Ministry of Health
and Long-Term Care

Ministère de la Santé
et des Soins de longue durée

Ontario

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Directive HR03-12
October 22, 2003

DIRECTIVE TO ALL ONTARIO ACUTE CARE FACILITIES FOR HIGH-RISK RESPIRATORY PROCEDURES (INCLUDES BOTH NON-OUTBREAK AND OUTBREAK CONDITIONS)

This Directive replaces the following:

Directive to all Ontario Acute Care Hospitals for High-Risk Procedures, June 16, 2003

Directives to all Ontario Acute Care Hospitals for High-Risk Procedures in Critical Care Areas during a SARS Outbreak, May 1, 2003

In order to prevent the transmission of respiratory and other pathogens to health care workers (HCWs) during respiratory procedures that generate droplets and aerosols, the Ontario Ministry of Health and Long-Term Care directs all acute care hospitals to undertake the following procedures. This Directive applies to both Non-Outbreak and Outbreak situations.

This Directive also applies to those non-acute facilities who have ventilated patients or who perform high-risk respiratory procedures as defined in the Glossary of Terms (see Appendix 1).

The procedures specific to containing the spread of SARS (severe acute respiratory syndrome) during SARS Outbreak conditions are highlighted in ***bold italics*.**

TABLE OF CONTENTS

1 GENERAL CONSIDERATIONS

1.1 Principles

Respiratory procedures that generate droplets and aerosols can expose staff to respiratory pathogens and should be conducted using infection control practices designed to reduce exposure to respiratory secretions.

The same level of protection must be undertaken for respiratory procedures that have the potential to generate droplets or aerosols, such as nebulized therapies, aerosol humidification, CPAP, BiPAP, use of bag-valve mask to ventilate a patient, endotracheal intubation, airway suctioning, tube or needle thoracostomy, bronchoscopy or other upper airway endoscopy, tracheostomy, and open thoracotomy.

1.2 Equipment

All crash carts must have personal protective equipment available including N95 or equivalent masks, eye protection, gloves, gowns, head covering and face shields, available for use during high-risk respiratory procedures.

Each unit or crash cart must also have:

- a manual resuscitation bag with bacterial/viral filter,
- in-line suction catheters[1],
- non-rebreather mask that allows filtration of exhaled gases (e.g., low flow high oxygen concentration mask with hydrophobic submicron filter), and
- intubation equipment.

Personal Protective Systems (PPS) for up to four individuals must be readily available (either on the ward crash cart or on a specialized SARS crash cart) in the Emergency Department, Critical Care and SARS units.

1.3 Personal Protection

All personnel not essential to the procedure must remain outside of the room; if attendance is necessary for non-medical reasons (e.g., teaching of students, presence of family members on compassionate grounds), persons must use personal protection identical to that worn by healthcare workers.

Protective equipment must be removed in such a way as to not contaminate the health care worker or others. The following process must be followed (the process is dependent on level of precautions in use):

- Remove gloves and discard using a glove-to-glove/skin-to-skin technique.
- Use alcohol hand rinse or, if available, a hand sink; **do not use** patient bathroom to wash hands.
- Remove gown (discard in linen hamper in a manner that minimizes air disturbance).

Just prior to leaving or immediately after leaving the room:

[1] Note: if the patient is a small child then suctioning may be performed in the normal fashion.

- Use alcohol hand rinse again.
- Remove face shield/fluid shield and eye protection and discard or place in clear plastic bag and send for decontamination.
- Remove hair cover and discard.
- Remove N95 mask or equivalent and discard.
- Use alcohol hand rinse again.

A table outlining the personal protective equipment required for a different categories of patients is provided in Appendix 2.

1.4 Personnel

Personal protective equipment must be properly used, fit and maintained in a manner consistent with *Regulation for Health Care and Residential Facilities* (Reg. 67/93 s.10) made under the Occupational Health and Safety Act. Staff who require N95 or equivalent masks must be qualitatively fit-tested to ensure maximum mask effectiveness. (See NIOSH website at www.cdc.gov/niosh -Publication No.99-143, and Canadian Standards Association *Z94.4-02* Selection, Use, and Care of Respirators, October 2002).

All staff working in SARS units or with SARS patients must follow the *Directive Regarding the Application of Respiratory and Contact Precautions (Enhanced) with Patients with Febrile Respiratory Illness and SARS Contact History; Persons Under Investigation; SARS Patients; and SARS Units, (Directive RCPE03-01), October 22, 2003.*

2 PERFORMING HIGH-RISK RESPIRATORY PROCEDURES IN PATIENTS WITHOUT FEBRILE RESPIRATORY ILLNESS (FRI) OR THOSE WITH FRI BUT WHO DO NOT HAVE SARS RISK FACTORS

This includes:

- **Patients with sudden cardio respiratory arrest or compromise that is not related to FRI (outbreak or non-outbreak)**
- ***NOTE: during an outbreak refer to section 3 for ALL patients with fever or respiratory symptoms***
- **Patients in routine precautions or droplet precautions only**

2.1 Principles

- High-risk respiratory procedures (see Appendix 1) in patients without known fever and respiratory symptoms must be performed while wearing gloves, a N95 or equivalent mask and eye protection because of the high risk of contact with respiratory secretions.
- Patients who present to Emergency Departments with sudden cardio-respiratory arrest should be managed according to the best judgement of the most responsible physician or other provider.

