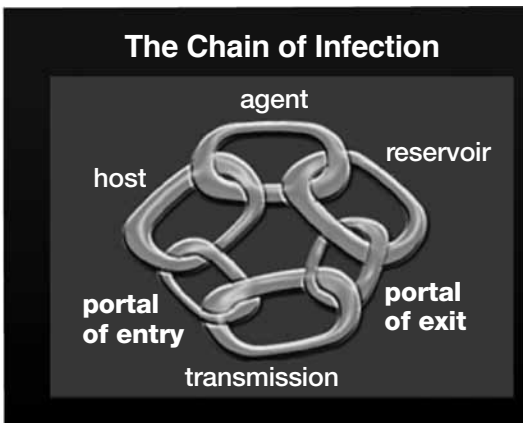
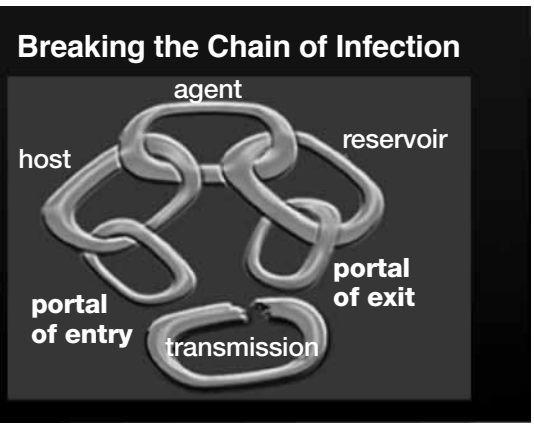


Figure 1b



3. Routes of Transmission

Routes of transmission of infectious agents (microorganisms) are conventionally categorized into five routes. These are: contact, droplet, airborne, common vehicle and vectorborne. Transmission of the many varieties of microorganisms cannot always be circumscribed within a limited number of transmission modes. Nevertheless these transmission categories have proven useful in describing the spread of microorganisms in populations. The routes of transmission vary with the microorganisms involved. Some microorganisms can be transferred by more than one route. (See Part A, Section II, C). The appropriate use of barriers and adherence to hand hygiene break this link in the Chain of Infection.

4. Portals of Entry

A portal of entry is the route by which an infectious agent enters the host. Examples include mucous membranes of the respiratory tract, the gastrointestinal tract, the urinary tract, breaks in the skin (e.g. wounds) and devices such as intravenous lines. This link in the Chain of Infection can be broken by protecting portals of entry by covering wounds, wearing PPE, reducing breaches in the mechanical barriers of the skin and mucous membranes, using sterilized equipment when required, or by performing hand hygiene so that hands do not transfer microorganisms to a portal of entry.

5. Portals of Exit

Portals of exit are the routes by which an infectious agent (microorganism) leaves the reservoir (not all reservoirs have an obvious portal of exit e.g. the environment). Infectious agents are contained in blood, body fluids, excretions, secretions and skin of human reservoirs, depending on the agent, and leave the reservoir through the respiratory, gastrointestinal or integumentary (skin/mucous membranes) system. Reduction of excretions or secretions, or covering portals of exit e.g. dressings on wounds may break this link in the Chain of Infection.

6. Susceptible Host

An individual must be susceptible to the infectious agent (microorganism) for an infection to occur. Humans do not become infected with most animal viruses because they do not have the appropriate cell receptors, and individuals with circulating antibodies to vaccine-preventable diseases do not develop infection because the immune response prevents the infectious agent from multiplying. (See Part A, Section II, D). This link in the Chain of Infection can be broken by ensuring host defences are maximized, e.g. through immunization, optimal nutrition, reduction of smoking, and control of diabetes.

B. Sources or Reservoirs of Infectious Agents (microorganisms)

The sources or reservoirs of infectious agents transmitted in health care may be human or environmental. Portals of exit vary by reservoir and infectious agent.

1. Human Sources

Source individuals may have active clinical disease, be in the asymptomatic and/or incubation period of an infection or may be transiently or indefinitely colonized with microorganisms, particularly on the skin and mucous membranes. Human reservoirs include patients, HCWs, household members and other visitors.

Transmission of microorganisms in health care is increased by the presence of: patients who visibly soil the environment or cannot maintain appropriate hygiene including respiratory hygiene; patients who are cognitively impaired; patients with uncontained secretions or excretions; patients with wound drainage that cannot be contained by a dressing; patients with fecal incontinence if stools cannot be contained in incontinence products or diapers and those with viral respiratory or gastrointestinal infections, especially infants.

2. Animal Sources

This is not a common mode of transmission of HAI in most care settings. The advent of pet therapy in acute care and presence of companion animals in home and LTC provides some opportunity for zoonotic infection. Recently researchers have demonstrated transfer of MRSA and *C. difficile* to canine visitors, emphasizing the importance of hand hygiene and environmental cleaning before and after contact with animals in health care settings.

3. Environmental Sources

Environmental factors may either assist or impede the transmission of microorganisms. The environment may play a larger role in the survival and growth of certain microorganisms than previously appreciated, reinforcing

the importance of minimizing environmental contamination by patient secretions and excretions, avoiding unnecessary hand contact with environmental surfaces and ensuring high standards for environmental cleaning are maintained.

Respiratory viruses, rotavirus, norovirus, and *C. difficile* spores persist for prolonged periods in the environment. The role of the environment is increasingly recognized as an important source of patient to patient transmission of AROs.

The mobile environment, e.g. equipment and items that are shared between patients (if not cleaned between uses), may be contaminated following exposure to one patient and be a source of transmission to other patients. Examples of items implicated in the transmission of infection or known to be an environmental source of contamination are listed in Table 1.

Table 1: Examples of Environmental Sources of Contamination

Patient care items implicated in the transmission of infection	Patient care items contaminated but not clearly implicated in the transmission
• Contaminated blood pressure cuffs in the transmission of *C. difficile*, and Klebsiella spp • Contaminated thermometers in the transmission of VRE and *C. difficile* • Ultrasonic nebulizers in the transmission of MRSA • Reusable finger stick blood sampling devices in the transmission of hepatitis B • Environmental surfaces near infant bedside such as countertops, crib sides, pacifiers, toys in the transmission of RSV • Toys in the transmission of multi-drug resistant *Pseudomonas aeruginosa*	• Call bells contaminated with VRE • Bedside tables, bedrails and furniture contaminated with VRE and contaminated with MRSA • Tourniquets, monitoring devices, otoscopes, stethoscopes • Computers, computer keyboards and faucets • Furnishings, mattresses, curtains and linen • Apparel, neckties, medical charts

C. Exposure to and Routes of Transmission of Infectious Agents

1. Exposure to Infectious Agents (microorganisms)

Exposure occurs when a susceptible host comes into contact with an infected source or contaminated environment (e.g. inanimate/animate object or via particles in the air). Not all exposures lead to transmission and infection. The probability of transmission and infection is dependent on factors including host susceptibility, presence of host receptors for the microorganism, microorganism inoculum size, viability and virulence, and the effectiveness of the Hierarchy of Controls (see Part A, Section III, A) utilized by an organization and the individual barriers worn by a HCW.

Figure 2 illustrates the continuum of infectious agent exposure specific to the contact, droplet or airborne routes that may be relevant to a susceptible host with contact with an infected source or a contaminated environment (physical or passive, face-to-face contact or close contact (within two metres from an infected coughing source) and when a susceptible host inhales a microorganism (as an aerosol or droplet). Research has demonstrated that both droplet and airborne sized particles can be found in the air at close proximity (up to two metres) to a coughing/sneezing source. In addition, a portion of larger particles (droplets) may desiccate and so become smaller while in the air and become in effect, droplet nuclei. Particles with a diameter of 1µm to 10 µm may penetrate as far as the alveolar ducts (e.g. beyond the vocal cords) but may also be deposited at any point in the respiratory tract, e.g. as shown in Figure 3.

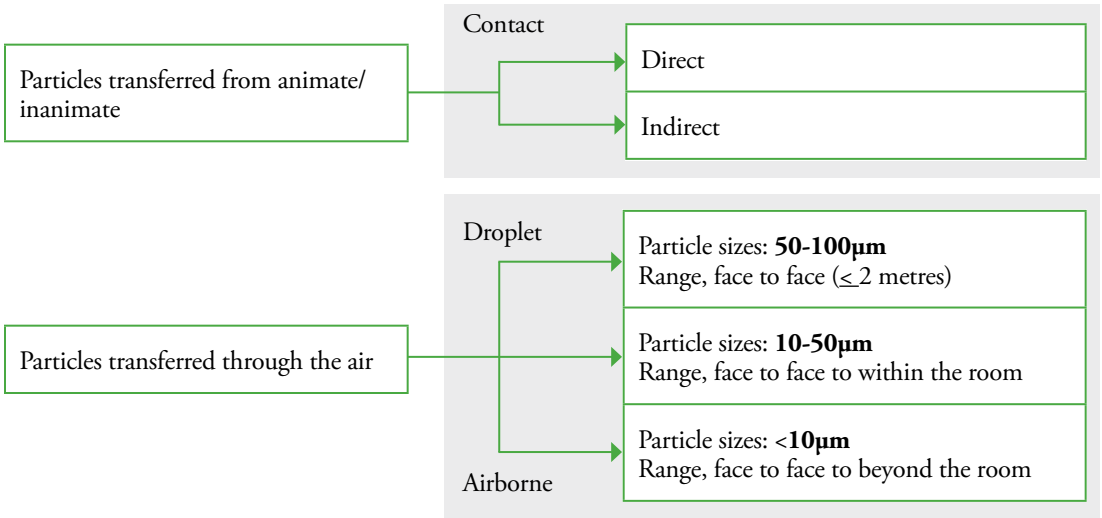


Figure 2: Exposure to Fomite Particles

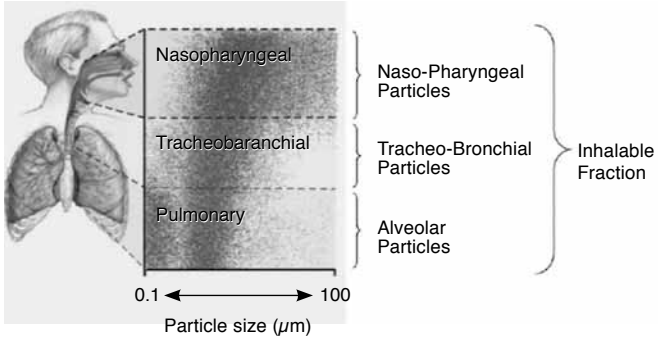


Figure 3: Deposition regions of the respiratory tract for the various particle sizes.

Continuum of Droplet and Airborne Exposure

The probability of airborne exposure to an infectious aerosol is influenced by several factors in addition to the proximity of the infected source to the host. These include the particle sizes containing the infectious agent, the viability of the infectious agent, and the animate and inanimate environment of a room, (e.g. the concentration of the viral particles in droplet nuclei, the concentration of aerosol in the room, the relative humidity, the direction of air flow and the number of air changes per hour in the room).

Particles of a variety of sizes are expelled from the human airway during coughing, sneezing, talking, and medical procedures. The size of these particles and the distance they will be propelled is dependent on the force generated by the individual or the procedure. Large particles (greater than 10 µm) will fall quickly (in a few seconds) to the ground. However, smaller particles may remain suspended for a significantly longer time: tens of seconds for a droplet of 10 µm diameter and minutes or hours longer for small droplet nuclei. The particles that remain aloft for minutes or hours (less than 10 µm diameter) can be carried by air currents over a measurable distance, including beyond the room, and are considered to represent an airborne exposure.

2. Routes of Transmission

Routes of transmission of microorganisms have conventionally been classified as contact, droplet, airborne, common vehicle and vectorborne. The routes of transmission vary with the microorganisms involved. For most microorganisms, transmission may primarily be by one route such as direct or indirect contact (e.g. rotavirus or *C. difficile*), droplet route (e.g. pertussis) or airborne route (e.g. *Mycobacterium tuberculosis*). Some infectious agents however, may be transmitted by more than one route, (e.g. RSV can be transmitted by both the droplet and contact routes).

a. Contact Exposure and Transmission

Contact exposure occurs when microorganisms are transferred through physical contact between an infected source and a host or through the passive transfer of the microorganisms to a host via an intermediate object. Hands can be contaminated by contact with an infected source or by contact with contaminated inanimate surfaces or objects in the immediate environment of an infected source.

Figure 4: direct contact where there is skin to skin contact between two persons

Contact exposure includes both direct contact and indirect contact:

i) Direct contact exposure occurs when the transfer of microorganisms results from direct physical contact between an infected or colonized source and a host (body surface to body surface without barriers) such as shaking hands as shown in Figure 4.

ii) With indirect contact exposure there is passive transfer of microorganisms to a host via an intermediate object, such as contaminated hands not cleaned between episodes of patient care, contaminated patient care equipment (e.g. commodes, wheelchairs, base of electronic thermometers, BP cuffs, monitoring equipment), surfaces such as bedrails that are not appropriately cleaned and disinfected between patients, or devices that have manufacturing defects that impede appropriate reprocessing.

Figure 5 indirect contact where there is contact with an inanimate object which may serve as the vehicle for transmission of pathogens

Other inanimate objects in the patient's environment that may also be involved include computers, toys, and electronic recreational devices that are not cleaned and disinfected between patients as shown in Figure 5.

Contact transmission occurs when contact exposure leads to an infectious dose of viable microorganisms from an infected/contaminated source resulting in colonization and/or infection of a susceptible host.

Microorganisms transmitted by the contact route include many of the epidemiologically significant microorganisms in health care settings such as *C. difficile*, AROs (e.g. MRSA, VRE), and the viruses that cause gastroenteritis (see Appendix VI). Other infectious agents, especially respiratory viruses (e.g. RSV, influenza, parainfluenza and rhinovirus) that are expelled in large droplets remain viable in droplets that settle on objects in the immediate environment of the patient and survive long enough on surfaces to contaminate the hands of patients or HCWs.

See Part C, Tables 5 & 6 for the complete list of microorganisms transmitted by the contact route. Prevention and control of infectious agents transmitted by the contact route requires adherence to Routine Practices and Contact Precautions.

b. Droplet Exposure and Transmission

Droplet exposure may occur when droplets that contain microorganisms are propelled a short distance (i.e. within 2 metres) through the air and are deposited on the mucous membranes of a host. Droplets may also contaminate the immediate environment when they settle on surfaces and may contribute to contact transmission as shown in Figure 6.

Figure 6: Droplet transmission, where large respiratory particles travel up to 2 metres

Droplets are generated naturally from an infected source primarily during coughing, sneezing, and talking or artificially through AGMPs. Aerosol-generating medical procedures may also result in the generation of smaller infectious droplets that can travel further than those generated spontaneously from patients (see Part A, Section II, C(c), for further discussion on AGMPs). The coughs and sneezes of some individuals, e.g., young children or frail elderly, may not be forceful enough to propel droplets as far as two metres.

Droplets of various sizes (see Figure 2) may contaminate the immediate environment when they settle on surfaces. Some microorganisms may remain viable for extended periods of time and contribute to contact transmission (e.g., many respiratory viruses). Large aerosol particles (i.e., greater than 10 µm diameter) will fall to the surface in a few seconds, and droplet exposure can only occur if the source and host are in close proximity (within two metres). Some microorganisms expelled in large droplets are very fragile and do not survive outside the human host or on surfaces (e.g. *Bordetella pertussis,* meningococcus).

Droplet transmission occurs when the droplets that contain an infectious dose of viable particles are propelled a short distance (i.e. less than two metres) through the air and are deposited on the mucous membranes of the eyes, nose or mouth of a susceptible host, and overcome host defences.

Microorganisms transmitted by the droplet route include viruses that cause respiratory tract infections (e.g. RSV, influenza, parainfluenza, rhinovirus, adenovirus), rubella, mumps, and *B. pertussis*. See Part C, Table 5 and Part C, Table 6 for a complete list of microorganisms transmitted by the droplet route.

Prevention and control of infections transmitted by

the droplet route involves immunization for those that are vaccine preventable and adhering to Routine Practices and droplet precautions.

c. Airborne Exposure and Transmission

Airborne exposure may occur if small particles (i.e. aerosols containing droplet nuclei) with viable microorganisms are generated and propelled over short or long distances, and inhaled. Aerosols containing viable microorganisms are generated naturally from an infected source during coughing, sneezing and talking or artificially through AGMPs. Airborne exposure may result immediately after generation (i.e. the direct projection of an aerosol containing viable amounts of microorganisms through the air, and directly captured by a susceptible host's respiratory system) or after a longer period of time. Droplet nuclei can remain suspended in the air for a period of time before settling out of the air during which time a susceptible host may inhale the suspended aerosol as shown in Figure 7.

Airborne transmission may occur when viable microorganisms contained in aerosolized secretions from an infected source are propelled a short distance (i.e. within two metres) through the air, are inhaled, come into contact with receptors in a susceptible host's airway, overcome host defences and cause disease. For transmission of infection to occur, the microorganisms contained in the particles must be capable of remaining viable in the air for a prolonged period of time and the susceptible host must be exposed to a sufficient concentration (infectious dose) of these viable microorganisms. Infection can result only if the appropriate receptors for the infectious agents are present at the site of exposure. Figure 3 depicts the regions of the respiratory tract with the size classification of particles and their corresponding region of deposition.

Figure 7: Airborne transmission whereby small particles travel long distances

Varicela zoster virus (chickenpox), *M. tuberculosis*, rubeola virus (measles) and smallpox, monkeypox and in certain circumstances viral hemorrhagic fever viruses, are infectious agents transmitted by the airborne route. Measles transmission has been reported up to 90 minutes after the index case has left the room.

See Part C, Tables 5 & 6 provide a complete list of microorganisms transmitted by the airborne route.

Prevention and control of infections transmitted by the airborne route involves vaccination against vaccine preventable diseases, and adhering to Routine Practices and Airborne Precautions as outlined in Part B, Section IV, sub-section (iii). Specific requirements related to airborne precautions are that only immune HCWs work with patients infected with chickenpox or measles and that airflow is controlled. Control of airflow ensures ventilation systems with adequate rates of air exchange and appropriate pressure differentials to maintain direction of flow as required for an airborne infection isolation room (AIIR).

Appendix III provides information regarding the length of time it takes for the removal of airborne contaminants in an empty room with no ongoing aerosol-generating source. This is the time required to ensure the room is safe to use for a new patient or staff to enter without a N95 respirator.

Aerosol-generating Medical Procedures

Aerosol-generating medical procedures can generate aerosols as a result of artificial manipulation of a patient's airway. Several types of AGMPS have been associated with an increased risk of tuberculosis (TB) or Severe Acute Respiratory Syndrome (SARS) transmission. While there is some evidence for the spread of infections via droplets and aerosols by these procedures, further research is needed to quantify the risk. Infection transmission may increase during AGMPs because of the potential to generate a high volume of respiratory aerosols that may be propelled over a longer distance than with natural dispersion. These procedures include:

- Intubation and related procedures (e.g. manual ventilation, open endotracheal suctioning)
- Cardiopulmonary resuscitation
- Bronchoscopy
- Sputum induction
- Nebulized therapy
- Autopsy
- Non-invasive positive pressure ventilation (CPAP, BIPAP)

Other medical procedures may result in the generation of aerosols but there is no published literature that documents transmission of respiratory infections, including TB, SARS or

influenza. Examples of such procedures include:

- High-frequency oscillatory ventilation
- Tracheostomy care
- Chest physiotherapy
- Obtaining nasopharyngeal swabs or aspirates

Patients should be carefully assessed for signs or symptoms of suspected or confirmed TB, SARS or other emerging respiratory infections prior to performing AGMPs. Strategies to reduce aerosol generation are required when performing AGMPs on patients with signs and symptoms of suspected or confirmed tuberculosis, SARS or other emerging respiratory infections (see Part B, Section IV, sub-section (iii) 1(b)). For novel influenza viruses or emergence of as yet unknown pathogens also refer to the PHAC website http://www.phac-aspc.gc.ca/nois-sinp/guide/pubs-eng.php for specific guidance documents.

Routine Practices are sufficient for AGMPs performed on patients with no signs or symptoms of suspected or confirmed TB, SARS or other emerging respiratory infections.

Figure 8: An example of common vehicle transmission is a contaminated multi-dose vial

d. Common Vehicle Transmission

Common vehicle transmission is infection acquired by multiple persons from a single contaminated source such as food, multi-dose vials, intravenous fluids) or equipment etc. Control is achieved by maintaining appropriate standards in the preparation of food and medications, and in decontamination of shared equipment. (Figure 8).

Figure 9: Disease transmitted by insects is an example of vectorborne transmissions

e. Vectorborne Transmission

Vectorborne transmission is transmission by insect vectors and is prevented by appropriate hospital construction and maintenance, closed or screened windows and proper housekeeping. Such transmission has rarely, if ever, been reported in Canadian health care settings. (Figure 9).

D. Host Factors

Microorganisms must gain access to a susceptible host by a receptive portal of entry for transmission to occur. The risk of transmission is influenced by the susceptibility of the host. The host's defences, if normal, may be able to eliminate a few microorganisms but be overwhelmed by a large number, while an immunocompromised host may not be able to eliminate even a few. Host defences, both non-specific (e.g. normal flora, intact skin, neutrophils, macrophages) and specific (antibodies, cell-mediated responses), may be altered by extremes of age, underlying disease (e.g. diabetes, HIV, malignancy/transplantation), genetic factors or medications. Additional factors that facilitate acquisition of microorganisms are: invasive/surgical procedures; radiation therapy; breaks in the skin and breaching of normal barriers such as occurs with the presence of invasive medical devices (e.g. endotracheal tubes, indwelling urethral catheters and intravascular devices); or provision of wound care.

E. Outcomes of Transmission of Infectious Agents (Microorganisms)

Whether or not transmission results in colonization, asymptomatic infection, or clinical disease depends on the pathogenicity and virulence of the infectious agent (microorganism), the inoculum size and the integrity of host defences (see Section II, D, above). Pathogenicity refers to the ability of the microorganism to cause disease (i.e. harm the host). Some microorganisms are inherently pathogenic and cause disease in any susceptible host (e.g. varicella); whereas others are opportunists causing infection only under special circumstances (e.g. coagulase-negative staphylococci in people who have prosthetic devices). Virulence refers to the intensity of pathogenicity and the ability to cause morbidity and mortality (e.g. Ebola has high virulence; rhinovirus has low virulence). Several factors contribute to the virulence of a microorganism: toxin production, invasiveness, presence of capsule, adherence mechanisms, and ability to survive in host cells. Inoculum size refers to the number of microorganisms transmitted to the host. Some microorganisms are highly pathogenic and need only a low inoculum to cause disease (e.g. *Shigella*).

1. Colonization

The presence of microorganisms in or on a host with growth and multiplication but without tissue invasion or cellular injury is referred to as colonization. For most microorganisms, colonization is far more frequent than clinical disease. Colonization of the nasopharynx with aerobic Gram negative rods occurs with increased severity of illness, malnutrition, major surgery,

alcoholism and diabetes. Colonization with *S. aureus* is common in normal healthy persons. Some patient populations are heavily colonized with *S. aureus* e.g. hemodialysis patients, injection drug users, and patients with diabetes mellitus or skin disorders.

Disturbance of the normal flora by antimicrobials enhances overgrowth of endogenous aerobic Gram negative rods and enterococci, and increases risk of colonization with exogenous microorganisms, including antimicrobial resistant bacteria and yeast. The presence of normal or endogenous bowel flora is a defence mechanism against colonization of the gastrointestinal tract by exogenous microorganisms. The endogenous flora (e.g. bacteria residing in the respiratory or gastrointestinal tract) are also a cause of HAIs. Once acquired, prolonged carriage of antimicrobial resistant organisms (AROs) is common in some patient populations; such as colonization with resistant strains of *P. aeruginosa* or *Burkholderia cepacia* in persons with cystic fibrosis or persistent VRE colonization in dialysis and other patient populations.

2. Asymptomatic Infection/Clinical Disease

Infection may or may not lead to clinical disease (illness). Infection may cause cellular and tissue changes that may be detectable in the absence of overt signs and symptoms. This is a subclinical or asymptomatic infection. When sufficient cellular and tissue changes occur to produce overt signs and symptoms, the individual has clinical disease, which may range from mild to severe, depending on the microorganism and the health status of the host.

III. Control Measures to Reduce Health Care Worker Exposure to and Transmission of Microorganisms

A. Hierarchy of Controls to Reduce Exposure to and Transmission of Infectious Agents

The approach to containment of a hazard is to implement a Hierarchy of Controls. The first level of control is engineering interventions. If this level of control is not possible or adequate, then administrative interventions are used. Last in the Hierarchy of Controls is PPE. PPE is not the first control measure as the use is dependent on variables of worker adherence. An understanding of the engineering, administrative (including patient care practices), and PPE controls enables health care organizations to determine how the health care environment in each setting (e.g. infrastructure, equipment, processes and practices) increases or decreases a susceptible host's (e.g. patient, HCW, visitor, etc.) likelihood of exposure to a microorganism/infected source within the health care setting.

1. Engineering Controls

The engineering control tier reduces the risk of exposure to an infectious agent/infected source hazard by applying building structure or ventilation strategies. Engineering controls do not depend on an individual's compliance with exposure prevention strategies. These controls are usually established and controlled within the building structure, thereby eliminating an individual's choice about their application and reducing the opportunity for individual error. As such, they provide more effective protection.

2. Administrative Controls

The administrative control tier provides an infrastructure of policies and procedures and patient care practices intended to prevent exposure to and/or transmission of microorganisms to a susceptible host during the provision of health care. To be effective, administrative controls must be implemented at the point of first encounter with an infected source and be continued until the infected source leaves the health care setting or is no longer infectious. Inherent in the development of administrative controls to prevent transmission of infection is the commitment by the health care organization to provide the necessary resources to implement the controls.

3. Personal Protective Equipment

Although the use of PPE controls are the most visible in the Hierarchy of Controls, PPE controls are the weakest tier in the Hierarchy of Controls and should not be relied on as a stand-alone primary prevention program. The PPE tier provides a physical barrier between the uninfected and an infectious agent/infected source. These barriers include: gloves, gowns, masks, facial protection, eye protection, (including face shields,

masks with visor attachments), and N95 respirators. The health care organization must ensure the availability of appropriate PPE for use by patients, HCWs, visitors, contractors, etc. to prevent exposure to an infectious agent/infected source.

Focusing only on availability and use of various PPE to the exclusion of other tiers in the Hierarchy of Controls will result in suboptimal protection of all persons in the health care setting, including patients, HCWs and other staff. The effective and appropriate use of PPE is the control that is most reliant on the user's adherence and competence and is, therefore, the control most easily compromised (resulting in ineffective protection from an infectious agent/infected source). See Appendix IV, *Technique for Putting on and Taking off PPE.*

Table 2: Examples of Control Measures According to Hierarchy of Controls

TIER 1: Examples of Engineering Controls

- Source control
  - Single rooms with private toilets, patient sink, designated staff hand washing sinks
  - Airborne infection isolation rooms (AIIRs)
  - Signage to direct patients to separate entrances (during community outbreaks) for patients symptomatic with respiratory infections
  - Physical barriers, e.g. partitions in triage areas to prevent exposure to patients symptomatic with respiratory infections
  - Appropriate ventilation, which may include natural ventilation in the home , when appropriate
- Installation of
  - Point of care ABHR
  - Point-of-use sharps containers
  - Appropriately functioning, accessible dispensers for hand hygiene products (ABHR, soap, lotion, paper towels) and respiratory hygiene/cough etiquette products
  - Designated hand washing sinks for HCW use
- Appropriate number of commodes
- Appropriate supply of and accessibility of PPE
- Appropriate number of accessible hands-free receptacles for disposal of paper towels, tissues, masks, gloves etc.

TIER 2: Examples of Administrative Controls

- Appropriate resources for diagnosis and treatment of infection or colonization and for immunization of patients and staff
- Organizational support for effective IP&C and OH services and for management of outbreaks
- Appropriate OH and safety policies, including pre-placement assessment, work restrictions, Respiratory Protection Program, sharps safety and prevention of exposure to BBPs and immunization programs
- Education of HCWs
- Policies, procedures and resources to support the application of:
  - Point of Care Risk Assessment (PCRA)
  - Point of care ABHR as the standard of care in all health settings
  - Routine Practices as the standard of care for all patients in all health care settings
    - Source control (instructions for patients)
    - Patient placement, transport and movement
    - Aseptic technique
    - Dedicated patient care equipment and cleaning of non-critical equipment between patients
    - Reprocessing (cleaning, disinfection and sterilization) of reusable patient care equipment
    - Environmental cleaning
    - Management of linen, waste
    - Management of visitors
- Additional Precautions when PCRA determines Routine Practices are not sufficient (e.g. AIIR) respiratory protection)

TIER 3: Examples of Personal Protective Equipment to Prevent Exposure of Patients, HCWs and other Staff

Following PCRA, personal protective equipment for the appropriate application of Routine Practices and Additional Precautions may include:

- Gloves
- Gowns
- Masks (surgical or procedure masks used by HCW and/or infectious source)
- Facial protection (masks and eye protection, face shields, masks with visor attachment)
- Respirators (e.g. N95)

B. Organizational Responsibilities to Reduce Exposure to and Transmission of Infectious Agents

1. Organizational Risk Assessment (ORA)

This ORA is central to any health care organization's preparation and planning to protect all individuals (e.g. patient, HCW, visitor, contractor, etc.) from HAIs in all health care settings. Organizations have a responsibility to provide information and train HCWs regarding the organization's ORA and its impact on their practice. For example, the availability of functioning AIIRs may impact when and where AGMPs are performed and may influence the PCRA performed by HCWs.

An ORA should be conducted on an annual basis and re-evaluated when major reorganization/restructuring and building/renovation take place. The need for an ORA applies to all levels of health care settings including prehospital care, acute care, LTC, ambulatory care and home care settings. Ongoing systematic evaluation of the ORA will be required to ensure that policies, procedures and programs:

- are consistent across the organization;
- achieve their stated objectives;
- are in compliance with current applicable regulations.

The ORA will characterize the organization's patient population, level and intensity of health care provided and resources available including skilled workers. It will need to evaluate the effectiveness of present control measures and the breadth of the Hierarchy of Controls in order to prevent HAIs.

To conduct the ORA an organization will need to:

- Determine situations/conditions where infectious microorganisms might exist.
- Evaluate the potential for exposure to and/or transmission of the microorganism.
- Determine the consequences of exposure to the microorganism.
- Determine the severity of illness caused by the microorganism.
- Determine the consequences of transmission of the microorganism on individuals, organizations and the community.
- Assess available control measures in place (e.g. engineering, administrative, and PPE) to mitigate exposure to or transmission of the microorganism in the specific health care setting.

2. Organizational Control Measures

Once the ORA is completed, control measures should be implemented to address any areas of concern. Such control measures can be at one or more of the three levels of the Hierarchy of Controls. Appropriate ventilation and hospital design (e.g. AIIRs, single patient rooms) are engineering controls while education of HCWs, Routine Practices and Additional Precautions and OH (e.g. Respiratory Protection Programs) are administrative controls.

2.1 Engineering Controls

a. Health Care Facility Design, Renovation and Construction

Facility design is an example of engineering control. Room design, ventilation systems, room air flow and human traffic patterns, positioning of ABHR dispensers, designated hand washing sinks, and physical barriers to separate patients in multi-bed wards in waiting areas, etc. are all examples of engineering controls. Adherence to spatial separation requirements (i.e. preferably a high proportion of single patient rooms or alternatively two metre separation between patient spaces) when designing new health care facilities, planning renovations to existing facilities or re-organizing patient care areas will enhance a health care organization's ability to prevent transmission of infections.

