

Joint Theater Trauma System Clinical Practice Guideline

PREVENTION OF VENTILATOR ASSOCIATED PNEUMONIA IN THE COMBAT INJURED

1. Goal:

Effective infection control measures are needed at U.S. military deployed medical treatment facilities to mitigate the impact of ventilator associated pneumonias (VAP) in the combat injured US military population.

2. Background:

The military operations in Iraq and Afghanistan are remarkable for an increase in the number of multi-drug resistant (MDR) bacteria infecting combat casualties, particularly *Acinetobacter calcoaceticus-baumannii* complex (ABC).¹ Within Iraq, Combat Support Hospitals (CSH) are the centralized US military referral healthcare facilities that provide tertiary medical and surgical care to US and non-US personnel. Previous reports have highlighted the frequency with which ABC and other MDR gram-negative bacteria are seen within these hospitals in Iraq,² but the sources remain to be definitively described.

Recent publications along with other circumstantial data, implicate nosocomial transmission as the major contributing source of these infections.³⁻⁵ Scott et al. described cluster outbreak strains of ABC within the military healthcare system suggesting that at least in the case of ABC, the bacteria has spread from field hospitals in Iraq to those within the continental US.⁵ Additionally, bacteria identical to those found in clinical isolates have been cultured from numerous environmental surfaces from CSH within Iraq.⁵

3. Prophylaxis Measures:

a. Staff Education

- i. Educate MTF staff about the epidemiology of VAP and infection-control procedures for prevention including implementation of interventions to prevent VAP
- ii. Periodic internal staff inspection of facility with aggressive education and enforcement of procedures

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b. Respiratory Equipment Management

i. Mechanical ventilators

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

ii. Breathing circuits with humidifiers

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

iii. Breathing circuit / tubing condensate

Periodically drain and discard any condensate that collects in the tubing of a mechanical ventilator, taking precautions not to allow condensate to drain toward the patient

Wear gloves to perform the previous procedure and/or when handling the fluid

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

iv. Humidifier fluids

Use sterile (not distilled, nonsterile) water to fill bubbling humidifiers

v. Ambu bags

Between the uses of reusable hand-powered resuscitation bags on different patients, sterilize or subject to high-level disinfection

vi. Anesthesia machines and breathing systems or patient circuits

Do not routinely sterilize or disinfect the internal machinery of anesthesia equipment.

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,

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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 .

c. Prevention of Person-to-Person Transmission of Bacteria

i. General

- Patient and staff cohorting whenever possible
- Stop sedative medications once daily
- Disinfect all patient care equipment after each patient transfer
- Terminally clean rooms between patients and consider periodic (monthly) ICU / ICU subunit closure for thorough cleaning and disinfection.

ii. Standard Precautions

-Hand hygiene: Decontaminate hands by washing them with either antimicrobial soap and water (if hands are visibly dirty or contaminated with blood or body fluids) or by using an alcohol-based waterless antiseptic agent if hands are not visibly soiled

-Contact barrier precautions with gloves and gown for all patients infected with epidemiologically significant pathogens, specifically MDR *Acinetobacter* spp., ESBL-producing *Klebsiella* spp. and *Escherichia coli*, vancomycin-resistant *Enterococcus* spp., and methicillin-resistant *Staphylococcus aureus*

-Gloving

Wear gloves for handling secretions or objects contaminated with secretions of any patient.

Change gloves and decontaminate hands as described previously between contacts with different patients

When soiling with secretions from a patient is anticipated, wear a gown and change it after soiling occurs and before providing care to another patient

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-Care of patients with tracheostomy

Perform tracheostomy under aseptic conditions.

When changing a tracheostomy tube, wear a gown, use aseptic technique, and replace the tube with a new sterile tube

-Suctioning of respiratory tract secretions

Appropriate to use either the multiuse closed system suction catheter or the single-use open system suction catheter

-If the open-system suction is employed, use a sterile, single-use catheter.

-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. Prevention of Aspiration (Endotracheal Tube):

- i. As soon as the clinical indications for their use are resolved, remove devices such as endotracheal, tracheostomy, and/or enteral tubes from patients.
- ii. Use of noninvasive ventilation (NIV) to reduce the need for and duration of endotracheal intubation
- iii. If feasible, use an endotracheal tube (Hi Lo Tube) with a dorsal lumen above the endotracheal cuff to allow drainage of tracheal secretions that accumulate in the patient's subglottic area.
- iv. Before deflating the cuff of an endotracheal tube in preparation for extubation, ensure that secretions are cleared from above the tube cuff.

d. Prevention of Aspiration (Gastrointestinal):

- i. Prevention of aspiration associated with enteral feeding

-In the absence of contraindication(s), elevate at an angle of 30 to 45 degrees of the head of the bed of a patient at high risk for aspiration (e.g., traumatic brain injury, mechanically assisted ventilation, enteral tube in place)

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- Verify appropriate placement of the feeding tube prior to use

- ii. Modulation of oropharyngeal colonization

- Comprehensive oral-hygiene program every 4 hours with an antiseptic agent such as chlorhexidine.

- iii. Prevention of gastric colonization

- Minimize the use of proton pump inhibitors and H₂-antagonists in mechanically ventilated patients.

e. Prevention of Postoperative Pneumonia

- i. Encourage all postoperative patients to take deep breaths, move about the bed, and ambulate unless medically contraindicated

- ii. Use incentive spirometry on postoperative patients at high risk for pneumonia.

- iii. Mobilize patients as early as possible in the post operative period.

f. Antibiotic Therapy

- i. Reduce the duration and spectrum of surgical antibiotic prophylaxis.

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References:

1. Aronson NE, Sanders JW, Moran KA. In harm's way: infections in deployed American military forces. *Clin Infect Dis*. 2006; 43:1045-1051.
2. Yun HC, Murray CK, Roop SA, et al. Bacteria recovered from patients admitted to a deployed U.S. military hospital in Baghdad, Iraq. *Mil Med*. 2006; 171:821-825.
3. Griffith ME, Ceremuga J, Ellis MW, et al. *Acinetobacter* skin colonization in US Army Soldiers. *Infect Control Hosp Epi*. 2006; 27:659-661.
4. Griffith ME, Lazarus DR, Mann PB, et al. *Acinetobacter* skin carriage among US Army soldiers deployed in Iraq. *Infect Control Hosp Epi*. 2007; 28:720-722.
5. Scott P, Deye G, Srinivasan A, et al. An outbreak of multi-drug resistant *Acinetobacter baumannii-calcoaceticus* complex infections in the U.S. military health-care system associated with military operations in Iraq. *Clin Infect Dis*. 2007; 44:1577-1584.
6. P. Gastmeier P, Geffers C: Prevention of ventilator-associated pneumonia: analysis of studies published since 2004. *Journal of Hospital Infection* (2007) 67, 1-8.
7. Landrum M, Murray C: Ventilator Associated Pneumonia in a Military Deployed Setting: The Impact of an Aggressive Infection Control Program. (in press)
8. Tablan OC, Anderson LJ, Besser R, Bridges C, Hajjeh R. Guidelines for preventing health-care--associated pneumonia, 2003: recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee. *MMWR Recomm Rep* 2004 Mar 26;53(RR-3):1-36.
9. Guidelines for the Management of Adults with Hospital-acquired, Ventilator Associated, and Healthcare-associated Pneumonia *Am J Respir Crit Care Med* Vol 171. pp 388–416, 2005.
10. Prevent ventilator-associated pneumonia. 5 Millions Lives Campaign, Institute for Healthcare Improvement (IHI). www.ihl.org/IHI/Programs/Campaign/VAP.htm

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