2.2 Personal Protection

- Due to the nature of high-risk respiratory procedures, health care workers must wear gloves, N95 or equivalent mask and eye protection. Gowns are to be worn if

contamination of uniform or clothing is anticipated. Scrupulous hand hygiene must be practiced.

3 PERFORMING HIGH-RISK RESPIRATORY PROCEDURES IN PATIENTS WITH FEBRILE RESPIRATORY ILLNESS AND SARS RISK FACTORS BUT NO SARS CONTACT HISTORY

This includes:

- **Patients in respiratory and contact precautions**
- **Patients with sudden cardio-respiratory arrest or compromise with pre-existing febrile respiratory illness and SARS risk factors**
- ***In outbreak conditions, patients with unexplained pre-existing fever or respiratory symptoms without known SARS contact history.***

3.1 Principles

- High-risk respiratory procedures performed on patients who have febrile respiratory illness (FRI) and risk factors may expose unprotected staff to respiratory pathogens.
- Patients who present to Emergency Departments with sudden cardio-respiratory arrest should be managed according to the best judgement of the most responsible physician or other provider; respiratory and contact precautions should be used if febrile respiratory illness with risk factors is suspected.
- Ideally, respiratory procedures on these patients shall only be performed as outlined below:
    - in a private room with negative pressure, if possible,
    - by the most experienced staff,
    - with minimum number of staff, and
    - with strict adherence to respiratory and contact precautions (enhanced).
- **For patients in this category with sudden respiratory arrest, refer to Appendix 3, Enhanced Code Blue.**
- ICUs must have access to an infection control advice and consultation to assist with the review of practices.

3.2 Personal Protection

Due to the nature of high-risk respiratory procedures, health care workers must wear gloves, gown, N95 or equivalent mask, and eye protection. Scrupulous hand hygiene must be practiced.

3.3 Procedures

3.3.1 Nebulized therapies should be avoided if at all possible. Salbutamol Sulphate (Ventolin®) or Ipratropium Bromide (Atrovent®) or Salbutamol/ Ipratropium Bromide (Combivent®) can be delivered using the metered dose inhaler (MDI) and aerochamber[2].

[2] Children and patients who are unable to be instructed in the use of MDI may receive nebulized therapy if MDI is not deemed to be appropriate. This should occur in a private room, and respiratory contact precautions (enhanced) must be followed by all persons in the room.

3.3.2 The need for chest physiotherapy must be carefully assessed recognizing that cough-inducing procedures may increase the risk of transmission.

3.3.3 Patients must receive frequent mouth care. Patients with tracheostomies must be provided with humidity.

3.3.4 The need for high frequency oscillation (HFO) and non-invasive ventilation (CPAP/BiPAP) should be carefully considered. If non-invasive ventilation is essential for the patient, the patient must be screened for respiratory infection in consultation with infectious diseases/infection control staff, and respiratory and contact precautions (enhanced) be followed, including the use of a private room (negative pressure preferred).[3]

3.3.5 **Intubation and bronchoscopy**

Personal Protection:

- Those on the intubation team must use respiratory and contact precautions (enhanced) and must be trained in their proper use.

Personnel:

- The procedure shall be performed by the most experienced staff members available. The number of persons in the room should be kept to a maximum of 4 persons.

Procedure:

- The procedure should be done in a negative pressure room. If none is available, the procedure must be done if at all possible in a private room with the door closed. If performed in a resuscitation area, curtains must be drawn and all non-essential persons must be at least 2 metres from the patient. An adjacent area should be used for decontamination.
- Staff in the room during the intubation must use respiratory and contact precautions (enhanced).
- The intubation should be done while the patient is sedated and paralysed if medical condition permits.
- The ventilator and in-line suction device shall be in the patient room in advance of intubation to reduce time needed for bag ventilation and disconnecting bag from the endotracheal tube suctioning.
- Minimize staff exposure by limiting staff re-entry to the room until the room has been cleaned.Critical care areas should preassemble medication/equipment for intubations performed on patients requiring these precautions. The preassembled kit must be in a disposable or easily cleaned container.

[3] In the pediatric population, the need for HFO should be carefully considered, and may be used if no other treatment is appropriate. Gases should be effectively scavenged and filtered to the greatest extent possible.

Cleaning:

- Excess medications must be discarded at the end of the procedure.
- Immediate clean up of room and equipment must be done in such a way as to reduce the re-release of droplets. Staff performing the clean up must use respiratory and contact precautions (enhanced).
- Staff performing the procedure must ensure that contaminated equipment and surfaces are discarded/disinfected and cleaned before leaving the room.
- Potentially contaminated surfaces in the room must be wiped with a hospital-approved disinfectant.