Health care facility design related to IP&C also includes appropriate number, location, and type of AIIRs; location(s) of special ventilation and filtration, such as emergency department triage and waiting areas; air handling and ventilation needs in surgical services and laboratories; local exhaust systems for hazardous agents and other special areas; water systems to limit *Legionella* species and waterborne opportunistic pathogens and consideration of preferred surface characteristics (of the ideal product), such as:

- Ease of maintenance/repair and cleanability
- Does not support microbial growth
- Nonporous – smooth
- Durable

- Sustainable
- Ease of installation, demolition and replacement
- Seamless
- Resilient, impact resistant.

Collaboration between IP&C/OH professionals and health care building engineers has led to better understanding and application of a tiered framework of measures/interventions that enables health care organizations to comprehensively evaluate the risk of exposure of HCWs (including volunteers) to microorganisms and other hazards in the workplace and the effectiveness of the health care organization's mitigation responses.

b. Heating, Ventilation and Air Conditioning (HVAC) in Health Care Facilities.

To ensure optimal performance of ventilation systems for removal of particulates, and elimination of excess moisture, organizations have a responsibility to design, construct, install and maintain ventilation systems in accordance with engineering and manufacturer recommendations. Recommendations for HVAC systems particular to health care facilities have been published.

Health care settings that provide care for, or potentially may care for patients with suspected or confirmed airborne transmissible infections require an adequate number of AIIRs (also called negative pressure rooms). The ORA should determine the appropriate number of AIIRs required. AIIRs are recommended for placement in the following areas in health care facilities, including but not limited to, emergency rooms, critical care settings, medical units, bronchoscopy and autopsy suites. Specifications for newly constructed and existing AIIRs are outlined in several publications. Recommended air changes per hour (ACH) for new or renovated AIIRs and for autopsy rooms, sputum induction rooms and bronchoscopy suites are 12 ACH (while existing AIIRs should be at least 6 ACH). A continuous negative air pressure differential of 2.5 Pa should be maintained

Specific requirements for HVAC in Operating Room settings are beyond the scope of this document. These are available from AIA Canadian Standards Association (CSA). http://www.csa.ca/cm/ca/en/home

c. Source Control

Source control measures are used to contain microorganisms from dissemination from an infectious source. Patients and other persons with symptoms require direction at the point of initial encounter in any health care setting (e.g. triage in emergency departments, acute assessment settings, reception and waiting areas in emergency departments, outpatient clinics and physician offices) and in strategic places (e.g. elevators, cafeteria) within ambulatory and inpatient settings. Policies and procedures (administrative controls) should be implemented to develop a program for source control.

Source control measures may include but are not limited to:

- Signage at entrances to health care settings for early recognition of symptoms (e.g. syndromic screening)
- Separate entrances/waiting areas
- Spatial separation
- Physical barriers for acute assessment
- Early identification, diagnosis and treatment of infection
- Respiratory hygiene
- Hand Hygiene
- Patient placement (e.g. patient care areas, single rooms/AIIRs)
- Strategies to reduce aerosols during AGMPs (see Part B, Section IV, sub-section (iii) 1(b)).

i) Spatial Separation

Appropriate spatial separation and spacing requirements are necessary to decrease exposure to microorganisms for patients and visitors in clinical and waiting areas. A two metre spatial distance between a coughing/sneezing infected source (e.g. symptomatic individual with an acute respiratory illness) and an unprotected susceptible host (e.g. patients, HCWs, visitors, contractors, etc.) is now recommended to prevent the transmission of droplet borne infectious particles.

Spatial separation requirements should be included when designing new health care facilities or planning renovations to existing facilities (see Part A, Section III, B, 2,).

ii) Respiratory Hygiene
Respiratory hygiene refers to a combination of measures designed to minimize the transmission of respiratory pathogens. These source control measures are targeted to all individuals with symptoms of respiratory infection starting at the initial encounter in a health care setting and maintained throughout every encounter in the health care setting (e.g. triage in emergency departments, reception in ambulatory clinics or health care provider offices, in strategic places e.g. elevators, cafeteria). Respiratory hygiene involves educating and encouraging all individuals (patients, HCWs and visitors) who have the physical and cognitive abilities to do so, to practice respiratory hygiene. Specific measures may include instructional signs, education programs and provision of materials for respiratory hygiene (e.g. tissues, hands-free plastic lined waste receptacles, ABHR, etc.).

iii) Hand Hygiene
Organizational barriers related to engineering controls such as a lack of accessibility to and maintenance of hand hygiene facilities and poor access to hand hygiene products negatively impact adherence to hand hygiene. Organizations have the responsibility to ensure such barriers are addressed. Refer to PHAC Infection Control Guidelines for *Hand Washing, Disinfection and Sterilization in Health Care 1998*. http://alturl.com/souwd

iv) Patient Placement
In an effort to increase access to limited inpatient beds and reduce Emergency Department crowding, some Canadian hospitals have developed "Overcapacity" or "Full Capacity" protocols (i.e. admitting patients to inpatient units that are already at maximum capacity). The Canadian Patient Safety Institute (CPSI) has noted concerns that such protocols may expose inpatients to increased risks of hospitalization, including risk of health care acquired infection, such as MRSA. CPSI advises that hospitals should take every necessary step to avoid use of Overcapacity protocols and that an Overcapacity protocol should not be considered the norm in the delivery of hospital services. Hospitals that may require short term use of Overcapacity or Full Capacity protocols should develop and implement policies and practices that minimize risk of spread of infection through overcrowding and understaffing. Patients who present to hospital with acute transmissible infections (e.g. including, but not limited to vomiting, diarrhea, fever, cough, coryza, shortness of breath) are not candidates for Overcapacity placement.

v) Strategies to Reduce Aerosols during Aerosol-Generating Medical procedures
See Part A, Section II, C, 2(c) for discussion on AGMPs and Part B., Section IV, sub-section (iii) 1(b), for strategies to reduce the risk of aerosol generation.

3. Administrative Control Measures

a. Occupational Health Program

An objective of an Occupational Health (OH) program is to identify risk situations with the potential for occupational exposure or transmission of a microorganism either to or from the HCW and other individuals. Components of an OH program that support the use of Routine Practices and Additional Precautions to prevent exposure or transmission of microorganisms can be found in the PHAC Infection Control Guidelines *Prevention and Control of Occupational Infections in Health Care* http://alturl.com/9sjk7 . Refer to Manitoba Workplace Health & Safety Act & Regulation and http://www.gov.mb.ca/labour/safety/ and Manitoba Workplace Health & Safety Act & Regulation and http://web2.gov.mb.ca/laws/statutes/ccsm/w210e.php

- Pre-placement assessment (at time of employment)
- Ensuring immunity to vaccine preventable infectious diseases
- Tuberculosis screening (pre-placement and screening as per organizational policies)
- Annual influenza immunization
- Policies for management of HCWs with infections
- Management of latex and other glove component allergies
- Prevention of exposure to BBPs, including a sharps safety program (see i), below)
- Management of HCWs who cannot wear PPE (e.g. respirators).

For management of HCWs unable to comply with hand hygiene recommendations, refer to PHAC Infection Control Guidelines for Hand Washing, Disinfection and Sterilization in Health Care 1998. http://alturl.com/souwd

- Respiratory Protection Program (see ii.), below)

i) Sharps Safety and Prevention of Exposure to Bloodborne Pathogens

The prevention of sharps injury and HCW exposure to BBPs is a component of Routine Practices.

Users of sharps require education and training about how to safely handle sharp devices to prevent injuries to themselves and to others who may encounter the device during or after procedures. Safety programs should include a formal incident investigation for every sharp injury occurring in the work setting. The CDC workbook for designing, implementing and evaluating a Sharps Injury Prevention Program is available at: http://www.cdc.gov/sharpssafety/pdf/sharpsworkbook_2008.pdf

Use of safety engineered devices such as using protected needle devices, needle-free systems with self-sealing ports, and syringes with safety features, have been reported to reduce needlestick injuries. Their use has been identified as a priority in risk-reduction strategies. In some jurisdictions these safety devices are required under regulation; refer to local regulations. The choice of specific needleless devices for a health care organization should be considered carefully as some models have demonstrated a risk for patients. Refer to CSA: Z316.6-07–Evaluation of Single-Use and Reusable Medical Sharps Containers for Biohazardous and Cytotoxic Waste http://shop.csa.ca/en/canada/medical-laboratory-systems/z3166-07/invt/27017482007/

ii) Respiratory Protection Program

Respiratory protection requires the use of a respirator classified as N95 or higher filtration to prevent inhalation of aerosols containing infectious particles. Respirators are required for the care of patients with airborne respiratory pathogens (e.g. TB, measles) and in some situations when AGMPs are performed. (See Part B, Section IV, sub-section (iii) 7, below). Health care organizations that use respirators should have a Respiratory Protection Program (RPP) in place. The RPP should provide health screening, fit testing/re-testing and training to all HCWs who may wear a respirator. The organization should be committed to developing, implementing, maintaining, and evaluating the RPP.

Health care organizations are responsible for choosing specific respirator brands, models and sizes to be used by their workforce while taking into consideration the diversity of their workforce and patient population. Organizations are to ensure their workforce has access to recommended respirator models and sizes as required by local Labour Code and Occupational Health requirements .Refer to CSA z94.4 Selection and Use of Respirators http://www.safemanitoba.com/uploads/bulletins/standardcsa_respirator_z94_4_02.pdf

Organizations should consider the following:

- When respirators are being selected by the organization, those with inherently good fit characteristics are preferred.
- Respirators from more than one manufacturer may be required to fit the range of ethnic groups/facial structures represented within the organization's workforce. In most Canadian jurisdictions, HCWs and other staff who need to wear a tight fitting respirator require formal fit-testing. Most jurisdictions require that fit-testing be repeated on a set schedule (e.g. at least every 2 years as per the CSA standard or as defined by jurisdictional regulations), or more frequently if facial conditions change (e.g. weight gain/loss, dental work, etc).
- If an organization chooses to change the brand and/or model of respirators available for use, it should be aware that fit testing results are not transferable between respirator brands and/or models.
- Health care organizations should develop policies for HCWs who are unable to form a tight facial seal when wearing a respirator (e.g. facial deformities, men with beards for religious reasons, etc.).

Health care workers should consider the following:

- Health care workers should only use respirators to which they were fit tested.
- Health care workers and other staff should be knowledgeable of the applications, advantages and limitations, and proper use of the specific respirator model(s) for which they have been fitted.
- Each time HCWs put on a respirator they are to perform a fit seal check (elsewhere referred to as a "user" seal check) to enable proper functioning of the respirator.

Refer to CSA z94.4 Selection and Use of Respirators http://www.safemanitoba.com/uploads/bulletins/standardcsa_respirator_z94_4_02.pdf

b. Education of Health Care Workers

Education and training on IP&C policies and procedures should be provided to all HCWs during their training in health professions, during employment orientation, as a result of special circumstances (e.g. outbreaks, new equipment/information) and on a regular basis. Health care organizations have the responsibility to provide the training and HCWs have the responsibility to take advantage of educational opportunities. Planning and evaluating educational programs for an adult learner is complex and appropriate resources should be consulted e.g. (Community and Hospital Infection Control Association – Canada, IP&C core competencies for HCWs, Planning Programs for Adult Learners). It is important that topics, methods and materials for education and training are appropriate to the level of the HCW understanding and responsibility. Content for Routine Practices and Additional Precautions education and training sessions should include but is not limited to:

- Point of Care Risk Assessment
- Transmission of microorganisms (Chain of Infection)
- Prevention of exposure to microorganisms
- Importance of immunization
- Indications for hand hygiene (ABHR at point of care as preferred method)
- Indications for and appropriate application of aseptic technique
- Safe use and disposal of sharps
- Cleaning and disinfection of non-critical patient care equipment between patients
- Patient/visitor education
- Indications for and appropriate use of PPE
- Implementation of Additional Precautions
- How to use Part C Table 5 to implement Additional Precautions empirically
- How to use Part C Table 6 to modify or discontinue Additional Precautions

c. Reprocessing of Patient Care Equipment

i) Processing and Reuse of Single-use Medical Devices

The appropriate reprocessing (i.e. cleaning, disinfection and sterilization) of reusable medical devices (e.g. equipment, instruments) is important in preventing the transmission of microorganisms, and must be performed according to published guidelines and standards.

Spaulding developed a system to classify the cleaning, disinfection and sterilization requirements for equipment used in patient care. This system divides medical devices, equipment and surgical materials into three categories (i.e. non-critical, semi-critical and critical) based on the potential risk of infection involved in their use. Health care workers need to be able to identify semi-critical and critical items that require reprocessing by high level disinfection or sterilization. Health care workers also need to be able to identify non-critical equipment and ensure it has been cleaned before use (see d. below).

Reprocessing of reusable medical devices can occur within a hospital or regional health facility, or it can be contracted to a third-party reprocessor. When third-party reprocessors are contracted, provincial/territorial regulations should apply. Reusable devices need to be reprocessed by trained personnel under the supervision of specially trained individuals. To the greatest extent possible, reprocessing should be in a centralized location and audited on a regular basis. Where this is not possible single-use disposable devices are preferred.

Identification and reprocessing of prion contaminated equipment (agents responsible for Transmissible Spongiform Encephalopathies (TSE) e.g. CJD require more rigorous and highly specific processes Refer to:

PHAC Infection Control Guidelines for Classic Creutzfeldt- Jakob Disease http://alturl.com/8jnfx

ii) Reprocessing and Reuse of Single-use Medical Devices (SUD)

Devices designed and sold for single-use are not intended for reprocessing and reuse. Concerns related to reprocessing SUDs include the increased risk of patient adverse events, legal liability, ethical concerns and the cost-effectiveness of reprocessing. When SUDs are reprocessed, cleaning, functional testing, repacking, relabeling, testing for pyrogenic

substances and disinfection or sterilization must be appropriate. Health care organizations contracting third-party reprocessors for this purpose must adhere to provincial/territorial legislation. Currently there is no process to regulate third-party reprocessors of SUDs in Canada. For this reason, facilities that choose to reprocess SUDs must contract with Food and Drug Administration (FDA) regulated facilities in the US.

iii) Cleaning and Disinfection of Non-critical Patient Care Equipment

Contamination of patient care equipment, items in the patient environment and the patient's environment has been implicated in transmission of infection. Used or potentially contaminated items that have contact with a patient's intact skin should always be cleaned before use with another patient.

d. Environmental Cleaning Measures to minimize exposure to environmental contamination include:

- Dedicating non-critical medical equipment to a single patient. Assigning responsibility and accountability for routine cleaning of patient care equipment.
- Ensuring environmental cleaning follows a set procedure and frequency, documented and supervised by adequately trained dedicated personnel.
- Ensuring surfaces are constructed of materials that can be easily cleaned at the point-of-use.
- Increasing the frequency of cleaning and disinfecting frequently-touched surfaces.
- Monitoring adherence to recommended environmental cleaning practices.
- Ensuring rooms are terminally cleaned following patient discharge and after discontinuing precautions (see Appendix II).
- Determining what product to use for routine environmental cleaning.

When continued transmission of selected microorganisms (e.g. norovirus, rotavirus, *C. difficile*) occurs, use of specific disinfectant products may need to be considered. In outbreak situations or when there is continued transmission, rooms of CDI patients should be decontaminated and cleaned with chlorine-containing cleaning agents (at least 1,000 ppm) or other sporicidal agents.

Additional information is available in the CDC/HICPAC *Guideline for Disinfection and Sterilization in Health care Facilities,* 2008 http://www.cdc.gov/hicpac/pdf/guidelines/Disinfection_Nov_2008.pdf

CDC's Guidelines for Environmental Infection Control in Health-care Facilities http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm

e. Waste

Most waste generated in health care settings is no more hazardous than household waste. Local regulations may require special handling of sharps and some biomedical waste e.g. sponges, dressings, or surgical drapes soaked with blood or secretions. Waste receptacles should be conveniently located and, preferably, hands-free.

Additional information is available in the CSA Handling of waste materials in health care facilities and veterinary health care facilities and the PHAC Infection Control Guidelines Hand Washing, Cleaning, Disinfection and Sterilization in Health Care http://alturl.com/5yx4h

f. Linen

Linen in health care facilities may become contaminated with pathogens but risk of disease is negligible. Care should be taken in the handling of soiled linen to prevent dispersal of microorganisms. Special handling of linen from patients on Additional Precautions is not required.

If laundry chutes are used, they should be properly designed, maintained, and used in a manner to minimize dispersion of aerosols from contaminated laundry. Clean linen should be transported and stored in a manner to prevent inadvertent handling or contamination by dust, which may contain fungal spores harmful to immunocompromised patients.

Additional information is available in the PHAC Infection Control Guidelines Hand Washing, Cleaning, Disinfection and Sterilization in Health Care

CCDR . Volume 2458, 1998
And from the following CDC guidelines : http://www.cdc.gov/hicpac/pdf/guidelines/Disinfection_Nov_2008.pdf Guidelines for Environmental Infection Control in Health-care Facilities. http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm

g. Management of Deceased Bodies

There are no special requirements when handling deceased bodies. Routine Practices properly and consistently applied are sufficient. Refer to Manitoba Health, *Public Health Act*, Dead Bodies Regulation http://web2.gov.mb.ca/laws/regs/pdf/p210-027.09.pdf

h. Management of Pets/Animals

The use of pet therapy in health care may have benefits to patients. Policies and procedures for animal health screening and IP&C for animal-assisted interventions in health care facilities are an organizational responsibility. Recommendations for IP&C practices related to animal health screening and interventions in health care facilities have been published.

C. Health Care Worker Responsibilities

1. Point of Care Risk Assessment

Prior to every patient interaction, all HCWs have a responsibility to assess the infectious risk posed to themselves and other patients, visitors, and HCWs by a patient, situation or procedure. The PCRA is an evaluation of the variables (risk factors) related to the interaction between the HCW, the patient and the patient's environment to assess and analyze their potential for exposure to infectious agents and identifies risks for transmission. This PCRA is based on judgement about the clinical situation and up to date information on how the specific health care organization has designed and implemented engineering and administrative controls, availability and use of PPE. Control measures are based on the evaluation of the variables (risk factors) identified.

Health care workers should routinely perform PCRAs many times a day and apply control measures for their safety and the safety of patients and others in the health care environment.

For example, a PCRA is performed when a HCW evaluates a patient and situation to:

- Determine the possibility of exposure to blood, body fluids, secretions and excretions and non intact skin and select appropriate control measures (e.g. PPE) to prevent exposure.
- Apply strategies to reduce aerosol generation during AGMPs (see Part B, Section IV, sub-section (iii), 1(b).)
- Determine the need for Additional Precautions when Routine Practices are not sufficient to prevent exposure.
- Determine the priority for single rooms or for roommate selection if rooms are to be shared by patients.

a. Variables (risk factors) Affecting Control Measures

Control measures to prevent exposure or transmission may differ for different microorganisms, patients or procedures and different settings. For example, measures to reduce the transmission of respiratory infections will differ from those to reduce the transmission of gastrointestinal infections. Certain patients (e.g. young children, incontinent adults or cognitively impaired individuals) or specific procedures for certain patients may increase the risk of transmission, thereby requiring different control measures. HCWs are at higher risk of exposure to respiratory viruses when providing care to patients who have copious respiratory secretions or frequent cough and unable to perform self-care, including respiratory hygiene and hand hygiene. AGMPs have been shown to increase the transmission of TB and SARS and therefore require specific control measures (see Part B, Section IV, sub-section (iii), 1(b).

Some infections may be more readily transmitted in paediatric settings compared to adult settings. Infection is a frequent cause of health care utilization by young children, who often harbour microorganisms, especially respiratory and gastrointestinal viruses that they may shed even if asymptomatic. Young children are also susceptible to many infections as they may not yet have developed immunity to many microorganisms. The close proximity of large numbers of infectious persons and susceptible hosts favours transmission, as do behavioural characteristics of young children such as incontinence, inadequate hygiene, frequent mouthing of hands and toys or other objects, drooling, and direct contact between children during play. In addition, basic care requires frequent hands-on contact from HCWs and parents. Shared toys, playrooms and visiting siblings also contribute to the transmission risk.

The risk varies in different settings (e.g. prehospital, acute, LTC, ambulatory and home care). Therefore, control measures may need to be modified

depending on the health care setting rather than imposing the same level of precautions in each setting. The usual care model of LTC is to provide a home-like setting with participation in activities of daily living requiring a balanced approach offering a safe environment without undue restrictive measures that could be detrimental to the individual's overall well-being or quality of life. For prehospital care there is a potential for increased risk of transmission as it is an uncontrolled environment.

The risk of transmission between patients increases when patients share rooms rather than being accommodated in a single patient care room.

b. Knowledge and Skills Required for Point of Care Risk Assessment

Health care workers require knowledge, skills and resources to perform a PCRA before every interaction with a patient in order to apply appropriate precautions. To perform a PCRA each HCW needs to understand the following:

- The links in the Chain of Infection
- Variables that influence transmission of microorganisms such as type of exposure, size of inoculum, host susceptibility and control methods that reduce risk
- Characteristics of the microorganism including reservoirs, infectivity, mode of transmission, incubation period, period of communicability, and virulence
- How to apply a risk assessment appropriate to their level of education of the HCW and the specific job/responsibilities
- Patient care practices that contribute to exposure to microorganisms
- Exposure risks specific to the health care setting
- Environmental circumstances
- The level of risk and the appropriate control measures to reduce the risk of transmission of microorganisms
- How to consult with IP&C with concerns or questions
- Control measures may differ with different microorganisms and in different health care settings.

c. Application of Point of Care Risk Assessments

- When performing a PCRA, each HCW considers questions to determine the risk of exposure and potential for transmission of microorganisms during patient interactions. Examples of such questions are:
- What contact will the HCW have with the patient?
- What task(s) or procedures(s) is the HCW going to perform? Is there a risk of splashes/sprays?
- If the patient has diarrhea, is he/she continent? If incontinent, can stool be contained in a diaper or adult incontinent product?
- Is the patient able and willing to perform hand hygiene?
- Is the patient in a shared room?

Tables 3 and 4 provide an overview PCRA, using *C. difficile* and influenza as examples of some variables (risk factors) identified in the questions above to consider when applying a PCRA. The tables outline how the risk of exposure and potential transmission changes depending on variables in the infected source, environment, and susceptible host.

The PCRA in the examples in Tables 3 and 4 provides information regarding:

- **An infected source:** the PCRA should evaluate the changing nature of the infected source's symptoms and environment to determine the appropriate PPE for HCW, other staff members and visitors. The PCRA should also determine if there is a need to move the patient to a single room with a private bathroom and any other practice changes required to address a change in a patient's condition.
- **A susceptible host** (other patients, HCWs, visitors, contractors, etc.): a PCRA should evaluate whether the susceptible host has developed an infection such as CDI (e.g. cross infection from a roommate/HCW) or whether the risk posed by an infected source has increased or decreased (e.g. diarrhea has increased or stools are now formed). The PCRA should lead to a determination of appropriate PPE required to care for the patient in various situations. Examples include: changing diaper products, taking BP or delivering meal trays without patient or environmental contact, whether there is a need to move the patient or the

Table 3: Variables (risk factors) Influencing Transmission Risk using *C. Difficile* as an Example of Contact Spread

	Higher Transmission Risk	Lower Transmission Risk
Infected source	• Frequent diarrhea • Incontinent • Poor hygiene • Not capable of self-care due to physical condition, age or cognitive impairment	• Formed stools • Continent • Good hygiene • Capable of self-care
Environment	• High patient-nurse ratio • Shared bathroom, shared sink • Shared commode without cleaning between patients • No hand hygiene at point of care • No designated staff hand washing sink or sink is used for other purposes or sink is dirty • Inadequate housekeeping	• Low patient-nurse ratio • Single room, private in-room toilet, designated patient hand washing sink • Designated commode • Hand hygiene at point of care • Accessible, designated, clean staff hand washing sink • Appropriate housekeeping
Host/Susceptible Host	• Requires direct patient care • Poor personal hygiene	• Capable of self-care • Good personal hygiene

roommates to another area, whether there is a need for enhanced housekeeping and any other care practices required as a result of the change in risk for *C. difficile* acquisition.

d. Applying Control Measures following PCRA

Additional Precautions are applied consistent with organizational policies and procedures. The PCRA of the circumstances of the patient, the environment, and task to be performed determine the control measures required. Control measures are at the level of HCW patient care practices and PPE in the Hierarchy of Controls and may include:

- Hand hygiene, ensuring point of care ABHR is available and used (the standard of care for all HCWs in all health care settings)
- Patient placement and accommodation giving priority to patients with uncontained wound drainage or uncontained diarrhea into a single room or placing a patient with suspected or confirmed airborne infection into an AIIR with the door closed
- Treatment of active infection
- Roommate selection for shared rooms or for transport in shared ambulances (and other types of transportation e.g., air ambulances, taxis), considering the immune status of patients who will potentially be exposed to certain infections (e.g. measles, mumps, rubella, varicella).
- Patient flow, restricting the movement of symptomatic patients within the specific patient care area/facility or outside the facility as appropriate for the suspected or confirmed microbial etiology.
- Work assignment, considering the immune status of HCWs who will potentially be exposed to certain infections (e.g. measles, mumps, rubella, and varicella).
- Personal protective equipment selection, applying PPE appropriate to the suspected or confirmed infection or colonization.
- Cleaning of non-critical patient care equipment and the patient environment.
- Handling of linen and waste.
- Restricting visitor access where appropriate.
- Reassessment of need for continuing or discontinuing Additional Precautions.

Table 4. Variables (risk factors) influencing transmission risk using seasonal influenza as an example of droplet spread

	Higher Transmission of Risk	Lower Transmission Risk
Infectious Agent/Infected Source	• Copious respiratory secretions • Frequent cough or sneeze • Poor compliance with respiratory hygiene • Early stage of illness • Not capable of self-care • Infants and children (potential prolonged viral shedding and environmental contamination) • Immunocompromised (potential prolonged viral shedding) • Inadequate patient placement or cohorting	• Minimal respiratory secretions • Infrequent cough or sneeze • Compliance with respiratory hygiene practices • Convalescent stage of illness • Capable of self care • Adults • Immunocompetent • Adequate patient placement, cohorting
Environment	• High patient-nurse ratio • Prolonged/frequent contact to infected source • Shared patient care equipment without cleaning between episodes of patient care • Inadequate spatial separation between infected source and susceptible host (less than two metres) • Non-compliance with cleaning and disinfection standards	• Low patient-nurse ratio • Limited contact with infected source • Single room and washroom • Appropriate housekeeping • Dedicated equipment between uses • Adequate spatial separation between infected source and susceptible host (at least two metres) • Compliance with cleaning and disinfection standards.
Susceptible Host (Patient)	• Not capable of self-care • Underlying disease • Susceptible • Immunocompromised	• Capable of self-care • No underlying disease • Immunized or recovered from disease • Immunocompetent
Susceptible Host – HCWs or other staff	• Inadequate application of engineering, administrative and PPE controls • Inadequate hand hygiene • Infected source actively coughing and sneezing and unable to contain secretions • Not immunized against the circulating strain of influenza virus • Immunocompromised	• Performs PCRA and chooses PPE appropriate to risk • Compliance with appropriate hand hygiene • Immunized against the circulating influenza virus more than 2 weeks prior to exposure • Immunocompetent.
Host/Susceptible Host	• Requires direct patient care • Poor personal hygiene	• Capable of self-care • Good personal hygiene

2. Health Care Worker Control Measures to Reduce Exposure to and Transmission of Infectious Agents.

a. Routine Practices

Routine Practices are a comprehensive set of IP&C measures that have been developed for use in the routine care of all patients at all times in all health care settings. Routine Practices aim to minimize or prevent HAIs in all individuals in the health care setting including patients, HCWs, visitors, contractors, etc. Routine Practices address infectious agent/infected source control, susceptible host protection and environmental hygiene, utilizing aspects from all components of the Hierarchy of Controls.

All HCWs (physicians, nurses, allied HCWs, students, volunteers and others) are responsible for complying with Routine Practices and for tactfully calling infractions to the attention of offenders. No one is exempt from complying with Routine Practices.

Patients and visitors have a responsibility to comply with Routine Practices where indicated. Teaching patients and visitors basic principles, such as hand hygiene, use of PPE, etc. is the responsibility of all HCWs.

i) Hand Hygiene

Use of ABHR has been shown to reduce HAI rates. Hand hygiene with point of care ABHR is the standard of care expected in all health care settings and of all HCWs.

A consistent trend demonstrating a reduction in infection rates related to improved hand hygiene has been reported. However, sustaining improved hand hygiene rates and the reduction of HAIs is difficult as a return to prestudy rates often occurs once the study is completed and interventions to promote hand hygiene are discontinued.

Refer to the PHAC Infection Control Guideline for *Hand Washing, Disinfection and Sterilization in Health Care 1998*. http://alturl.com/souwd.

ii) Patient Placement and Accommodation

Accommodation of inpatients in single rooms facilitates IP&C activities. Single rooms with a private toilet, designated patient hand washing sink and designated staff hand washing sink may reduce opportunities for cross transmission between patients, particularly when the patient has poor hygiene, contaminates the environment or cannot comply with IP&C measures because of age or decreased cognitive abilities.

iii) Patient Flow

Patient flow refers to patient transfer/transport within and outside of the facility, and patient activity. There is a potential for exposure to and transmission of microorganisms as a result of patient activity and transport due to inadvertent contact with other patients, patient care items and environmental surfaces. Patients should not be transported between patient care units, departments or facilities unless medically essential. Frequent patient transfers should be avoided as this increases the number of interactions with staff and other patients, providing opportunities for transmission to occur. The HCW, including bed/accommodation co-ordinators, are responsible for selecting the most appropriate accommodation based on the PCRA and for prioritizing use of single rooms and AIIRs if these are scarce. When in doubt regarding accommodation, consult IP&C professional.

iv) Aseptic Technique for Injections, Intravascular and other Invasive Procedures

Aseptic technique is the purposeful prevention of transfer of microorganisms from the patient's body surface to a normally sterile body site or from one person to another by keeping the organism count to an irreducible minimum. It is sometimes referred to as sterile technique. Aseptic technique refers to practices designed to render the patient's skin, medical supplies and surfaces as maximally free from microorganisms. These practices are required when performing procedures that expose the patient's normally sterile sites (e.g. intravascular system, spinal canal, subdural space, urinary tract) to minimize contamination with microorganisms. Components of aseptic technique involve the following:

- Preparing the patient's skin with an antiseptic
- Hand hygiene, preferably with ABHR, or if not accessible, an antimicrobial soap
- Sterile gloves
- Gowns
- Masks

- Sterile drapes
- Maintaining a sterile field

Drapes are used to prevent transferring microorganisms from the environment to the patient while the procedure is being performed. Masks are worn to prevent microorganisms carried in the HCWs' nose and mouth from contaminating the sterile field.

Infections may result from failure to use proper skin antisepsis prior to injection of medications, vaccines or venipuncture. Chlorhexidine in alcohol inactivates microorganisms on the skin more effectively than most other antiseptics and is the preferred antiseptic for skin preparation prior to insertion of central venous catheters and pulmonary artery catheters. Maximal aseptic barriers (including a head cap, mask, long sleeved sterile surgical gown, sterile gloves, and large (full bed) sterile drape during insertion) reduce infection rates associated with insertion of central venous catheters.

Meningitis reported after myelography and other spinal procedures is usually caused by respiratory flora of the person performing the procedure. The failure of the operator to properly wear a face mask during the procedure has been implicated. Aseptic technique for sterile procedures, such as placing a catheter or injecting material into the spinal canal or subdural space (e.g. during myelograms, lumbar puncture, intrathecal chemotherapy, and spinal or epidural anesthesia) includes hand hygiene with ABHR, preparation of the site with an antiseptic, use of a mask, use of sterile gloves, and maintaining a sterile field.

