

## 1.40 Prevention of Nosocomial Pneumonia

**Purpose** The guideline is designed to reduce the incidence of pneumonia and other acute lower respiratory tract infections.

**Audience** All UTMB healthcare workers and contract healthcare workers and students who have contact with patients and UTMB personnel who clean and disinfect equipment used for respiratory therapy.

**Policy Statement:**

### **I. Prevention of Person-to-Person Transmission of Bacteria**

#### **A. Standard Precautions**

1. Hand hygiene: Decontaminate hands by washing them with either antimicrobial soap and water or with nonantimicrobial soap and water (if hands are visibly dirty or contaminated with proteinaceous material or are soiled with blood or body fluids) or by using an alcohol-based waterless antiseptic agent (e.g., hand rub) if hands are not visibly soiled after contact with mucous membranes, respiratory secretions, or objects contaminated with respiratory secretions, whether or not gloves are worn. Decontaminate hands as described previously before and after contact with a patient who has an endotracheal or tracheostomy tube in place, and before and after contact with any respiratory device that is used on the patient, whether or not gloves are worn.
2. Gloving
  - a. Wear gloves for handling respiratory secretions or objects contaminated with respiratory secretions of any patient.
  - b. Change gloves and decontaminate hands as described previously between contacts with different patients; after handling respiratory secretions or objects contaminated with secretions from one patient and before contact with another patient, object, or environmental surface; and between contacts with a contaminated body site and the respiratory tract of, or respiratory device on, the same patient.
3. When soiling with respiratory secretions from a patient is anticipated, wear a gown and change it after soiling occurs and before providing care to another patient.

#### **B. Care of patients with tracheostomy**

1. Perform tracheostomy under aseptic conditions.
2. When changing a tracheostomy tube, wear a gown, use aseptic technique, and replace the tube with one that has undergone sterilization or high-level disinfection.

**C. Suctioning of respiratory tract secretions:** use only sterile fluid to remove secretions from the suction catheter if the catheter is to be used for re-entry into the patient's lower respiratory tract.

**D. Breathing circuits, humidifiers, and heat-and-moisture**

exchangers (HMEs)

1. Breathing circuits with humidifiers.

- a. Do not change routinely, on the basis of duration of use, the breathing circuit (i.e., ventilator tubing and exhalation valve and the attached humidifier) that is in use on an individual patient. Change the circuit when it is visibly soiled or mechanically malfunctioning.
- b. Breathing-circuit--tubing condensate.
  - 1) Periodically drain and discard any condensate that collects in the tubing of a mechanical ventilator, taking precautions to prevent drainage of condensate toward the patient.
  - 2) Wear gloves to perform the above procedure and/or when handling the fluid.
  - 3) Decontaminate hands with soap and water (if hands are visibly soiled) or with an alcohol-based hand rub after performing the procedure or handling the fluid.
- c. Humidifier fluids
  - 1) Use sterile (not distilled, nonsterile) water to fill bubbling humidifiers.

E. Oxygen humidifiers

1. Follow manufacturers' instructions for use of oxygen humidifiers.
2. Change the humidifier-tubing (including any nasal prongs or mask) that is in use on a patient when it malfunctions or becomes visibly contaminated.

F. Small-volume medication nebulizers: in-line and hand-held nebulizers

1. Between treatments on the same patient, remove the remaining medication from the cup, rinse with a saline bullet, and wipe the inside of the cup thoroughly with an alcohol pad (first remove the plunger). Reattach to system and store for next use. The nebulizer must be changed every 24 hours.
2. Use only sterile fluid for nebulization and dispense the fluid into the nebulizer aseptically.
3. Whenever possible, use aerosolized medications in single-dose vials. If multidose medication vials are used, follow manufacturers' instructions for handling, storing, and dispensing the medications.

G. Mist tents

1. Between uses on different patients, replace mist tents and their nebulizers, reservoirs, and tubing with those that have been subjected to sterilization or high-level disinfection.
2. Subject mist-tent nebulizers, reservoirs, and tubing that are used on the same patient to daily low-level disinfection (e.g., with 2% acetic acid) or pasteurization followed by air-drying.