3.3.6 Mechanical Ventilation

Note: Infectious respiratory secretions from these patients may contaminate respiratory equipment and be expelled into the surrounding environment

Ventilators:

- If possible, ventilators with built in bacterial/viral filters in the expiratory circuit should be used. If this is not possible, such a filter must be placed in the expiratory circuit of the ventilator. Filters must be changed when fluid build-up impedes ventilation.
- Disposal of filters is a high-risk exposure and staff must protect themselves using respiratory and contact precautions (enhanced).
- Filters and respiratory circuits used for these patients must be single use and disposed of after use.
- Filters must be bagged, sealed, and then placed in a biohazardous bag for disposal.
- Heated wire circuits must be used on both the inspiratory and expiratory sides of the circuit.
- A water trap/filter combination must be placed at the end of the expiratory circuit.

Manual Resuscitation Bags:

- A hydrophobic submicron filter must be placed between the endotracheal tube and the bag.
- Equipment used for manual bagging must be disposed of after use, not cleaned.
- Disposal of bags and filters is a high-risk exposure and staff must protect themselves following maximum precautions using respiratory and contact precautions (enhanced).
- Equipment must be bagged, sealed, and then placed in a biohazardous bag for disposal. Under no circumstances should the equipment be re-sterilized for re-use.

4 PERFORMING HIGH-RISK RESPIRATORY PROCEDURES IN PATIENTS <u>WITH</u> FRI <u>AND</u> SARS CONTACT HISTORY

This includes:

- **Patients in Respiratory and Contact Precautions (Enhanced).**
- **Patients with sudden cardio respiratory arrest or compromise related to febrile respiratory illness (FRI) with a SARS contact history.**

- ***During an outbreak, patients with pre-existing fever <u>OR</u> respiratory symptoms, who have a SARS contact history, or who are suspect or probable SARS cases.***

4.1 Principles:

- All high-risk respiratory procedures, but in particular bronchoscopy, should be avoided if possible.
- If deemed necessary for life-saving reasons, these procedures should only be performed as outlined below:
    - in a private room with negative pressure if possible,
    - by the most experienced staff,
    - with minimum numbers of staff, and
    - using personal protective systems (PPS).
- **For patients in this category with sudden cardio respiratory arrest refer to Appendix 4, Protected Code Blue**
- ICUs must have access to infection control advice and consultation to assist with review of practices.

4.2 Personal Protection

Due to the nature of high-risk respiratory procedures, at minimum health care workers must wear gloves, gown, N95 mask or equivalent**,** eye protection, face shield and head covering. **Individuals performing the procedure should wear PPS (refer to section 4.3.5).** Scrupulous hand hygiene must be practiced.

4.3 Procedures

4.3.1 Nebulized therapies must be avoided. Salbutamol Sulphate (Ventolin®) or Ipratropium Bromide (Atrovent®) or Salbutamol/Ipratropium Bromide (Combivent®) can be delivered using the metered dose inhaler (MDI) and aerochamber[4].

4.3.2 The need for chest physiotherapy must be carefully assessed recognizing that cough-inducing procedures may increase the risk of transmission.

4.3.3 Oxygen should be delivered DRY, avoiding nebulized humidity. Maximum flow rate for nasal prongs should be 6 litres per minute.[5]

- If a patient requires up to 50% oxygen by mask use a venti-mask. If a patient requires more than 50% oxygen then the respiratory therapist (RT) must be notified. The nebulizer system must be emptied of the water from the prefilled water bottle. The water bottle should remain DRY. The RT will monitor the patient and wean to nasal prongs as soon as the patient can tolerate.
- Patients must receive frequent mouth care.
- Patients with tracheostomies must be provided with humidity.

[4] Children and patients who are unable to be instructed in the use of MDI may receive nebulized therapy if MDI is not deemed to be appropriate. This should occur in a private room, and respiratory contact precautions must be followed by all persons in the room.

[5] For children, oxygen should be humidified as usual.

- Patients who require oxygen greater than 50% shall be referred to RT for set up and ongoing monitoring.

4.3.4 High frequency oscillation (HFO) and non-invasive ventilation (CPAP/BiPAP) should be avoided. If non-invasive ventilation is essential for the patient, the patient must be screened for respiratory infection, in consultation with infectious diseases/infection control staff, and respiratory and contact (enhanced) precautions be followed, including the use of a private room (negative pressure preferred).[6]

4.3.5 **Intubation and bronchoscopy**

Personal Protection:

- Those on the intubation team must wear full head, face and neck protection. This may consist of Powered Air-Purifying Respirator (PAPR) or another type of PPS (see Appendix 5 - Parameters to Guide the Selection of Personal Protective Systems).
- The system chosen must allow for safe performance of the procedure and not fog when in use.
- Staff must be trained in the use of the specific type of PPS chosen.