Appropriate aseptic technique for the insertion of urinary catheters includes sterile equipment (e.g. gloves, drapes, sponges and catheters), a sterile or antiseptic solution for cleaning the meatus and a single-use packet of sterile lubricant jelly for insertion.

Aseptic technique for the withdrawal of medication or other sterile substances from any vial or other containers includes: hand hygiene, the use of alcohol to prepare the rubber stopper or injection port (waiting for alcohol to dry) and single-use sterile needles and syringes. Transmission of hepatitis B and hepatitis C virus has followed the reuse of needles and/or syringes for withdrawing from multiuse vials.

As well as inappropriate use of glucose monitoring equipment and to reuse of single needles and syringe to administer medications to multiple patients. Recommendations for injection safety include:

- Never administer medications from the same syringe to more than one patient, even if the needle is changed.
- Consider a syringe or needle contaminated after it has been used to enter or connect to a patient's intravenous infusion bag or administration set.
- Do not enter a vial with a syringe or needle which has been previously used.
- Never use medications packaged as single-use vials for more than one patient.
- Assign medications packaged as multi-use vials to a single patient whenever possible.
- Do not use bags or bottles of intravenous solution as a common source of supply for more than one patient.
- Follow proper IP&C practices during the preparation and administration of injected medications.

v) Personal Protective Equipment

Personal protective equipment consists of barriers worn by HCWs to protect the patient from transmission of microorganisms and to protect the HCW from exposure to bloodborne and other microorganisms (e.g. sprays of blood, body fluids, respiratory tract or other secretions or excretions). Health care organizations are responsible for ensuring that HCWs have access to the PPE appropriate to the work and patient care being provided and have received training on its use (as previously described in Organizational Responsibilities, see Part A, Section III, B, above).

Health care workers should be fully knowledgeable of the application and limitations of the specific PPE available for their use and be able to determine what is needed by assessing the risk of exposure to blood, body fluids, secretions and excretions, mucous membranes, or non-intact skin during patient care interactions. The PCRA identifies hazards and enables the HCW to select PPE compatible with the hazard likely to be encountered during the patient care interaction. The selected PPE should maximize protection, dexterity and comfort.

Performing a risk assessment to determine whether PPE is necessary is also important to avoid over-reliance on PPE, misuse or waste. Over-reliance on PPE may result in a false sense of security. Misapplication or incorrect removal of PPE can result in inadvertent exposure of the HCW or the patient to infectious agents or contamination of the patient's environment. Wasting PPE can be avoided by maximizing the provision of clinical care during each entry into the patient's room.

The effectiveness of PPE is highly dependent on appropriate and proper use. Appropriate and proper use of PPE includes:

- Point of Care Risk Assessment to determine need for PPE.
- Correct technique for putting on and taking off PPE (see Appendix IV).
- Correct technique when wearing PPE (e.g. not to self-contaminate).
- Discard into designated receptacles immediately after use, followed by hand hygiene, preferably with ABHR.

Gloves

The use of gloves is not a substitute for hand hygiene, but an additional measure of protection. For Routine Practices, glove use is dependent on a risk assessment of the patient, the environment and the interaction. Gloves are used to reduce the transmission of microorganisms from one patient to another or from one body site to another, and to reduce the risk of exposure of HCWs to blood, body fluids, secretions and excretions, mucous membranes, draining wounds or non-intact skin and for handling items or touching surfaces visibly or potentially soiled. Gloves do not completely eliminate hand contamination as hands can become contaminated during the wearing of gloves through glove defects, or during glove removal. **Therefore, hand hygiene is necessary after the removal of gloves.**

It is important to assess and select the most appropriate glove to be worn for the circumstances. Glove selection should include assessment of its durability during use, the rigor and duration of the procedures being performed, the potential for exposure to infectious microorganisms or other hazardous substances, and ultimately, the safety of the user (e.g. including latex allergies). Factors such as comfort, fit, and whether the gloves are powdered to facilitate putting them on are important considerations.

Nonsterile disposable medical gloves for routine patient care are made from nitrile, latex and vinyl. Latex-free alternatives must be used by persons with type I hypersensitivity to natural rubber and for care of patients with this latex allergy. Because of risk to patients and HCWs, many hospitals now use medical supplies and products that are latex-free.

The barrier quality of medical examination gloves is influenced by glove material, production quality and stress during use. Higher failure rates have been observed with vinyl gloves as compared to latex or nitrile gloves when tested under simulated and actual clinical conditions

The integrity of latex gloves may be affected by the use of petroleum based lotions or creams. Some ABHRs may interact with powder remaining on HCWs' hands following the removal of powdered gloves and produce gritty particles on the hands. Gloving hands that have not yet dried following the use of an ABHR may result in significant increase in glove perforations.

Single-use gloves must never be washed with soap, chlorhexidine gluconate (CHG) or alcohol and then reused, as washing affects their integrity and has not been shown to be effective in removing inoculated microorganisms.

The use of gloves to prevent the transmission of BBPs is discussed in the PHAC Infection Control Guidelines *Prevention and Control of Occupational Infections in Health Care.*

Long Sleeved Gowns and Other Apparel

Long sleeved gowns are worn for Routine Practices as indicated by the risk assessment, to protect uncovered skin and clothing during procedures and patient care activities likely to produce soiling or generate splashes or sprays of blood, body fluids, secretions or excretions. Gowns should be cuffed and cover the front and back of the HCW from the neck to mid thigh. Gowns include isolation gowns – reusable/disposable, fluid repellent, or sterile. The type of gown selected is based on the:

- Anticipated degree of contact with infectious material.

- Potential for blood and body fluid penetration of the gown (fluid repellence when heavy liquid contamination is anticipated (e.g. operating theatre, dialysis).
- Requirement for sterility (e.g. operating theatre, central line insertion).

There is no evidence that the routine use of gowns for all patient care is beneficial in the prevention of HAIs, even in high risk units (e.g. neonatal intensive care unit (NICU), ICU, haematopoietic stem cell transplant (HSCT) unit). Universal gown use has had no effect on HAI rates in neonatal or paediatric ICUs, or on rates of neonatal colonization on postpartum wards.

In the laboratory setting, wearing of laboratory coats is considered PPE. Outside of the laboratory, apparel such as uniforms, laboratory coats or scrub suits may be worn by HCWs for purposes of comfort, convenience or identity but do not have a role in the prevention of infection (i.e. they are not considered PPE). For aesthetic purposes and professional etiquette, HCW apparel and uniforms should be clean. It is safe to launder HCWs uniforms at home.

Facial Protection

Transmission of hepatitis C and HIV has been reported by splashes of blood to the mucous membranes of the face. Facial protection includes masks and eye protection, face shields, or masks with visor attachment. Eye protection may include masks with built-in eye protection, or safety glasses, or face shields as necessary. The need for facial protection during routine patient care is determined by the risk assessment of the patient interaction and the task to be performed. Interactions involving activities likely to generate coughing, splashes or sprays of blood, body fluids, secretions or excretions, and procedures that potentially expose the mucous membranes of the eyes, nose or mouth require facial protection. Masks include surgical or procedure masks; no specific mask has been shown to be superior to another for achieving the purpose of facial protection. Masks have several uses: as a barrier to protect from sprays or splashes, as a barrier for infectious sources, as a barrier when performing aseptic/sterile procedures and as a barrier to protect susceptible hosts when within 2 metres of patients on droplet precautions.

vi) Management of Visitors

Visiting policies must balance the risk of transmission of infectious diseases and the promotion of patient and family centered care. Visitors have been documented to transmit infections including TB, pertussis, and respiratory viruses in health care settings. Exclusion of those with signs and symptoms of transmissible infections should reduce this risk. For essential visits, the visitor with an infection should be instructed on measures to take to reduce the risk of transmission (e.g. wear a mask for a respiratory tract infection, perform appropriate hand hygiene, remain in the patient's room, avoid public areas, avoid contact with other patients or with patient care equipment).

b. Additional Precautions

Additional Precautions are applied when the natural transmission characteristics of specific microorganisms (e.g. epidemiologically significant organisms, see Appendix VI) or syndromes are not fully addressed by Routine Practices. Additional Precautions may also be required when medical procedures increase the risk of transmission of a specific microorganism or because of the clinical situation (e.g. young child, incontinent adult or cognitively impaired individual). Additional Precautions are specific to the care setting, e.g. acute care, ambulatory care, prehospital care, LTC, and home care. Additional Precautions are conventionally divided into:

- Contact precautions, for microorganisms of low infective dose and/or situations where heavy contamination of the patient's environment is anticipated.
- Droplet precautions, for microorganisms transmitted by the large droplet route.
- Airborne precautions, for microorganisms transmitted over extended time and distance by small particles.

i) Implementing and Discontinuing Additional Precautions

Additional Precautions are to be implemented as soon as disease or risk factors are suspected or identified. A confirmed diagnosis is not necessary for Additional Precautions to be applied. The organization is responsible for:

- Designating the personnel responsible on a day-to-day basis for implementing Additional Precautions.
- Specifying the notification processes required once precautions have been initiated.
- Identifying the person responsible for modifying or discontinuing precautions.
- Identifying the person who has ultimate authority to make decisions regarding precautions and bed allocation.

The HCW is responsible for:

- Ensuring that appropriate Additional Precautions are taken for specific patients.
- Ensuring patients are not subjected to unnecessary Additional Precautions.
- Ensuring that precautions are reviewed daily, adjusted if indicated by new information, and discontinued when no longer indicated.

To minimize the transmission of microorganisms, patients should be assessed for evidence of infection or potential infections on admission (if an inpatient setting) or at the initial point of patient encounter and regularly throughout their stay as per the PCRA. The results of the assessment should be communicated to other personnel providing care and be documented in the patient record. In situations where a patient has or is suspected of having a disease requiring Additional Precautions above and beyond Routine Practices, these precautions must be implemented as soon as indicated by triggering mechanisms such as diagnosis, symptoms of infection, laboratory information, or assessment of risk factors. It is not necessary to wait for a specific diagnosis or microbiologic confirmation before initiating Additional Precautions when patient assessment clearly indicates a clinical syndrome or risk factors related to a potentially transmissible infection.

All HCWs (physicians, nurses, allied HCWs, students, volunteers and others) are responsible for complying with Additional Precautions (in addition to Routine Practices) and for tactfully calling infractions to the attention of offenders. No one is exempt from complying with additional precautions. Patients and visitors have a responsibility to comply where indicated. Teaching the basic principles of Additional Precautions is the responsibility of all HCWs.

ii) Accommodation

When availability of single rooms is limited, priorities for placement of patients in single rooms are determined by the PCRA. Priority for single rooms goes to patients:

- Requiring Additional Precautions.
- Identified as high risk for transmission of microorganisms (e.g. stool incontinence, uncontained secretions).
- Identified as being at higher risk of acquisition and adverse outcomes resulting from transmission of microorganisms (e.g. immunosuppression, open wounds, indwelling catheters).

When single rooms are not available and rooms must be shared, factors to be considered with shared rooms include:

- Selecting appropriate roommates.
- Avoiding placing patients at high risk of complications should they become infected in rooms with patients with transmissible infections, diarrhea or open wounds.
- Delineating the boundary of the potentially contaminated patient area within the shared room.
- Preventing transmission risks through sharing of sinks and toilets.
- Assessing activities of the roommates and their visitors.

Assignment of patients known to be infected with the same microorganisms to the same room (cohorting) or separate wards or areas has been successful in controlling transmission of some microorganisms. The specific benefit of using cohorting for managing ARO outbreaks, including MRSA, VRE, Gram negative resistant organisms and outbreaks due to other infectious agents is, however, not known as multiple other control measure were implemented during published outbreaks.

iii) Airborne Infection Isolation Rooms(AIIRs)

AIIRs with negative pressure ventilation (i.e. with air flow from the outside corridor into a room through the doorway and exiting directly to the exterior of the building or filtered before recirculation) are designed for patients suspected or confirmed to

have an infection transmitted by the airborne route including:

- Measles
- Respiratory (including pleural or laryngeal) tuberculosis
- Smallpox or monkeypox
- Varicella (chickenpox)
- Disseminated zoster
- Viral hemorrhagic fever with pneumonia

An AIIR is also required for performing AGMPs on patients with SARS, T.B., and other emerging respiratory infections (see Appendix I,3).

In settings where AIIRs are limited, patients with proven or suspected infectious respiratory tuberculosis have priority. For measles, varicella and disseminated zoster, risk of transmission may be assessed in relation to the presence of non-immune patients or HCWs. Non-immune HCWs should not work with patients with measles, varicella or disseminated zoster. Non-immune patients should not share rooms with patients with measles, varicella or zoster.

In situations when AIIRs are not available, the patient should be temporarily housed in a single room with the door closed, away from high risk patients. Patients should be transferred as soon as medically feasible to a facility with AIIRs.

- Prehospital care: patients should wear a mask and be transported separately. When transporting multiple patients, the risk of transmission should be considered as noted above and control measures applied as necessary (e.g. personnel in the ambulance should be restricted to only those medically necessary, open window in ambulance, close window between the driver and the patient area of the ambulance).
- Ambulatory care: patients should defer their appointment if possible or enter through a separate entrance. Upon arrival, patients should be asked to wear a mask, perform hand hygiene and be placed in an examining room with the door closed as soon as possible.
- Home care settings: family members who have not been exposed or are not immune should avoid sharing airspace with the patient. Natural ventilation (e.g. open windows) will help disperse the microorganisms from the room.

iii) Patient Flow

When Additional Precautions are necessary, patients should leave their rooms for medically necessary purposes only. Communication between the transporting area and the receiving area is important to ensure consistency of precautions and to decrease unnecessary waiting time in public areas. Source control measures (e.g. requesting patient to perform hand hygiene before leaving their room, cover skin lesions, to wear a mask) should be applied.

iv) Personal Protective Equipment

Gloves

Gloves are used for all care of patients on contact precautions. When worn appropriately, gloves are effective to prevent contamination of HCWs' hands, thereby reducing the potential transfer of microorganisms from colonized or infected patients to HCWs and from patient to patient via HCWs' hands. Failing to change gloves between care activities and procedures with the same patient after contact with materials that may contain high concentrations of microorganisms (e.g. after handling an indwelling urinary catheter, or suctioning an endotracheal tube), may result in contamination of clean body sites or the patient's environment.

Long Sleeved Gowns

The benefits of using gowns as a control measure to prevent transmission is difficult to determine as the use of gowns is often implemented concurrently with multiple other interventions (e.g. gloves, increased emphasis on hand hygiene, isolation/cohorting) and the unique impact cannot be assessed.

Gowns are used for contact precautions if direct contact of clothing with the patient or with contaminated environmental surfaces is anticipated. Although gowns may become contaminated with potential pathogens after caring for an infected or colonized patient (e.g. MRSA, VRE and *C. difficile*), there is no evidence gowns have been involved in the transmission of these pathogens to others.

Facial Protection

Facial protection includes masks and eye protection, face shields, or masks with visor attachment. Facial protection is worn when within two metres of a coughing/sneezing patient with a suspect or

confirmed transmissible respiratory infection.

The eye is an important portal of entry for some pathogens. Pathogens may be introduced into the eye directly via respiratory droplets generated during coughing or suctioning, or by self inoculation if the eyes are touched with contaminated fingers. Wearing eye protection during all care of children with RSV has been shown to reduce the acquisition of this infection by HCWs, probably by preventing hand-eye contact.

Respiratory Protection

Respiratory protection from airborne infection requires the use of a respirator with NIOSH-approved N95 or higher filtration to prevent inhalation of microorganisms. The need for respiratory protection is determined by a PCRA. Factors to be considered are the specific infectious agent, known or suspected infection status of the patient involved, the patient care activity to be performed, the immune status of the HCW and the patient's ability to perform respiratory hygiene. Refer to Health Care Responsibilities
Part A, III. b. (c).

v) Management of Visitors

Visitors could be at risk for serious diseases should they acquire the patient's infection (e.g. acquisition of a respiratory virus by a visitor with chronic lung disease, or exposure of a non-immune visitor to varicella), and should be capable of complying with the necessary precautions to prevent indirect transmission to other patients (e.g. hand hygiene, not sharing of personal items). Generally, visitors should have access to the same PPE as staff.

Evidence to support the use of PPE by visitors is lacking. The following should be considered when requesting visitors to wear PPE:

- PPE may not be necessary if they have likely been exposed to the infection preadmission.
- PPE may be appropriate for visitors who visit multiple patients in the facility.

vi) Epidemiologically Significant Organisms Requiring Additional Precautions Include The Following Diseases/conditions: (also see Appendix I)

- *Clostridium difficile*
- Certain antibiotic resistant organisms
- Viral gastroenteritis
- Emerging respiratory infections

Part B – Recommendations for Routine Practices and Additional Precautions

I. Organizational Responsibilities

A major responsibility of any health care organization is to minimize the risk of exposure to and transmission of infections within health care settings. Policies, procedures and programs should be developed and be consistent across the organization to achieve the stated objectives and be in compliance with current regulations. These should include:

1. Provide sufficient expert human resources (e.g. hospital epidemiologist, infection control professional(s), clerical staff) and sufficient financial resources to ensure an effective Infection Prevention and Control program appropriate to the organization's mandate and consistent with current recommendations.

   Implement a comprehensive Occupational Health program including, but not limited to, ensuring health care worker immunity to vaccine-preventable diseases (including annual influenza immunization), tuberculosis screening, provision of a Respiratory Protection Program, sharps safety and prevention of exposure to bloodborne pathogens, management of ill health care workers and of health care workers exposed to communicable infections. This program should be consistent with current recommendations. Perform ongoing Organizational Risk Assessment to evaluate the workplace risk of exposure to microorganisms. The Organizational Risk Assessment, will include but is not limited to, facility health care design, renovation and construction, ventilation requirements, source control, occupational health, education of health care workers, cleaning, disinfection and sterilization of reusable patient care equipment, environmental cleaning, and management of waste and linen. Ensure regular audits of the application of Routine Practices and Additional Precautions.

2. Promote and facilitate adherence to hand hygiene recommendations. Use alcohol-based hand rub as the preferred method of hand hygiene at the point of care and at other locations as indicated in the PHAC Infection Control Guidelines *Hand Hygiene Practices in Health Care Settings.*

3. Promote the application of the Point of Care Risk Assessment prior to every patient interaction as an organizational priority and an expectation of all health care workers.

4. Develop and promote policies and procedures for the application of Routine Practices for the care of all patients at all times in all health care settings and for Additional Precautions when required.

5. Promote adherence to aseptic technique for invasive procedures, including but not limited to insertion of central lines and handling of intravenous systems, spinal procedures and safe injection practices including the use of multidose vials.

6. Develop and promote policies and procedures for preventing the transmission of Creutzfeldt-Jakob Disease as outlined in relevant publications.

7. Develop policies and procedures to ensure that patients colonized or infected with microorganisms, including antibiotic resistant organisms, are not denied appropriate care.

8. Ensure personal protective equipment appropriate to the care setting is available, sufficient, and located in convenient and accessible areas. The selected personal protective equipment should maximize protection, dexterity and comfort.

   Refer to Manitoba Workplace Health & Safety Act & Regulation and http://www.gov.mb.ca/labour/safety/ and Manitoba Workplace Health & Safety Act & Regulation and http://web2.gov.mb.ca/laws/statutes/ccsm/w210e.php

9. Develop and implement policies and procedures to reduce exposure to latex in health care workers and patients.

10. Include infection control professionals in planning when designing newly constructed health care facilities or renovations to existing health care facilities.

11. Ensure facilities are designed and maintained in accordance with the most current infection prevention and control specifications as outlined by the Canadian Standards Association http://alturl.com/6zzzk and/or the American Institute of Architects, http://www.fgiguidelines.org/ including but not limited to:

i) Single rooms for the routine care of inpatients (with in-room private toilets, designated patient sinks, alcohol-based hand rub dispensers and designated staff hand washing sinks).

ii) Appropriate number and location of AIIRs (including critical care units, inpatient, emergency departments and ambulatory care clinics) according to the Organizational Risk Assessment.

iii) Appropriate ventilation requirements for AIIRs (see 14. and 15. below).

iv) Appropriate spatial separation and spacing requirements in clinical and waiting areas, including nurseries.

v) Appropriate number of and placement of hand hygiene product dispensers; designated hand washing sinks.

12. Ensure AIIRs are designed and maintained to meet the most current infection prevention and control specifications

    i) Ensure a monitoring schedule is in place for airborne infection isolation rooms (e.g. air changes per hour, pressure differentials, and filtration efficiencies) and establish an action plan to review and,where necessary, upgrade the ventilation systems of facilities to meet the requirements.

    ii) A minimum total of 12 air changes per hour is required for AIIRs.

    Note: In facilities without AIIRs with 12 air changes per hour, 6 air changes per hour may be acceptable for short term management of patients with airborne infection.

    Refer to Appendix III- Air exchanges Per Hour and Time in Minutes.

13. Ensure bronchoscopy suites, autopsy suites and rooms used for sputum induction have a minimum of 12 air changes per hour.

14. Ensure the air from both the anteroom and the patient room is exhausted to the outdoors or filtered through a high efficiency particulate air filter if an anteroom is used.

Note: An anteroom may assist in maintaining inward directional air flow, but is not essential if the pressure differential is adequate.

15. Have and apply strategies to prevent overcapacity (i.e. providing care for more patients than current bed infrastructure normally permits). If overcapacity is unavoidable for short periods, ensure appropriate triage of patients, convenient access to alcohol-based hand rub dispensers and appropriate personal protective equipment when considering locations for overcapacity patient care areas.

18. Provide adequate resources to develop, implement, and maintain a source control program for the management of potentially infectious persons, including but not limited to:

    - Signage at initial points of patient encounter (e.g. entrances to hospitals, ambulatory care and long term care settings, reception areas in outpatient settings).
    - Physical barriers at triage in emergency departments and acute assessment settings.
    - Spatial separation.
    - Respiratory hygiene (provide masks, tissues, hand hygiene products and designated hand washing sinks, and hands free receptacles).
    - Airborne infection isolation rooms; and
    - Strategies to reduce production of aerosols during aerosol-generating medical procedures.

19. Develop, implement and maintain systems to screen visitors who are not immune to chickenpox or measles and who visit defined high-risk populations (e.g. neonatal intensive care units,infants less than one year old, oncology patients, other severely immunocompromised patients) for recent contact with this infection.

20. Include infection control professionals in selection of new patient care equipment and devices that require cleaning, disinfection or sterilization.

21. Establish, maintain and audit standards for cleaning, disinfection and sterilization of reusable patient care equipment, as outlined in the most current published guidelines or as regulated in some jurisdictions. Provide disposable single-use semi-critical and critical devices when access to appropriate reprocessing is not available.

22. Develop a process for evaluation and management of actual and potential disinfection and sterilization failures in disinfection and sterilization processes.

23. Develop and implement policies and procedures for routine scheduled environmental cleaning, including procedures for assigning responsibility and accountability for cleaning as indicated by the level of patient contact and degree of soiling including event-related cleaning of environmental surfaces and increased cleaning following Additional Precautions.
24. Ensure adequate numbers, training and supervision of housekeeping staff.
25. Develop education and training for those responsible for environmental cleaning and perform evaluation of policies, procedures and practices including audits to determine effectiveness of environmental cleaning.
26. Develop and implement routine policies and procedures including assigning responsibility for cleaning and disinfection of all non-critical patient care items that are moved in and out of patient care areas (e.g. mobile devices, multi-use electronics, intravenous poles, toys and electronic games).
27. Use detergent disinfectants with a Drug Identification Number (DIN) that have microbiocidal (i.e. killing) activity against the pathogens most likely to contaminate the patient care environment. The infection prevention and control program should approve the products purchased. The product should be used in accordance with manufacturer's instructions.
28. Establish and maintain standards for laundry as outlined in the most current publications. If laundry chutes are used, ensure that they are properly designed, maintained and used in a manner to minimize dispersion of aerosols from contaminated laundry (e.g. securely bagged).
29. Establish and maintain standards for waste management as outlined in the most current publication.
30. Follow municipal or regional regulations and/or bylaws when developing and implementing treatment and disposal policies for biologic waste, including sharps.

    Refer to Manitoba Environmental Services http://www.gov.mb.ca/conservation/envprograms/haz-waste/
31. Ensure development and implementation of policies and procedures for safe delivery of any pet therapy program in the facility.

II. Health Care Worker Responsibilities

Health Care Workers have a responsibility to minimize the risk of exposure to and transmission of microorganisms within health care settings. The following recommendations are applicable to health care workers in all health care settings.

1. Perform a Point of Care Risk Assessment before each patient interaction to determine the appropriate Routine Practices and Additional Precautions required for safe patient care.
2. Use alcohol-based hand rub at the point of care as the preferred method of hand hygiene to prevent the transmission of microorganisms in the health care setting.
3. Adhere to Routine Practices including the application of aseptic technique when necessary (see Part B, Section III, (6) during the care of all patients at all times in all settings.
4. Apply Additional Precautions (see Part B, Section IV) as indicated by the Point of Care Risk Assessment, in addition to Routine Practices.
5. Know and follow the policies and procedures related to Routine Practices and Additional Precautions and who to contact for questions and concerns related to infection prevention and control.
6. Know the applications, advantages and limitations of the personal protective equipment available within the organization/facility.
7. Provide education to patients, their families and visitors regarding respiratory hygiene, hand hygiene and when necessary, the reason for precautions required for their care.
8. Ensure medical, psychological and safety needs of patients on Additional Precautions are met.
9. Adhere to pre-placement immunization recommendations and screening of staff for vaccine preventable infections including hepatitis B, measles, mumps, rubella, pertussis, varicella, combined tetanus and diphtheria and receive annual influenza vaccination unless valid medical contraindications exist. Comply with organizational tuberculosis protocols related to the assessment of health care workers tuberculosis status.
10. Adhere to policies and procedures related to the organizations Respiratory Protection Program.

11. Stay away from work when symptomatic with an infection that may have important consequences if transmitted, including but not limited to acute conjunctivitis, acute respiratory infection, gastroenteritis with vomiting or diarrhea, varicella or extensive zoster that cannot be kept covered, or open infected skin lesions or herpetic skin lesions on the hands. Inform immediate supervisor/ Occupational Health if worked when symptomatic.
12. Communicate to Occupational Health or delegate responsible for Occupational Health information about personal infections that may be a risk to others.
13. Report any potential occupational exposure to a communicable infection to immediate supervisor and Occupational Health or occupational health delegate.
14. Know and follow the policies and procedures regarding management of exposures to communicable infections (e.g. percutaneous or mucosal exposures to blood, body fluids, pulmonary tuberculosis, varicella).
15. Report clusters of similar illnesses (i.e. occurring in the same time or place) in patients and/or health care workers to a supervisor.
16. Follow policies and procedures for containing, transporting and handling used patient care equipment, medical instruments and devices including, but not limited to wearing personal protective equipment when handling used items if indicated by the Point of Care Risk Assessment.
17. Identify semi-critical and critical items that require reprocessing (i.e. cleaning, disinfection, or sterilization) and do not use until appropriately reprocessed.
18. Identify used non-critical patient care equipment and other items such as toys and electronic games and do not allow use by another patient until these items are appropriately cleaned and disinfected.
19. Discard personal care items (e.g. tissues, lotions, soaps, razors) and disposable equipment such as containers used for blood collection or tourniquets left in the room following transfer, terminal cleaning or discharge.
20. Use single patient medications such as multidose inhalers, sprays, topical anesthetics, or other topical agents used on the skin, eye or other mucous membranes on one patient.
21. Refrain from taking the patient care record/chart into the patient room, cubicle or designated bed space in a shared room and perform hand hygiene after handling the record/chart.
22. Refrain from eating or drinking in areas where direct patient care is provided or in reprocessing or laboratory areas.

III. Recommendations for Routine Practices in all Health Care Settings

The recommendations that follow are for all health care settings unless otherwise stated.

1. Point of Care Risk Assessment

a. Perform a Point of Care Risk Assessment before each patient interaction to determine the appropriate Routine Practices required for safe patient care.

2. Hand Hygiene Practices in Health Care Settings

Adhere to recommendations as outlined in the Public Health Agency of Canada Infection Control Guidelines *Hand Hygiene Practices in Health Care* and as specified by Accreditation Canada.

3. Source Control

Adhere to the following source control measures:

a. Triage

i. Emergency rooms and acute assessment settings

- Post signs to direct patients with symptoms of acute infection (e.g. cough, fever, vomiting, diarrhea, coryza, rash, conjunctivitis) to specific waiting areas.
- Ensure a physical barrier (e.g. plastic partition at triage desk) is located between infectious sources (e.g. patients with symptoms of a respiratory infection) and others.

- Place patients with respiratory infections directly into an examining room or an airborne infection isolation room, as indicated by the respiratory infection suspected.
- Place patients with an acute diarrheal illness into a single examining room whenever possible.

ii. Community or outpatient settings

- Identify patients with symptoms of an acute infection when scheduling appointments for routine clinic visits and request that they defer routine clinic visits until symptoms of the acute infection have subsided, if possible.
- Inform patients who cannot defer their routine clinic visit (i.e. those that require assessment of symptoms/condition) to follow hand hygiene and/or respiratory hygiene recommendations appropriate for their symptoms. Direct these patients into an examining room as soon as they arrive and/or schedule their appointment for a time when other patients are not present.
- Post signs at the entrance to the clinic reminding symptomatic patients to perform hand hygiene and/or respiratory hygiene appropriate for symptoms.

b. Early Diagnosis and Treatment

i. Ensure symptomatic patients are assessed in a timely manner and that any potential communicable infection is considered (e.g. tuberculosis, norovirus, RSV, pertussis).

c. Respiratory Hygiene

i. Encourage respiratory hygiene for patients and accompanying individuals who have signs and symptoms of an acute respiratory infection, beginning at the point of initial encounter in any health care setting (e.g. prehospital, triage, reception and waiting areas in emergency departments, outpatient clinics and physician offices). Respiratory hygiene includes:

- Using tissues to contain respiratory secretions to cover the mouth and nose during coughing or sneezing, with prompt disposal of these into a hands-free waste receptacle.
- Covering the mouth and nose against a sleeve/shoulder during coughing or sneezing, if a tissue is not available.
- Wearing a mask when coughing or sneezing.
- Turning the head away from others when coughing or sneezing.
- Maintaining a spatial separation of two metres between patients symptomatic with an acute respiratory infection (manifested by new cough, shortness of breath and fever) and those who do not have symptoms of a respiratory infection. If this cannot be achieved, the patients must be at least one metre apart and the symptomatic patient must wear a mask. One metre may be sufficient for young children and others whose cough is not forceful enough to propel the droplets as far as two metres.

d. Spatial Separation

i. Ensure a minimum two metre separation between patients who may have a respiratory infection and are symptomatic with a cough, fever or shortness of breath and those who do not have symptoms.

ii. One metre may be sufficient for young children and others whose cough is not forceful enough to propel the droplets as far as two metres.

e. **Strategies to Reduce Risk from Aerosol Generation of Microorganisms**

i. Assess patients for signs or symptoms of suspected or confirmed tuberculosis, SARS or emerging respiratory infections prior to performing an aerosol-generating medical procedure.

ii. Apply strategies to reduce the level of aerosol generation as listed in Part B, Airborne Precautions , Source Control B,iii,1.for aerosol-generating medical procedures performed on patients with signs and symptoms of suspected or confirmed tuberculosis, severe acute respiratory syndrome or emerging respiratory infections.

iii. Routine Practices are sufficient for aerosol-generating medical procedures performed on patients with no signs or symptoms of suspected or confirmed tuberculosis, SARS or emerging respiratory infections.

