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Infection Control Precautions for Respiratory Infections Transmitted by Large Droplet and Contact

Infection Control Guidance if there is a SARS Outbreak Anywhere in the World, When an Individual Presents to a Health Care Institution¹ With a Respiratory Infection

The recommendations in this document have been developed under the guidance of the Health Canada's Infection Control Guidelines Steering Committee. The initial draft of this document was written by the professional staff in the Nosocomial and Occupational Infections section based on the infection control guideline *Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*. A consensus meeting of experts was held on November 24, 2003 to review the initial draft. The decisions from the consensus meeting were brought to Steering Committee which further developed the recommendations. Subsequent drafts have been vetted through various expert groups.

The following recommendations have been developed to assist health care workers (HCWs) prevent the transmission of respiratory infections including Severe Acute Respiratory Syndrome (SARS).

Refer to Appendix I for recommendations related to aerosol-generating respiratory procedures. Refer to Appendix II for reprocessing of respiratory equipment.

For case definitions and other current information on SARS, visit the website: www.sars.gc.ca

The Health Canada Infection Control Guidelines Steering Committee emphasizes that additional human and material resources are required for the screening and infection control precautions necessary during a SARS outbreak.

Definition: SARS outbreak: - A cluster of individuals with SARS with local transmission of SARS
- An outbreak may be setting-specific (e.g., a hospital with

¹Health care institutions include, but are not limited to, acute care hospitals, emergency departments, rehabilitation hospitals, mental health hospitals, and long term care facilities.

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transmission) or health unit wide (e.g., transmission in more than one setting or significant community exposure)

Screening

Questionnaire to be administered to all patients at first encounter to a health care institution:

- a. Emergency Department/EMS (Emergency Medical Services)
- b. Outpatient clinics

- In a SARS outbreak, all entrances to facilities should be restricted to allow screening of all persons entering the facility².
- Active screening should be done in addition to self-screening in outbreak situations².

The HCW should maintain a distance of at least 1 metre from the patient while asking the screening questions.

Screening Questions:

1. Do you have new or worsening cough or shortness of breath?
2. Have you had a fever or chills?

If yes to EITHER, the HCW should don an N95 respirator or equivalent, and eye protection. Persons accompanying the patient should don a surgical mask.

Patient should don a surgical mask and perform hand hygiene. Move the patient to an area separate from other patients, then ask:

3. Have you been to a SARS-affected area, e.g., China, Taiwan, Hong Kong, or other SARS affected areas within the last 14 days³?
4. Have you had contact with a sick person that has travelled to these areas in the last 14 days³?

²At this time, there is no evidence to support the utility of restricted access and active screening in limiting the transmission of SARS.

³Although the evidence indicates that the incubation period for SARS is 2 to 10 days, the experts proposed that 14 days be used as a prudent observation period for the purposes of screening.

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On admission repeat the above questions and include:

5. Are you a Health Care Worker?
6. Have you worked, visited, or been admitted to a hospital that has SARS patients?

Notify infection control if the responses to the screening questions are positive.

- A risk assessment should be done for all patients and procedures.
- Each institution should have an algorithm for screening, admitting and managing patients who may have SARS.
- Signage should be posted outside the triage area with instructions for all arrivals.
- Hand hygiene stations and surgical masks to be placed at the entrances to emergency departments and outpatient clinics.
- Expedited triage should be established for those who answer positive to the screening questions.
- Consideration should be given to establishing a separate pre-triage waiting area for patients with respiratory symptoms and fever.
- Screening criteria may differ for facilities or programs depending on the population (e.g., pediatric or adult), local SARS situation, and may vary seasonally (fall/winter vs spring/summer).
- Long term care facilities should ask the screening questions prior to transferring the resident to another facility/agency.
- Ambulance dispatch should ask the caller the screening questions and notify EMS of its findings. EMS should ask the screening questions and take the patient's temperature prior to transporting the patient.

Triage:

- Triage staff must ask the screening questions about (Screening Question 1) respiratory symptoms and (Question 2) fever of all patients.