Use of Personal Protection Systems (PPS):

- An N95 mask or equivalent and protective eye equipment must be worn underneath the PAPR and be left in place once the PPS is removed until health care worker has left the room.
- Staff using this equipment must receive proper instruction on the application and removal to avoid contamination.
- A practice session shall be carried out prior to use and written instructions must be given to staff. Staff training sessions must be documented. The hospital Infection Control Practitioner must review the written procedure/ instructions.
- Ensure that all disposable components of the equipment are carefully removed at the end of the procedure and reusable items are thoroughly cleaned using hospital disinfectant or disinfectant wipes.
- The application and removal of PAPR/PPS equipment requires the assistance of another person and must not be done alone. For information on the application and removal of this equipment, refer to www.SARS.medtau.org or manufacturer's instructions.

Personnel:

- The procedure shall be performed by the most experienced staff members available. The number of persons in the room should be kept to a maximum of 4 persons (Note: hospitals may wish to consider creating a SARS intubation team).

Procedure:

- The procedure should be done in a negative pressure room. If none is available, the procedure must be done in a private room with the door closed.

[6] In the pediatric population, high-frequency oscillation (HFO) should be avoided if possible, but may be used if no other treatment is appropriate. Gases should be effectively scavenged and filtered to the greatest extent possible.

- After hand-washing and prior to entering the room, the code team must apply the personal protective equipment as per *Directive Regarding the Application of Respiratory and Contact Precautions (Enhanced) with Patients with Febrile Respiratory Illness and SARS Contact History; Persons Under Investigation; SARS Patients; and SARS Units, (Directive RCPE03-01), October 22, 2003* and manufacturer's instructions.
- Staff in the room during the intubation must wear the personal protection system (PPS).
- The intubation should be done while the patient is sedated and paralysed if medical condition permits.
- The ventilator and in-line suction device shall be in the patient room in advance of intubation to reduce time needed for bag ventilation and disconnecting bag from the endotracheal tube suctioning.
- Minimize staff exposure by limiting staff re-entry to the room until the room has been cleaned.
- Critical care areas shall preassemble medication/equipment for intubations performed on patients requiring these precautions. The preassembled kit must be in a disposable or easily cleaned container.

Cleaning and Mechanical Ventilation:

- The cleaning and mechanical ventilation requirements are the same as in Section 3.0.

Original signed by

Dr. James G. Young
Commissioner of
Public Security

Original signed by

Dr. Colin D'Cunha
Commissioner of
Public Health and Chief Medical
Officer of Health

APPENDIX 1 - GLOSSARY OF TERMS

Active Surveillance Program: a term to describe surveillance activities for SARS within an acute care facility. The intent of such a program is the early detection of clusters of potential SARS cases requiring investigation.

There are two types of Active Surveillance Program: Febrile Respiratory Illness (FRI) Surveillance and Intensive Hospital (IH) Surveillance.

ARDS: Adult Respiratory Distress Syndrome is the rapid onset of progressive malfunction of the lungs usually associated with the malfunction of other organs due to the inability to take up oxygen. The condition is associated with extensive lung inflammation and small blood vessel injury in all affected organs.

Cluster: a grouping of cases of a disease (e.g., respiratory illness indicative of SARS) within a specific in time frame and geographic location suggesting a possible association between the cases with respect to transmission.

CXR: Chest x-ray (roentgenogram).

- **Droplet Precautions:** (see also Routine Practices) The use of surgical or procedure masks and eye protection or face shields for patients who have respiratory infections especially if associated with coughing, sneezing, felt to be transmissible principally by large respiratory droplets particularly when within 1 meter of such a patient. Also used where appropriate 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 (e.g., air way suctioning).

Febrile Respiratory Illness (FRI): temperature greater than 38^0 C and new or worsening cough or shortness of breath. During non-outbreak conditions this includes a fever of greater than 38^0C **and** new or worsening cough or shortness of breath to increase the specificity of this designation. During outbreak conditions, to maximize the sensitivity to potential SARS infection, this includes a fever of greater than 38^0C **or** new or worsening cough or shortness of breath. The context in which FRI is determined must take the outbreak vs. non-outbreak conditions into account.

Febrile Respiratory Illness (FRI) Surveillance Program: a type of Active Surveillance Program for SARS characterized by surveillance for febrile respiratory illness in patients in Emergency Departments and patients being admitted through regular admitting procedures to the acute care facility.

Hand Hygiene: hand washing with soap and running water or alcohol-based hand sanitizers

Health Care Facility: a location where ill people are examined and assessed by health care workers and/or provided with direct health care services. Locations may range from private physician offices, ambulatory clinics or diagnostic facilities, to hospitals.

Health Care Facilities SARS Categories: a categorization system established by the Ministry of Health and Long-Term Care to determine precautionary measures to be taken during a SARS outbreak. The levels are as follows:

> **SARS Category 0**: Health care facility has no known cases of SARS (suspect or probable).
>
> **SARS Category 1**: No unprotected SARS exposure – staff and/or patients. Health care facility has one or more cases of SARS (suspect or probable).
>
> **SARS Category 2**: Any unprotected SARS exposure within the last 10 days but without transmission to staff or patients. The health care facility may or may not currently have one or more cases of SARS (suspect or probable).
>
> **SARS Category 3**: Unprotected SARS exposure with transmission to health care workers and/or patients. The health care facility may or may not currently have one or more case of SARS (suspect or probable).

