

VENTILATOR ASSOCIATED PNEUMONIA

Original Release/Approval	09 Nov 2007	Note: This CPG requires an annual review.		
Reviewed:	Jun 2012	Approved:	17 Jul 2012	
Supersedes:	Ventilator Associated Pneumonia, 1 Mar 2010			
<input type="checkbox"/> Minor Changes (or)	<input checked="" type="checkbox"/> Changes are substantial and require a thorough reading of this CPG (or)			
<input type="checkbox"/> Significant Changes	VAP data collection definition added; PI monitoring plan added.			

- 1. Goal.** To establish guidance for the prevention and mitigation of Ventilator Acquired Pneumonia (VAP).
- 2. Background.** Military operations in Iraq and Afghanistan are notable for an increase in the number of multi-drug resistant (MDR) bacteria infecting combat casualties, particularly *Acinetobacter calcoaceticus-baumannii* complex (ABC).¹

Recent publications along with other data, implicate nosocomial transmission as the major contributing source of these infections.^{3,4,5} 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 U.S. medical treatment facilities within Iraq.⁵ Pneumonia and more specifically, VAP represents a complication in patients across the continuum of care, not simply isolated to a single facility. For the purposes of data collection to support continuous performance improvement, the following definitions will be utilized to abstract and record data in the Joint Theater Trauma Registry (JTTR).

Pneumonia Definition Modifications

Effective 2 April 2012, pneumonia definitions will read as follows:

a. Aspiration Pneumonia

NTDB: History of aspiration of gastric contents followed by clinical and new radiologic findings of pneumonitis within 48 hours.

NOTE: Report pneumonias that are ventilator-associated (i.e., patient is intubated at the time of diagnosis OR extubated within 48 hours before diagnosis).

NOTE: There is NO MINIMUM period of time that the ventilator must be in place in order for the pneumonia to be considered ventilator associated.

b. Pneumonia

All of the following must be present: CDC guidelines used as reference

- 1) Fever (> 38 degrees C), leukocytosis
- 2) Two chest radiographs with pneumonic infiltrate and culture of sputum demonstrating a pathogen (4+growth/ 10⁴ – 10⁵ colonies).

* Pediatric patients must have the following for an occurrence of pneumonia:

- 1) Fever - as defined above, leukocytosis or gram stain of sputum or aspirate.

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2) Two chest radiograph with pneumonic infiltrate and culture of sputum or aspirate.

NOTE: Report pneumonias that are ventilator-associated (i.e., patient is intubated at the time of diagnosis OR extubated within 48 hours before diagnosis).

NOTE: There is NO MINIMUM period of time that the ventilator must be in place in order for the pneumonia to be considered ventilator associated.

c. Ventilator Associated Pneumonia (VAP)

Any pneumonia (see criteria below) that occurs in a patient who is intubated OR who was extubated within the past 48 hours. Mechanical ventilation continuously, including the weaning period, through a tracheostomy or endotracheal intubation at any point in the 48 hours leading up to the clinical evidence of pneumonia;

AND at least 2 of the following:

- Temperature $>38\text{ C}$ or $<36\text{ C}$
- Leukocytosis $>10,000/\text{mm}^3$, or leukopenia $<4,000$, or $>15\%$ bands
- New or increased production of purulent sputum
- Rhonchi or wheezing

AND at least 1 CXR finding from below:

- New or progressive infiltrate, consolidation, cavitation, or pleural effusion

AND at least 1 of the following:

- Organism isolated from blood culture
- Isolation of pathogen from trans-tracheal, bronchial brush, biopsy or lavage
- Histopathologic evidence of pneumonia

VENTILATOR-ASSOCIATED PNEUMONIA (VAP). Pneumonias are ventilator associated if the patient was intubated and ventilated at the time of, or within 48 hours before, the ONSET OF THE EVENT (symptoms or lab data per criteria).

VENTILATOR-ASSOCIATED PNEUMONIA (VAP) - COMPLICATION. The facility that makes the initial identification of ventilator-associated pneumonia (VAP) will record VAP as a COMPLICATION (74).

VENTILATOR-ASSOCIATED PNEUMONIA (VAP) - NON-TRAUMA DIAGNOSIS. The facility that receives the patient with identified VAP will record VAP as a NON-TRAUMA DIAGNOSIS (997.31).

3. Prophylaxis Measures.

a. General Measures:

- 1) Conduct active surveillance for VAP.
- 2) Minimize duration of ventilation and perform daily assessments of readiness to wean and use weaning protocols.