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- Triage staff should ask subsequent screening questions including:
 - (Question 3) recent travel history
 - (Question 4) contact or exposure to persons with a similar illness whether accompanying persons are experiencing respiratory symptoms
- If the patient is screened positive (Questions 1 and 2), he/she should be given a surgical mask to wear and interviewed immediately to determine the travel history, contact with any person with respiratory symptoms (Questions 3 and 4), or history of having worked in, visited or been admitted to an acute care hospital in the previous 14 days (Question 6).
- Triage staff should know the symptoms to screen for and specific infection control precautions required.
- Triage staff should have hand hygiene stations readily available.
- Triage staff should have the required personal protective equipment (i.e., N95 respirator or equivalent, eye protection, gloves, gown) readily available to use if the patient responds yes to screening questions 1 and 2.
- Triage staff are expected to follow the recommended infection control precautions, including personal protective equipment (PPE).
- Triage staff should consider the following infection control issues for a patient being investigated for SARS:
 - What additional precautions (beyond routine practices) may be required?
 - Is patient segregation required in the emergency room or in the outpatient clinic?
 - Are a surgical mask and hand hygiene required of the patient?
 - What infection control precautions are required for the person(s) accompanying the patient?
 - Patients should not be accompanied unless necessary. Friends, family or volunteer drivers accompanying the patient should wear a surgical mask.
- Local public health to be informed according to protocol developed by public health and hospital administration.

Triage Waiting Location

- If provisional diagnosis is SARS or lower respiratory tract infection transmitted by droplets, the patient should wait in a separate area from the general population.

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Precautions for patients post-triage, while awaiting admission, and on admission to acute care facilities

Routine practices and additional precautions during a SARS outbreak:

1. Hand Hygiene

Hand hygiene is the most important measure in preventing the spread of infection.

- Hand hygiene should be performed:
 - before direct contact with a patient
 - after any direct contact with a patient, before contact with the next patient
 - before performing invasive procedures
 - after contact with body fluids, secretions and excretions
 - after contact with items known or considered likely to be contaminated with blood, body fluids, secretions and excretions, including respiratory secretions (e.g., oxygen tubing, masks, used tissues and other items handled by the patient)
 - immediately after removing gloves and other protective equipment
 - between certain procedures on the same patient where soiling of hands is likely, to avoid cross-contamination of body sites
 - before preparing, handling, serving or eating food and before feeding a patient.
- Waterless antiseptic hand rinses are effective for hand hygiene and should be readily available. If there is visible soiling, hands should be washed with soap and water before using waterless antiseptic hand rinses. If soap and water are unavailable, cleanse hands first with detergent-containing towelettes to remove visible soil.
- Ideally, HCWs should not wash hands in patient washrooms. If patient washroom is used, avoid contamination of hands from potentially contaminated surfaces and objects after washing.
- Patients, care givers and visitors should be instructed in proper hand hygiene.
- Health care workers should be vigilant to avoid touching their face with their hands, and

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avoid hand contact with their mucous membranes, including the eyes.

2. Gloves

- Gloves should be used as an additional measure, not as a substitute for hand hygiene.
- Gloves should be worn when entering the room of a patient with possible or definite SARS:
- Gloves should be changed between care activities and procedures with the same patient after contact with materials that may contain high concentrations of microorganisms, e.g., after open suctioning of an endotracheal tube.
- Medical quality gloves of adequate size for the wearer should be worn.
- Gloves should cover the sleeve cuff of gown.
- Gloves should be removed prior to leaving the patient's room.
- Hand hygiene should be performed immediately after removing gloves. Prevent hand contamination on leaving the room, e.g. door knob. Hand hygiene may be required again after leaving the patient's room if there is a risk that hands became contaminated after removal of gloves.
- Single-use gloves should not be reused or washed.

3. Respirators

- Currently, N95 respirators or equivalent are recommended by Health Canada, WHO and the CDC for the care of SARS patients even though the evidence shows that SARS is spread by droplet transmission. International SARS studies have not shown a difference in efficacy between surgical masks and N95 respirators in preventing transmission of the SARS coronavirus. Recommendations will be reviewed as further evidence emerges.
- N95 respirators or equivalent respirators should filter particles one micron in size, have a 95% filter efficiency and provide a tight facial seal (less than 10% leak). Provided that an adequate facial seal is present, respirators that are NIOSH certified as N95 meet or exceed this minimum recommendation. Equivalent respirators must meet the same specifications. Check the manufacturer's written specifications. See Health Canada *Guideline for preventing the transmission of tuberculosis in Canadian health care facilities and other institutional settings* for further details.

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- The respirator should be removed carefully using the straps so as not to contaminate the HCW.
- Respirators should be changed according to the manufacturer's recommendations.
- Discard a respirator that is crushed, wet, or has become contaminated by patient secretions.
- HCWs should perform hand hygiene after removing respirator.
- Discard the N95 respirator after every use with a SARS patient. N95 respirators used for the care of patients where SARS has been ruled out may be reused by the same health care worker as per the manufacturer's guidelines (usually for up to 12 hours) provided the respirator is not soiled or wet and is stored in a manner to prevent deformation of the respirator.
- There is no evidence to support the need for enhanced respiratory PPE, such as the powered air purified respirator system (PAPRS) during the care of patients with SARS. These devices are not recommended.