High-Risk Respiratory Procedure: any procedure with the potential to generate respiratory droplets, including, but not limited to nebulized therapy, endotracheal intubation, bronchoscopy, bag-valve mask ventilation, non-invasive ventilation (CPAP, BiPAP), and ventilation using high frequency oscillation.

Home Quarantine: To prevent potential transmission of SARS virus by persons who have been in contact with a known probable or suspected case of SARS and may be in the incubation period of illness.

Measures include but are not limited to the following:

1) Remain home during the period of quarantine
2) No visitors during the period of quarantine
3) A surgical or procedure mask to be worn when in the presence of other persons. Masks should be changed approximately every 4 hours if worn for extended periods of time
4) Meals are to be taken away from other household members
5) Persons under quarantine should sleep alone in a separate room
6) Frequent hand washing is emphasized to all household members
7) Body temperature is to be taken twice daily. Any temperature reading 38 degrees Celsius is to be reported to the Public Health Department right away
8) Any new onset of cough or shortness of breath is to be reported to the local public health unit right away

Intensive Hospital (IH) Surveillance Program: a type of Active Surveillance Program for SARS characterized by surveillance for either fever **or** respiratory illness in patients in Emergency Departments, patients being admitted to the facility and inpatients.

This program is limited to health care facilities within the area of a **current** SARS outbreak as designated by the MOHLTC in consultation with the local Medical Officer of Health.

Non-Outbreak: *Non-outbreak* refers to the conditions once a SARS Outbreak is declared over by the local Medical Officer of Health (MOH) or in a region where no SARS outbreak has occurred. Facilities within the region may have one or more SARS patient(s), either local cases or those imported through travel activity, provided there has been no transmission within the hospital population.

Outbreak: for the purposes of SARS activity, an *outbreak* is defined as local transmission of SARS. The local Medical Officer of Health is responsible for declaring a SARS outbreak. An outbreak may be setting-specific (e.g., a hospital with transmission) or health unit wide (e.g. transmission in more than one setting or significant community exposure).

Personal Protective System (PPS): a full body suit or equivalent protective apparatus consisting of head, face and neck protection with or without enclosed body protection; or a powered air-purifying respirator (PAPR).

Respiratory and Contact Precautions (RCP): infection control procedures for institutional and community-based settings with the intent of protecting the Health care worker from SARS.

1. Common Elements for both institutional and community-based settings:

    A. Personal protective equipment (PPE):

    - Staff to use an N95 or equivalent mask, eye protection, gown, and gloves.
    - Remove PPE after there is no further contact with the patient/client in the following order: Remove gloves, clean hands, remove gown, clean hands, remove eye protection and finally the N95 mask. Wash hands carefully after removing the final PPE. Avoid touching other objects or people until after removing PPE and washing hands.
    - Disinfect non-disposable equipment (e.g., stethoscope, testing items) and anything the client used or touched before it is used for others.
    - When the patient leaves the examining room it should be cleaned with a hospital grade disinfectant.

    B. Patient Management:

    - Isolate the patient/client immediately from other patients/clients and staff.
    - Whenever the patient/client is in a public setting (eg in the hallway, or waiting room), in the same room with others, and during transport, the patient/client must wear a surgical mask, unless medically contraindicated..
    - Limit visitation to the symptomatic patient/client except for essential or compassionate reasons. Visitors should wear PPE.

2. For Institutional Settings:

Patient Accommodation for Hospitals: Patients are to be placed as follows (in order of decreasing preference):

1. Single room with negative pressure ventilation, with at least 6 air exchanges per hour or 12 air exchanges if the building is a new facility, as per Canadian Standards Association, Sept 2001 (highest preference)
2. Single room with HEPA filtration unit which achieves at least 9 air exchanges per hour
3. Single room, with no special air handling
4. Semi-private room, cohorted with patients with similar SARS Risk Factors and/or symptoms or diagnosis

3. For Community-Based Settings:

Includes physician's offices, community health practice settings, non-acute care facilities, and home and community care:

- Physician, if present, to assess the patient
- If SARS is possible, or if hospitalization is required, arrange for the patient/client to be taken to an Emergency Department for evaluation (call ahead)
- Transportation for medical examination must be by private vehicle or medical transport with the patient/client wearing a surgical mask during transport.
- Contact the local Public Health Unit, as appropriate

Respiratory and Contact Precautions (Enhanced) (RCP[E]): an enhanced form of infection control procedures, which require the following in addition to procedures under Respiratory and Contact Precautions:

A. Personal Protective Equipment: also includes a full face shield and hair covering

B. Patient Accommodation in hospitals: patients assessed to be at risk for having SARS, based on the SARS Risk Management Algorithms have priority for the highest level of accommodation

Respiratory Symptoms: new or worse cough (onset within 7 days) OR new or worse shortness of breath (worse than what is normal for the patient).