4. Patient Placement and Accommodation

a. Determine options for patient placement and room sharing if single rooms are limited using the Point of Care Risk Assessment, based on:

i. Presence or absence of known or suspected

infection (i.e. need for Additional Precautions).

ii. Route(s) of transmission of the known or suspected infectious agents (e.g. airborne infections require an airborne infection isolation room):
- Contact (single room is preferred)
- Droplet (single room is preferred)
- Airborne (airborne infection isolation room required).

iii. Risk factors for transmission from the infected patient.

iv. Susceptibility of other patients in the room to adverse outcome from a health care associated infection.

v. Patient options for room sharing (e.g. cohorting patients infected with the same organism)

AND

vi. Ability of patient, roommate(s) and visitors to comply with infection prevention and control measures.

b. Give priority for placement in single rooms to patients who pose an increased risk for transmission of a microorganism to others. The following patients should have priority:

i. Patients on Additional Precautions:
- Contact (single room is preferred)
- Droplet (single room is preferred)
- Airborne (airborne infection isolation room required).

OR

ii. Patients who visibly soil the environment or who cannot maintain appropriate hygiene including respiratory hygiene.

OR

iii. Patients with uncontained secretions or excretions.

OR

iv. Patients with wound drainage that cannot be contained by a dressing.

OR

v. Patients with fecal incontinence if stools cannot be contained in incontinent products or infant diapers.

In prehospital settings:

i. Single patient transport is preferred.

ii. If multi-patient transport is required, consider b., i,-v. above to determine priority for single patient transport.

5. Patient Flow

a. Avoid transfer of patients within facilities unless medically indicated.

6. Aseptic Technique

a. Use aseptic technique when performing invasive procedures and handling injectable products. Aseptic technique includes:

i. Performing hand hygiene, preferably with alcohol-based hand rub prior to opening supplies.

ii. When alcohol-based hand rub is not accessible, perform hand hygiene with antimicrobial soap and water for invasive procedures (e.g. placing central intravascular catheters or catheters for injecting into the spinal canal or subdural spaces).

iii. Opening tray and supplies only when ready to use to ensure a sterile field.

iv. Performing hand hygiene prior to putting on single-use clean gloves, sterile gloves, sterile gown or mask, as indicated by the specific procedure.

v. Preparing the patient's skin with an appropriate antiseptic before performing an invasive procedure.

vi. Using the appropriate size drape when a drape is required, to maintain a sterile field.

vii. Not administering medications or solutions from single-dose vials, ampules or syringes to multiple patients or combine leftover contents for later use.

viii. Using single-dose medication vials, prefilled syringes, and ampules in clinical settings. If the product is only available as multi-dose vial, see b. below.

ix. Using a sterile, single-use disposable needle and syringe for each medication/fluid withdrawal from vials or ampules.

x. Cleaning the stoppers or injection ports of medication vials, infusion bags, etc with alcohol before entering the port, vial or bag.

b. When a product is only available for purchase in multi-dose vials:

   i) Restrict the multi-dose vial to single patient use whenever possible.

   ii) Prepare syringes from multi-dose vials from a centralized medication preparation area (e.g. do not take multi-dose vials to the patient).

   iii) Store the multi-dose vial to restrict access. (e.g. in a secure location away from the patient bedside and where access is restricted, such as a medication room or locked cart).

   iv) Use a sterile, single-use needle and syringe each time the multi-dose vial is entered.

   v) Do not re-enter the multi-dose vial with a previously used needle or syringe.

   vi) Store the multi-dose vial in accordance with manufacturer's recommendations.

   vii) Label the multi-dose vial with date of first opening.

   viii) Discard the multi-dose vial according to manufacturer's expiry date or organizational policy, whichever is the shorter time.

   ix) Inspect the multi-dose vial for clouding or particulate contamination prior to each use and discard multi-dose vial if clouding or particulate contamination present.

   x) Discard the multi-dose vial if sterility or product integrity is compromised.

c. Use single patient multi-use devices (e.g. glucose sampling devices, fingerstick capillary blood sampling devices) for only one patient. If not feasible to assign glucometers to individual patients, clean and disinfect before use between patients.

d. Use aseptic technique (Part B, Section III, 6a. above) including requiring the use of a mask and sterile gloves, when placing a catheter or injecting material into the spinal canal or subdural space (e.g. during lumbar puncture, myelogram, and spinal or epidural anesthesia).

e. Adhere to aseptic technique for storage, assembly or handling components of intravenous delivery systems.

   i. Use intravenous bags, tubing and connectors for one patient only and dispose appropriately after use.

   ii. Consider a syringe, needle or cannula as contaminated once it has been used to enter or connect to one patient's intravenous infusion bag or administration set and do not reuse.

   iii. Do not assemble sterile components until time of need with the exception of the emergency department, operating room, intensive care unit, or prehospital settings where it may be essential to maintain one system primed and ready for emergency use. If so, store the primed system in a clean and dry area secure from tampering and label with the date of priming. Replace if not used within 24 hours.

   iv. Store sterile intravenous equipment components in a clean, dry and secure environment.

f. Use aseptic technique for insertion of central venous catheters.

   i. Use maximal aseptic barriers (as outlined in Part B, Section III 6a. above), in addition to a cap, mask, long sleeved sterile surgical gown, sterile gloves, and a large full body sterile drape) and prepare the skin with chlorhexidine in alcohol or an equally effective alternative for inserting any central venous catheters and pulmonary arterial catheters.

   ii. When inserting peripheral venous catheters or peripheral arterial lines, as a minimum, perform hand hygiene, prepare the skin with an antiseptic and wear clean disposable gloves.

   iii. Use skin antisepsis and single-use disposable needles for acupuncture and for the use of lancets, blood sampling devices, or other items which will be contaminated with blood.

7. Use of Personal Protective Equipment

a. Adhere to the technique for putting on and taking off personal protective equipment (Appendix IV).

b. Gloves (clean single-use, non sterile)

   i. Gloves do not substitute for other elements of hand hygiene.

   ii. Gloves are not required for routine patient care activities when contact is limited to a patient's intact skin.

iii. Wear gloves as determined by the Point of Care Risk Assessment:

- For anticipated contact with blood, body fluids, secretions and excretions, mucous membranes, draining wounds or non-intact skin (including skin lesions or rash).
- For handling items or touching surfaces visibly or potentially soiled with blood, body fluids, secretions or excretions.
- While providing direct care if the health care worker has an open cut or abrasions on the hands.

Appropriate Glove Use:

- Perform hand hygiene prior to putting on gloves for tasks requiring clean, aseptic or sterile technique.
- Put gloves on directly before contact with the patient or just before the tasks or procedure requiring gloves.
- Wear gloves with fit and durability appropriate to the task (see Appendix IV). Use of powder-free gloves is preferred.
- Wear disposable medical examination gloves or reusable utility gloves for cleaning the environment or medical equipment.
- Remove gloves and perform hand hygiene immediately after patient care activities that involve contact with materials that may likely contain large amounts of microorganisms (e.g. after contact with mucous membranes, after handling an indwelling urinary catheter, after open suctioning of an endotracheal tube or changing a dressing) before continuing care of that patient. If gloves are still indicated, replace with a clean pair.
- Remove gloves and dispose into a hands-free waste receptacle immediately following their intended use. Do not reuse single-use gloves, clean them with alcohol-based hand rub or wash for reuse.
- Perform hand hygiene following the removal of gloves, before leaving the patient's environment and before touching clean environmental surfaces.
- Do not use the same pair of gloves for the care of more than one patient.

a. Long sleeved gowns

i. Use of gowns is not routinely indicated to enter high risk units (e.g. burn unit, intensive care unit, neonatal intensive care unit, hematopoietic stem cell unit).

ii. Wear long sleeved cuffed gowns as determined by the Point of Care Risk Assessment:

- To protect uncovered skin.
- To prevent soiling of clothing.
- During procedures and patient care activities likely to soil clothing and/or generate splashes or sprays of blood, body fluids, secretions or excretions.

iii. Gowns should be cuffed and cover the front and back of the HCW, from the neck to mid-thigh. The type of gown is based on:

- Anticipated degree of contact with infectious material.
- Potential for blood and body fluid penetration of the gown (fluid repellence when heavy liquid contamination is anticipated (e.g. operating theatre, dialysis).
- Requirement for sterility (e.g. operating theatre, central line insertion).

iv. Adhere to organizational policy regarding the laundering of scrub suits and uniforms supplied by the organization.

Appropriate Gown Use

- Perform hand hygiene before gowning.
- Ensure the gown is long enough to cover the front and back of the health care worker, from the neck to mid-thigh and the sleeves no shorter than just above the wrist.
- Put the gown on with the opening at the back, with edges overlapping, thus covering as much clothing as possible.
- Ensure the cuffs of the gown are covered by gloves.
- Tie the gown at the waist and neck.
- Remove gown by undoing the neck and waist ties, starting with neck ties, and remove the gown

without touching the clothing or agitating the gown unnecessarily then turn the gown inside on itself, and roll it up.

- Remove gown immediately after the indication for use and place in a hands-free waste receptacle and perform hand hygiene before leaving the patient's environment.
- Remove wet gowns immediately to prevent a wicking action that facilitates the passage of microorganisms through the fabric.
- Do not reuse gowns once removed, even for repeated contacts with same patient.
- Do not wear the same gown between successive patients.

b. Facial Eye Protection

i. Educate health care workers to avoid touching their faces with their hands during patient care.

ii. Wear facial protection (i.e. masks and eye protection, face shields, or masks with visor attachment) as determined by the Point of Care Risk Assessment:

- To protect the mucous membranes of the eyes, nose and mouth during procedures and patient care activities likely to generate splashes or sprays of blood, body fluids, secretions or excretions including respiratory secretions.
- When caring for a coughing/sneezing patient.

i. Wear disposable eye protection or face shields only once to avoid self contamination and do not position on head or around the neck for later use.

ii. Remove eye protection or face shields immediately after use and place promptly into a hands-free waste receptacle and perform hand hygiene. Remove gloves after removing eye protection. Refer to Appendix IV– Technique for Putting On and Taking off PPE

iii. If eye protection or face shields are reusable, clean and disinfect as per organizational policy before reuse.

iv. When eye protection is required, wear eye protection over prescription glasses; prescription glasses by themselves are not adequate for eye protection.

Appropriate Use of Facial Eye Protection:

- Perform hand hygiene prior to putting facial protection on.
- Wear facial protection as instructed by manufacturer.
- Wear and discard facial protection appropriately to prevent self-contamination.
- Ensure nose, mouth and chin are covered when wearing a mask.
- Avoid self-contamination by not touching facial protection on its external surface during use and disposal.
- Remove facial protection carefully by the straps or ties.
- Discard facial protection immediately after the intended use into a hands-free waste receptacle (i.e., disposed of as soon as removed from the face) and perform hand hygiene.
- Do not dangle a mask around the neck when not in use; do not reuse mask.
- Change the mask if it becomes wet or soiled (from the wearer's breathing or due to an external splash).
- Change the mask if breathing becomes difficult.
- In cohort settings, facial protection may be worn for the care of successive patients.

8. Sharps Safety and Prevention of Exposure to Bloodborne Pathogens

a. Follow provincial/territorial regulations regarding the use of safety engineered sharp devices.

b. Use safety engineered sharp devices wherever possible. Consider the safety of both patients and HCWs when selecting safety engineered sharp devices.

c. Do not recap used needles. Dispose of used needles and other used single use sharp items immediately into designated puncture-resistant containers readily accessible at the point of care.

d. Have health care workers cover open skin areas/ lesions on hands or forearms with a dry dressing at all times. Consult Occupational Health or alternative designate if adherence to hand hygiene

recommendations is impeded by the dressing.

e. Protect eyes, nose and mouth (using facial protection) when splashes with blood and/or body fluids are anticipated.

f. Perform first aid immediately if exposed to blood or body fluids.

   i. Thoroughly rinse the site of a percutaneous injury with running water and gently clean any wound with soap and water.

   ii. Flush mucous membranes of the eyes, nose, or mouth with running water if contaminated with blood, body fluids, secretions or excretions.

   iii. Thoroughly rinse non-intact skin with running water if contaminated with blood, body fluids, secretions or excretions.

g. Report immediately to employer after first aid and seek immediate medical attention.

9. Cleaning and Disinfection of Non-Critical Patient Care Equipment

a. Clean and perform low level disinfection of reusable non-critical equipment that has been in direct contact with a patient or in that patient's environment before use in the care of another patient.

b. Clean and perform low level disinfection of items such as toys and electronic games that have been in direct contact with a patient or in that patient's environment before use by another patient.

c. Clean non-critical patient care equipment dedicated to an individual patient according to a regular schedule.

d. Dedicate bedpans and commodes for single patient use and label appropriately. Clean and perform low level disinfection before use by another patient. The use of disposable bedpans is acceptable.

e. Follow manufacturer's written instruction for use of products for cleaning and disinfecting.

f. Store sterile and clean supplies in a designated and separate clean dry area protected from dust. Do not store under sinks and/or near plumbing as leaks may occur.

In home care settings,

- Educate patients about the importance of environmental cleaning.
- Limit the amount of disposable and non-disposable patient care equipment and supplies brought into the home.
- Advise patients to purchase items such as thermometers and scissors for personal use.
- Whenever possible, leave reusable patient care equipment in the home until patient is discharged from home care services.
- Clean and low level disinfect non-critical patient care equipment (e.g. stethoscope) that cannot remain in the home before taking them from the home.
- Alternatively, place contaminated reusable items in a plastic bag for transport and subsequent cleaning and disinfection.
- Discard or leave unused disposable equipment or supplies in the home following discharge from home care services (do not reuse for other patients).

In pre-hospital care,

- Use of disposable items is preferred where practical.
- Clean and disinfect patient care equipment touched or potentially touched by patients and personnel following transport.

10. Environmental Cleaning

a. Clean and disinfect surfaces that are likely to be touched and/or used on a more frequent schedule compared to other surfaces. This includes surfaces that are in close proximity to the patient (e.g. bedrails, overbed tables, call bells) and frequently-touched surfaces in the patient care environment such as door knobs, surfaces in the patient's bathroom and shared common areas for dining, bathing, toileting.

In prehospital care,

- Perform a terminal clean following patient care and transport.
- Clean and disinfect response bags following use and if heavily soiled or contaminated with blood and/or body fluids remove from service and launder as per organizational policy.

11. Handling of Deceased Bodies

a. Use Routine Practices properly and consistently applied for the routine handling of deceased bodies. Adhere to provincial/territorial specified communicable disease regulations. Refer to Manitoba Health , *Public Health Act*, Dead Bodies Regulation http://web2.gov.mb.ca/laws/regs/pdf/p210-027.09.pdf

12. Handling of Linen, Waste, Dishes and Cutlery

a. Linen

i. Change patient bed linen regularly and when soiled, upon discontinuation of contact precautions and following patient discharge.

ii. Handle soiled linen from health care settings in the same way for all patients without regard to their infection status. Place soiled linen in an appropriate receptacle at the point-of-use.

iii. Handle soiled linen with a minimum of agitation to avoid contamination of air, surfaces and persons.

iv. Sort and rinse linen outside of patient care areas, with the exception of specialized items and personal clothing in specific health care settings.

v. Roll or fold heavily soiled linen to contain the heaviest soil in the centre of the bundle. Do not remove large amounts of solid soil, feces or blood clots from linen by spraying with water; use a gloved hand and toilet tissue then place into a bedpan or toilet for flushing.

vi. Perform hand hygiene after handling soiled linen.

vii. Transport and store clean linen in a manner that prevents its contamination and ensures its cleanliness.

viii. Maintain separation of clean and soiled linen during transport and storage.

ix. Wash reusable linen bags after each use; they may be washed in the same cycle as the linen contained in them.

In ambulatory care

- Change linen following every patient treatment / procedure

In prehospital care

- Change patent linen following every patient treatment/transport.

a. Waste

i. Contain biomedical waste (e.g. sponges, dressings, or surgical drapes soaked with blood or secretions) in impervious waste-holding bags or double bags according to municipal/regional regulations.

ii. Dispose of blood, suctioned fluids, excretions and secretions in a sanitary sewer or septic system according to municipal/regional regulations.

iii. Handle used needles and other sharp instruments with care to avoid injuries during disposal. Dispose of used medical sharps immediately in designated puncture-resistant containers located at the point-of-use.

In home care settings

- Advise patients to dispose of medical sharps (e.g. hypodermic needles used by patients) in accordance with municipal or regional regulations.
- Inform patients to place sharps into an impervious container (e.g. coffee can). Some local pharmacies provide sharps containers.

b. Dishes
There are no indications for the use of disposable dishes other than when dishwashing equipment is non-functioning.

13. Education of Patients, Families and Visitors

a. Health care workers should provide instructions to patients, families and visitors regarding hand hygiene and respiratory hygiene.

14. Visitor Management

a) Visitors with symptoms of acute infection (e.g. cough, fever, vomiting, diarrhea, coryza, rash, conjunctivitis) should not visit unless the visit is essential (e.g. parent, guardian or primary caretaker), in which case they should be instructed and supervised in precautions to take to minimize transmission of infection.

IV. Recommendations for Additional Precautions in All Health care Settings and Modifications for Precautions in Specific Health Care Settings

IN ADDITION TO ROUTINE PRACTICES FOR THE CARE OF ALL PATIENTS, IN ALL SETTINGS, THE RECOMMENDATIONS THAT FOLLOW APPLY TO THE CARE OF PATIENTS ON ADDITIONAL PRECAUTIONS

Sub-section (i) Contact Precautions for ALL Care Settings

And

Modifications for Specific Health Care Settings

Contact precautions may be required for selected situations including extensive contamination of the environment or microorganisms with a low infectious dose.

Refer to Table 5 Transmission Characteristics and Empiric Precautions/Clinical Presentations; Refer to Table 6 Transmission Characteristics and Precautions by Specific Etiology

1. Source Control

a. Develop a system to identify patients with known or suspected infections that require contact precautions.

i) Implement contact precautions empirically for patients with conditions listed in Table 5 without waiting for the etiology to be determined.

ii) Follow precautions in Table 6, if the etiology has been established.

iii) Some indications for contact precautions may differ for paediatric (e.g. children who are incontinent or unable to comply with hygiene) and certain adult patients (e.g. incontinent or cognitively impaired adults).

iv) Note some disease/conditions require two precautions categories (e.g. contact and droplet).

v) Place a sign at the entrance to the patient room or other visible locations to identify contact precautions.

vi) Restrict patients on contact precautions from participating in pet therapy programs.

2. Patient Accommodation and Placement

a. Single Room

i) Place patients requiring contact precautions into a single room with a private toilet (or designated commode chair), designated patient sink and a designated staff hand washing sink. It may be difficult to maintain physical separation related to shared spaces and equipment (e.g. toilets, sinks) in a shared room.

ii) The room door may remain open.

b. When single patient rooms are limited, perform a risk assessment to determine patient placement and/or suitability for cohorting.

i) Give priority to patients with conditions that may facilitate cross-transmission of microorganisms (e.g. uncontained drainage, stool incontinence, young age, and cognitive impairment) for single patient room placement.

ii) Cohort patients who are infected or colonized with the same microorganism and are suitable roommates.

iii) Select roommates for their ability and the ability of their visitors to comply with required precautions.

c. When cohorting is not feasible:

i) Avoid placing a patient requiring contact precautions in the same room as a patient who is at high risk for complications if infection occurs or with conditions that may facilitate transmission (e.g. immunocompromised, open wounds).

ii) In a shared room, a patient with diarrhea should not share a toilet with another patient. Assign a designated toilet or commode to the patient with diarrhea.

iii) In shared rooms, roommates and all visitors should be aware of the precautions to follow.

Select roommates for their ability and the ability of their visitors to comply with required precautions.

iv) If possible, close the privacy curtain between beds to minimize opportunities for direct contact.

v) Ensure contact precautions can be applied in nursery settings including providing the required spacing between infant stations to minimize opportunities for direct contact. If multiple infants are kept in a single room, ensure a 1.2-2.4 metre space between infant stations (depending on care requirements) and that family members or designated visitors are able to comply with the required precautions.

3. Patient Flow

a. Ensure, assisting as necessary, that the patient performs hand hygiene before leaving their room.

b. Allow the patient out of their room as required for their care plan. Provide supervision of the patient if compliance with precautions is inadequate.

c. Provide patient with clean bedclothes and bedding, contain draining wounds with clean dressings and ensure infected areas of the patient's body are covered and body substances are contained when transfer or movement in health care facilities is necessary.

d. Inform personnel in the area to which the patient is to be transported of precautions to follow and request that the patient be seen promptly to minimize time in waiting areas and reduce time spent outside the room by the patient.

e. Avoid transfer within facilities unless medically indicated. If medically indicated transfer is unavoidable, advise the transferring service, receiving unit, or facility or home care agency of the necessary precautions.

f. Remove and dispose of personal protective equipment and perform hand hygiene prior to transporting patients.

g. Put on clean personal protective equipment to handle the patient if necessary during transport and at the transport destination.

4. Personal Protective Equipment

a. Provide personal protective equipment for contact precautions outside the patient room (or when available, the anteroom), cubicle or patient's designated bedspace in shared rooms.

c. In addition to the use of personal protective equipment as per Routine Practices:

i) Gloves

- Wear gloves to enter the patient room, cubicle or patient's designated bedspace in shared rooms.
- Remove gloves and dispose into a hands-free waste receptacle and perform hand hygiene on exit from the room or patient bedspace.

ii) Long sleeved gowns

- Wear a long sleeved gown if it is anticipated that clothing or forearms will be in direct contact with the patient or with environmental surfaces or objects in the patient care environment.
- If a gown is to be worn, put it on upon entry into the room, cubicle or patient's designated bedspace in shared rooms.
- Remove gown and dispose into a hands-free receptacle immediately after the indication for use and perform hand hygiene before leaving the patient's environment.

d. Do not wear the same personal protective equipment for more than one patient. Change personal protective equipment and perform hand hygiene between contacts with all patients in the same room.

5. Cleaning and Disinfection of Non-Critical Patient Care Equipment

a. All equipment/supplies should be identified and stored in a manner that prevents use by or for other patients.

b. Dedicate non-critical patient-care equipment (e.g. thermometers, blood pressure cuffs to the use of one patient and clean and disinfect following Routine Practices before reuse with another patient or use a single use device and place in garbage immediately after use.

c. Do not share toys, electronic games or personal effects between patients.

6. Cleaning of the Patient Environment

a. Additional cleaning measures or frequency may be required in situations when continued transmission of specific infectious agents (e.g. *C. difficile*, norovirus and rotavirus). Assess the efficacy of disinfectants being used and if indicated, select a more effective disinfectant. Clean all horizontal and frequently touched surfaces at least twice daily and when soiled.

b. When precautions are discontinued or the patient is moved, terminal cleaning of the room/bedspace and bathroom, changing of privacy curtains and cleaning or changing of string/cloth call bells or light cords is required. See Appendix VII.

7. Education of Patients, Families and Visitors

a. Educate patients, their visitors, families and decision makers about the precautions being used, the duration of precautions, as well as the prevention of transmission of disease to others with a particular focus on hand hygiene.

b. Instruct visitors who are participating in patient care about the indications for and appropriate use of personal protective equipment (barriers). In the adult setting, visitors who assist with patient care should use the same personal protective equipment as health care workers. This may not be necessary for parents carrying out their usual care of young children.

8. Management of Visitors

a. Instruct visitors to speak with a nurse before entering the patient room, to evaluate the risk to the health of the visitor, the risk of the visitor transmitting infection, and the ability of the visitor to comply with precautions.

b. Only essential visitors (e.g. parent, guardian or primary caretaker) should be allowed. Restrict visitors to visiting only one patient. If the visitor must visit more than one patient, instruct the visitor to use the same barriers as the health care workers and perform hand hygiene before going to the next patient room.

9. Duration of Precautions

a. Discontinue contact precautions after signs and symptoms of the infection have resolved, following the pathogen specific recommendations in Table 6.

b. Determine duration of precautions on a case-by-case basis for patient with prolonged symptoms or who are immune suppressed. Re-evaluate a patient with persistent symptoms for other potential causes. Repeated microbiological testing may sometimes be indicated.

c. Discontinue precautions only after the room/bedspace and bathroom has been terminally cleaned.

10. Handling of Deceased Bodies

Use Routine Practices, properly and consistently applied in addition to contact precautions for handling deceased bodies. Adhere to provincial/territorial specified communicable disease regulations. Ensure adequate numbers, training and supervision of housekeeping staff. Refer to Manitoba Health, *Public Health Act*, Dead Bodies Regulation http://web2.gov.mb.ca/laws/regs/pdf/p210-027.09.pdf

11. Waste, Laundry, Dishes and Cutlery

No special precautions; Routine Practices are sufficient.

Special Considerations for Antibiotic Resistant Organisms in All Health Care Settings

- In acute care inpatient facilities, Routine Practices and Contact precautions are recommended for infection or colonization (i.e. patient is asymptomatic) with organisms such as methicillin-resistant *S. aureus* (MRSA), vancomycin resistant enterococcus (VRE) or other organisms resistant to a wide spectrum of antibiotics (as determined by the Infection Prevention and Control service of the facility) (Table 6). In addition, some facilities may choose to include precautions for persons at risk of colonization pending screening results, particularly in outbreak situations.
- Wear masks consistent with Routine Practices for patients with MRSA.

- There are insufficient data at present on which to base recommendations for discontinuation of precautions for patients colonized with antibiotic resistant organisms. Decisions will need to be made locally, considering the specific microorganism, the patient population, and local experience with duration of colonization. These policies should be updated periodically.
- Avoid policies and practices that result in stigmatization of patients with antibiotic resistant organisms (e.g. disease-specific signage) or increase the patients' sense of isolation. Recognize that patients placed on contact precautions may have fewer contacts with health care providers, and this may reduce their quality of care; take steps to mitigate this impact on care.

12. Modifications for Contact Precautions for Long Term Care, Ambulatory Care, Home Care, Prehospital.

For Long Term Care

- Perform a Point of Care Risk Assessment to determine patient placement, removal from a shared room or participation in group activities on a case-by case basis, balancing infection risks to other patients in the room, the presence of risk factors that increase the likelihood of transmission, and the potential adverse psychological impact on the infected patient.
- Participation in group activities should be restricted only if wound drainage or diarrhea cannot be contained.
- Ensure patient performs hand hygiene or is assisted as necessary before participation with group activities.

b. Use of Personal Protective Equipment

- Wear gloves if direct personal care contact with the patient is required or if direct contact with frequently touched environmental surfaces is anticipated.
- Wear gowns for direct hands on care.

c. Cleaning of Patient Environment

- In outbreaks, consider more frequent cleaning and/or cleaning with disinfectants. This includes bathing and toileting facilities, recreational equipment and horizontal surfaces in the patient room and, in particular, areas/items that are frequently touched, e.g. hand and bedrails, light cords etc).

Special Considerations for the Care of Patients with Antibiotic Resistant Organisms in Long Term Care Settings

- Policies for managing antibiotic resistant organisms, including initiation and discontinuation of precautions, should be in place and reflect the local experience with particular antibiotic resistant organisms and be flexible enough to accommodate the characteristics of different antibiotic resistant organisms. It is important to collaborate with other local health care organizations to design a comprehensive and consistent program.
- Management strategies should take into consideration risk-benefits for both the patient and the facility based on individual patient assessment. Controlling transmission is primarily the responsibility of direct caregivers through hand hygiene and appropriate use of gloves. Ability to maintain hygiene by the patient and caregivers, individualized activity restrictions, selection of low-risk roommate, and environmental cleanliness also require consideration.

For Ambulatory Care

a. Follow Routine Practices (as per Part B, Section III., above) and contact precautions recommended for all health care settings (Part B, Section IV., sub-section (i), above), and apply the following modifications:

a. Source control

Triage

- Minimize contact between symptomatic patients and others by minimizing time spent in waiting rooms.
- Schedule symptomatic patients at a time when less likely to encounter other patients.
- Place in a separate room as soon as possible.

b. Cleaning and Disinfection of Non-Critical Patient Care Equipment and Patient Environment

- Clean equipment and surfaces in direct contact with the patient or infective material (e.g. respiratory secretions, stool or skin exudates) before the room is used for another patient. Place contaminated reusable non-critical patient care

equipment in a plastic bag for transport to a soiled utility area for reprocessing.

- Clean all horizontal surfaces and frequently touched surfaces in the room if the patient is likely to cause extensive environmental contamination (diarrhea or fecal incontinence not contained by diapers, copious wound drainage, copious uncontrolled respiratory secretions or sputum) prior to use by another patient.

Special Considerations for the Care of Patients with Antibiotic Resistant Organisms in Ambulatory Care Settings

- Do not use contact precautions for asymptomatic carriers (i.e. colonized only) of antibiotic resistant organisms; Routine Practices, properly and consistently applied are sufficient.
- Adhere to modifications of contact precautions for ambulatory care as above.
- Requiring proof of screening for antibiotic resistant organisms before service is not advised. Communicate (preferably with infection control personnel) when referring a patient known to have an antibiotic resistant organism to a health care facility/service to ensure appropriate precautions are implemented. If asymptomatic, Routine Practices properly and consistently applied are sufficient.
- Collaborate with local or regional public health departments and infection control professionals in order to design a comprehensive infection and prevention control program.

Modifications of Contact Precautions for Home Care

a. Accommodation

Advise symptomatic patients to:

- Rest away from others, in a separate room if available.
- Use a designated bathroom, whenever possible.
- Clean the bathroom frequently, especially frequently touched surfaces.
- Not share towels or other personal items.

b. Patient Flow

- Do not exclude asymptomatic patients from group/social activities.
- Advise symptomatic patients how to contain secretions/excretions to minimize the risk of transmission to others (e.g. contain draining wounds with an intact dressing) and to perform hand hygiene prior to group activities.
- Advise symptomatic patients to exclude themselves from group/social activities when experiencing acute symptoms and when secretions/excretions cannot be contained.
- Reschedule care and services (e.g. appointments at foot care clinics, volunteer visiting and volunteer transportation) that are not medically necessary, until patients are asymptomatic.

c. Personal Protective Equipment

- Wear gloves and gowns when direct contact is anticipated with a symptomatic patient or with equipment and environmental surfaces in the patient's immediate environment.

d. Duration of Precautions

- Discontinue precautions when patient is asymptomatic.

Special Considerations for the Care of Patients with Antibiotic Resistant Organisms in Home Care

- Requiring proof of screening for antibiotic resistant organisms before service is not advised. Communicate (preferably with infection control personnel) when referring a patient known to have an antibiotic resistant organisms to a health care facility/service to ensure appropriate precautions are implemented. For asymptomatic patients, Routine Practices properly and consistently applied are sufficient.
- Do not use contact precautions for patients who are asymptomatic including asymptomatic carriers of antibiotic resistant organisms; Routine Practices, properly and consistently applied are sufficient.
- Collaborate with local or regional public health departments and infection control professional to design a comprehensive infection prevention and control program. In some jurisdictions such collaboration may be appropriate with the local funder of home care services.

Modifications of Contact Precautions for Prehospital Care

a. Limit number of personnel attending the patient when possible.

b. Put gloves/gowns on at the point of care.

c. Remove gloves/gown when patient care is broken, immediately discard and perform hand hygiene.

d. Wrap patient in an examining room in a sheet to minimize contact with personnel and environment.

e. Single patient transport is preferred.

f. Multipatient transport requires a risk assessment; consider conditions as listed in Routine Practices for priority for single transport.

g. Notify receiving hospital/facility if precautions are required.

h. Clean and disinfect equipment and surfaces and change linen after every patient.

Special Considerations for the Care of Patients with Antibiotic Resistant Organisms in Prehospital Care

- Adhere to modifications of contact precautions for prehospital care described above.
- Do not use contact precautions for patients who are asymptomatic including asymptomatic carriers of antibiotic resistant organisms; Routine Practices, properly and consistently applied are sufficient.