4. Eye Protection

- Eye protection (e.g., safety glasses, goggles or full face shields) should be worn:
 - when providing care for a patient with suspect, probable or confirmed SARS
 - during cough producing and aerosol-generating procedures
 - where there is a potential for splattering or spraying of blood or other body substances.
- The eye protection should protect the eyes from splashes.
- Prescription eye glasses do not provide adequate protection.
- Choose eye protection that does not impair the HCW's vision and thereby interfere with patient care.
- Eye protection should be removed carefully to prevent self-contamination, and discarded after every use if disposable. Reusable items should be handled with care until decontaminated.

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- To prevent self-contamination, HCWs should not touch their eyes.
 - HCWs should perform hand hygiene after removing eye protection.
- 5. Gowns**
- Gowns should be donned prior to entering the room of a patient with suspect, probable or confirmed SARS.
 - Long-sleeved gowns should be worn to protect the forearms and clothing of the HCW from splashing and soiling with body substances during procedures and patient care activities likely to generate splashes or sprays of blood, body fluids, secretions, or excretions.
 - Gowns should be removed before leaving the patient's room.
- 6. Other PPE**
- Hair and shoe covers are not recommended.
- 7. Patient Accommodation**
- Establish a hierarchy of preferred accommodations for patients with SARS that is operational in any facility as the SARS outbreak evolves.
 - Current epidemiologic evidence does not indicate that a negative pressure room is required to prevent SARS transmission.
 - A single room is recommended for cases of suspect, probable or definite SARS. If not available, cohort SARS cases. Possible cases of SARS should not be cohorted.
- 8. Signage**
- The entry to the SARS room/unit should have signage to inform all HCWs and any visitors the precautions and other infection control measures that should be followed. These signs should be easy to read and the information should provide step by step instructions.
- 9. Patient Transport Within the Facility**
- For the transport of SARS patients, personnel should wear an N95 respirator, eye

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protection, gowns, and gloves and remove PPE immediately on completion of patient transport.

- Patients with SARS should be out of their rooms for essential procedures only.
- Patients should wear a surgical mask during transport.
- If unable to keep mask on a child, use tissues to cover the child's nose and mouth. An incubator can be used for infant transportation.
- If it is necessary for the patient to be transported within the facility, the transport route should be the shortest route possible, avoiding well populated areas. Ideally, a dedicated patient elevator with no other patients on it, should be used.
- Effective communication should occur so that the transport is accomplished as expeditiously as possible to prevent any delay.
- Personnel in the area to which patient is to be transported should receive prior notification and be aware of precautions to follow.
- Transport personnel should take precautions to minimize direct contact between the patient and other patients and environmental surfaces and objects.

10. Patient Transfer Between Institutions

- Critically evaluate the medical need to transfer a patient with SARS: whenever possible transfer should be avoided.
- Transportation services should have established policies and procedures for transporting patients with SARS.
- The transferring institution should advise the personnel transporting the patient which precautions are required.
- The receiving agency should be notified and be aware of precautions and PPE to follow. Patients transferred from a SARS affected hospital should be monitored for signs and symptoms of SARS for 14 days

11. Air Evacuation of Patients With SARS:

Will be developed by a working group in the future.

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12. Patient Care Equipment (Refer to *Infection Control Guidelines Hand Washing, Cleaning, Disinfection and Sterilization in Health Care*. See web address on last page)

- Ensure that staff are trained with and follow the recommendations for cleaning, disinfecting and sterilizing patient care equipment in *Infection Control Guideline Hand Washing, Cleaning, Disinfection and Sterilization in Health Care*.
- Procedures should be established for assigning responsibility and accountability for routine cleaning of all patient care equipment.
- Disposable equipment should be used whenever possible.
- Mouthpieces, resuscitation bags or other ventilation devices should be provided for use in hospital areas where the need to resuscitate is likely to occur.
- Refer to Appendix II for disinfection and sterilization of respiratory equipment.
- Equipment that is visibly soiled should be cleaned promptly with soap and water, detergents or enzymatic agents.
- Soiled patient care equipment should be handled in a manner that prevents exposure of skin and mucous membranes, and contamination of clothing and the environment.
- Used sharp items should be handled with care to avoid injuries during disposal or reprocessing.
- Patient care equipment (e.g., thermometer, blood pressure cuff, pulse oxymeter, commode) should be dedicated to the use of that patient and should be cleaned and disinfected before reuse with another patient. The reprocessing method required for a specific item depends on the item's intended use, the risk of infection to the patient, and the amount of soiling.