Routine Practices (See also "Droplet Precautions"): the Health Canada term to describe the system of infection prevention recommended in Canada to prevent transmission of infections in health care settings. These practices describe prevention strategies to be used with all patients during all patient care, and include:

- Hand washing or cleansing with an alcohol-based sanitizer before and after any direct contact with a patient.
- The use of additional barrier precautions to prevent health care worker contact with a patient's blood and body fluids, non intact skin or mucous membranes.
    - Gloves are to be worn when there is a risk of body fluid contact with hands; gloves should be used as an additional measure, not as a substitute for hand washing.

- Gowns are to be worn if contamination of uniform or clothing is anticipated.
- The wearing of masks and eye protection or face shields where appropriate 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.

The full description of routine practices to prevent transmission of nosocomial pathogens can be found on the Health Canada website (http://www.hc-sc.gc.ca/pphb-dgspsp/dpg_e.html#infection)

RSV: respiratory syncytial virus, a common respiratory virus especially common in winter months and recognized as a common cause of symptomatic respiratory infection in children, the elderly and individuals who are immunocompromised.

SARS Contact History: SARS contact history in a patient with febrile and/or respiratory illness is defined as any one of:

- Unprotected contact with a person with SARS in the last 10 days prior to the onset of this illness
- Were present in a healthcare facility closed due to SARS before the onset of symptoms, 10 days prior to the onset of this illness
- Instructed by Public Health to be in quarantine or isolation.
- Travel to a SARS affected area in the 10 days prior to the onset of illness

SARS Risk Management Algorithm: a tool to be used by health care workers to assist in the management of a patient based on information derived from the SARS Risk Factor Assessment Tool. There are various algorithms, depending on whether the health care worker is in a facility operating under FRI or IH Surveillance, or in the community.

SARS Risk Factor Screening Tool: a tool to be used by health care workers during triage, admitting, and outpatient /ambulatory settings (or otherwise defined by FRI or IH surveillance). This tool gathers information from the patient regarding temperature, respiratory illness, contact history and SARS Risk Factors.

SARS Risk Factors: SARS risk factors in a patient with febrile and/or respiratory illness are defined as:

- Travel (patient or household/close family) to a former or current SARS affected area in the last 30 days.
- Admission to a hospital* or nursing home* in the 10 days prior to the onset of this illness.
- Household members or other close contacts with fever or pneumonia.
- Health care worker with direct patient contact in a healthcare facility.
- (*Only facilities in Toronto, York, Durham regions of Ontario or Taiwan, Singapore or Hong Kong are considered as positive Risk Factors.)

Working Quarantine: To prevent the potential transmission of SARS virus by persons who have been in contact with a known probable or suspected case of SARS and may be in the incubation period of illness and those who work in an area where exposures to SARS may have occurred. The precautionary measures are to be applied to those who meet the above criteria and whose work has been identified as essential (e.g., health care workers during a SARS outbreak).

Measures include but are not limited to the following:

1) Arrive to the workplace wearing a mask.
2) Go directly to the quarantine workplace area.
3) All breaks and meals are to be taken in the designated quarantine area.
4) Respiratory and Contact Precautions, which include gowns, gloves, masks, and eye protection, are to be worn while working in the quarantined area.
5) All staff on working quarantine are to leave work wearing a clean procedure mask.
6) Public transit is to be avoided.
7) For persons who were exposed to SARS virus and considered contacts, they are to apply Home Quarantine Measure when not at work.

APPENDIX 2 - HIGH RISK RESPIRATORY PROCEDURES PERSONAL PROTECTIVE EQUIPMENT

	PPE (non outbreak)	**Code Blue (non outbreak)**	**PPE (outbreak)**	**Code Blue (outbreak)**	**Comments**
Patients without febrile respiratory illness (FRI)	N95 mask, eye protection, gloves	N95 mask, eye protection, gloves	N95 mask, eye protection, gloves	N95 mask, eye protection, gloves	Gowns to be worn if contamination of uniform or clothing is anticipated.
Patients with FRI, but without Risk Factors or Contact History	N95 mask, eye protection, gloves	N95 mask, eye protection, gloves	Respiratory and Contact Precautions (use enhanced for intubation/ bronchoscopy)	Enhanced Code Blue	In outbreak, febrile respiratory illness (FRI) refers to fever ***or*** respiratory symptoms.
Patients with FRI and with Risk Factors	Respiratory and Contact Precautions*	Enhanced Code Blue	Respiratory and Contact Precautions (enhanced)*	Enhanced Code Blue	In outbreak, FRI refers to fever ***or*** respiratory symptoms.
Patients with FRI and with Contact History or SARS patients	Respiratory and Contact Precautions (enhanced)*	Protected Code Blue	Personal Protective System*	Protected Code Blue	In outbreak, FRI refers to fever ***or*** respiratory symptoms. Requires negative pressure room, or, if in resuscitation area, no non protected people within two (2) metres, and area set aside for donning and removing PPS.