Sub-section (ii) Droplet Precautions in ALL Care Settings

IN ADDITION TO ROUTINE PRACTICES FOR THE CARE OF ALL PATIENTS, IN ALL SETTINGS, THE RECOMMENDATIONS THAT FOLLOW APPLY TO THE CARE OF PATIENTS ON DROPLET PRECAUTIONS

And

Modifications for Specific Health Care Settings

Droplet Precautions

Refer to Table 5 Transmission Characteristics and Empiric Precautions/Clinical Presentations; Refer to Table 6 Transmission Characteristics and Precautions by Specific Etiology.

1. Source Control

a. Develop a system to identify patients with known or suspected acute infections that require droplet precautions.

i) Implement droplet precautions empirically for patients with conditions listed in Table 5 without waiting for the etiology to be determined.

ii) Refer to Table 6, if the etiology has been established.

iii) Note: some indications for droplet precautions may differ for certain paediatric patients (e.g. epiglottis or cellulitus in child < 5 years, scarlet fever in children) and adult patients.

iv) Note: some conditions/specific etiologies require two categories of precautions (e.g. contact and droplet).

v) Instruct patients to adhere to respiratory hygiene.

vi) Direct patients with acute respiratory symptoms to a separate waiting area or place patient in a single room or pull privacy curtain in multi-bed room (see 3, Patient placement, below).

vii) Place a sign at the entrance to the patient room or other visible locations to identify droplet precautions.

2. Personnel Restrictions

a. Health care workers should avoid touching the mucous membranes of their eyes, nose and mouth with their hands to prevent self-contamination.

b. Only HCWs who are immune to mumps and rubella should provide direct care for patients with these infections.

3. Patient Placement and Accommodation

a. In inpatient facilities, a single room with in-room designated toilet and sink is preferable, as it may be difficult to maintain the recommended spatial separation of 2 metres between patients.

i) The room door may remain open.

ii) When single patient rooms are not available, perform a risk assessment to determine suitability for room sharing.

iii) Give priority for single patient room

placement to patients who cannot be confined to their bed or bed area.

b. If sufficient single rooms are not available, cohort patients who are known to be infected with the same pathogen and are suitable roommates.

c. When the room must be shared and cohorting patients with the same pathogen is not possible:

i) Avoid placing patients on droplet precautions in the same room with patients who, if they were to become infected, would be at high risk for complications or who may facilitate transmission (e.g. elderly, patients with cardio-pulmonary disease, immunocompromised).

ii) Roommates and all visitors should be aware of precautions to follow.

iii) Visitor's ability to comply with precautions should be a factor considered in roommate selection.

iv) Ensure that patients are physically separated (i.e. at least 2 metres apart) from each other. Draw the privacy curtain between beds to minimize opportunities for droplet spread.

v) Ensure droplet precautions can be applied in nursery settings including providing the required spacing between infant stations to minimize opportunities for droplet contact. Ensure family members or designated visitors are able to comply with the required precautions.

4. Patient Flow

a. Ensure, assisting as necessary, that the patient performs hand hygiene before leaving the room.

b. Allow the patient out of the room as required for their care plan. Provide supervision of the patient if compliance with precautions is inadequate.

i) Patient should wear a mask if tolerated and comply with respiratory hygiene during transport.

c. Personnel in the area to which patient is to be transported should be aware of the status of the patient and of the precautions to follow.

5. Use of Personal Protective Equipment

a. Provide personal protective equipment for droplet precautions outside the room or in the anteroom.

b. Transport personnel should wear facial protection if the patient cannot follow respiratory hygiene.

c. Wear and discard facial protection to prevent self-contamination, as outlined in Routine Practices.

d. In addition to the use of personal protective equipment described in Routine Practices, wear facial protection (i.e. masks and eye protection, face shields, or masks with visor attachment).

ii) For care of patients with symptoms of acute respiratory viral infection, facial protection is required within 2 metres of a patient who is coughing at the time of interaction or if performing procedures that may result in coughing.

iii) For care of patients with rubella or mumps, facial protection is not needed if the health care worker is immune. Non-immune personnel (rubella, mumps) should not enter the room unless it is essential and, when necessary, must wear facial protection.

e. In a cohort of patients infected with the same microorganisms, facial protection may be used for successive patients (gloves should be changed and hand hygiene performed between patients).

6. Cleaning of Patient Care Equipment

Follow Routine Practices unless contact precautions are also required, then follow contact precautions.

7. Cleaning of Patient Environment

Follow Routine Practices unless contact precautions are also required, then follow contact precautions.

8. Education of Patient and Family

a. Educate patients, their visitors, families and their decision makers about the precautions being used; with a particular focus on hand hygiene, the duration of precautions, and the prevention of transmission of disease to others.

b. Instruct visitors participating in patient care about the indications for and appropriate use of personal protective equipment (barriers). In the adult setting, visitors who assist with patient care should use the same personal protective equipment as health care workers. This may not be necessary for parents providing their usual care of young children.

9. Management of Visitors

a. The number of visitors should be kept to a minimum. Instruct visitors to speak with a nurse before entering the patient room. In the case of acute viral respiratory infection, household members need not wear facial protection (as they may have already been exposed). On a case-by-case basis, other visitors should be instructed in the appropriate use of a mask and other precautions.

b. Exceptions to the need for facial protection include:

   i) For patients with suspected or confirmed *H. influenzae* type b infection, visitors need to wear facial protection only if they will subsequently have extensive close contact with non-immune infants.

   ii) For patients with rubella or mumps, facial protection is not needed if the visitor is immune. Non-immune visitors should only enter the room when it is absolutely necessary, and if they enter the room they should wear facial protection.

10. Duration of Precautions

a. Discontinue droplet precautions after signs and symptoms of the infection have resolved or as noted in the disease-specific recommendations in Table 6.

b. Determine duration of precautions on a case-by-case basis when patient symptoms are prolonged or when the patient is immune suppressed. Re-evaluate the patient with persistent symptoms for other potential diagnoses. Repeat microbiological testing may sometimes be warranted.

11. Handling Deceased Bodies

Use Routine Practices, properly and consistently applied for handling deceased bodies, preparing bodies for autopsy or transfer to mortuary services. Droplet precautions are not necessary. Adhere to provincial/territorial specified communicable disease regulations. Refer to Manitoba Health, *Public Health Act*, Dead Bodies Regulation http://web2.gov.mb.ca/laws/regs/pdf/p210-027.09.pdf

12. Waste, Laundry, Dishes and Cutlery

No special precautions; Routine Practices are sufficient.

13. Modifications for Long Term Care, Ambulatory Care, Home Care, Prehospital Care

Modifications of Droplet Precautions in Long Term Care

a. In long-term care and other patiential settings, perform a Point of Care Risk Assessment to determine patient placement, considering infection risks to other patient in the room and available alternatives.

b. If a 2 metre spatial separation is not possible, manage the patient in their bed space with privacy curtains drawn.

c. Participation in group activities may need to be restricted while the patient is symptomatic.

d. During an outbreak in a facility, restrict social activities to units/areas.

e. Restrictions in the number of visitors may be advisable during community or facility outbreaks of respiratory infections.

Modifications of Droplet Precautions in Ambulatory Care

a. Place the patient directly into a single room, especially if he or she has known or suspected meningococcal infection, rubella, mumps or pertussis. If this is not possible, place the patient in an area of the waiting room separated from other patients by at least 2 metres, and minimize time spent in the waiting room.

b. If this cannot be achieved, the patients must be at least one metre apart and the symptomatic patient must wear a mask.

c. Consider separate waiting rooms or areas for well child visits and for children with acute respiratory infection, especially during community outbreaks.

Modifications of Droplet Precautions in Home Care

a. Ask patient to self-screen for acute respiratory illness and inform the home care agency prior to the health care worker visit, scheduled appointment or attendance at a group program.

b. Advise patient to exclude themselves from group programs when experiencing acute symptoms of respiratory illness.

c. Health care workers should screen patients for febrile illness by phone, prior to the homecare visits, whenever possible. Health care workers should screen patients upon entry into clinics or group programs and for home visits if advance telephone screening is not possible.

d. Ensure medically necessary care is provided. Defer care (e.g. foot care clinics) and services (e.g. volunteer visitors and volunteer transportation) that are not medically necessary when patients are experiencing acute respiratory symptoms.

Modifications of Droplet Precautions in Prehospital Care

a. Develop practices to promptly identify patients with known or suspected infections that require droplet precautions.

b. Limit the number of personnel attending to the patient.

c. Single patient transport is preferred.

d. Place a mask on the patient if tolerated.

e. Notify receiving facility of precautions required.

f. If the disease is known to be by droplet transmission a procedure/surgical mask should be used. However, if an assessment suggests disease caused by airborne transmission cannot be ruled out, then airborne precautions should be used.

Sub-section (iii) Airborne Precautions in All Care Settings

IN ADDITION TO ROUTINE PRACTICES FOR THE CARE OF ALL PATIENTS, IN ALL SETTINGS, THE RECOMMENDATIONS THAT FOLLOW APPLY TO THE CARE OF PATIENTS ON AIRBORNE PRECAUTIONS

And

Modifications for Specific Health Care Settings

Airborne Precautions

Refer to Table 5 Transmission Characteristics and Empiric Precautions/Clinical Presentations;

Refer to Table 6 Transmission Characteristics and Precautions by Specific Etiology.

1. Source Control

a. Have in place practices to identify patients with known or suspected infection that require airborne precautions i.e. infectious tuberculosis, measles, varicella or disseminated zoster.

i) Note that some airborne disease/conditions require two precaution categories (e.g. airborne and contact).

ii) Direct the patient to put a mask on (if tolerated) when not in an airborne infection isolation room.

iii) Place patients known or suspected to have an airborne infection directly into an airborne infection isolation room with the door closed. The room must meet engineering controls for airborne isolation, including exhaust vented to the outside or filtered through a high efficiency particulate filter if recirculated.

iv) Allow the patient to remove their mask once they are in the airborne infection isolation room (see 2, Patient placement, below).

v) Place the patient into a single room if an airborne infection isolation room is unavailable; the patient should wear a mask in the room and the door must remain closed.

vi) When an airborne isolation room is unavailable, transfer the patient to a facility with an airborne infection isolation room as soon as medically stable.

vii) Place a sign at the entrance to the patient room or other visible location to identify airborne precautions.

b. Apply the following strategies to reduce the level of aerosol generation when performing aerosol-generating medical procedures for patients with suspected or confirmed SARS, tuberculosis and emerging respiratory infections :

i) Only medically necessary aerosol-generating medical procedures should be undertaken.

ii) Anticipate and plan for aerosol-generating medical procedures.

iii) Use appropriate patient sedation.

iv) Limit the number of personnel in the room when aerosol-generating medical procedures are performed.

v) Perform aerosol-generating medical procedures in airborne infection isolation rooms whenever feasible.

vi) Maintain appropriate ventilation (e.g. level of air filtration and direction of air flow).

vii) Use a single room (with the door closed and away from high risk patients if feasible), when airborne infection isolation room is unavailable.

viii) Ensure respirators (N95 or higher) are worn by all personnel present in the room during the procedure.

ix) Use closed endotracheal suction systems whenever possible.

Note: When responding to a code (cardiac arrest) on a patient with an airborne infection who is not in an airborne infection isolation room and transfer to a single room or airborne infection isolation room is not feasible: pull the privacy curtain and ensure all personnel in the room or within the privacy curtain area are wearing appropriate personal protective equipment. Remove visitors and other patients (if feasible).

c. Ventilated patients and patients in incubators.

i) Ensure an appropriate bacterial filter is placed on the endotracheal tube to prevent contamination of the ventilator and the ambient air.

ii) Perform endotracheal suctioning using a closed suction apparatus where possible

2. Patient Placement and Accommodation
See Source control (see 1(a), above)

a. Ensure the airborne infection isolation room has an in-room toilet, sink and bathing facility for the patient, and designated hand washing sink for health care worker.

b. Patients known to be infected with the same virus (measles or varicella) may share a room.

c. Patients with tuberculosis may not share rooms as strains and levels of infectivity may differ.

d. Monitoring.

i) Check the pressure differential in an airborne isolation room using visual indicators (smoke tubes or flutter strips) or portable manometers prior to placing a patient requiring airborne isolation in the room.

ii) Recheck with visual indicators or portable manometers regularly, preferably daily, when airborne infection isolation rooms are in use irrespective of the presence of continuous differential pressure sensing devices.

iii) Document results of monitoring.

iv) Do not inactivate visual or audible alarms.

3. Patient Flow

a. Restrict the patient to the room, except for medically essential procedures. The patient should be accompanied by a health care worker whenever outside the room.

b. The patient must wear a mask (if tolerated) if they leave the room. See (d) below if patient cannot wear a mask.

c. Cover skin lesions of patients with varicella or smallpox or nonpulmonary draining lesions due to *M. tuberculosis* with a clean sheet to prevent aerosolization of the infectious agent if the patient leaves the room.

d. If the patient must be transported for medically essential purposes and cannot wear a mask, plan transport to limit the exposure of other individuals e.g. no waiting in the reception areas, and communicate the need for precautions to all areas of the facility which are affected.

e. If the patient has proven or suspect tuberculosis, viral hemorrhagic fever, smallpox or monkeypox, the transport personnel should wear a respirator during transport.

f. For other conditions (i.e. measles, varicella), the transport personnel should be immune so that they will not require a respirator.

4. Personnel

a. Health care workers should be aware of their immune status to measles and varicella.

b. All health care workers should be immune to measles and varicella. A health care worker who is not immune should not provide care for a patient with measles, varicella or zoster or for a susceptible

exposed patient who is in the incubation period.

c. Non-immune health care workers should not enter the rooms of patients known or suspected to have measles, varicella (chickenpox), or disseminated zoster, or the room of a susceptible, exposed patient in the incubation period for these conditions unless unavoidable. In such circumstances a respirator should be worn (see 7, below, Personal protective equipment).

*Note: gloves should also be worn by non-immune health care workers.

a. Immune health care workers do not require respirators when caring for patients known or suspected to have measles (rubeola), varicella (chickenpox) or disseminated zoster.

5. Management of Case Patients with Airborne Infections:

a. For varicella:

- The patient should remain in the room until all lesions have crusted.
- Susceptible personnel and visitors should not enter the room. If exceptional circumstances make this necessary, the susceptible person should wear a respirator and gloves.
- The patient should leave the room for medically essential purposes only, unless it is established that all other patients and all health care workers are known to be immune to varicella.
- The patient should wear a mask, have skin lesions covered and clean bedclothes and bedding (as required) when out of the room.

b. For measles:

- The patient should remain in the room until four days after onset of rash or, if immunocompromised, the duration of illness.
- Susceptible personnel and visitors should not enter the room. If exceptional circumstances make this necessary, a respirator should be worn.
- The patient should leave the room for medically essential purposes only, unless all other patients and all health care workers are known to be immune to measles. The patient should wear a mask when out of the room.

6. Management of Exposed Susceptible Roommates and Other Close Contacts:

a. For varicella:

- Determine the immune status of exposed roommates and other close contacts. Place exposed susceptible contact in single airborne infection isolation room from 7 days after the first possible exposure until 21 days after the last exposure.
- Refer to the most recent National Advisory Committee on Immunization recommendations to determine whether varicella-zoster immune globulin or varicella vaccination is recommended for exposed susceptible contacts at risk of severe disease, and, if given, precautions should be extended to 28 days after exposure.
- Offer varicella vaccine to exposed susceptible individuals within 72 hours after first contact and no contraindications to the vaccine.
- Precautions for exposed individuals are to be followed regardless of the administration of varicella-zoster immune globulin or vaccine.

b. For measles:

- Determine the immune status of exposed roommates and other close contacts.
- Provide susceptible contacts with prophylaxis i.e., measles vaccine or Immunoglobulin as per the most recent National Advisory Committee on Immunization recommendations.

Refer to Manitoba Health Disease Protocols http://www.gov.mb.ca/health/publichealth/cdc/protocol/index.html

Place exposed susceptible contacts in single airborne infection isolation rooms from five days after the first possible exposure until 21 days after the last exposure.

7. Personal Protective Equipment

a. Health care workers should wear respirators when caring for a patient with suspect or confirmed respiratory tuberculosis. Health care workers should wear respirators when there are draining

infectious tuberculosis skin lesions and procedures are performed that would aerosolize viable organisms (e.g. irrigation, incision and drainage).

b. Health care workers should wear respirators when caring for a patient with vaccine preventable airborne infections (i.e. varicella, measles) to which they are not immune.

c. Health care workers should wear respirators when performing or assisting with AGMPs (Strategies to Reduce Aerosol Generation, see Part B, Section IV, sub-section (iii), 1(b)) for patients with signs and symptoms of SARS or other emerging respiratory infections. For novel influenza viruses or emergence of as yet unknown pathogens refer to the PHAC website for specific guidance documents.

Refer to http://www.phac-aspc.gc.ca/eri-ire/index-eng.php

d. Health care workers should wear respirators when caring for a patient with suspect or confirmed viral hemorrhagic fever with pneumonia.

e. Health care workers should wear respirators when caring for a patient with suspect or confirmed monkeypox or smallpox.

f. HCWs should only wear respirators for which they have been fit tested.

g. Health care workers should remain clean shaven in the area of the mask seal to ensure facial seal.

Appropriate Respirator Use:

- Perform hand hygiene prior to putting on the respirator.
- Perform a seal (fit) check immediately after putting on the respirator.
- Avoid self-contamination; do not touch the respirator on its external surface during use and disposal.
- Remove respirators carefully by the straps.
- Do not dangle a respirator around the neck when not in use; do not reuse disposable respirators.
- Change the respirator if it becomes wet or soiled (from the wearer's breathing or due to an external splash).
- Change the respirator if breathing becomes difficult.
- Discard the disposable respirator immediately after its use (i.e. dispose of when removed from the face), into a hands-free waste receptacle and perform hand hygiene. Follow organization policy for reusable respirators, placing into appropriate receptacle for reprocessing.
- In cohort settings, respirators may be used for successive patients.

8. Management of Patient Care Equipment

Follow Routine Practices unless contact precautions are also required, then, follow contact precautions.

9. Cleaning of Patient Environment

Follow Routine Practices. When contact precautions are also required, follow contact precautions.

10. Education of Patient, Family and Visitors

a. Educate patients, their visitors, families and caretakers about the precautions being used, the duration of the precautions as well as the prevention of transmission of disease to others.

b. Instruct patients with known or suspected airborne infections to wear a mask and to cover skin lesions with a dry dressing if, for medical reasons, they leave the airborne infection isolation room.

c. Instruct visitors to wear the same personal protective equipment as health care workers unless known to have had prolonged exposure to the patient or immune to the specific disease/condition requiring patient precaution. Visitors should be instructed to perform a fit seal check if wearing a respirator.

11. Management of visitors

a. For tuberculosis:

- Restrict visitors to immediate family or guardian.
- Screen close contact visitors (e.g. household members, those who routinely have visited the patient's home) for the presence of cough and refer coughing visitors for tuberculosis assessment immediately. Until assessed they should visit only if it is essential and should wear a mask while in the facility.

b. For other airborne infections:

- Instruct visitors to speak with a nurse before entering the patient room.
- Visitors of patients on airborne precautions must be confirmed to be immune to the specific infection for which the patient is on precautions unless there are exceptional circumstances, (e.g. the patient is terminally ill or the visit is otherwise essential (e.g. parent, guardian or primary caretaker)).
- If a visit is essential, non-immune visitors must wear appropriate personal protective equipment.

12. Duration of Precautions

Discontinue airborne precautions after signs and symptoms of the infection have resolved or following the disease-specific recommendations in Table 6.

13. Handling of Deceased Bodies

Use Routine Practices properly and consistently applied in addition to airborne precautions for handling deceased individuals. Airborne precautions should be continued for the handling of a deceased patient with infectious respiratory tuberculosis, measles or varicella until the appropriate time has elapsed to remove airborne contaminants in the room (see Appendix III). Adhere to provincial/territorial specified communicable disease regulations). Refer to Manitoba Health, Public Health Act, Dead Bodies Regulation http://web2.gov.mb.ca/laws/regs/pdf/p210-027.09.pdf

14. Upon Discharge or Discontinuation of Airborne Precautions

a. Allow sufficient time for the air to be cleared of aerosolized droplet nuclei (see Appendix III) before housekeeping performs terminal cleaning. If the housekeeper enters the room before the appropriate time has elapsed, they are required to wear a respirator.

Modifications for Airborne Precautions in Specific Health Care Settings

1. Follow Routine Practices (Part B, Section III.) and airborne precautions recommendations for all health care settings (Part B, Section IV., sub-section (iii), and apply the following modifications:

Modifications of Airborne Precautions in for Long Term Care

a. Tuberculosis (infectious, respiratory (pleural or laryngeal))

i) Determine the tuberculosis infection status of patients at the time of admission.

ii) If an airborne infection isolation room is not available in the long-term care setting, arrange for transfer to a facility with airborne infection isolation rooms. Reduce the risk of transmission of tuberculosis when transfer is delayed by the following:

- Place the patient in a single room with the door closed, preferably without recirculation of air from the room and as far away from rooms of other patients as possible.
- Limit the number of people entering the room (e.g. no non-essential visitors).

b. Varicella or disseminated herpes zoster or localized herpes zoster which cannot be kept covered, or measles:

i) Determine the immune status (measles, varicella) of patients at the time of admission and offer immunization, if appropriate.

ii) If an airborne infection isolation room is not available in the long-term care setting, arrange for transfer to a facility with airborne infection isolation rooms. Reduce the likelihood of transmission if transfer is delayed by the following:

- Place the patient in a single room with the door closed, preferably without recirculation of air from the room and as far away from rooms of other patients as possible.
- Limit the number of people entering the room (e.g. no non-essential visitors).
- If all personnel and all other patients in the facility are immune and if non-immune visitors can be excluded, transfer to a facility with an AIIR may not be essential.

iii) Do not place infectious patients on units where there are susceptible immunocompromised patients.

Modification of Airborne Precautions for Ambulatory Care

a. Develop a system (e.g. triage, signage) at entry to ambulatory settings or when making telephone appointments to identify patients with known or suspected infection that require airborne precautions (i.e. infectious tuberculosis, measles, varicella or disseminated zoster). If feasible, the visit should be scheduled at a time to minimize exposure of other patients, such as at the end of the day.

b. Direct patients with suspected airborne infection to put a mask on upon entry to the facility.

c. Place patients known or suspected to have airborne infection directly into an airborne infection isolation room.

d. Place the patient into a single room only if an airborne infection isolation room is unavailable; ensure the patient keeps the mask on and the door remains closed.

e. Allow the patient to remove their mask once in an airborne infection isolation room.

f. Follow recommendations for Personnel, Patient Flow and Personal Protective Equipment.

g. Upon discharge, allow sufficient time for the air to clear aerosolized droplet nuclei before using the room for another patient (tuberculosis) or for a nonimmune patient (measles or varicella). The duration will depend on the rate of air exchange in the room (see Appendix VIII).

Modifications of Airborne Precautions for Home Care

a. Develop a system to screen patients prior to appointments to identify patients with known or suspected infection that require airborne precautions (i.e. infectious tuberculosis, measles, varicella or disseminated zoster).

b. Home care agencies should consult with Public Health to determine if the patient with respiratory tuberculosis is infectious and requires airborne precautions.

Modifications of Airborne Precautions for Prehospital Care

a. Whenever possible, First Responders should perform a Point of Care Risk Assessment and put on required personal protective equipment prior to entering the home or location of the patient.

b. Where available, use vehicle ventilation system to create a negative pressure environment. If not available, use natural ventilation (e.g. open vehicle windows).

c. Patient should wear a mask during transport, if tolerated. If the patient requires oxygen, a filtered oxygen mask should be used.

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Table 5 Transmission Characteristics and Empiric Precautions

PAEDIATRIC PRECAUTIONS APPLY TO CHILDREN WHO ARE INCONTINENT OR TOO IMMATURE TO COMPLY WITH HYGIENE

RP – Routine Practice. Once Specific etiology is known, refer to Table 6.

Clinical findings	Potential Pathogens	Empiric precautions	Infective material	Route of transmission	Duration of precautions	Comments
Abscess See draining wound						
Bronchiolitis	Respiratory syncytial virus (RSV), human metapneumovirus parainfluenza virus, influenza, adenovirus	**Droplet and Contact**	Respiratory secretions	Large droplet and direct and indirect contact	Duration of symptoms	Patient should not share room with high-risk roommates. Cohorting may be necessary during community outbreaks
Burns, infected See draining wound						
Cellulitis Periorbital in child < 5 years old without portal of entry Draining: See draining wound	*H.influenzae* type b in non-immune child <2 years of age; *Streptococcus pneumoniae,* group A *Streptococcus,* *Staphylococcus aureus,* other bacteria.	**Droplet if *H. influenzae* type b is possible cause, otherwise RP**	Drainage from Ulcers, wounds Respiratory secretions	Direct Contact Large droplet	Until 24 hours of appropriate antimicrobial therapy received or if *H. influenzae* type b ruled out	
Cold	Rhinovirus, RSV, human metapneumovirus, parainfluenza, adenovirus, coronavirus	**Droplet and Contact**	Respiratory secretions	Large droplet and direct and indirect contact	Duration of symptoms	Patient should not share room with high-risk roommates.
Conjunctivitis	multiple microbial agents adenovirus, enterovirus, *Chlamydia,* *Neisseria gonorrhoeae*	**Contact***	Eye discharge	Direct and indirect contact	Until viral etiology ruled out; duration of symptoms, up to 14 days if viral	*RP if non-viral.
Cough, fever, acute upper respiratory tract infection	Rhinovirus, RSV, human metapneumovirus parainfluenza, influenza, adenovirus, coronavirus, pertussis, *Mycoplasma pneumoniae*	**Droplet and Contact**	Respiratory secretions	Large droplet, direct and indirect contact	Duration of symptoms or until infectious etiology ruled out	Fever and asthma in child <2 years old should be considered viral infection. Patient should not share room with high-risk roommates.

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PAEDIATRIC PRECAUTIONS APPLY TO CHILDREN WHO ARE INCONTINENT OR TOO IMMATURE TO COMPLY WITH HYGIENE

RP – Routine Practice. Once Specific etiology is known, refer to Table 6.

Clinical findings	Potential Pathogens	Empiric precautions	Infective material	Route of transmission	Duration of precautions	Comments
Cough, fever, pulmonary infiltrates in person at risk for tuberculosis	*Mycobacterium tuberculosis*	**Airborne**	Respiratory secretions	Airborne	Until infectious TB is ruled out For infected patients, until patient has received two weeks of effective therapy, and is improving clinically, and has three consecutive sputum smears negative for acid fast bacilli collected 8-24 hours apart If multi-drug resistant TB; until sputum culture negative	Tuberculosis in young children is rarely transmissible. • Refer to; Canadian Tuberculosis Standards Edition 6th Edit • http://www.phac-aspc.gc.ca/tbpc-latb/pubs/tbstand07-eng.php and • PHAC Guidelines Preventing the Transmission of Tuberculosis in Canadian Health Care Facilities 1996 http://www.collectionscanada.gc.ca/webarchives/20071120001332/ http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/96vol22/22s1/index.html
Croup	Parainfluenza, influenza, human metapneumovirus, RSV, adenovirus	**Droplet and Contact**	Respiratory secretions	Large droplet, direct and indirect contact	Duration of symptoms or until infectious cause ruled	Patient should not share room with high-risk roommates.
Decubitus (pressure ulcer, draining) See draining wound						
Dermatitis See draining wound	Many (bacteria, virus, fungus)	**Contact**	Pus, drainage from open skin	Direct and indirect contact	Until infectious etiology ruled out	If compatible with scabies take appropriate precautions pending diagnosis.
Desquamation, extensive See draining wound	*Staphylococcus aureus*	**Contact**	Pus, drainage from open skin	Direct and indirect contact	Until contained or infection ruled out	
Diarrhea See gastroenteritis Acute diarrhea of likely infectious cause						

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Table 5 Transmission Characteristics and Empiric Precautions

PAEDIATRIC PRECAUTIONS APPLY TO CHILDREN WHO ARE INCONTINENT OR TOO IMMATURE TO COMPLY WITH HYGIENE

RP – Routine Practice. Once Specific etiology is known, refer to Table 6.

Clinical findings	Potential Pathogens	Empiric precautions	Infective material	Route of transmission	Duration of precautions	Comments
Draining wounds	*Staphylococcus aureus*, group A Streptococcus many other bacteria	**RP** ***Contact: Major wound (uncontained drainage)** **** Droplet and Contact**	Pus	Direct and indirect contact	Duration of drainage	*Major = drainage not contained by dressing. ** Droplet for first 24 hours of antimicrobial therapy if invasive group A streptococcal infection suspected.
Encephalitis	Multiple agents including HSV, enterovirus, arbovirus (West Nile virus)	**ADULT: RP*** **PAEDIATRIC: Contact***	Feces, respiratory secretions	Direct and indirect contact (fecal/oral)	Until specific etiology established or until enterovirus ruled out	*May be associated with other agents including measles, mumps, varicella, *Mycoplasma pneumoniae.*
Endometritis	Group A Streptococcus; many other bacteria	**RP unless signs of toxic shock***				*Contact and droplet for the first 24 hours of antimicrobial therapy if invasive group A Streptococcus suspected.
Enterocolitis **See diarrhea**						
Epiglottitis In child < 5 years old	*H. influenzae* type b; **possible in non-immune infant <5 years of age**, group A Streptococcus, *Staphylococcus aureus*	**RP Droplet if *H. influenzae* type b is possible cause**	Respiratory secretions	Large droplet, direct contact	Until 24 hours of appropriate antimicrobial therapy received or until *H. influenzae* type b ruled out	
Erysipelas Draining: See draining wound	Group A Streptococcus	**RP**				
Febrile respiratory illness (FRI) Usually present with symptoms of fever greater than 38°C **and** new or worsening cough or shortness of breath.	Wide range of droplet-spread respiratory infections, such as colds, influenza, influenza-like illness (ILI) and pneumonia	**Contact and Droplet Precautions if viral etiology suspected**	Respiratory secretions	Droplet	While symptoms persist	Note: elderly people and people who are immunocompromised may not have a febrile response to a respiratory infection.

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Table 5 Transmission Characteristics and Empiric Precautions

PAEDIATRIC PRECAUTIONS APPLY TO CHILDREN WHO ARE INCONTINENT OR TOO IMMATURE TO COMPLY WITH HYGIENE

RP – Routine Practice. Once Specific etiology is known, refer to Table 6.

Clinical findings	Potential Pathogens	Empiric precautions	Infective material	Route of transmission	Duration of precautions	Comments
Fever without focus (acute, in children)	Enterovirus and multiple other pathogens	**ADULT: RP* PAEDIATRIC: Contact**	Feces, respiratory secretions	Direct or indirect contact (fecal/ oral)	Duration of symptoms or until enteroviral infection ruled out	*If findings suggest a specific transmissible infection, take precautions for that infection pending diagnosis.
Food poisoning	*Bacillus cereus, Clostridium perfringens, Staphylococcus aureus, Salmonella spp., Vibrio parahaemolyticus, Escherichia coli 0157*, and others	**ADULT: RP* PAEDIATRIC: Contact**	Food; Feces if *Salmonella or Escherichia coli* 0157	Foodborne; or direct and indirect contact (fecal/oral)		*Consider Contact Precautions for incontinent adults if stool cannot be contained or for adults with poor hygiene who contaminate their environment. Paediatric precautions apply to children who are incontinent or unable to comply with hygiene.
Furuncles See draining wound	*Staphylococcus aureus*					
Gas gangrene Draining: see draining wound	*Clostridium spp.*					
Gastroenteritis	Diarrhea and/or vomiting due to infection or toxin	**ADULT: RP* PAEDIATRIC & INCONTINENT OR NON-COMPLIANT ADUTS: Contact**	Feces	Direct and indirect contact (fecal/oral)	Duration of symptoms or *C. difficile*, norovirus, rotavirus ruled out. In paediatrics, until normal stools or infectious etiology ruled out	*Consider contact precautions for incontinent adults if stool cannot be contained or for adults with poor hygiene who contaminate their environment. Paediatric precautions apply to children who are incontinent or unable to comply with hygiene. See Table 6 for specific etiologies.
Gingivostomatitis	HSV, other causes including radiation therapy, chemotherapy, idiopathic (aphthous)	**Contact if primary and extensive HSV. Otherwise RP**	Mucosal lesions	Direct contact	While lesions present	
Guillain-Barré syndrome	Some cases associated with infection (e.g., *Campylobacter*)*					*Take appropriate precautions for disease identified.