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- 3) Daily wake-ups for patients who are sedated to assess their readiness to extubate.
- b. Staff Education:
- 1) Educate MTF staff about the epidemiology of VAP and infection-control procedures for prevention of VAP.
 - 2) Periodic internal staff inspection of the facility-providers' use of guidelines with aggressive education and enforcement of procedures.
- c. Respiratory Equipment Management:
- 1) Mechanical ventilators: Do not routinely sterilize or disinfect the internal machinery of mechanical ventilators.
 - 2) Breathing Circuits with Humidifiers: Change the circuit when it is visibly soiled or mechanically malfunctioning. Do not routinely change on the basis of duration of use of the breathing circuit (i.e., ventilator tubing and exhalation valve and the attached humidifier) that is in use on an individual patient.
 - 3) Breathing Circuit/Tubing Condensation: Periodically drain and discard any condensation that collects in the tubing of mechanical ventilators, taking precautions not to allow condensation to drain toward the patient. Wear gloves to perform the procedure and/or when handling the fluid. Decontaminate hands with soap and water (if hands are visibly soiled) or with an alcohol-based hand solution before and after performing the procedure or handling the fluid.
 - 4) Humidifiers: Use sterile (not distilled, nonsterile) water to fill bubbling humidifiers. Between the uses of reusable hand-powered resuscitation bags on different patients, sterilize or subject to high-level disinfection. 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, 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.
- d. Prevention of Person-to-Person Transmission of Bacteria:
- 1) Cohorting: Implement patient and staff cohorting whenever possible. Stop sedative medications once daily for a sedation holiday and assess for the feasibility of extubation or tracheostomy decanulation. 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 as field conditions permit.**
 - 2) Standard Precautions: Hand Hygiene - Decontaminate hands by washing either with 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*,

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- vancomycin-resistant *Enterococcus* spp., and methicillin-resistant *Staphylococcus aureus*. Decontaminate hands before and after patient contact and use gloves as below.
- 3) Gloves: 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 anticipating becoming soiled from secretions, wear a gown and change it after soiling occurs and before providing care to another patient.
 - 4) Care of Patients with Tracheostomy: Perform tracheostomy care under aseptic conditions. **When changing a tracheostomy tube, wear a gown, use aseptic technique, and replace the inner cannula with a new, sterile inner cannula.**
 - 5) 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 and sterile technique when suctioning. 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.
- e. Prevention of Aspiration (Endotracheal Tube):
- 1) As soon as the clinical indications for their use are resolved, remove devices such as endotracheal, tracheostomy, and/or enteral tubes from patients.
 - 2) 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.
 - 3) Before deflating the cuff of an endotracheal tube in preparation for extubation, ensure that secretions are cleared from above the tube cuff.
- f. Prevention of Aspiration Related Infection (Gastrointestinal):
- 1) Head of Bed (HOB) Elevation: In the absence of contraindication(s), elevate the head of bed at an angle of 30° to 45° of a patient at high risk for aspiration (e.g., traumatic brain injury, mechanically assisted ventilation)
 - 2) Feeding Tube Verification: Verify appropriate placement of the feeding tube prior to use.
 - 3) Modulation of Oropharyngeal Colonization: Comprehensive oral-hygiene program every 4 hours with an antiseptic agent such as chlorhexidine oral solution.
- g. Prevention of Gastric Colonization: Use proton pump inhibitors and H₂-antagonists in mechanically ventilated patients for appropriate indications.
- h. Prevention of Postoperative Pneumonia:
- 1) Encourage all postoperative patients to take deep breaths, move about the bed, and ambulate unless medically contraindicated.
 - 2) Use incentive spirometry on postoperative patients.

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

i. Antibiotic Therapy:

- 1) Surgical Prophylaxis: Reduce the duration and spectrum of surgical antibiotic prophylaxis based on each facility's known microbiology pattern.
- 2) Suspected Infection: Initial therapy should be broad spectrum. When possible cultures should be obtained prior to initiation of antibiotic therapy. Therapy should be tailored based on culture results. Literature has shown eight days of antibiotic therapy is superior to longer courses.

4. Performance Improvement (PI) Monitoring.

a. Intent (Expected Outcomes).