13. Environmental Control (Refer to *Infection Control Guidelines Hand Washing, Cleaning, Disinfection and Sterilization in Health Care*.)

- Procedures should be established for assigning responsibility and accountability for routine cleaning of all environmental surfaces including furniture (e.g., bedrails and over bed table) and noncritical patient care items (e.g., call bell).
- All horizontal and frequently touched surfaces should be cleaned daily and more often if soiled.

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- Frequent cleaning of environmental surfaces and noncritical patient care items using hospital grade germicide with virucidal label claim is recommended.
- Sufficient quantity of germicide in the correct concentration applied with a clean cloth are components of an effective cleaning process. Comply with contact time on manufacturers label and workplace safety requirements.
- Personnel who are assigned this responsibility should be trained and supervised in cleaning and disinfection methods.
- Personnel involved in cleaning and disinfection of a SARS patient's room should wear personal protective equipment: N95 respirator, eye protection, long sleeved gown and disposable gloves.
- Routine practices should be applied in the handling of soiled linen. Linen should be transported from the patient's room in closed laundry bags. Wet items need to be contained.
- Routine practices should be applied to handling clinical waste. Double bagging of waste is not required.

14. Visitors

- Visitors should not be permitted. Exceptions may be made, rarely, after careful review for compassionate reasons.
- Visitors should talk with a nurse before entering the room and should be instructed in the appropriate use of PPE and hand hygiene.
- Visitors should wear the same PPE as recommended for HCWs.

15. Patient and Family Education

- Patients and family members should have the nature of the illness (SARS) and the reason for infection control precautions explained to them.

16. HCW Education

- HCWs should be able to apply routine practices and additional precautions in the clinical setting.

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- HCWs should be trained to don and doff PPE, perform hand hygiene, etc.
- HCWs should know the epidemiology and symptoms of the respiratory diseases requiring infection control precautions.
- HCWs should self screen and not come to work if they have a febrile respiratory illness.
- HCWs should report possible exposures to the occupational health department.

17. Postmortem Care

- Routine practices should be followed during postmortem procedures.

Infection Control Guidelines: Hand Washing, Cleaning, Disinfection and Sterilization in Health Care

<http://www.hc-sc.gc.ca/pphb-dgspsp/publicat/ccdr-rmtc/98pdf/cdr24s8e.pdf>

Infection Control Guidelines: Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care

<http://www.hc-sc.gc.ca/pphb-dgspsp/publicat/ccdr-rmtc/99vol25/25s4/index.html>

Guidelines for Preventing the Transmission of Tuberculosis in Canadian Health Care Facilities and Other Institutional Settings

<http://www.hc-sc.gc.ca/pphb-dgspsp/publicat/ccdr-rmtc/96vol22/22s1/index.html>

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APPENDIX I: Aerosol Generating Respiratory Procedures

Infection Control Guidance when there is SARS activity and an Individual Presents With a Febrile Respiratory Infection

The following infection control guidance sheet has been developed to assist health care workers (HCWs) prevent the transmission of SARS during aerosol generating respiratory procedures.

Definition: SARS Outbreak Situation. Refers to the situation when there is:

- a cluster of individuals with SARS
- or local transmission of SARS
- or an outbreak in a specific setting (e.g. a hospital with transmission)
- or an outbreak in more than one setting or significant community exposure/transmission

Aerosolizing respiratory procedure: a procedure with the potential to generate a high volume of respiratory droplets and the procedure may propel these droplets over a wide radius (i.e., > 1 metre).

- Aerosol generating procedures for suspect, probable or confirmed SARS patients should be limited to those deemed absolutely medically essential and the higher risk procedures in the table below should be avoided.
- Although all aerosol generating procedures involve risk, some, particularly when there is SARS activity, present a greater infection control risk than others.

Higher Risk Procedures	Moderate Risk Procedures	Lower Risk Procedures
<ul style="list-style-type: none"> • uncontrolled intubation* • bag-valve mask ventilation (e.g. manual ventilation with ambu bag) • non intubated ventilation (e.g. CPAP, BiPAP) • use of nebulizer** • high flow oxygen with humidification • bronchoscopy • (see special note *** for sputum induction) 	<ul style="list-style-type: none"> • any break in circuit for patient on ventilator • tracheal suctioning • any procedure that will induce coughing 	<ul style="list-style-type: none"> • pulmonary function tests including bedside spirometry • oral suctioning • controlled intubation

Notes:

* Uncontrolled intubation procedures can be avoided in most, if not all cases, if administrative controls (see

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point # 2) are established and regularly reviewed with all HCWs.