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Table 5 Transmission Characteristics and Empiric Precautions

PAEDIATRIC PRECAUTIONS APPLY TO CHILDREN WHO ARE INCONTINENT OR TOO IMMATURE TO COMPLY WITH HYGIENE

RP – Routine Practice. Once Specific etiology is known, refer to Table 6.

Clinical findings	Potential Pathogens	Empiric precautions	Infective material	Route of transmission	Duration of precautions	Comments
Hand, foot and mouth disease	Enterovirus	**ADULT: RP PAEDIATRIC: Contact**	Feces, respiratory secretions	Direct and indirect contact (fecal/oral)	Duration of symptoms	Paediatric precautions apply to children who are incontinent or unable to comply with hygiene.
Hemolytic-uremic syndrome	Some associated with *E.coli* 0157	**ADULT: RP PAEDIATRIC: Contact**	Feces	Direct and indirect contact (fecal/oral)	Until *E. coli* 0157 ruled out.	*Consider contact precautions for incontinent adults if stool cannot be contained or for adults with poor hygiene who contaminate their environment. Paediatric precautions apply to children who are incontinent or unable to comply with hygiene.
Hemorrhagic fever acquired in endemic or epidemic area	Ebola, Lassa, Marburg, Crimean-Congo and others	**Contact plus Droplet and Airborne if pneumonia**	Blood and bloody body fluids; respiratory secretions; and urine if Lassa; and intact skin, Ebola	Direct and indirect contact; possibly aerosol if pneumonia Lassa-sexual transmission	Duration of symptoms or until hemorrhagic fever virus ruled out	Local public health authorities should be notified immediately.
Hepatitis of unknown etiology	HAV, HBV, HCV HEV, and others	**ADULT: RP* PAEDIATRIC & INCONTINENT OR NON-COMPLIANT ADUTS: Contact**	Feces; blood and certain body fluids	Mucosal or percutaneous exposure to infective body fluids Sexual transmission Vertical; mother to child Direct and indirect contact (fecal/oral) for hepatitis A, E	For 7 days after onset of jaundice or until hepatitis A and E excluded	*Consider contact precautions for incontinent adults if stool cannot be contained or for adults with poor hygiene who contaminate their environment unless hepatitis A and E are excluded: Paediatric precautions apply to children who are incontinent or unable to comply with hygiene.
Herpangina	Enterovirus	**ADULT: RP PAEDIATRIC: Contact**	Feces, respiratory secretions	Direct and indirect contact (fecal/oral)	Duration of symptoms	Paediatric precautions apply to children who are incontinent or unable to comply with hygiene.

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Table 5 Transmission Characteristics and Empiric Precautions

PAEDIATRIC PRECAUTIONS APPLY TO CHILDREN WHO ARE INCONTINENT OR TOO IMMATURE TO COMPLY WITH HYGIENE

RP – Routine Practice. Once Specific etiology is known, refer to Table 6.

Clinical findings	Potential Pathogens	Empiric precautions	Infective material	Route of transmission	Duration of precautions	Comments
Impetigo See draining wound	Group A Streptococcus, *Staphylococcus aureus*					
Influenza-like illness	Influenza, other respiratory viruses	**Contact and Droplet**	Respiratory secretions	Large droplet, direct and indirect contact	Duration of symptoms or until infectious etiology ruled out	
Kawasaki disease (Mucocutaneous lymph node syndrome)	Unknown	**RP**				Not known to be transmissible.
Meningitis	In child<5 years Bacterial: *Neisseria meningitidis, H. influenzae type b* possible in non-immune infant <2 years of age, *Streptococcus pneumoniae*, Group B Streptococcus, *Listeria monocytogenes, E. coli* and other Gram negative rods	**ADULT: Droplet until *Neisseria meningitidis* ruled out, otherwise RP** **PAEDIATRIC: Droplet and Contact**	Respiratory secretions	Large droplet, direct contact	Until 24 hours of appropriate antimicrobial therapy received	*Paediatric: precautions for both bacterial and viral until etiology established. Droplet if viral etiology established. Paediatric precautions apply to children who are incontinent or unable to comply with hygiene.
Necrotizing enterocolitis	Viral: enterovirus, arboviruses	**ADULT: RP*** **PAEDIATRIC: Contact***	Feces, respiratory secretions	Direct or indirect contact	Until enterovirus ruled out	Cohorting of ill patients on Contact Precaution may be indicated for clusters/outbreaks
	Unknown, probably many organisms	**RP***			Duration of symptoms	*Unknown if transmissible.
Osteomyelitis	*Staphylococcus aureus,* other bacteria H. *influenzae* *type b possible in non-immune infant <5 years of age,	**ADULT: RP** **PAEDIATRIC* Droplet if *H. influenzae* type b possible; otherwise RP**			*Until 24 hours of effective antimicrobial therapy or until *H. influenzae* type b ruled out	
Otitis, draining See draining wound						

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Table 5 Transmission Characteristics and Empiric Precautions

PAEDIATRIC PRECAUTIONS APPLY TO CHILDREN WHO ARE INCONTINENT OR TOO IMMATURE TO COMPLY WITH HYGIENE

RP – Routine Practice. Once Specific etiology is known, refer to Table 6.

Clinical findings	Potential Pathogens	Empiric precautions	Infective material	Route of transmission	Duration of precautions	Comments
Paroxysmal cough, suspected pertussis	*B. pertussis,* *B. parapertussis*	**Droplet**	Respiratory secretions	Large droplets	Until pertussis ruled out or 3 wks after onset of paroxysms if not treated or until 5 days of antimicrobial therapy received	See Table 6 for information regarding contacts.
Pharyngitis	Group A Streptococcus, viral, *Corynebacterium diphtheriae*	**Droplet and Contact**	Respiratory secretions	Direct and indirect contact; large droplets	Duration of symptoms; if group A Streptococcus until 24 hours of antimicrobial therapy received	*If diphtheria suspected, see Table 6.
Pleurodynia	Enterovirus	**ADULT: RP PAEDIATRIC: Contact***	Feces, respiratory secretions	Direct and indirect contact (fecal/oral)	Duration of symptoms	*Paediatric precautions apply to children who are incontinent or unable to comply with hygiene.
Pneumonia	Viruses, pertussis, Mycoplasma, *Streptococcus pneumoniae, H. influenzae* Type b, *Staphylococcus aureus,* Group A Streptococcus, Gram negative enteric rods, *Chlamydia pneumoniae, Legionella pneumophila; Pneumocystis jirovecii,* other fungi; other agents.	**Adult: *RP Paediatric: Droplet and Contact**	Respiratory secretions	Large droplets, direct and indirect contact	Until etiology established, then for specific organism; contact precautions for ARO pneumonia	*RP for adults unless clinical, epidemiologic or microbiologic data necessitates contact and droplet precautions. Minimize exposure of immunocompromised patients, patients with chronic cardiac or lung disease, neonates.
Pseudomembranous colitis	*Clostridium difficile*	**Contact**	Feces	Direct and indirect contact (fecal/oral)	Duration of symptoms	Until 72 hours after stool is normal.
Rash compatible with scabies	*Sarcoptes scabiei*	**Contact**	Mites	Direct and indirect contact	If confirmed, until 24 hours after initiation of appropriate therapy	*For typical scabies, RP (use gloves and gown for direct patient contact only) See scabies, Table 6.
Rash (maculopapular) with fever and one of coryza, conjunctivitis or cough	Measles	**Airborne**	Respiratory secretions	Airborne	If confirmed, until 4 days after onset of rash	See measles, Table 6.

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Table 5 Transmission Characteristics and Empiric Precautions

PAEDIATRIC PRECAUTIONS APPLY TO CHILDREN WHO ARE INCONTINENT OR TOO IMMATURE TO COMPLY WITH HYGIENE

RP – Routine Practice. Once Specific etiology is known, refer to Table 6.

Clinical findings	Potential Pathogens	Empiric precautions	Infective material	Route of transmission	Duration of precautions	Comments
Rash (petechial/ purpuric) with fever	*Neisseria meningitidis*	**Droplet if *N. meningitidis* suspected, otherwise RP**	Respiratory secretions	Large droplets, direct contact	Discontinue if *Neisseria meningitidis* ruled out. If *N. meningitidis* confirmed, until 24 hours of appropriate antimicrobial therapy received	
Rash (vesicular) with fever	Varicella	**Airborne and Contact**	Respiratory secretions, skin lesion drainage	Airborne, direct and indirect contact	If confirmed, until all lesions are dry	See varicella, Table 6
Rash, vesicular/ pustular in appropriate epidemiologic context until smallpox, disseminated vaccinia and monkeypox ruled out	Smallpox, disseminated vaccinia, monkeypox	**Contact, Droplet and Airborne**	Respiratory secretions, skin lesions	Airborne	Until smallpox, disseminated vaccine, monkeypox ruled out.	
Reye's syndrome	May be associated with viral infection, especially influenza, varicella					Precautions for known or suspected associated viral infection.
Scalded skin syndrome		**RP**				
Septic arthritis	*Staphylococcus aureus, Streptococcus pneumoniae,* Group A Streptococcus, N *gonorrhoeae,* other bacteria , *H. influenzae* Type b possible in non-immune infant <2 years of age;	**ADULT: RP PAEDIATRIC: Droplet if *H. influenzae* type b possible; otherwise RP**	Respiratory secretions for *H. influenzae type b*	Large droplet direct contact *H. influenzae type b*	Until 24 hours of appropriate antimicrobial therapy received or until *H. influenzae type b* ruled out	
Severe respiratory illness See febrile respiratory illness						

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Table 5 Transmission Characteristics and Empiric Precautions

PAEDIATRIC PRECAUTIONS APPLY TO CHILDREN WHO ARE INCONTINENT OR TOO IMMATURE TO COMPLY WITH HYGIENE

RP – Routine Practice. Once Specific etiology is known, refer to Table 6.

Clinical findings	Potential Pathogens	Empiric precautions	Infective material	Route of transmission	Duration of precautions	Comments
Skin infection See cellulitus						
Toxic shock syndrome	*Staphylococcus aureus,* Group A Streptococcus	***Droplet** **RP**				*Droplet for first 24 hours of antimicrobial therapy if invasive group A streptococcal infection suspected. See draining wound if drainage or pus.
Urinary tract infection	Many	**RP***				*Contact if ARO.
Vincent's angina, Trench mouth	Multiple bacteria	**RP**				
Wound infection (see draining wound)						

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Table 6 Transmission Characteristics and Precautions by Specific Etiology

PAEDIATRIC PRECAUTIONS APPLY TO CHILDREN WHO ARE INCONTINENT OR TOO IMMATURE TO COMPLY WITH HYGIENE RP – Routine Practice.

Refer to Manitoba Health Reporting of Diseases and Conditions by Health Professionals (HP) and Labs (L) http://web2.gov.mb.ca/laws/regs/pdf/p210-037.09.pdf

Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Actinomycosis (Actinomyces spp.)	Cervicofacial, thoracic or abdominal infection	**RP**			Variable	Not person-to-person		Normal flora; infection usually secondary to trauma.
Adenovirus Respiratory strains	Respiratory tract infection (pneumonia)	**Droplet and Contact**	Respiratory secretions	Large droplets; direct and indirect contact	1 – 10 days	Shortly prior to and until symptoms cease	Duration of symptoms.	Different strains responsible for respiratory and gastrointestinal disease. Patient should not share room with high-risk roommates Minimize exposure of immunocompromised patients, patients with chronic cardiac or lung disease, neonates Symptoms may be prolonged in immunocompromised patients.
	Conjunctivitis	**Contact**	Eye discharge	Direct and indirect contact	5 – 12 days	Late in incubation period until 14 days after onset	Duration of symptoms, up to 14 days	Careful attention to aseptic technique and reprocessing of ophthalmology equipment to prevent epidemic keratoconjunctivitis.
Adenovirus Enteric strain	Diarrhea	ADULT: **RP*** PAEDIATRIC: **Contact**	Feces	Direct and indirect contact (fecal/oral)	3 – 10 days	Until symptoms cease	Duration of symptoms	*Consider contact precautions for incontinent adults if stool cannot be contained or for adults with poor hygiene who contaminate their environment. Paediatric precautions apply to children who are incontinent or unable to comply with hygiene.
Amebiasis (*Entamoeba histolytica*)	Dysentery and liver abscess	**ADULT: RP* PAEDIATRIC: Contact****	Feces	Direct and indirect contact (fecal/oral)	2 – 4 weeks	Duration of cyst excretion	Duration of symptoms	*Consider contact precautions for incontinent adults if stool cannot be contained or for adults with poor hygiene who contaminate their environment. **Paediatric precautions apply to children who are incontinent or unable to comply with hygiene.

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Table 6 Transmission Characteristics and Precautions by Specific Etiology

PAEDIATRIC PRECAUTIONS APPLY TO CHILDREN WHO ARE INCONTINENT OR TOO IMMATURE TO COMPLY WITH HYGIENE RP – Routine Practice.

Refer to Manitoba Health Reporting of Diseases and Conditions by Health Professionals (HP) and Labs (L) http://web2.gov.mb.ca/laws/regs/pdf/p210-037.09.pdf

Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Anthrax (*Bacillus anthracis*)	Cutaneous Pulmonary	**RP**			1 – 7 days; may be up to 60 days	Not person-to-person		Acquired from contact with infected animals and animal products. Inhalation anthrax may occur as a result of occupational exposure to anthrax spores or as a result of bioterrorism. Decontamination and post exposure prophylaxis required for exposure to aerosols in laboratory exposures or biological terrorism. Reportable Disease
Antimicrobial Resistant Organisms (AROs)	Infection or colonization (i.e., asymptomatic) of any body site	***Contact**	Infected or colonized secretions, excretions	Direct and indirect contact	Variable	Variable	As directed by ICP	*When asymptomatic, precautions not required in long term care, prehospital and home care. Includes MRSA, VRE, resistant Gram-negative rods and other organisms as per ICP. See Appendix I, ARO
Arthropod borne virus* (arboviruses)	Encephalitis, fever, rash, arthralgia, meningitis	**RP**	Blood, tissues	Vector-borne (spread by mosquitoes, ticks)	3 – 21 days (varies with different arboviruses)	Not person-to-person except rarely by blood transfusion or organ transplantation		*Over one hundred different viruses, most limited to specific geographic areas. In North America: West Nile is most common; others include California, St. Louis, Western equine, Eastern equine, Powassan, Colorado tick, Snowshoe hare, Jamestown Canyon
Ascariasis (*Ascaris lumbricoides*) (roundworm)	Usually asymptomatic	**RP**				Not person-to-person		Ova must hatch in soil to become infective.
Aspergillosis (*Aspergillus spp.*)	Skin, lung, wound or central nervous system infection	**RP**				Not person-to-person		Spores in dust; infections in immunocompromised patients may be associated with construction.
Avian influenza-See influenza								
Astrovirus	Diarrhea	**ADULT: RP* PAEDIATRIC: Contact**	Feces	Direct and indirect contact (fecal/oral)	3 – 4 days	Duration of symptoms	Duration of symptoms	*Consider contact precautions for incontinent adults if stool cannot be contained or for adults with poor hygiene who contaminate their environment.

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Babesiosis		**RP** **Paediatric Contact**	Blood	Tick borne		Not person-to-person except rarely by blood transfusion from asymptomatic parasitaemic donors		
Bacillus cereus	Food poisoning nausea, vomiting, diarrhea, abdominal cramps	**RP*** **PAEDIATRIC: CONTACT**		Foodborne				*Consider Contact Precautions for incontinent adults if stool cannot be contained or for adults with poor hygiene who contaminate their environment.
Blastomycosis (*Blastomyces dermatitidis*)	Pneumonia, skin lesions	**RP**				Not person-to-person		Acquired from spores in soil
Bocavirus Respiratory tract infection		**Droplet and Contact**						May cohort if infected with same virus. Patient should not share room with high-risk roommates.
Botulism (*Clostridium botulinum*)	Flaccid paralysis; cranial nerve palsies	**RP**		Foodborne		Not person-to-person		Reportable Disease
Brucellosis (*Brucella sp.*) Undulant, Malta or Mediterranean fever	Systemic bacterial disease of acute or insidious onset	**RP**			Weeks to months	Not transmitted person to person (rarely via banked spermatozoa and sexual contact)		Acquired from contact with infected animals or from contaminated food, mostly dairy products. *Brucella* is hazardous to laboratory workers. Notify laboratory if diagnosis is suspected. Prophylaxis required following laboratory exposure
	Draining lesions	**MINOR: RP** **MAJOR: Contact***	Drainage from open lesions	Possibly direct contact			Duration of drainage	*MAJOR: Contact precautions required only if wound drainage cannot be contained by dressings
Burkholderia cepacia	Exacerbation of chronic lung disease in patients with cystic fibrosis	**Contact***					Until organism cleared as directed by ICP	*B. cepacia* can result in respiratory tract colonization or infection in patient with cystic fibrosis *If other CF patients are on the unit. All interactions with other CF patients should be avoided.

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Caliciviruses See Noroviruses								
Campylobacter	Gastroenteritis	**ADULT: RP*** **PAEDIATRIC Contact**	Contaminated food feces	Direct and indirect contact (fecal/oral)	2–5 days	Duration of excretion Person–to–person uncommon	Duration of symptoms	*Consider contact precautions for adults if stool cannot be contained or for adults with poor hygiene who contaminate their environment.
Candidiasis (*Candida sp.*)	Many	**RP**						Normal flora.
Cat Scratch Disease (*Bartonella henselae*)	Fever, lymphadenopathy	**RP**			16-22 days	Not person-to-person		Acquired from animals (cats and others).
Chancroid (*Haemophilus ducreyi*)	Genital ulcers	**RP**		Sexual transmission	3-5 days	Until healed and as long as infectious agent persists in the original lesion		
Chickenpox – See varicella								
Chlamydia Infections: ***C. trachomatis***	Urethritis, cervicitis, pelvic inflammatory disease; neonatal conjunctivitis, infant pneumonia; trachoma	**RP**	Conjunctival and genital secretions	Sexual transmission Mother to child at birth Trachoma: direct/indirect contact	Variable	As long as organism present in sections		
C. pneumoniae	Pneumonia	**RP**	Respiratory secretions	Unknown	Unknown	Unknown		Rare outbreaks of pneumonia in institutionalized populations.
C. psittaci (psittacosis, ornithosis)	Pneumonia, undifferentiated fever	**RP**	Infected birds		7-14 days	Not person-to-person		Acquired by inhalation of desiccated droppings, secretions and dust of infected birds.

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Cholera (*Vibrio cholerae* 01, 0139)	Diarrhea	**ADULT: RP* PAEDIATRIC: Contact**	Feces	Direct and indirect contact (fecal/oral)	2-3 days	Duration of shedding	Duration of symptoms	*Consider contact precautions for adults if stool cannot be contained or for adults with poor hygiene who contaminate their environment.
Clostridium difficile	Diarrhea, pseudo-membranous colitis	**Contact**	Feces	Direct and indirect contact (fecal/or oral)	Variable	Duration of shedding	Until asymptomatic for at least 48 hours.	Bacterial spores persist in the environment. Consider increased environmental cleaning. Dedicate patient care equipment. RP are adequate for home care settings. Relapses are common.
Clostridium perfringens	Food poisoning	**RP**		Foodborne	6-24 hours	Not person-to-person		
	Gas gangrene, abscesses, myonecrosis	**RP**			Variable	Not person-to-person		Found in normal gut flora, soil. Infection related to devitalized tissue.
Coccidioido-mycosis (*Coccidioides immitis*)	Pneumonia, draining lesions	**RP**			1-4 weeks	Not person-to-person		Acquired from spores in soil, dust in endemic areas.
Colorado tick fever See Arbovirus	Fever	RP		Tick-borne	3-6 days	Not person-to-person		
Congential rubella See Rubella								
Coronavirus (other than SARS-CoV) **For SARS CoV** See Severe acute respiratory syndrome	Common cold	**Droplet and Contact**	Respiratory secretions	Direct and indirect contact. Possible large droplet	2-4 days	Until symptoms cease	Duration of symptoms	May cohort if infected with same virus. Patient should not share room with high-risk roommates.
Coxsackievirus – See Enteroviral infections								

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Creutzfeldt-Jakob Disease (CJD)	Chronic encephalopathy	**RP** *	Contaminated neurosurgical instruments; tissue grafts from infected donors					*PHAC guidelines for precautions for surgery and other procedures may be accessed at: http://alturl.com/bz3vg Notification of a suspected or diagnosed case of CJD should be made to the CJD surveillance system at: 1-888-489-2999 Reportable Disease
Crimean-Congo Fever See Viral Hemorrhagic Fevers								
Cryptococcosis (*Cryptococcus neoformans*)	Pneumonia, meningitis, adenopathy	**RP**			Unknown	Not person-to-person		
Cryptosporidiosis (*Cryptosporidium parvum*)	Diarrhea	ADULT: **RP*** **PAEDIATRIC:** **Contact**	Feces	Direct and indirect contact (fecal/oral)	1-12 days	From onset of symptoms until several weeks after resolution	Duration of symptoms	*Consider contact precautions for incontinent adults if stool cannot be contained or for adults with poor hygiene who contaminate their environment. Paediatric precautions apply to children who are incontinent or unable to comply with hygiene.
Cysticercosis (*Taenia solium* larvae)	*T. solium* larval cysts in various organs	**RP**	Ova in feces	Direct contact (fecal/oral)	Months to years	While eggs present in feces		Transmissible only from humans with *T. solium* adult tapeworm in gastrointestinal tract (autoinfection occurs)
Cytomegalovirus	Usually asymptomatic; congenital infection, retinitis, mononucleosis, pneumonia, disseminated infection in immunocompromised host	**RP**	Saliva, genital secretions, urine, breast milk, transplanted organs or stem cells, blood products	Direct * Sexual transmission Vertical mother to child in utero, at birth or through breast milk Transfusion, transplantation	Unknown	Virus is excreted in urine, saliva, genital secretions, breast milk for many months; may persist or be episodic for life		Requires close direct personal contact for transmission * Disease often reactivation rather than new infection.

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Dengue (arbovirus)	Fever, arthralgia, rash	**RP**		Mosquito-borne	3-14 days	Not person-to-person		
Dermatophytosis -See *Tinea spp*								
Diphtheria (*Corynebacterium diphtheriae*)	Cutaneous (characteristic ulcerative lesion)	**Contact**	Lesion drainage	Direct or indirect contact	2-5 days;	If untreated, 2 weeks to several months	Until two cultures* from skin lesions are negative	*Cultures should be taken at least 24 hours apart and at least 24 hours after cessation of antimicrobial therapy. Close contacts should be given antimicrobial prophylaxis as per Canadian Immunization Guide 7th Ed., 2006 http://www.phac-aspc.gc.ca/publicat/cig-gc/index-eng.php Reportable Disease for all cases and contacts
	Pharyngeal (adherent grayish membrane)	Droplet	Nasopharyn-geal secretions	Large droplets	2-5 days;	If untreated, 2 weeks to several months	Until two cultures* from both nose and throat are negative	*Cultures should be taken at least 24 hours apart and at least 24 hours after cessation of antimicrobial therapy. Close contacts should be given antimicrobial prophylaxis.
Ebola See Viral hemorrhagic fever								
Echinococcosis (Hydatidosis) (*Echinococcus granulosis, E. multilocularis*)	Cysts in various organisms	**RP**			Months to years	Not person-to-person		Acquired from contact with infected animals.
Echovirus See enterovirus								
Enterobiasis (oxyuriasis, pinworm) (*Enterobius vermicularis*)	Perianal itching	**RP**	Ova in stool, perianal region	Direct, indirect contact *	Life cycle requires 2-6 weeks	As long as gravid females discharge eggs on perianal skin. Eggs remain infective indoors about 2 weeks.		Direct transfer of infective eggs by hand from anus to mouth of the same or another person; indirectly through clothing, bedding or other contaminated articles. Close household contacts may need treatment.

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Enterococcus species (Vancomycin resistant only) – See Vancomycin-resistant enterococci								
Enteroviral infections Echovirus, Coxsackievirus A, Coxsackievirus B Enterovirus Poliovirus See poliomyelitis	Acute febrile symptoms, aseptic meningitis, encephalitis, pharyngitis, herpangina, rash, pleurodynia, hand, foot and mouth disease	**ADULT: RP PAEDIATRIC: Contact**	Feces, respiratory secretions	Direct and indirect contact (fecal/oral)	3-5 days		Duration of symptoms; If poliovirus, see poliomyelitis	
	Conjunctivitis	**Contact**	Eye discharge	Direct and indirect contact	1-3 days		Duration of symptoms	
Epstein Barr virus	Infectious mononucleosis	**RP**	Saliva, transplanted organs or stem cells	Direct oropharyngeal route via saliva; transplantation	4-6 weeks	Prolonged; pharyngeal excretion may be intermittent or persistent for years		
Erythema infectiosum *See Parvovirus* B19								
Escherichia coli (enteropathogenic strains)	Diarrhea, food poisoning, hemolytic uremic syndrome (HUS), thrombotic thrombocytopenic purpura	**ADULT: RP* PAEDIATRIC: Contact**	Feces	Direct and indirect contact (fecal/oral) Foodborne	1 – 8 days	Duration of shedding	Duration of symptoms If HUS: until two stools negative for *E. coli* 0157:H7 or 10 days from onset of diarrhea.	*Consider contact precautions for incontinent adults if stool cannot be contained or for adults with poor hygiene who contaminate their environment.

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Fifth disease See Parvovirus								
German measles – See Rubella								
Giardia (*Giardia lamblia*)	Diarrhea	**ADULT: RP* PAEDIATRIC: Contact**	Feces	Direct and indirect contact (fecal/oral)	3-25 days	Entire period of infection; often months	Duration of symptoms	*Consider contact precautions for incontinent adults if stool cannot be contained or for adults with poor hygiene who contaminate their environment.
Granuloma inguinale (Donovanosis) (*Calymmato-bacterium granulomatis*)	Painless genital ulcers, inguinal ulcers, nodules	**RP**		Sexual transmission	Unknown; probably between 1-16 weeks	Unknown; probably for the duration of open lesions on the skin or mucous membranes.		
***Haemophilus influenzae* type b** (invasive infections)	Pneumonia, epiglottitis, meningitis, bacteremia, septic arthritis, cellulitis, osteomyelitis in a child	**ADULT: RP PAEDIATRIC: Droplet**	Respiratory secretions	Large droplets, direct contact	Variable	Most infectious in the week prior to onset of symptoms and during symptoms until treated	Until 24 hours of appropriate antimicrobial therapy has been received	Close contacts <48 months old and who are not immune may require chemoprophylaxis. Reportable Disease if invasive disease for Haemophilus type-able organisms.
Hand foot and mouth disease See enteroviral infections								
Hansen's Disease See Leprosy								
Hantavirus (Hantavirus pulmonary syndrome)	Fever, pneumonia	**RP**	Rodent excreta	Presumed aerosol transmission from rodent excreta	A few days to 6 weeks.	Not well defined, person to person is rare (person to person documented for S. American strains)		Infection acquired from rodents.

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Helicobacter pylori	Gastritis, duodenal ulcer disease	**RP**		Probable ingestion of organisms; presumed fecal-oral/oral-oral	5-10 days	Unknown		
Hepatitis A, E	Hepatitis, anicteric acute febrile symptoms	**ADULT: RP*** **PAEDIATRIC: Contact**	Feces	Direct and indirect contact (fecal/oral)	A: 28-30 days E: 26-42 days	A: Two weeks before to 1 week after onset of jaundice Shedding is prolonged in the newborn. E: not known; at least 2 weeks before onset of symptoms.	1 week after onset of jaundice; duration of hospitalization if newborn	*Consider contact precautions for incontinent adults if stool cannot be contained or for adults with poor hygiene who contaminate their environment. Post-exposure prophylaxis indicated for non-immune household contacts with significant exposure to hepatitis A if within 2 weeks of exposure. Refer to Canadian Immunization Guide 7th Ed., 2006 information http://www.phac-aspc.gc.ca/publicat/cig-gc/index-eng.php Outbreaks of HAV in HCWs have been associated with eating and drinking in patient care areas.
Hepatitis B, C, D	Hepatitis, often asymptomatic; cirrhosis, hepatic cancer	**RP**	Blood, genital secretions, and certain other body fluids	Mucosal or percutaneous exposure to infective body fluids Sexual transmission; Vertical mother to child	**B**: 2-3 months **C**: 2 weeks – 6 months **D**: 2-8 weeks	**B**: all persons who are HBsAg positive are infectious; **C**: indefinite **D**: indefinite		Refer to Canadian Immunization Guide 7th Ed., 2006 http://www.phac-aspc.gc.ca/publicat/cig-gc/index-eng.php Contact OH or delegate if HCW has percutaneous, non-intact skin or mucous membrane exposure. Refer to CDC dialysis recommendations available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5005a1.htm
***Herpes simplex* virus**	Encephalitis	**ADULT: RP** **PEDS: Contact**						
	Neonatal	**Contact**	Skin or mucosal lesions; possibly all body secretions and excretions	Direct contact	Birth to 6 weeks of age		Duration of symptoms	Contact precautions are also indicated for infants delivered vaginally (or by C-section if membranes have been ruptured more than 4-6 hours) to women with active genital HSV infections, until neonatal HSV infection has been ruled out.

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
	Mucocutaneous: disseminated or primary and extensive (gingivostomatitis, eczema herpeticum)	**Contact**	Skin or mucosal lesions Sexual transmission Mother to child at birth	Direct contact	2 days to 2 weeks	While lesions present	Until lesions are dry and crusted	
	Recurrent	**RP**						
Herpes zoster (see *varicella zoster*)								
Histoplasmosis (*Histoplasma capsulatum*)	Pneumonia, lymphadenopathy, fever	**RP**			3-17 days	Not person-to-person		Acquired from spores in soil.
Hookworm (*Necator americanus, Ancyclostoma duodenale)*	Usually asymptomatic	**RP**		Percutaneous Fecal-oral	Few weeks to many months	Not person-to-person		Larvae must hatch in soil to become infectious.
Human herpesvirus 6 (HHV-6) See Roseola								
Human immunodeficiency virus (HIV)	Asymptomatic; multiple clinical presentations	**RP**	Blood, genital secretions, breast milk and certain other body fluids	Mucosal or percutaneous exposure to infective body fluids Sexual transmission, Vertical mother to child	Weeks to years	From onset of infection	Continuous	Immediately contact OH or delegate if HCW has percutaneous, non-intact skin or mucous membrane exposure Diagnosis of AIDS is a Reportable Disease.
Human metapneumovirus	Respiratory tract infection	**Droplet and Contact**	Respiratory secretions	Large droplets Direct and indirect contact	3-5 days		Duration of symptoms	May cohort if infected with same virus. Patient should not share room with high-risk roommates.