* refer to Glossary of Terms, Appendix 1

APPENDIX 3 - ENHANCED CODE BLUE

Respiratory and contact precautions are essential. In the resuscitation of a patient the Code Blue (CB) team must ensure appropriate protection, consisting of respiratory and contact precautions to prevent the spread of communicable respiratory diseases to a health care worker. This applies to cardiac arrest procedures for:

- Patients in respiratory and contact precautions
- Patients with Febrile Respiratory Illness **and** SARS risk factors or another communicable illness
- ***During an outbreak, patients with fever <u>OR</u> respiratory illness***

1. Equipment:

   The Enhanced Code Blue Team must have accessible crash carts which include:

   - Personal protective equipment including N95 or equivalent masks, eye protection, gloves, gowns, head covering and face shields, available for use during high-risk respiratory procedures.

   Each unit or crash cart must also have:

   - a manual resuscitation bag with bacterial/viral filter,
   - in-line suction catheters[7],
   - non-rebreather mask that allows filtration of exhaled gases (e.g., low flow high oxygen concentration mask with hydrophobic submicron filter), and
   - intubation equipment.

2. Preparation:
   - Consider early controlled intubation when patient's respiratory status deteriorates.
   - Keep all non-essential staff outside room.
   - Ensure fit-testing of N95 masks or equivalent for all staff on the team.

3. Procedure:
   a) First Responder (First person to recognize non-responsiveness or cardio respiratory arrest)
      i. Should be wearing N95 or equivalent mask and may be in apparel for respiratory and contact precautions.
      ii. Should **not** perform high risk procedures (such as bag valve mask ventilation/intubation) without using respiratory and contact precautions on patient who has had unexplained respiratory symptoms prior to arrest
      iii. Calls Code Blue.
      iv. Places low flow high concentration O_2 mask with hydrophobic submicron filter on patient – if not available use regular O_2 mask @ 6 litres per minute.
      v. Attaches cardiac monitor, if available; defibrillates if indicated.
      vi. Performs chest compressions, if patient has no pulse.

[7] Suctioning may be performed in the normal fashion in small children.

vii. If not wearing apparel for respiratory and contact precautions, must leave room when persons wearing appropriate apparel arrive.
viii. Gives report on leaving room.
ix. Prepares any drugs or equipment requested.

b) CB responder #1
   i. Takes report and assumes responsibility.
   ii. Attaches cardiac monitor if not already done; defibrillates, if indicated.
   iii. Continues compressions, if indicated.

c) CB #2 (may be first responder who changes into appropriate apparel)
   i. Prepares BVM with hydrophobic submicron filter and intubation equipment.
   ii. Prepares for intubation.

d) CB #3 (may be first responder who changes into appropriate apparel)
   i. Prepares appropriate drugs.
   ii. Performs (or assists with) intubation.

e) CB #4
   i. Provides ACLS assistance as directed by team leader.

APPENDIX 4 - PROTECTED CODE BLUE

To prevent the spread of communicable respiratory diseases to a health care worker, respiratory and contact precautions are essential. However, during an outbreak and/or in certain high-risk settings, such as cardio-respiratory failure in a patient with a SARS contact history who requires airway management, these may not be sufficient and a Protected Code Blue Team should be called.

The Protected Code Blue (PCB) Team is an in-hospital team which consists of four individuals, at least one of whom (Staff Emergentologist, Intensivist, Anaesthetist, etc.) is highly skilled in intubation and resuscitation measures. All PCB Team members must wear Personal Protection Systems in addition to standard SARS protective equipment.

In teaching hospitals, only attending staff, fellows or senior house staff with considerable experience in rapid sequence intubation should be allowed to perform intubations in patients with SARS. Junior house staff may be members of the team but must not do the highest risk procedure—intubation. In the event of a delayed response by the airway expert physician, intubation may be attempted by other PCB team physicians or respiratory therapists if the patient is unconscious (i.e., does not require sedation and paralysis) and the team member is competent in airway management. Other team members may be nurses, respiratory therapists, or paramedics.

A cadre of teams must be specially trained, with consistent adherence to skills and opportunities to maintain skills.

A team must be available in hospital 24/7 during times of regional outbreaks as defined by the local Medical Officer of Health such as SARS, or if a patient is admitted with a known high-risk communicable respiratory disease.

During outbreaks with potential for large numbers of patients, the core PCB Teams shall train staff in high risk areas such as emergency, affected medical units, critical care units and operating room staff to either assist in the PCB or to run them independently as the demand may overwhelm the team's capacity.

Ideally these patients should be in hospital isolation rooms with negative pressure, but may arrive unexpectedly in the Emergency Department (ED) in need of life saving care after being transported by family or paramedics. Each of these steps poses significant risk to all involved and has the potential to rapidly spread the disease.

1. Equipment:
    - EDs, Critical Care and SARS units must have crash carts which include:
        i. Manual resuscitation bag with bacterial/viral filter,
        ii. In-line suction catheters, and
        iii. Personal Protective Systems (PPS).

2. Preparation:
   - Consider early critical care unit transfer when deteriorating (50% 0_2 necessary).
   - Consider early controlled intubation when patient's respiratory status deteriorates.
   - Keep all non-essential staff outside room.
   - Ensure fit testing of N95 masks or equivalent for all staff on the unit.
   - Ensure training in PPS for all staff involved in intubation.
   - Develop protocols for Protected Code Blue activation.

