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Directive 03-11
June 16, 2003

DIRECTIVE
TO ALL ONTARIO ACUTE CARE HOSPITALS
FOR HIGH-RISK PROCEDURES

This Directive replaces the following:

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 contain the spread of SARS (severe acute respiratory syndrome), the Ontario Ministry of Health and Long-Term Care directs all acute care hospitals to undertake the following procedures:

High-risk procedures performed on patients can expose staff to a high viral burden and should be avoided whenever possible. However, in situations where such procedures are unavoidable (e.g., intubation of a SARS patient in respiratory distress), staff should follow the additional level of staff precautions outlined in this document for these high-risk procedures.

All staff working in SARS units or with SARS patients must follow the *Directives for Acute Care Hospitals Regarding Infection Control Measures for SARS Units*, Version 03-05(R), April 24, 2003.

The principles described herein apply to other invasive procedures which have the potential to generate droplet transmission, such as tube or needle thoracostomy, tracheostomy, and open thoracotomy. The same level of protection must be undertaken for these procedures.

Principles:

- High-risk procedures performed on SARS patients expose staff to a high viral burden and must be avoided as much as possible.
- Ideally, high-risk procedures shall only be performed as outlined below:
 - in a private room with negative pressure,
 - by the most experienced staff,
 - with minimum numbers of staff, and
 - with strict adherence to SARS precautions and hand disinfection.
- ICUs must have 24-hour access to an infection control consultant to assist with the review of practices.

SPECIFIC DIRECTIVES FOR:

A. NON-SARS PATIENTS

Protection/Equipment

- For emergency endotracheal intubation of **non-SARS** patients, ensure that each patient unit has:
 - a manual resuscitation bag with bacterial/viral filter,
 - in-line suction catheters¹,
 - intubation equipment, and
 - full protective apparel for all the individuals in the room. This includes N95 mask or equivalent, gown, gloves, eye protection, and full-face shield. Personal protective equipment must be properly used, fit and maintained in a manner consistent with Reg. 67/93 s.10. under *The Occupational Health and Safety Act*. N95 or equivalent masks must be qualitatively fit-tested to ensure maximum effectiveness. (See NIOSH website at www.cdc.gov/niosh - Publication No.99-143).
- Protective apparel must be removed carefully at the end of the procedure to reduce the risk of contamination and re-aerosolization of droplets.

Procedures

- Nebulized therapies should be avoided. Ventolin® or atrovent® can be delivered using the metered dose inhaler and aerochamber².
- The need for chest physiotherapy must be carefully assessed; recognizing that cough-inducing procedures may increase the risk of transmission.
- Oxygen should be delivered DRY, avoiding nebulized humidity. Maximum flow rate for nasal prongs should be 6 litres per minute.³

¹ Suctioning may be performed in the normal fashion in small children.

² Children may receive nebulized therapy if MDI is not deemed to be appropriate. Full protective apparel must be worn by all persons in the room.

³ For children, oxygen should be humidified as usual.

- 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.
- Patients who require oxygen greater than 50% shall be referred to RT for set up and ongoing monitoring.
- High frequency oscillation and non-invasive ventilation (CPAP/BiPAP) should be avoided. If ventilation is essential for the patient, the patient must be screened for a diagnosis of SARS in consultation with infectious diseases/infection control staff. The procedure should be performed in a private room.⁴

B. SARS PATIENTS

Note 1: See Appendix B for Protected Code Blue (sudden cardiorespiratory arrest in SARS patients)

Note 2: Bronchoscopy should be avoided if possible in patients known or suspected to have SARS

1. Equipment:

- In the ICU, SARS unit, and other high risk areas identified by the hospital, include with the arrest cart (crash cart):
 - manual resuscitation bag with bacterial/viral filter,
 - in-line suction catheters,
 - personal protection system (PPS) – an apparatus consisting of head, face and neck protection with or without enclosed body protection for up to four individuals, and
 - personal protective equipment (PPE) for off-unit responders.