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Human T-cell leukemia virus, human T-lymphotrophic virus (HTLV-I, HTLV-II)	Usually asymptomatic, tropical spastic, paraperisis, lymphoma	**RP**	Breast milk, blood and certain other body fluids	Vertical mother to child; mucosal or percutaneous exposure to infective body fluids	Weeks to years	Indefinite		
Infectious mononucleosis – See Epstein-Barr								
Influenza **Seasonal**	Respiratory tract infection	**Droplet and Contact**	Respiratory secretions	Large droplets, direct and indirect contact	1-3 days	Probably 3-5 days from clinical onset in adults; up to 7 days in young children	Duration of symptoms	If private room is unavailable, consider cohorting patients during outbreaks. Patient should not share room with high-risk roommates. Consider anti-viral prophylaxis for exposed roommates. For further information for all types of influenza see: http://www.phac.aspc.gc.ca/influenza/index-eng.php
Pandemic **Novel influenza viruses**	Respiratory tract infection	* **Pandemic Influenza Precautions**	As seasonal	As seasonal	Unknown; possibly 1-7 days	Unknown, possibly up to 7 days	http://www.phac –aspc.gc.ca/influenza/	*See Canadian Pandemic Plan Annex F, Infection Prevention and Control and Occupational Health and Hygiene guidelines during Pandemic Influenza in Existing and Temporary Health care Settings, available at* http://www.phac-aspc.gc.ca/influenza-eng.php Refer to PHAC website for specific guidance documents.
Avian	Respiratory tract infection, conjunctivitis	**Droplet and Contact**	Excreta of sick birds, possibly human respiratory tract secretions					For current information on Avian influenza: Human Health Issues Related to Domestic Avian Influenza in Canada, available at http://www.phac-aspc.gc.ca/influenza-eng.php http://www.phac-aspc.gc.ca/publicat/daio-enia/9-eng.php

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Lassa fever See Viral hemorrhagic fever								
Legionellosis (*Legionella spp*) Legionnaires' disease	Pneumonia, Legionnaires' disease, Pontiac fever	**RP**			2-10 days;	Not person-to-person		Acquired from contaminated water sources (inhalation not ingestion).
Leprosy (Hansen's disease) (*Mycobacterium leprae*)	Chronic disease of skin, nerves, nasopharyngeal mucosa	**RP**	Nasal secretions, skin lesions	Direct contact	9 months to 20 years			Transmitted between persons only with very prolonged extensive close personal contact. Household contacts should be assessed and may be given prophylaxis. Reportable Disease
Leptospirosis (*Leptospira sp.)*	Fever, jaundice, aseptic meningitis	**RP**			2-30 days	Direct person-to-person transmission is rare		Acquired from contact with animals and animal excretion.
Lice (pediculosis) Head Body Pubic (crab) (*Pediculus capitas, Pediculus corporis, Pediculus humanus, Phthirus pubis*)	Scalp or body itch, itchy rash	**RP plus gloves for direct patient contact only**	Louse	Head and body lice: Direct and indirect contact Pubic lice: Usually sexual contact	6-10 days	Until effective treatment to kill lice and ova	Until 24 hours after application of appropriate pediculicide; applied as directed.	Apply pediculicides as directed on label. If live lice found after therapy, repeat. Head lice: Wash headgear, combs, pillowcases, towels with hot water or dry clean or seal in plastic bag and store for 10 days. Body lice: As above, for all exposed clothing and bedding.

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Listeriosis (*Listeria monocytogenes*)	Fever, meningitis Congenital or neonatal infection	**RP**	*Listeria* grows well at low temperatures and is able to multiply in refrigerated foods that are contaminated. Pregnant women and immuno-compromised persons should avoid cheese made with unpasteurized milk, cold cuts and uncooked meat products including hot dogs.	Foodborne Vertical mother to child in utero or at birth	Mean 21 days; -3-70 days following a single exposure to an implicated food product			Nosocomial outbreaks reported in newborn nurseries due to contaminated equipment or materials.
Lyme disease (*Borrelia burgdorferi*)	Fever, arthritis, rash, meningitis	**RP**		Tickborne	To initial rash: 3-32 days; mean 7-10 days	Not person-to-person		Reportable Disease
Lymphocytic choriomeningitis virus	Aseptic meningitis	**RP**	Urine of rodents		6-21 days	Not person-to-person		Acquired from contact with rodents.
Lymphogranuloma venereum (*C. trachomatis* serovars L1,L2,L3)	Genital ulcers, inguinal adenopathy	**RP**		Sexually transmitted	Range of 3-30 days for a primary lesion			
Malaria (*Plasmodium spp.)*	Fever	**RP**	Blood	Mosquito-borne; rarely transplacental from mother to fetus; blood transfusion	Variable; 9-14 days for *P. falciparum*	Not normally person-to-person		Can be transmitted via blood transfusion

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Marburg virus See Viral haemorrhagic fever								
Measles (Rubeola)	Fever, cough, coryza, conjunctivitis, maculopapular skin rash	**Airborne**	Respiratory secretions	Airborne	7-18 days to onset of fever; rarely as long as 21 days	5 days before onset of rash (1-2 days before onset of initial symptoms) until 4 days after onset of rash (longer in immunocompromised patients)	4 days after start of rash; duration of symptoms in immuno-compromised patients	Only immune HCWs, caretakers and visitors should enter the room. N95 respirators required for non-immune persons who must enter. Precautions should be taken with neonates born to mothers with measles infection at delivery. Immunoprophylaxis is indicated for susceptible contacts. Refer to Canadian Immunization Guide 7th Ed., 2006 for specific information available at: http://www.phac-aspc.gc.ca/publicat/cig-gci/index-eng.php Reportable Disease
Measles (Rubeola)	Susceptible contact	**Airborne**	Respiratory secretions	Airborne		Potentially communicable during last 2 days of incubation period	From 5 days after first exposure through 21 days after last exposure regardless of post-exposure prophylaxis	Only immune HCWs, caretakers and visitors should enter the room. N95 respirators required for non-immune persons who must enter. Precautions should be taken with neonates born to mothers with measles infection at delivery. Immunoprophylaxis is indicated for susceptible contacts.
Melioidosis (*Pseudomonas pseudomallei*)	Pneumonia, fever	**RP**	Contaminated soil		Variable			Organism in soil in South-East Asia. Person-to-person has not been proven.
Meningococcus (*Neisseria meningitidis*)	Rash (petechia/ purpuric) with fever Meningococcemia meningitis, pneumonia	**Droplet**	Respiratory secretions	Large droplet, direct contact	Usually 2-10 days		Until 24 hours of effective antimicrobial therapy has been received	Close contacts may require chemoprophylaxis as per Canadian Immunization Guide 7th Ed., 2006 http://www.phac-aspc.gc.ca/publicat/cig-gci/index-eng.php Reportable Disease if invasive

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PAEDIATRIC PRECAUTIONS APPLY TO CHILDREN WHO ARE INCONTINENT OR TOO IMMATURE TO COMPLY WITH HYGIENE RP – Routine Practice.

Refer to Manitoba Health Reporting of Diseases and Conditions by Health Professionals (HP) and Labs (L) http://web2.gov.mb.ca/laws/regs/pdf/p210-037.09.pdf

Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Methicillin resistant *S. aureus* (MRSA) – See ARO								
Molluscum contagiosum	Umbilicated papules	**RP**	contents of papules	Direct contact	2 weeks to 6 months	Unknown		Requires close direct personal contact for transmission.
Monkeypox	Resembles small-pox; lymphaden-opathy is a more predominant feature	***Contact, Droplet and Airborne**	Lesions and respiratory secretions,	Contact with infected animals; possible airborne transmission from animals to humans			*Contact: Until all lesions crusted	Transmission in hospital settings is unlikely. See: http://www.cdc.gov/ncidod/monkeypox.
Mucormycosis (phycomycosis; zygomycosis) (Mucor, Zygomycetes)	Skin, wound, rhinocerebral, pulmonary, gastrointestinal, disseminated infection *	**RP**	Fungal spores in dust and soil	Inhalation or ingestion of fungal spores	Unknown	Not person-to-person	Unknown	Acquired from spores in dust, soil. *Infections in immunocompromised patients.
Mumps	Swelling of salivary glands, orchitis, meningitis	**Droplet**	Saliva	Large droplets, direct contact	Usually 16-18 days; range 14-25 days	Viral excretion highest 2 days before to 5 days after onset or parotitis	Until 5 days after onset of parotitis	Droplet precautions for exposed susceptible patients/health care workers should begin 10 days after first contact and continue through 26 days after last exposure. For outbreaks see also, http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/10pdf/36s1-eng.pdf Reportable Disease
Mycobacterium, non-tuberculosis (atypical)	Lymphadenitis; pneumonia; disseminated disease in immuno-compromised host	**RP**			Unknown	Not person-to-person		Acquired from soil, water, animal, reservoirs.

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Mycobacterium tuberculosis (also *Mycobacterium africanum, Mycobacterium bovis*)	Confirmed or suspected respiratory (including pleural, laryngeal)	**Airborne***	Respiratory secretions	Airborne	Weeks to years	While organisms are viable in sputum	Until deemed no longer infectious. If confirmed TB, until patient has received two weeks of effective therapy, and is improving clinically and has three consecutive sputum smears negative for acid fast bacilli, collected 8-24 hours apart with at least one early morning specimen If multi-drug resistant tuberculosis, until sputum culture negative	Tuberculosis in young children is rarely transmissible; due to lack of cavitary disease and weak cough. Assess visiting family members for cough. Refer to: Tuberculosis in young children is rarely transmissible. • Refer to; Canadian Tuberculosis Standards Edition 6th Edit • http://www.phac-aspc.gc.ca/tbpc-latb/pubs/tbstand07-eng.php and • PHAC Guidelines Preventing the Transmission of Tuberculosis in Canadian Health Care Facilities 1996 http://www.collectionscanada.gc.ca/webarchives/20071120001332/http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/96vol22/22s1/index.html *If AGMP: see strategies to reduce aerosol generation Reportable disease
	Nonpulmonary: meningitis, bone or joint infection peritonitis, pericardial with no drainage Nonpulmonary: skin or soft tissue draining lesions	**RP** **RP Airborne***	Aerosolized wound drainage	While viable microorganisms are in drainage			Maintain precautions until drainage has ceased or there are three consecutive negative acid fast bacilli smears of drainage. If multi-drug resistant tuberculosis, until culture negative	Most patients with nonpulmonary disease alone are noncontagious; it is important to assess for concurrent pulmonary tuberculosis. * Airborne precautions if procedures which may aerosolize drainage are being performed.
	PPD skin test positive with no evidence of current pulmonary disease	**RP**		Non communicable				

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Mycoplasma pneumoniae	Pneumonia	**Droplet**	Respiratory secretions	Large droplets	1-4 weeks	Unknown	Duration of symptoms	
Neisseria gonorrhoeae	Urethritis, cervicitis, pelvic inflammatory disease, arthritis, ophthalmia neonatorum, conjunctivitis	**RP**		Sexual transmission Mother to child at birth Rarely: direct/ indirect contact	2-7 days	May extend for months if untreated		
Neisseria meningitidis See Meningococcus								
Nocardiosis (*Nocardia spp.)*	Fever, pulmonary or CNS infection or disseminated disease	**RP**			Unknown	Not person-to-person		Acquired from organisms in dust, soil.
Noroviruses (Norwalk-like agents, Caliciviruses)	Nausea, vomiting, diarrhea	**Contact**	Feces	Direct and indirect contact (fecal/oral)	Usually 24-48 hours; range of 10-50 hours	Duration of viral shedding; usual 48 hrs. after diarrhea resolves	48 hours after resolution of symptoms.	Special attention should be made to cleaning. Usually outbreak associated.
Orf (poxvirus)	Skin lesions	**RP**			Generally 3-6 days	Not person-to-person		Acquired from infected animals.
Parainfluenza virus	Respiratory tract infection	**Droplet and Contact**	Respiratory secretions	Large droplets, direct and indirect contact	2-6 days	1-3 weeks	Duration of symptoms	May cohort if infected with same virus. Patient should not share room with high-risk roommates.

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Parvovirus B-19 Human parvovirus	Erythema infectiosum (fifth disease), aplastic or erythrocytic crisis	**RP: Fifth disease:** **Droplet: Aplastic crisis or chronic infection in immuno-compromised patient**	Respiratory secretions	Large droplets, direct contact Vertical mother to fetus	4-21 days to onset of rash	Fifth disease: no longer infectious by the time the rash appears Aplastic crisis: Up to 1 week after onset of crisis Immuno-compromised with chronic infection: months to years	Aplastic or erythrocytic crisis: 7 days Chronic infection in Immuno-compromised patient: duration of hospitalization	
Pediculosis See lice								
Pertussis (*Bordetella pertussis B. parapertussis*)	Whooping cough, non specific respiratory tract infection in infants, adolescents and adults	**Droplet**	Respiratory secretions	Large droplets	Average 9-10 days; range 6-20 days	To 3 weeks after onset of paroxysms if not treated	To 3 weeks after onset of paroxysms if not treated; or until 5 days of appropriate antimicrobial therapy received	Close contacts (household and HCWs) may need chemoprophylaxis and/or immunization. If HCWs immunization not up to date refer to OH and/or delegate. Refer Canadian Immunization Guide 7th Ed., 2006 http://www.phac-aspc.gc.ca/publicat/cig-gci/index-eng.php Reportable Disease
Pinworms See *Enterobius vermiculoys*								
Plague (*Yersinia pestis*)	Bubonic (lymphadenitis)	**RP**	Fleas		1-7 days			
	Pneumonic (cough, fever, hemoptysis)	**Droplet**	Respiratory secretions	Large droplets	1-4 days	Until 48 hours of appropriate antimicrobial therapy received	Until 48 hours of appropriate antimicrobial therapy received	Close contacts and exposed HCWs may require prophylaxis.
Pneumocystis jirovecii (carinii)	Pneumonia in immuno-compromised host	**RP**		Unknown	Unknown			Ensure roommates are not immunocompromised.

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Poliomyelitis Infantile paralysis	Fever, aseptic meningitis, flaccid paralysis	**Contact**	Feces, respiratory secretions	Direct and indirect contact	3-35 days	Virus in the throat for approximately 1 week and in feces for 3-6 weeks	Until 6 weeks from onset of symptoms or until feces viral culture negative	Most infectious during the days before and after onset of symptoms. Close contacts who are not immune should receive immunoprophylaxis. Reportable Disease
Prion disease See CJD								
Psittacosis See *Chlamydia psittaci*								
Q Fever (*Coxiella burnetii*)	Pneumonia, fever	**RP**	Infected animals unpasteurized milk	Direct contact with infected animals; raw milk Airborne from aerosolized contaminated dust	14-39 days	Not person-to-person		Acquired from contact with infected animals or from ingestion of raw milk.
Rabies	Acute encephalomyelitis	**RP**	Saliva	Mucosal or percutaneous exposure to saliva; corneal, tissue and organ transplantation	Usually 3-8 weeks, rarely as short as 9 days or as long as 7 years	Person-to-person transmission is theoretically possible, but not well documented.		Acquired from contact with infected animals. Post-exposure prophylaxis is recommended for percutaneous or mucosal exposure to saliva of rabid animal or patient Reportable Disease.
Rat bite fever *Actinobacillus (formerly Streptobacillus) moniliformis; Spirillum minus*	Fever, arthralgia	**RP**	Saliva of infected rodents; contaminated milk	Rodent bite, ingestion of contaminated milk	*A. moniliformis* 3-10 days, rarely longer; *S. minus* 1-3 weeks	Not person-to-person		*A.moniliformis*: rats and other animals, contaminated milk. *S. minus*: rats, mice only.
Relapsing fever (*Borellia recurrentis*, other Borellia species)	Recurrent fevers	**RP**		Vector-borne		Not person-to-person		Spread by ticks or lice

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Respiratory syncytial virus (RSV)	Respiratory tract infection	**Droplet and Contact**	Respiratory secretions	Large droplets, direct and indirect contact	2-8 days	Shortly prior to and for the duration of active disease	Duration of symptoms	May cohort if infected with same virus. Patient should not share room with high-risk roommates.
Rhinovirus	Respiratory tract infection, common cold	**Contact and Droplet**	Respiratory secretions	Direct and indirect contact, possibly large droplets	2-3 days	Until symptoms cease	Duration of symptoms	**May cohort if infected with same virus.** Patient should not share room with high-risk roommates.
Rickettsialpox *Rickettsia akari*	Fever, rash	**RP**		Mite-borne	9-14 days	Not person-to-person		Transmitted by mouse mites.
Ringworm See *Tinea*								
Rocky Mountain Spotted Fever *Rickettsia rickettsii*	Fever, petechial rash, encephalitis	**RP**		Tick-borne	3-14 days	Not transmitted from person-to-person except rarely through transfusion		
Roseola infantum (HHV-6)	Rash, fever	**RP**	Saliva	Direct contact	10 days	Unknown		Transmission requires close direct personnel contact.
Rotavirus	Diarrhea	**Contact**	Feces	Direct and indirect contact (fecal-oral)	1-3 days	Duration of viral shedding	Duration of symptoms	*Consider contact precautions for adults if stool cannot be contained or for adults with poor hygiene who contaminate their environment.
Roundworm See Ascariasis								

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Rubella Acquired	Fever, maculopapular rash	**Droplet**	Respiratory secretions	Large droplets, direct contact	14-21 days	For about 1 week before and after onset of rash	Until 7 days after onset of rash	Only immune HCWs, caretakers and visitors should enter the room. Pregnant HCWs should not care for rubella patients regardless of their immune status. HCWs, roommates and caregivers should be immune to Rubella. Droplet precautions should be maintained for exposed susceptible patients for 7 days after first contact through to 21 days after last contact. Administer vaccine to exposed susceptible non-pregnant persons within 3 days of exposure. Refer Canadian Immunization Guide 7th Ed., 2006 http://www.phac-aspc.gc.ca/publicat/cig-gci/index-eng.php Exclude susceptible HCWs from duty from day 7 after first exposure to day 21 after last exposure, regardless of post-exposure vaccination. Reportable Disease.
Rubella Congenital	Congenital rubella syndrome	**Droplet and Contact**	Respiratory secretions, urine	Direct and indirect contact; large droplets		Prolonged shedding in respiratory tract and urine; can be up to one year	Until one year of age, unless nasopharyngeal and urine cultures done after 3 months of age are negative	
Rubeola See Measles								
Salmonella spp. (including *Salmonella typhi*)	Diarrhea, enteric fever, typhoid fever, food poisoning	**ADULT: RP*** **PAEDIATRIC: Contact**	Feces	Direct and indirect contact (fecal/oral) Food borne	6-72 hours	Variable	Duration of symptoms	*Consider contact precautions for incontinent adults if stool cannot be contained or for adults with poor hygiene who contaminate their environment.
Scabies (*Sarcoptes scabiei*)	Itchy skin rash	**Contact**	Mite	Direct and indirect contact	Without previous exposure, 2-6 weeks; 1-4 days after re-exposure.	Until mites and eggs are destroyed by treatment, usually after 1 or occasionally 2 courses of treatment, a week apart.	Until 24 hours after initiation of appropriate therapy	Apply scabicide as directed on label. Wash clothes and bedding in hot water, dry clean or seal in a plastic bag, and store for 1 week. Household contacts and exposed staff should be treated.

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Scarlet fever See Streptococcus, group A								
Schistosomiasis (bilharziasis) *(Schistosoma spp.)*	Diarrhea, fever, itchy rash, hepatospleno-megaly, hematuria	**RP**				Not person-to-person		Contact with larvae in contaminated water.
Shigellosis ***Shigella spp.***	Diarrhea	**ADULT: RP* PAEDIATRIC: Contact**	Feces	Direct and indirect contact (fecal/oral)	1-3 days	Usually 4 weeks if not treated	Duration of symptoms	*Consider contact precautions for incontinent adults if stool cannot be contained or for adults with poor hygiene who contaminate their environment. Treatment with effective antimicrobial shortens period of infectivity.
Severe acute respiratory syndrome (SARS Coronavirus)	Malaise, myalgia, headache, fever, respiratory symptoms (cough, increasing shortness of breath), pneumonia, ARDS	**Contact and Droplet *AGMP**	Respiratory secretions, stool	Droplet, direct and indirect contact Aerosols during AGMP	3-10 days	Net yet determined; suggested to be less than 21 days	10 days following resolution of fever if respiratory symptoms have also resolved	*If AGMP: see strategies to reduce aerosol generation, *see Part B, Section IV, sub-section (iii), 1(b).* Single room; may cohort if infected with same virus. Reportable Disease
Shingles *See varicella zoster*								
Smallpox (Variola virus) Generalized vaccinia, eczema vaccinatum See Vaccinia for management of vaccinated persons)	Fever, vesicular/ pustular in appropriate epidemiologic context	Droplet, Contact and Airborne	Skin lesions, oropharyngeal secretions	Airborne, direct and indirect contact	7-10 days	Onset of mucosal lesions, until all skin lesions have crusted	Until all scabs have crusted and separated (3-4 weeks).	Immunization of HCWs was stopped in 1977. Canadian Immunization Guide 7th Ed., 2006 http://www.phac-aspc.gc.ca/publicat/cig-gci/index-eng.php for information regarding vaccine. Care preferably should be provided by immune HCWs. Non-vaccinated HCWs should not provide care if immune HCWs are available. N95 respirator for all regardless of vaccination status.

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Sporotrichosis *Sporothrix schenckii*	Skin lesions, disseminated	**RP**			Variable	Rare person-to-person		Acquired from spores in soil, on vegetation.
Staphylococcus aureus (If methicillin-resistant, also see ARO)	Skin (furuncles, impetigo) wound or burn infection; abscess; scalded skin syndrome, osteomyelitis	**MINOR: RP MAJOR: Contact***	Drainage, pus	Direct and indirect contact	Variable	As long as organism is in the exudates or drainage	Until drainage resolved or contained by dressings	*MAJOR: drainage not contained by dressings.
	Endometritis	**RP**						
	Food poisoning	**RP**		Foodborne				
	Pneumonia	**ADULT: RP PAEDIATRIC: Droplet**	Respiratory secretions	Large droplets, direct contact	Variable		Until 24 hours of appropriate antimicrobial therapy received	
	Toxic shock syndrome	**RP**						Reportable Disease
Streptobacillus moniliformis disease *See Rat-bite fever*								
Streptococcus pneumoniae	Pneumonia, meningitis and other	**RP**			Variable			Normal flora.

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Streptococcus, Group A (*Streptococcus pyogenes*)	Skin (e.g., erysipelas, impetigo), wound or burn infection	**MINOR: RP MAJOR: Contact***	Drainage, pus	Direct and indirect contact	1-3 days, rarely longer	As long as organism is in drainage	Until 24 hours of appropriate antimicrobial therapy received	*MAJOR = drainage not contained by dressings.
	Scarlet fever, pharyngitis, in children under 5 years	**ADULT: RP PAEDIATRIC: Contact and Droplet**	Respiratory secretions	Large droplets	2-5 days	10-21 days if not treated	Until 24 hours of appropriate antimicrobial therapy received	
	GAS- Endometritis (puerperal fever)	**RP**						
	GAS-Toxic shock, invasive disease (including necrotizing fasciitis, myositis, meningitis, pneumonia)	**Droplet and Contact**	Respiratory secretions, wound drainage	Large droplets, direct or indirect contact			Until 24 hours of appropriate antimicrobial therapy received	Chemoprophylaxis may be indicated for close contacts of patients with invasive disease or toxic shock syndrome. Reportable Disease
Streptococcus Group B (*Streptococcus agalactiae*)	**GB S** Newborn sepsis, pneumonia, meningitis	**RP**		Mother to child at birth	Early onset 1-7 days of age; late onset 7 days to 3 months of age			Normal flora.
Strongyloides (*Strongyloides stercoralis*)	Usually asymp-tomatic May cause dis-seminated disease presenting as gram negative bacteremia, meningitis in immunocompro-mised patient.	**RP**	Larvae in feces		Unknown	Rarely transmitted person-to-person		Infective larvae in soil.

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Syphilis (*Treponema pallidum*)	Genital, skin or mucosal lesions, disseminated disease, neurological or cardiac disease; latent infection	**RP *Gloves for direct contact with skin lesions**	Genital secretions lesion exudates	Direct contact with infectious exudates or lesions Sexual transmission, Intrauterine or intrapartum from mother to child	10-90 days; usually 3 weeks	When moist mucocutaneous lesions of primary and secondary syphilis are present		
Tapeworm *Taenia saginata* *Taenia solium* *Diphyllobothrium latum*	Usually asymptomatic	**RP**	Larvae in food	Foodborne	Variable	Not transmissible person-to-person		Consumption of larvae in raw or undercooked beef or pork or raw fish; larvae develop into adult tapeworms in gastrointestinal tract. Individuals with *T. solium* adult tapeworms may transmit cysticercosis to others
Hymenolepsis nana	Usually asymptomatic	**RP**	Ova in rodent or human feces	Direct contact (fecal/oral)	2-4 weeks	While ova in feces		
Tetanus *Clostridium tetani*	Tetanus	**RP**			1 day to several months	Not person-to-person		Acquired from spores in soil which germinate in wounds, devitalized tissue. Reportable Disease
Tinea (Dermatophytosis) *Trichophyton spp.*, *Microsporum spp.* *Malassezia furur*	Ringworm (skin, beard, scalp, groin, perineal region); athletes foot; pityriasis versicolor	**RP**	Organism in skin or hair	Direct skin-to-skin contact	Variable 4-14 days	While lesion present		May be acquired from animals, shared combs, brushes, clothing, hats, sheets, shower stalls.
Toxic shock syndrome See *Staphylococcus aureus*, Group A Streptococcus								

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Toxocariasis (*Toxocara canis, Toxocara cati*)	Fever, wheeze, rash, eosinophilia	**RP**	Ova in dog/cat feces		Unknown	Not person-to-person		Acquired from contact with dogs, cats.
Toxoplasmosis (*Toxoplasma gondii*)	Asymptomatic, fever, lymph-adenopathy; retinitis, encephalitis in immuno-compromised host; congenital infection	**RP**	Ingestion contaminated food or water; cat feces.	Intrauterine transmission from mother to foetus; transplantation of stem cells or organs	5-23 days			Acquired to contact with infected felines or soil contaminated by felines, consumption of raw meat, contaminated raw vegetables or contaminated water.
Trachoma See *Chlamydia trachomatis*								
Transmissible spongiform encephalopathy See Creutzfeld-Jacob disease								
Trench fever (*Bartonella quintana*)	Relapsing fevers, rash	**RP**	Feces of human body lice	Louse-borne	7-30 days	Not person-to-person in the absence of lice		
Trichinosis (*Trichinella spiralis*)	Fever, rash, diarrhea	**RP**	Infected meat	Food-borne	5-45 days	Not person-to-person		Acquired from consumption of infected meat.
Trichomoniasis (*Trichomonas vaginalis)*	Vaginitis	**RP**		Sexually transmitted	4-20 days	Duration of infection		
Trichuriasis (whipworm) (*Trichuris trichiura*)	Abdominal pain, diarrhea	**RP**			Unknown	Not person-to-person		Ova must hatch in soil to be infective.
Tuberculosis See *Mycobacterium tuberculosis*								

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Tularemia (*Francisella tularensis*)	Fever, lymph-adenopathy pneumonia	**RP**			1-14 days	Not person-to-person		Acquired from contact with infected animals. *F. tularensis* is hazardous to laboratory workers. Notify laboratory if diagnosis is suspected.
Typhoid/ paratyphoid fever See *Salmonella*								
Typhus fever Endemic flea-borne typhus *(Rickettsia prowazekii)* Epidemic Louse-Borne Fever	Fever, rash	**RP**	Rat fleas	Flea borne	From 1-2 weeks, commonly 12 days	Not transmitted person-to-person		
	Fever, rash	**RP**	Human body louse	Louse borne	1-2 weeks			Person-to-person through close personal contact, not transmitted in absence of louse.
Vaccinia	Range of adverse reactions to the smallpox vaccine (e.g., eczema vaccination, generalized or progressive vaccinia, other)	**Airborne and Contact**	Skin exudates	Direct and indirect contact	3-5 days	Until all skin lesions resolved and scabs separated	Until all skin lesions resolved and scabs separated	Vaccinia may be spread by touching a vaccination site before it has healed or by touching bandages or clothing that may have been contaminated with live virus from the smallpox vaccination site. Immunization of health care workers was stopped in 1977. Refer to Canadian Immunization Guide 7th Ed., 2006 for information regarding vaccine. http://www.phac-aspc.gc.ca/publicat/cig-gci/index-eng.php
Vancomycin-resistant enterococci (VRE)	Infection or colonization of any body site	**Contact**	Infected or colonized secretions, excretions	Direct and indirect contact	Variable	Duration of colonization	As directed by ICP	Enterococci persist in the environment. Pay special attention to cleaning. See Appendix I. II. ARO

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Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Vancomycin-resistant *Staphylococcus aureus* (VRSA) Theoretical, to date not reported in Canada.	Infection or colonization of any body site	**Contact**	Infected or colonized secretions, excretions	Direct and indirect contact	Variable	Duration of colonization	As directed by ICP	Local public health authorities should be notified immediately. See Appendix I. II. ARO
Varicella-zoster virus Varicella (chickenpox)	Fever with vesicular rash	**Airborne and Contact**	Skin lesion drainage, respiratory secretions	Airborne, direct and indirect contact;	10-21 days	1-2 days before rash and until skin lesions have crusted May be prolonged in immuno-compromised patients	Until all lesions have crusted and dried	HCWs, roommates and caregivers should be immune to chickenpox. Susceptible high-risk contacts should receive varicella zoster immunoglobulin as soon as possible, latest within 96 hours of exposure. Varicella zoster immunoglobulin may extend the incubation period to 28 days. Refer to Canadian Immunization Guide 7th Ed., 2006 for specific information, available at: http://www.phac-aspc.gc.ca/publicat/cig-gci/index-eng.php
Herpes zoster (shingles), **Disseminated**	Vesicular skin lesions	**Airborne and Contact**	Vesicle fluid, respiratory secretions	Airborne, direct and indirect contact		Until all lesions have crusted and dried	Until all lesions have crusted and dried	HCWs, roommates and caregivers should be immune to chickenpox. Susceptible high-risk contacts should receive varicella zoster immunoglobulin as soon as possible, latest within 96 hours of exposure. Varicella zoster immunoglobulin may extend the incubation period to 28 days.
Herpes zoster **Localized –** immunocompro-mised host	Vesicular skin lesions in dermatomal distribution	**Airborne and Contact**	Vesicle fluid	Direct and indirect contact, airborne		Until all lesions have crusted and dried and disseminated infection is ruled out	Until 24 hours after antiviral therapy started; then as for localized zoster in normal host	Localized zoster may disseminate in immunocompromised host if not treated. HCWs, roommates and caregivers should be immune to chickenpox. Susceptible high-risk contacts should receive varicella zoster immunoglobulin as soon as possible, latest within 96 hours of exposure. Varicella zoster immunoglobulin may extend the incubation period to 28 days.

PART C

Table 6 Transmission Characteristics and Precautions by Specific Etiology

PAEDIATRIC PRECAUTIONS APPLY TO CHILDREN WHO ARE INCONTINENT OR TOO IMMATURE TO COMPLY WITH HYGIENE RP – Routine Practice.