3. Personnel: (Protected Code Blue Team)
   NOTE: All staff in vicinity of the patient's room must wear full SARS protective apparel.
   - "Airway expert" physician (such as Staff Emergentologist, Intensivist or Anaesthetist)
   - Appropriately trained nurse
   - Respiratory therapist
   - 4th person capable of performing ACLS Procedures
   - "Coach" individual who is trained to assist with donning and removal of adjunct equipment and room entry/exit procedures (this may be the First Responder).This person must use checklist to ensure all steps followed. For information on the application and removal of this equipment, refer to www.SARS.medtau.org or manufacturer's instructions.

4. Procedure:
   a) First Responder (First person to recognize non-responsiveness or cardio respiratory arrest)
      i. Likely wearing respiratory and contact precautions (enhanced) protection but no PPS.
      ii. Must not perform high-risk procedures (such as bag valve mask ventilation/intubation) or be present in the room when these take place if no PPS.
      iii. Calls Protected Code Blue.
      i. Places low flow high concentration O_2 mask with hydrophobic submicron filter on patient – if not available use regular O_2 mask @ 6 litres per minute.
      iv. Attaches cardiac monitor, if available; defibrillates if indicated.
      v. Performs chest compressions, if the patient has no pulse.
      vi. Must leave room when persons with PPS arrive.
      vii. Gives report on leaving room.
      viii. May assist dressing team in appropriate PPS. Removes contaminated PPE in the appropriate manner and re-dons PPE.
      ix. Prepares any drugs or equipment requested.

   b) PCB responder #1 (wears PPS)
      i. Takes report and assumes responsibility.
      ii. Attaches cardiac monitor if not already done; defibrillates, if indicated.
      iii. Continues compressions, if indicated.

c) PCB #2 (wears PPS)
   i. Prepares BVM with exhalation filter and intubation equipment.
   ii. Prepares for intubation.

d) PCB #3 (wears PPS)
   i. Prepares appropriate drugs.
   ii. Performs (or assists with) intubation, if "airway expert" is present.
   iii. If "airway expert" is not present, proceeds with two-person BVM Ventilation.

e) PCB #4 (Wears PPS)
   i. If designated intubator, performs intubation.
   ii. Provides ACLS assistance as directed by Team leader.

5. Termination

- If resuscitation is successful, a member of the PCB Team must remain with the patient until transfer to another area in the hospital or to another hospital is possible. If there is a prolonged delay in moving the patient, this team member must have back-up. Precautions for patient movement such as plastic tent over stretcher, etc. will be at the discretion of the PCB Team.
- Consideration should be given to termination of resuscitative attempts at the time survival is deemed to be futile (e.g., unwitnessed arrest, asystole) as the outcome of resuscitation is inversely proportional to the length of time of resuscitation, and the risk to the providers increases.
- Personal protection systems must be removed in the approved manner prior to exiting room to avoid contamination of hospital environment.

For further information and education on Protected Code Blue, please see www.sars.medtau.org

APPENDIX 5 - PARAMETERS TO GUIDE THE SELECTION OF PERSONAL PROTECTIVE SYSTEMS

1. Provides barrier precautions for droplets/splashing and completely covers all of the face and head, or can be easily combined with other protective apparel to provide full coverage.

2. Provides filtration at <0.3 micron with 95% filter efficiency. For hooded devices, the circulating air within the hood should not affect the wearing of a N95 mask or equivalent nor impede its effectiveness.

3. Hooded devices should be able to create positive pressure.

4. Consideration should be given to the extent of CO_2 build up within hood or respirator. Current guidelines recommend that CO_2 should not exceed 5000 ppm as a time weighted average (TWA).

5. The equipment should be able to be assembled with little chance of error, and disassembled easily.

6. Ability to clean the surface of the equipment with hospital grade disinfectants. Single use of high-risk components is preferred, or the product is easily disassembled and cleaned and tolerates high-level disinfection or sterilization.

7. The filter for any system should be easy to remove and dispose.

8. Demonstrable ease of donning with minimal amount of time.

9. Ability to remove equipment with minimal contamination of the wearer and the equipment.

10. The device provides a good field of vision and a clear view with no distortion in order to perform procedures such as intubation and bronchoscopy.

11. The device should not interfere with communications between team members and allow for clinical assessments of patients such as auscultation.

12. Wearer is able to easily perform procedures easily using ergonomic techniques.

13. The system or device should be comfortable to wear for at least a continuous 2-hour period.

14. The equipment should be easily worn and managed by staff of varying sizes.

15. The equipment or device should allow for the wearer to remain cool and comfortable.

Personal Protective Systems

A listing of powered air-purifying respirators can be found by doing the following:

- Log on to http://www2.cdc.gov/drds/cel/cel/_form.asp
- Highlight "HEPA (PAPR only)" in the section headed "For Protection Against"
- Click on "View Results" at the bottom of the screen.