**Whenever possible, alternative methods for delivery of medication should be used instead of nebulizers (e.g., metered dose inhalers).

*** Sputum induction procedures also pose very high infection control risks. This procedure should be performed using airborne precautions such as a negative pressure room with regulated air exchanges, personnel wearing an N 95 (or equivalent) respirator, etc.

1. A risk assessment of the patient, using the SARS screening tool, should be performed prior to any aerosol generating procedure to determine the need for administrative controls, environmental controls and personal protective equipment.
2. For patients with possible or definite SARS the following controls are recommended:
 - a) Predetermined administrative controls (e.g. aerosol generating procedures should be performed by the most experienced personnel available, signage, keeping the number of people in the room to a minimum [i.e., no more than four], procedures such as sedating the patient which will limit the duration of the intubation, ensuring that there is adequate equipment in the room)
 - b) Engineering controls (e.g. route of air flow, air exchanges) and
 - c) Environmental controls (e.g., staff performing the procedure should ensure that contaminated equipment and surfaces are discarded or cleaned/disinfected before leaving the room).
3. Whenever possible, ensure that these procedures are conducted in a controlled setting. This requires early recognition of patients who may require high risk interventions in order to avoid emergency procedures.
4. The stimulation of coughing and aerosol-generating procedures on patients with suspect, probable or confirmed SARS should be limited to those deemed medically essential.
5. It is recommended that aerosol-generating procedures on suspect, probable or confirmed SARS patients not be performed unless absolutely essential and then while using airborne precautions (e.g. an isolation room with negative pressure relative to the surrounding area).
6. All personnel in the room of a suspect, probable or confirmed SARS patient should wear the recommended PPE: a fluid resistant N95 respirator (or equivalent), eye protection , long-sleeved gown and gloves. Eye protection should protect the eyes from splashes from all directions.
7. Health Canada does not recommend the use of enhanced respiratory personal protective equipment (PPE) such as the powered air purified respirator system (PAPRS) during high

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risk procedures involving airway interventions including endotracheal intubation and extubation. Additionally, the increased complexity involved in the removal and disposal/cleaning/ decontamination of this equipment may increase the potential risk of self contamination.

8. Respiratory equipment should be cleaned and disinfected according to manufacturer's recommendations for the device, and Appendix II Reprocessing of Respiratory Equipment.

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APPENDIX II

Infection Control Guidance for Reprocessing of Respiratory Equipment and Devices

The following fact sheet has been developed to assist with the reprocessing of respiratory equipment and devices according to infection risk categories (Spaulding Classification). Manufacturer’s instructions for the reprocessing of every medical device must be followed. For the methods to achieve the level of disinfection or sterilization required for medical devices, refer to *Health Canada Infection Control Guidelines Hand Washing, Cleaning, Disinfection and Sterilization in Health Care*.
<http://www.hc-sc.gc.ca/pphb-dgspsp/publicat/ccdr-rmtc/98pdf/cdr24s8e.pdf>

Sterilization and Disinfection of Respiratory Equipment and Devices According to Infection Risk Categories (Spaulding Classification)

Category	Description	Device	Processing
Critical	Devices that enter the blood stream or sterile tissue	Bronchoscope biopsy forceps and specimen brushes	Sterilization
Semicritical	Devices that directly or indirectly contact mucus membranes, including devices through which air or other gases flow for delivery to the lower respiratory tract	Bronchoscopes and accessories Oral, nasal and tracheal airways Ventilator breathing circuits Bubbling or wick humidifiers Exhalation valves Small volume medication nebulizers Large volume nebulizers in ventilators PFT mouthpieces, tubing, connectors Resuscitation bags Laryngoscope blades Stylets Air-pressure monitor probes CO2 and O2 analyzer probes used within respiratory circuits or devices Temperature probes used within respirator circuits or devices Respirometers Suction catheters Anesthesia devices or equipment: <ul style="list-style-type: none"> • face masks or tracheal tubes • inspiratory and expiratory tubings • Y connectors • right angle connectors • reservoir bags • humidifier and tubing 	High-level disinfection
Noncritical	Devices that touch only intact skin but not the mucous membranes or do not contact the patient	Exterior surface of ventilator Transcutaneous oxygen monitor probes	Low/intermediate level disinfection

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