Refer to Manitoba Health Reporting of Diseases and Conditions by Health Professionals (HP) and Labs (L) http://web2.gov.mb.ca/laws/regs/pdf/p210-037.09.pdf

Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
normal host	Vesicular skin lesions in dermatomal distribution	**RP** ***Contact and Airborne**	Vesicle fluid	Direct and indirect contact, possibly airborne		Until all lesions have crusted and dried	Until all lesions have crusted and dried	*Consider contact and airborne for cases of extensive localized zoster that cannot be covered, in situations where there are varicella susceptible patients/HCWs.
Varicella or herpes zoster contact	Susceptible contact	**Airborne**	Respiratory secretions	Airborne	10-21 days	Potentially communicable during last 2 days of incubation period	From 8 days after first contact until 21 days after last contact with rash regardless of post-exposure vaccination (28 days if given varicella zoster immunoglobulin)	Airborne precautions should be taken with neonates born to mothers with varicella onset <5 days before delivery. HCWs, roommates and caregivers should be immune to chickenpox.
Variola See smallpox								
***Vibrio parahaemolyticus* enteritis**	Diarrhea, food poisoning	**RP**	Contaminated food, especially seafood	Foodborne	Between 12 and 24 hours; range from 4-30 hours			
Vincent's angina (trench mouth)		**RP**						
Viral hemorrhagic fevers (Lassa, Ebola, Marburg, Crimean-Congo viruses)	Hemorrhagic fever	**Contact and Droplet and Airborne if pneumonia**	Blood and bloody body fluids, respiratory secretions Lassa: urine Ebola: skin	Direct and Indirect contact Possibly Airborne if pneumonia Lassa: Sexual contact	Lassa 1-3 weeks Ebola 2-21 days	Unknown, possibly several weeks Lassa virus may be excreted in urine for 3-9 weeks after onset	Until symptoms resolve	Local public health authorities should be notified immediately.
West Nile See Arboviruses								

PART C

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Refer to Manitoba Health Reporting of Diseases and Conditions by Health Professionals (HP) and Labs (L) http://web2.gov.mb.ca/laws/regs/pdf/p210-037.09.pdf

Microorganism	Clinical presentation	Precautions	Infective material	Route of transmission	Incubation period	Period of communicability	Duration of precautions	Comments
Whipworm See Trichuriasis								
Whooping cough See Pertussis								
Yersinia enterocolitica; Y. pseudo-tuberculosis	Diarrhea, mesenteric adenitis	**ADULT: RP* PAEDIATRIC Contact**	Feces	Direct and indirect contact (fecal/oral foodborne)	3-7 days, generally under 10 days	Duration of excretion in stool	Duration of symptoms	*Consider contact precautions for incontinent adults if stool cannot be contained or for adults with poor hygiene who contaminate their environment. Paediatric precautions apply to children who are incontinent or unable to comply with hygiene.
Zoster See Varicella (herpes zoster)								
Zygomycosis (Phycomycosis) See Mucormycosis								

Appendix I – Epidemiologically Significant Organisms

Requiring Additional Precautions

Note: See recommendations for contact precautions for control measures (Part B, Section IV, sub-section (i).

1. *Clostridium difficile*

Clostridium difficile infection (CDI), previously referred to as *C. difficile* associated disease (CDAD), is an important HAI, most often a complication of antimicrobial therapy. It is the most frequent cause of infectious diarrhea in adults in health care settings in industrialized countries. The severity of CDI ranges from mild diarrhea to toxic megacolon. In hospitals participating in the Canadian Nosocomial Infection Surveillance Program (CNISP), the overall incidence and incidence density rates of health care associated CDI for a six month period (November 1, 2004 -April 30, 2005) were 4.5 cases per 1,000 patient admissions and 6.4 per 10,000 patient-days. The rates were significantly higher in Quebec than the rest of Canada (11.1 vs. 3.9 cases per 1000 admissions and 11.9 vs. 5.7 per 10,000 patient days).

Subsequently, through multimodal interventions, Quebec rates fell (6.4/10,000 pt days in 2008-2009). 2004-2005 Canada –wide CNISP rates are similar to those found in a previous CNISP study reporting 6.4 versus 6.6 cases per 10,000 days in 1997. Detailed surveillance performed over a two month period in March and April 2007, reported rates of 4.8 per 1,000 admissions and 7.2 per 10,000 patient days, with the highest rates in British Columbia, Ontario and the Atlantic Provinces. Increased lengths of hospital stay, costs, morbidity and mortality have been reported among adult patients with CDI. Studies have suggested both the incidence and the severity of CDI have increased since 2000. The elderly are especially vulnerable. More severe disease and worse patient outcome have been attributed to a new hypervirulent strain. In one report, authors noted that lack of investment in hospital maintenance and cleaning may have facilitated the transmission of this spore-forming pathogen.

Clostridium difficile infections have generally been considered to occur less frequently in children than in adults. Newborns are not susceptible to *C. difficile* disease probably due to a lack of receptors, although colonization is common. Langley et al. in a review of nosocomial diarrhea over a decade of surveillance in a university affiliated paediatric hospital reported *C. difficile* to be a common cause of nosocomial diarrhea. The presence of diapers was identified as a risk factor for nosocomial *C. difficile*.

Clostridium difficile and VRE share risk factors for transmission. Any factor associated with alteration of the normal enteric flora increases the risk of *C. difficile* colonization after exposure to the organism. Risk factors for developing *C. difficile* include exposure to antibiotics, chemotherapy or immunosuppressive agents, gastrointestinal surgery and use of nasogastric tubes, and possibly stool softeners, gastrointestinal stimulants, antiperistaltic drugs and proton pump inhibitors. Antacids and enemas have also been associated with an increased risk of colonization.

The primary reservoirs of *C. difficile* include colonized or infected patients and contaminated surfaces and equipment within hospitals and LTC facilities. The appropriate use of gloves has been demonstrated to significantly reduce the spread of *C. difficile* in hospitals.

To reduce transmission of *C. difficile*, patients with diarrhea should be placed on contact precautions until the diarrhea is resolved or its cause determined not to be infectious.

Concern has been raised regarding methods of hand hygiene and environmental disinfection, as *C. difficile* spores are resistant to commonly used hand hygiene products and most hospital disinfectants. Alcohols are thought to have little or no activity against bacterial spores. *Clostridium difficile* infection is spread by bacterial spores and concern whether increased rates of CDI are associated with increased use of ABHR has been raised. In a study to determine whether there is an association between the increasing use of ABHRs and the increased incidence of CDI, Boyce et al. reported that a ten-fold increase in the use of ABHR over three years in a 500 bed university-affiliated community teaching hospital did not alter the incidence of CDI. Others have reported similar findings over a one to three-year period.

Wearing gloves for the care of a patient with CDI or for contact with the patient environment (including items in the environment) reduces the microbial load of *C. difficile* on the hands of HCWs. Gloves should be removed prior to leaving the room and hand hygiene performed. Hand hygiene at the point of care (either

with ABHR or soap and water) is necessary before leaving the room of the patient. If a point of care hand washing sink is not available, ABHR should be used and hands subsequently washed at the nearest sink. In outbreak situations or when there is continued transmission, rooms of CDI patients should be decontaminated and cleaned with chlorine-containing cleaning agents (at least 1,000 ppm) or other sporicidal agents.

It is difficult to determine the most appropriate methods for prevention and control of CDI as most data published are from outbreak reports where several interventions were introduced at the same time. There is strong evidence to support the importance of antimicrobial stewardship in addition to IP&C interventions in controlling CDI.

Manitoba Health has published *clostridium difficile*-Associated Diseases (CDAD) Infection Control Guidelines 2006 http://www.gov.mb.ca/health/publichealth/cdc/fs/cdad_icg.pdf and *Clostridium – difficile Associated Diseases* (CDAD) protocol 2006

http://alturl.com/tjxav

2. Antimicrobial Resistant Organisms

Antimicrobial organisms are microorganisms that have developed resistance to the action of one or more antimicrobial agents and are of special clinical or epidemiologic significance. As the clinical or epidemiologic significance of an antimicrobial resistant organism can vary over time, geographic location, and health care setting there is variability in which organisms are considered AROs. In Canada, currently MRSA is considered an ARO in almost all settings and VRE are considered AROs in many. Certain resistant gram negative bacteria are emerging in Canada (e.g. extended spectrum ß-lactams (ESBLs), carbapenemase producers) which may be considered AROs.

Prevention and Control of AROs

Siegel *et al* note that optimal control strategies for ARO are not yet known and evidence-based control measures that can be universally applied in all health care settings have not been established. They also note that successful control of ARO transmission in health care facilities is a dynamic process that requires a systematic approach tailored to the problem and health care setting. Selection of interventions should be based on assessment of the local problem, the prevalence of various AROs and the feasibility of implementing the interventions.

Clinical microbiology support is a required element of ARO control. Identification and differentiation of resistant strains requires the use of appropriate laboratory protocols. In some circumstances, active surveillance cultures requiring testing of at-risk but asymptomatic individuals for the presence of ARO colonization may be necessary to achieve control of spread of AROs within facilities. During outbreaks of AROs, an ability to distinguish quickly between spread of a single clone versus spread of multiple clones, through use of molecular laboratory typing techniques, can be a key element in outbreak control.

Transmission of AROs occurs directly via HCW hand contact with infected or colonized patients and indirectly via HCW hand contact with contaminated equipment and/or environments, to other patients or other equipment and/or environments. Judicial selection and use of antibiotics may reduce the development of AROs. Preventing HAIs will reduce the prevalence of AROs.

A thorough review of the literature for the prevention and control of AROs can be found in the Ontario Ministry of Health and Long-Term Care, *Best Practices for Infection Prevention and Control of Resistant Staphylococcus aureus and Enterococci* and *Management of Multi-Drug-Resistant Organisms in Health Care Settings 2006*. See recommendations for contact precautions for control measures.

a. Methicillin-resistant *Staphylococcus aureus*

Methicillin-resistant *Staphylococcus aureus* (MRSA) has become endemic worldwide in many hospitals. A review of the epidemiology, health care resource utilization and cost data for MRSA in Canadian settings reported the rate of MRSA in Canadian hospitals increased from 0.46 to 5.90 per 1000 admissions between 1995 and 2004. Patients infected with MRSA required prolonged hospitalization (average 26 days of isolation per patient), special control measures, and expensive treatments. MRSA transmission in hospitals resulted in further extensive surveillance. Total cost per infected MRSA patient averaged $12,216, with hospitalization being the major cost driver (81%), followed by barrier precautions (13%), antimicrobial therapy (4%) and laboratory investigations (2%). The most recent epidemiological data suggest that direct health care costs attributable to MRSA in Canada, including costs for management

of MRSA-infected and-colonized patients and MRSA infrastructure, was $82 million in 2004 and could reach $129 million in 2010.

During 2007, 47 sentinel hospitals from nine Canadian provinces participated in the Canadian Nosocomial Infection Surveillance Program (CNISP) for new MRSA cases. Results indicated no significant (*p-value = 0.195*) change in the rate of MRSA infections associated with health care in comparison with the previous year, although there was an apparent slight increase from 164 cases per 100,000 patient-admissions to 181. Compared to 2007 MRSA CNISP results, the 2008 surveillance data from 48 sentinel hospitals showed a 16.1% increase (*p-value < 0.05*) in the incidence of MRSA infection and 19.9% increase (*p-value < 0.05*) in the incidence of MRSA colonization. Although the overall incidence for community-associated MRSA remained virtually unchanged (*p-value = 0.46*): 174 per 100,000 patient-admissions in 2007 to 171 in 2008, there was a marginally significant (*P-value = 0.084*) 26.9% increase in its infection rate.

Risk factors for MRSA acquisition have included previous hospitalization, admission to an ICU, prolonged hospital stay, proximity to another patient with MRSA, older age, invasive procedures, presence of wounds or skin lesions and prior antimicrobial therapy. The inanimate hospital environment of patients with MRSA is frequently contaminated. Contamination can occur without direct patient contact and has been demonstrated via contact only with environmental surfaces in the patient's room. This reinforces the need for Routine Practices including hand hygiene and cleaning and disinfecting patient care equipment between patients.

Community-associated MRSA is an emerging cause of morbidity and mortality among individuals in the community setting. Community-associated MRSA has accounted for a high proportion of community acquired skin and soft tissue infections in many US and Canadian cities. These strains differ from nosocomial strains but can be introduced into the hospital and transmitted there or in other health care settings. Transmission, prevention and control is not different from that of hospital strains. Refer to Manitoba Health Guidelines:

Admission Screening Statement for MRSA and VRE for Acute Care Facilities and Surgical Centres

January 2007

http://www.gov.mb.ca/health/publichealth/cdc/fs/mrsa_vre.pdf

And

Manitoba Guidelines for the Prevention and Control of Antibiotic Resistant Organisms (AROs)

January 2007

http://www.gov.mb.ca/health/publichealth/cdc/fs/aro.pdf

b. Vancomycin-resistant enterococci (VRE)

Enterococcus is part of the endogenous flora of the human gastrointestinal tract. Vancomycin-resistant enterococci are strains of *Enterococcus faecium or Enterococcus faecalis* that contain the resistance genes vanA or vanB.

Certain patient populations are at increased risk for VRE infection or colonization including those with severe underlying illness or immunosuppression, such as ICU patients, patients with invasive devices such as urinary or central venous catheters, prior antibiotic use and prolonged length of hospital stay. Since the inherent pathogenicity of Enterococcus species is low, the approach to containing the spread of VRE may vary depending on presence or absence of patients with risk factors for infection.

During 2006, 50 sentinel hospitals from nine Canadian provinces participated in CNISP surveillance for 'newly-identified' VRE. There was a significant decrease in the overall incidence of VRE acquisition to 1.2 per 1,000 patient admissions from 1.32 reported in 2005. This rate remains higher than the previous rate of 0.77 per 1,000 patient admissions for 2004.

The primary reservoirs of VRE include patients colonized or infected with VRE and VRE contaminated materials, surfaces and equipment. Examples of items that may be contaminated include patient gowns and linens, beds, bedside rails, overbed tables, floors, doorknobs, washbasins, glucose metres, blood pressure cuffs, electronic thermometers, electrocardiogram monitors, electrocardiograph wires, intravenous fluid pumps and commodes. Environmental contamination of the patient room is more likely to be widespread when patients have diarrhea or are incontinent.

VRE is most commonly spread via the transiently colonized hands of HCWs who acquire it from contact with colonized or infected patients or after handling contaminated material, surfaces or equipment.

Measures to prevent transmission of VRE include adherence to hand hygiene recommendations and environmental cleaning. Verifying procedures and responsibilities for scheduled cleaning and disinfection of environmental surfaces, (including frequently touched surfaces) is very important. A persistent decrease in the acquisition of VRE in a medical ICU was reported following an educational and observational intervention with a targeted group of housekeeping personnel. When patient care equipment cannot be dedicated to the use of one patient it requires cleaning and disinfection prior to use on another patient

c. Resistant Gram negative microorganisms

Certain Gram-negative bacilli such as *E. coli, Klebsiella, Pseudomonas, Acinetobacter spp*. have become increasingly resistant to commonly used antimicrobials. Gram negative bacilli resistant to extended spectrum ß-lactams (penicillins and cephalosporins), fluoroquinolones, carbapenems and aminoglycosides have increased in prevalence. Outbreaks have been reported in burn units, ICUs, surgical patients, soldiers returning from Afghanistan and LTC settings. Carbapenemase producing *Klebsiella* organisms have emerged as major hospital problems in US and elsewhere. Carbapenemase producing Gram-negative bacilli, particularly *Acinetobacter spp.* are emerging outside Canada as important hospital pathogens and may be seen in Canadian hospitals in the future. Carbapenemase producing Gram-negative bacilli spp. such as *Enterobacteriaceae* carrying the New Delhi metallo-beta-lactamase, (NDM) -1 carbapenemase (currently associated with South Asia, including hospitalization in India) and *Acinetobacter spp*. are emerging outside Canada as important hospital pathogens and may be seen in Canadian hospitals in the future.

3. Viral Gastroenteritis

Noroviruses (previously called Norwalk-like viruses) are a common cause of gastroenteritis. These viruses are part of a family called caliciviruses.

Many strains of noroviruses have been implicated in explosive outbreaks of gastroenteritis in various settings including hospitals, LTC facilities, and rehabilitation centers. Noroviruses are found in the stool or emesis of infected individuals when they are symptomatic and up to at least 3 or 4 days after recovery. The virus is able to survive relatively high levels of chlorine and varying temperatures and can survive on hard surfaces for hours or days. Alcohol-based hand rubs are effective against norovirus but the optimal alcohol concentration requires further evaluation. Transmission during facility outbreaks has been documented to result from person to person contact affecting patients as well as HCWs. Environmental contamination may be a factor in outbreaks in health care.

The identification of outbreaks is based on clinical and epidemiological factors as there is a short incubation period with rapid onset of symptoms. In addition, diagnostic testing is technically difficult and not always readily available except in a reference laboratory. A draft guideline for the prevention and control of a norovirus outbreak has been published.

Rotavirus is the most common cause of nosocomial gastroenteritis in paediatric settings. Rotavirus can be a causative microbial agent of nosocomial infection not only in children but also in immunocompromised persons and the elderly.

The virus is present in extremely high concentration in the stool, thus minimal environmental contamination may lead to transmission.

4. Emerging Respiratory Infections

Acute respiratory infections of significant public health importance include infections caused by either emergence of new variants of known respiratory pathogens (e.g. novel influenza viruses, SARS) or emergence of as yet unknown pathogens.

For more information, or in situations of emerging respiratory infections, refer to the PHAC website for specific guidance documents. See http://www.phac-aspc.gc.ca/index-eng.php

Appendix II – Terminal Cleaning

1. Terminal cleaning refers to the process for cleaning and disinfection of patient accommodation which is undertaken upon discharge of any patient or on discontinuation of contact precautions. The patient room, cubicle, or bedspace, bed, bedside equipment and environmental surfaces and sinks and bathroom should be thoroughly cleaned before another patient is allowed to occupy the space. The bed linens should be removed before cleaning begins.
2. In general, no extra cleaning techniques are required for rooms that have housed patients for whom other Additional Precautions were in place. Specific recommendations related to Additional Precautions are outlined in items 4. and 9. below.
3. Terminal cleaning should primarily be directed toward those items that have been in direct contact with the patient or in contact with the patient's excretions, secretions, blood or body fluids.
4. Housekeeping personnel should use the same precautions to protect themselves during terminal cleaning that they would use for routine cleaning. Respirators are not needed unless the room was occupied by a patient for whom there were airborne precautions and insufficient time has elapsed to allow clearing of the air of potential airborne microorganisms (See Appendix III).
5. All disposable items in the patient's room should be discarded.
6. Reusable items in the room should be reprocessed as appropriate to the item. Refer to the most current publication for environmental infection control.
7. Bedside tables, bedrails, commodes, mattress covers and all horizontal surfaces in the room should be cleaned with a detergent/disinfectant.
8. Carpets that are visibly soiled with patient's excretions, blood or body fluids should be cleaned promptly.
   a. Routine washing of walls, blinds, and window curtains is not indicated. These should be cleaned if visibly soiled.
   b. Privacy and shower curtains should be changed.
   c. Disinfectant fogging is not a satisfactory method of decontaminating air and surfaces and should not be used.
9. Additional terminal cleaning may be required in outbreak situations where continued transmission of specific infectious agents is noted (e.g. *C. difficile,* norovirus, rotavirus). The efficacy of disinfectants being used should be assessed and if indicated, a more effective disinfectant should be selected. Attention should be paid to frequently touched surfaces such as doorknobs, call bell pulls, faucet handles, and wall surfaces which have been frequently touched by the patient.

Appendix III – Air Changes Per Hour and Time in Minutes

Required for Removal Efficiencies of 90%, 99% or 99.9% of Airborne Contaminants

Air Changes Per Hour and Time in Minutes Required for Removal Efficiencies of 90%, 99% or 99.9% of Airborne Contaminants*

Minutes required for a removal efficiency of:

Air Changes Per Hour	90%	99%	99.9%
1	138	276	414
2	69	138	207
3	46	92	138
4	35	69	104
5	28	55	83
6	23	46	69
7	20	39	59
8	17	35	52
9	15	31	46
10	14	28	41
11	13	25	38
12	12	23	35
13	11	21	32
14	10	20	30
15	9	18	28
16	9	17	26
17	8	16	24
18	8	15	23
19	7	15	22
20	7	14	21

* This table is prepared according to the formula t= (in C2/C1)/(Q/V)=60, which is an adaptation of the formula for the rate of purging airborne contaminants (100-Mutchler 1973) with t1=0 and C2/C1=1—(removal efficiency/100).

Source: Adapted from CDC. *Guidelines for preventing the transmission of* ***Mycobacterium tuberculosis*** *in health-care facilities, 1994.* MMWR 1994;43(No. RR-13):1-32.

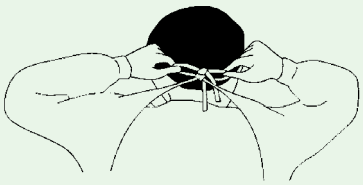
Appendix IV – Technique for Putting On and Taking off PPE

PUTTING ON PPE

1. Perform Hand Hygiene

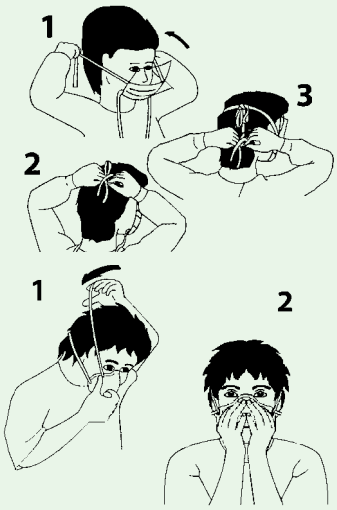
2. Put on Gown

- Tie neck and waist ties securely



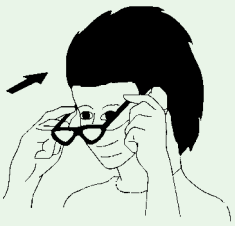
3. Put on Mask/N95 Respirator

- Place mask over nose and under chin
- Secure ties, loops or straps
- Mould metal piece to your nose bridge
- For respirators, perform a seal-check



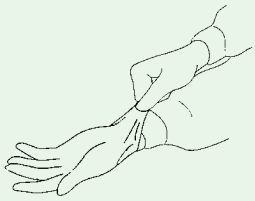
4. Put on Protective Eyewear

- Put on eye protection and adjust to fit
- Face shield should fit over brow



5. Put on Gloves

- Put on gloves, taking care not to tear or puncture glove
- If a gown is worn, the glove fits over the gown's cuff



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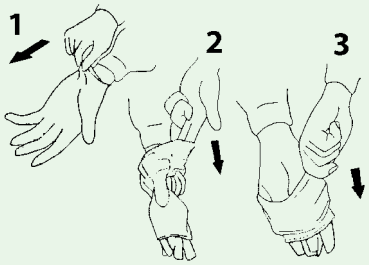
Appendix IV – Technique for Putting On and Taking off PPE

Additional optional opportunities for hand hygiene include:
*between steps 1 and 2
*between steps 4 and 5, and before leaving the care area

TAKING OFF PPE

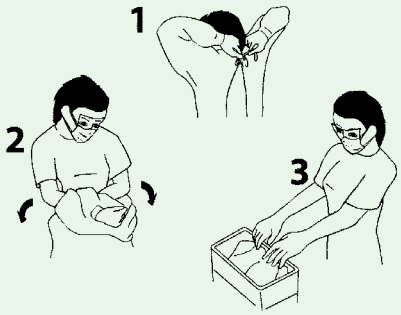
1. Remove Gloves

- Remove gloves using a glove-to-glove/skin-to-skin technique
- Grasp outside edge near the wrist and peel away, rolling the glove inside-out
- Reach under the second glove and peel away
- Discard immediately into waste receptacle



2. Remove Gown

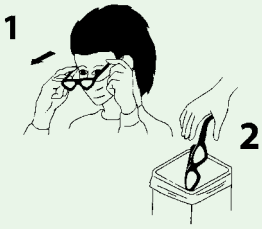
- Remove gown in a manner that prevents contamination of clothing or skin
- Starting at the neck ties, the outer, 'contaiminated', side of the gown is pulled forward and turned inward, rolled off the arms into a bundle, then discarded immediately in a manner that minimizes air disturbance



3. Perform Hand Hygiene

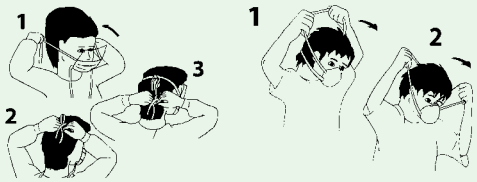
4. Remove Eye Protection

- Arms of goggles and headband of face shields are considered to be 'clean' and may be touched with the hands
- The front of goggles/face shield is considered to be contaminated
- Discard into waste receptacle or into appropriate container to be sent for reprocessing
- Personally-owned eyewear may be cleaned by the individual after each use



5. Remove Mask/N95 Respirator

- Ties/ear loops/straps are considered to be 'clean' and may be touched with the hands
- The front of the mask/repirator is considered to be contaminated
- Untie bottom tie then top tie, or grasp straps or ear loops
- Pull forward off the heard, bending forward to allow mask/respirator to fall away from the face
- Discard immediately to waste receptacle



6. Perform Hand Hygiene

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Appendix – V Elements that Comprise Contact Precautions

In addition to Routine Practices, the following are elements that comprise Contact Precautions

Element	Acute Care	Long-term Care	Ambulatory/Clinic Setting	Home Health Care
CONTACT PRECAUTIONS				
Accommodations	Door may be open			No restrictions on accommodations
	Single room with dedicated toilet and patient sink	Placement is on a case-by-case basis		
	Remain in room unless required for diagnostic, therapeutic or ambulation purposes	Not required to remain in room unless symptomatic	Identify patients who require precautions	
	May go or be taken outside the facility, but cannot visit other patient rooms		Encourage patient to perform hand hygiene on entering the setting	
Signage	Yes		Flag chart	
Gloves	For all activities in the room/bed space	For direct hands on care		
Gown	For all activities where skin or clothing will come in contact with the patient or the patient's environment	For direct hands on care		
Equipment and items in the environment	Dedicate if possible		Routine Practices	Routine Practices
	Chart (paper or mobile electronic) should not be taken into the room Clean and disinfect shared items between use cover examination tables with a clean sheet prior to use			
Environmental cleaning	VRE and *C. difficile* rooms require additional cleaning			Routine Household Cleaning
	Routine cleaning for all other rooms			
	Remove and launder all curtains (privacy, window, shower) when visibly soiled and on terminal cleaning			
Transport	Staff wear gloves and gown for direct contact with the patient during transport			Not applicable
Communication	Effective communication regarding precautions must be given to patient/patient/patient, families, other departments, other facilities and transport services prior to transfer			

Source: Adapted from Ontario Ministry of Health and Long-Term Care; PIDAC, adapted from Routine Practices and Additional Precautions in all Health Care Setting, May 2010

Appendix – VI Elements that Comprise Droplet Precautions

In addition to Routine Practices, the following are elements that comprise Droplet Precautions

Element	Acute Care	Long-Term Care	Ambulatory/ Clinic Setting	Home Health Care
Accommodations	Door may be open Patient to remain in room or bedspace			Discuss feasibility of spatial separation with patient (e.g. when sleeping)
	Single room dedicated toilet and patient sink preferred. If not available perform risk assessment to determine placement. Cohorting of those who are confirmed to have the same infectious agent may be acceptable. Ensure that patients have 2 meters spatial separation and draw privacy curtain Ensure droplet precautions can be applied in nursery settings.	Perform point of care risk assessment to determine placement. If a 2 metre separation is not possible, manage the patient in their bed space with privacy curtain drawn.	Triage patient/patient away from waiting area to a single room as soon as possible or maintain a 2 metre spatial separation. Patient to wear a mask and perform hand hygiene.	
Signage	Yes	Yes		Not applicable
Facial Protection	Yes, within two metres of patient			
Equipment and items in the environment	Dedicate if possible			
	Chart (paper or mobile electronic) should not be taken into the room Clean and disinfect shared items (e.g. wheelchair, commode)			Routine household cleaning practices
Environmental Cleaning	Routine cleaning			
Transport	Limit transport unless required for diagnostic or therapeutic procedures transport		Patient/patient to wear a mask for duration of visit and during transport	
Communication	Effective communication regarding precautions must be given to patient families, other departments, other facilities and transport services prior to transfer.			

Source: Adapted from the Ontario Ministry of Health and Long-Term Care, PIDAC, Routine Practices and Additional Precautions in All Health Care Settings, May 2010

Appendix – VII: Elements That Comprise Airborne Precautions

In addition to Routine Practices, the following are elements that comprise Airborne Precautions

Element	Acute Care	Long-Term Care	Ambulatory/ Clinic Setting	Home Health Care
AIRBORNE PRECAUTIONS				
Accommodation	Airborne isolation room or transfer as soon as possible If unavailable, place patient in a single room with door closed. Patient to wear a mask if feasible			Not applicable.
Signage	Yes		Yes	Not applicable
N95 Respirator **TB** **Measles** **Varicella**	Required for entry to room		For duration of visit	Required for entry to patient's home
	Only immune staff to enter room. N95 respirator not required if immune			
Equipment and Items in the environment	As per Routine Practices			
Environmental Cleaning	As per routine cleaning			Routine household cleaning
Transport	Patient to wear a mask during transport			Not applicable
	Transport staff to wear an N95 respirator during transport			
	Limit transport unless required for diagnostic or therapeutic procedure			
Communication	Effective communication regarding precautions must be given to patient families, other departments, other facilities and transport services prior to transfer			

Source: Adapted from the Ontario Ministry of Health and Long Term Care, PIDAC, Routine Practices and Additional Precautions in All Health Care Settings, May 2010

Appendix VIII
Elements That Comprise Droplet and Contact Precautions for Acute Respiratory Infection

In addition to Routine Practices, the following are elements that comprise Droplet/ Contact Precautions

Element	Acute Care	Long-Term Care	Ambulatory/Clinic Setting	Home Health Care
Accommodations	Door may be open Patient/Patient to remain in room or bedspace			Discuss feasibility of spatial separation with patient (e.g. when sleeping
	Single room dedicated toilet and patient sink preferred. If not available perform risk assessment to determine placement. Cohorting of those who are confirmed to have the same infectious agent may be acceptable. Ensure that patients have 2 meters spatial separation and draw privacy curtain. Ensure droplet precautions can be applied in nursery settings.	Perform point of care risk assessment to determine placement. If a 2 metre separation is not possible, manage the patient in their bed space with privacy curtain drawn.	Triage patient/patient away from waiting area to a single room as soon as possible or maintain a 2 metre spatial separation. Patient to wear a mask and perform hand hygiene.	
Signage	Yes	Yes	Yes	Not applicable
Facial Protection	For all activities in the room/bed space		Within two metres of patient/patient/patient	
Gloves	For all activities in the room/bed spaces		For direct patient care	
Gowns	For all activities where skin or clothing will come in contact with the patient or the patient's environment	For direct hands on care		
Equipment and items in the environment	Dedicate if possible		Routine Practices	Routine Household Cleaning
	Chart (paper or mobile electronic) should not be taken into the room. Clean and disinfect shared equipment after use. Cover examination table with a clean sheet prior to use.			
Environmental Cleaning	Routine Practices			
Transport	Limit Transport unless required for diagnostic or therapeutic procedures		Patient to wear a mask for duration of visit and during transport	Not applicable
	Patent to wear a mask during transport			
	Staff wear appropriate PPE for direct contact with the patient/during transport		Not applicable.	
	Clean and disinfect equipment used for transport after use.			
Communication	Effective communication regarding precautions must be given to patient families, other departments and transport services prior to transfer.			

Precautions in All Health Care Settings, May 2010 Source: Adapted from the Ontario Ministry of Health and Lon-Term Care, PIDAC, Routine Practices and Additional

References

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(5) Health care Infection Control Practices Advisory Committee (HICPAC), Guidelines for Isolation Precautions: Preventing Transmission of Infectious Agents in Health Care Settings, 2007

(6) Public Health Agency of Canada, Early Detection of Re-emerging Respiratory Infections through Severe Respiratory Illness (SRI) Surveillance, November2006, pg2-5.