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<b>Topic: 01.40 - Prevention of Nosocomial Pneumonia</b>	<b>2004 - Author</b>

- H. Other devices used in association with respiratory therapy
  1. Respirometer and ventilator thermometer: between their uses on different patients, sterilize or subject to high-level disinfection portable respirometers and ventilator thermometers.
  2. Sterilize or subject to high-level disinfection reusable hand-powered resuscitation bags between use on different patients.
- I. Anesthesia machines and breathing systems or patient circuits
  1. Do not routinely sterilize or disinfect the internal machinery of anesthesia equipment.
  2. Between uses on different patients, clean reusable components of the breathing system or patient circuit (e.g., tracheal tube or face mask) inspiratory and expiratory breathing tubing, y-piece, reservoir bag, humidifier, and tubing, and then sterilize or subject them to high-level liquid chemical disinfection or pasteurization in accordance with the device manufacturers' instructions for their reprocessing.
  3. Follow published guidelines or manufacturers' instructions about in-use maintenance, cleaning, and disinfection or sterilization of other components or attachments of the breathing system or patient circuit of anesthesia equipment.
- J. Pulmonary-function testing equipment
  1. Do not routinely sterilize or disinfect the internal machinery of pulmonary-function testing machines between uses on different patients.
  2. Change the mouthpiece of a peak flow meter or the mouthpiece and filter of a spirometer between uses on different patients.
- K. Room-air "humidifiers": do not use large-volume room-air humidifiers that create aerosols (e.g., by venturi principle, ultrasound, or spinning disk, and are thus, actually nebulizers) unless they can be sterilized or subjected to high-level disinfection at least daily and filled only with sterile water.

## **II. Precautions for Prevention of Aspiration**

As soon as the clinical indications for their use are resolved, remove devices such as endotracheal, tracheostomy, and/or enteral (i.e., oro- or nasogastric or jejunal) tubes from patients.

- A. Prevention of aspiration associated with endotracheal intubation.
  1. Use noninvasive ventilation (NIV) to reduce the need for and duration of endotracheal intubation.
    - a. When feasible and not medically contraindicated, use noninvasive positive-pressure ventilation delivered continuously by face or nose mask, instead of performing endotracheal intubation in patients who are in respiratory failure and are not needing immediate intubation (e.g.,

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those who are in hypercapneic respiratory failure secondary to acute exacerbation of COPD or cardiogenic pulmonary edema.

- b. When feasible and not medically contraindicated, use NIV as part of the weaning process (from mechanically assisted ventilation) to shorten the period of endotracheal intubation.
2. As much as possible, avoid repeat endotracheal intubation in patients who have received mechanically assisted ventilation.
3. Before deflating the cuff of an endotracheal tube in preparation for tube removal, or before moving the tube, ensure that secretions are cleared from above the tube cuff.
- B. Prevention of aspiration associated with enteral feeding.
  1. In the absence of medical contraindication(s) elevate, at an angle of 30-45 degrees, the head of the bed of a patient at high risk for aspiration (e.g., a person receiving mechanically assisted ventilation and/or who has an enteral tube in place).
  2. Routinely verify appropriate placement of the feeding tube.
- C. Prevention or modulation of oropharyngeal colonization.  
 Oropharyngeal cleaning and decontamination with an antiseptic agent: develop and implement a comprehensive oral-hygiene program (that might include the use of an antiseptic agent) for patients in acute-care settings or residents in long-term-care facilities who are at high risk for health-care-associated pneumonia.

### **III. Prevention of Postoperative Pneumonia**

- A. Instruct preoperative patients, especially those at high risk for contracting pneumonia, about taking deep breaths and ambulating as soon as medically indicated in the postoperative period. Patients at high risk include those who will have abdominal aortic aneurysm repair, thoracic surgery, or emergency surgery; those who will receive general anesthesia; those who are aged  $\geq 60$  years; those with totally dependent functional status; those who have had a weight loss  $> 10\%$ ; those using steroids for chronic conditions; those with recent history of alcohol use, history of COPD, or smoking during the preceding year; those with impaired sensorium, a history of cerebrovascular accident with residual neurologic deficit, or low ( $<8\text{mg/dL}$ ) or high ( $>33\text{mg/dL}$ ) blood urea nitrogen level; and those who will have received  $>4$  units of blood before surgery.
- B. Encourage all postoperative patients to take deep breaths, move about the bed, and ambulate unless medically contraindicated.
- C. Use incentive spirometry on postoperative patients at high risk for pneumonia.

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#### **IV. Sterilization or Disinfection and Maintenance of Equipment and Devices**

##### **A. General measures**

1. Thoroughly clean all equipment and devices to be sterilized or disinfected.
2. Adhere to provisions in FDA's enforcement document for single-use devices that are reprocessed by third parties.

##### **B. Mechanical ventilators**

Do not routinely sterilize or disinfect the internal machinery of mechanical ventilators.

Reference      Centers for Disease Control and Prevention. Guidelines for preventing health-care-associated pneumonia, 2003. Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee, MMWR 2004; 53(RR03): 1-36.