- 1) When the diagnosis of pneumonia is made in an adult, the patient has:
 - a) Fever (> 38 degrees C), leukocytosis
 - b) Two chest radiographs with pneumonic infiltrate and culture of sputum demonstrating a pathogen (4+growth/ $10^4 - 10^5$ colonies).
- 2) When the diagnosis of VAP is made, the facility that makes the initial identification of ventilator-associated pneumonia (VAP) records VAP as a COMPLICATION (74) and the facility that receives the patient with identified VAP records VAP as a NON-TRAUMA DIAGNOSIS (997.31).

b. Performance/Adherence Measures.

- 1) When the diagnosis of pneumonia was made in an adult, the patient had:
 - a) Fever (> 38 degrees C), leukocytosis
 - b) Two chest radiographs with pneumonic infiltrate and culture of sputum demonstrating a pathogen (4+growth/ $10^4 - 10^5$ colonies).
- 2) When the diagnosis of VAP was made, the facility that made the initial identification of ventilator-associated pneumonia (VAP) recorded VAP as a COMPLICATION (74) and the facility that received the patient with identified VAP recorded VAP as a NON-TRAUMA DIAGNOSIS (997.31).

c. Data Source.

- 1) Patient Record
- 2) Joint Theater Trauma Registry (JTTR)

d. System Reporting & Frequency.

The above constitutes the minimum criteria for PI monitoring of this CPG. System reporting will be performed annually; additional PI monitoring and system reporting may be performed as needed.

The system review and data analysis will be performed by the Joint Theater Trauma System (JTTS) Director, JTTS Program Manager, and the Joint Trauma System (JTS) Performance Improvement Branch.

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5. Responsibilities:

- a. It is the trauma team leader's responsibility along with his or her infection control team, to ensure familiarity, appropriate compliance and PI monitoring at the local level with this CPG. All Health Care Providers will:
 - 1) Become familiar with the guidelines for the prevention and mitigation of VAP.
 - 2) Use of recommend prophylaxis measures is recommended.
 - 3) Appropriately manage patients who develop VAP.
 - 4) Provide feedback on these guidelines and suggestions for changes to the CPG to the JTTS.

6. References.

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Approved by CENTCOM JTTS Director,
JTS Director and CENTCOM SG

Opinions, interpretations, conclusions, and recommendations are those of the authors
and are not necessarily endorsed by the Services or DoD.

APPENDIX A

ADDITIONAL INFORMATION REGARDING OFF-LABEL USES IN CPGs

- 1. Purpose.** The purpose of this Appendix is to ensure an understanding of DoD policy and practice regarding inclusion in CPGs of “off-label” uses of U.S. Food and Drug Administration (FDA)–approved products. This applies to off-label uses with patients who are armed forces members.
- 2. Background.** Unapproved (i.e., “off-label”) uses of FDA-approved products are extremely common in American medicine and are usually not subject to any special regulations. However, under Federal law, in some circumstances, unapproved uses of approved drugs are subject to FDA regulations governing “investigational new drugs.” These circumstances include such uses as part of clinical trials, and in the military context, command required, unapproved uses. Some command requested unapproved uses may also be subject to special regulations.
- 3. Additional Information Regarding Off-Label Uses in CPGs.** The inclusion in CPGs of off-label uses is not a clinical trial, nor is it a command request or requirement. Further, it does not imply that the Military Health System requires that use by DoD health care practitioners or considers it to be the “standard of care.” Rather, the inclusion in CPGs of off-label uses is to inform the clinical judgment of the responsible health care practitioner by providing information regarding potential risks and benefits of treatment alternatives. The decision is for the clinical judgment of the responsible health care practitioner within the practitioner-patient relationship.
- 4. Additional Procedures.**
 - a. **Balanced Discussion.** Consistent with this purpose, CPG discussions of off-label uses specifically state that they are uses not approved by the FDA. Further, such discussions are balanced in the presentation of appropriate clinical study data, including any such data that suggest caution in the use of the product and specifically including any FDA-issued warnings.
 - b. **Quality Assurance Monitoring.** With respect to such off-label uses, DoD procedure is to maintain a regular system of quality assurance monitoring of outcomes and known potential adverse events. For this reason, the importance of accurate clinical records is underscored.
 - c. **Information to Patients.** Good clinical practice includes the provision of appropriate information to patients. Each CPG discussing an unusual off-label use will address the issue of information to patients. When practicable, consideration will be given to including in an appendix an appropriate information sheet for distribution to patients, whether before or after use of the product. Information to patients should address in plain language: a) that the use is not approved by the FDA; b) the reasons why a DoD health care practitioner would decide to use the product for this purpose; and c) the potential risks associated with such use.