2. Intubation and bronchoscopy:

Personal Protection:

- Those on the intubation team must wear full head, face and neck protection. This may consist of Positive Airway Pressure Respirator (PAPR) or another type of PPS (see Appendix A - Parameters to Guide the Selection of Personal Protective Systems).

⁴ In the paediatric population, 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.

- 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 the Positive Airway Pressure Respirators (PAPR) and 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 staff 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.

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 2-4 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.
- After hand-washing and prior to entering the room, the code team must apply the personal protective equipment as per Directive Version 03-05 (R), April 24, 2003 and manufacturer's instructions.
- Staff in the room during the intubation must apply 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 to reduce time needed for bag ventilation and disconnecting bag from the endotracheal tube suctioning.
- Remove protective equipment following Directive Version 03-05 (R), April 24, 2003 and manufacturer's instructions after intubation.
- Minimize staff exposure by limiting staff re-entry to the room for approximately 2 hours post procedure.

- Critical care areas shall preassemble medication/equipment for intubations performed in a SARS patient room. The preassembled kit must be in a disposable or easily cleaned container.

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 aerosols.
- 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.

4. Management of SARS patients with mechanical ventilation:

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

Procedure:

- Ventilators
 - A hydrophobic submicron filter must be placed between the endotracheal tube and the ventilator circuit tubing.
 - 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 full SARS protective equipment.
 - Filters and respiratory circuits for known SARS cases 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 full SARS protective equipment.

- Equipment must be bagged, sealed, and then placed in a biohazardous bag for disposal.

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Appendix A

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 CO₂ build up within hood or respirator. Current guidelines recommend that CO₂ should not exceed 5000 ppm as a time weighted average (TWA).
5. The system should be able to be full fit tested, similar to the fit testing for N95 masks.
6. The equipment should be able to be assembled with little chance of error, and disassembled easily.
7. 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.
8. The filter for any system should be easy to remove and dispose.
9. Demonstrable ease of donning with minimal amount of time.
10. Ability to remove equipment with minimal contamination of the wearer and the equipment.
11. 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.
12. The device should not interfere with communications between team members and allow for clinical assessments of patients such as auscultation.
13. Wearer is able to easily perform procedures easily using ergonomic techniques.
14. The system or device should be comfortable to wear for at least a continuous 2-hour period.

15. The equipment should be easily worn and managed by staff of varying sizes.
16. The equipment or device should allow for the wearer to remain cool and comfortable.

Personal Protective Systems

- Examples of personal protective systems include: 3M PAPR Hood; Stryker T4 System; and full face respirators
- 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.

APPENDIX B

Protected Code Blue

To prevent the spread of communicable respiratory diseases to a HCW, SARS precautions are essential and include eye protection (face shield and goggles), N95 mask or equivalent, gown, and gloves. However in certain high risk settings, such as cardio-respiratory failure requiring 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 would consist of four individuals, at least one of whom (Staff Emergentologist, Intensivist, Anaesthetist, etc.) is highly skilled in intubation and resuscitation measures.

Residents may be members of the Team but must not do the highest risk procedure—intubation. Other team members may be nurses and respiratory therapists.

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 serious regional outbreaks 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 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
 - iii. Personal Protective Systems (PPS)
2. Preparation:
 - Consider early critical care unit transfer when deteriorating (50% O₂ 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)

- “airway expert” physician (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

All staff in vicinity of the patient’s room must wear full SARS protective apparel.

4. Procedure:

- a) First Responder (First person to recognize non-responsiveness or cardio respiratory arrest)
 - i. Likely wearing full SARS 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
 - iv. Places high flow O₂ mask with exhalation filter (e.g. HiOx) on patient – if not available puts N95 mask on patient
 - v. Attaches cardiac monitor, if available; defibrillates if indicated
 - vi. If no pulse, performs chest compressions
 - vii. Must leave room when persons with PPS arrive
 - viii. Gives report on leaving room
 - ix. Assists dressing team in appropriate PPS
 - x. 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 2-person BVM Ventillation

- 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.

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