



VENTILATOR ASSOCIATED PNEUMONIA

Practice Alert Statements:

- ☑ All patients receiving mechanical ventilation, as well as those at high risk for aspiration (e.g., decreased level of consciousness; enteral tube in place), should have the head of the bed (HOB) elevated at an angle of 30 to 45° unless medically contraindicated.¹⁻⁷ (Level VI)
- ☑ Use an endotracheal tube (ET) with a dorsal lumen above the endotracheal cuff to allow drainage by continuous suctioning of tracheal secretions that accumulate in the subglottic area.^{1,2,8-13} (Level VI)
- ☑ Do not routinely change, on the basis of duration of use, the patient's ventilator circuit.^{1,14-17} (Level VI)

Supporting Evidence:

- Critically ill patients who are intubated for > 24 hours are at 6 to 21 times the risk of developing ventilator-associated pneumonia (VAP)^{1,2,18-20} and those intubated for < 24 hours are at 3 times the risk of VAP.²⁰ Other risk factors for VAP include decreased level of consciousness, supine positioning with HOB flat, use of H₂ antagonists and antacids, gastric distention, presence of gastric or small intestine tubes, enteral feedings, and a trauma or COPD diagnosis.^{1,18-22} VAP is reported to occur at rates of 10 to 35 cases / 1000 ventilator days, depending on the clinical situation.^{1,19}
- Morbidity and mortality associated with the development of VAP is high, with mortality rates ranging from 20 to 41%.^{20,23-25} Development of VAP increases ventilator days, critical care and hospital lengths of stay (LOS) by 4, 4 and 9 days, respectively,^{18,23,26} and results in > \$11,000 additional costs / VAP case.^{18,25,27}
- Micro or macro aspiration of oropharyngeal and/or gastric fluids are presumed to be an essential step in the development of VAP.^{1,2,12,28} Pulmonary aspiration is increased by supine positioning and pooling of secretions above the ET tube cuff.^{1,3,19}
- Compared to supine positioning, studies have shown that simple positioning with HOB elevation to 30° or higher significantly reduces gastric reflux and VAP,³⁻⁷ yet national surveys and reports in the literature describe poor compliance rates with HOB elevation in critical care units.^{20,29-34}
- Studies on the use of special ET tubes which remove secretions pooled above the cuff with continuous suction decrease VAP by 45 to 50 %.⁸⁻¹¹
- Studies on the frequency of ventilator circuit changes have found no increase in VAP with prolonged use.¹⁴⁻¹⁷
- National regulatory and expert consensus groups include the AACN VAP Practice Alert interventions as critical to decreasing VAP rates.^{1,2,35-37}

Actions for Nursing Practice:

- Always keep mechanically ventilated patients HOB elevated to 30° or higher, unless medically contraindicated; use an ET tube with continuous suction above the cuff in patients expected to be intubated > 48 hours; do not routinely change ventilator circuits.
- Assure that your critical care unit has written practice documents such as a policy, procedure or standards of care that includes these practice alerts.³⁸
- Determine your unit's rate of compliance with the HOB elevation directive and use an ET tube with continuous suction above the cuff ([click here for PI audit tool](#))
- If compliance with HOB elevation is < 90%, develop a plan to improve compliance^{29,38-45}
 - ⇒ Consider forming a multidisciplinary task force (nurses, physicians, respiratory therapists, clinical pharmacists) to address VAP practice changes.
 - ⇒ Educate staff about the significance of hospital-acquired pneumonias in critically ill patients and how the interventions listed in the Practice Alert can reduce VAP ([click for education slide program](#)).
 - ⇒ Incorporate content into orientation programs, initial and annual competency verifications.

- ⇒ Develop a variety of communication strategies to alert and remind staff of the importance of these VAP interventions and to disseminate results of audits.
- ⇒ Develop documentation standards for HOB elevation that include a rationale for when HOB elevation is not done.
- ⇒ Incorporate HOB elevation to at least 30° in mechanically ventilated patients or patients at high risk for aspiration in any unit standing orders. Also include HOB elevation monitoring in your critical care scorecard / QI plan / PI activities to assure that compliance levels are maintained.

Expected Outcomes:

- Decrease in VAP rates for the unit
- Increase in number of patients with HOB elevation to at least 30°
- Cost savings due to decreased rates of VAP and less frequent ventilator circuit changes

Resources:

- Education Materials:
 - ⇒ Power Point slide program for VAP education sessions (www.aacn.org)
 - ⇒ Online continuing education program on prevention strategies for VAP (<http://www.nellcor.com/educ/onlineed.aspx>)
- Audit Tools:
 - ⇒ Measurement of compliance with HOB elevation in mechanically ventilated patients (www.aacn.org)
- Others:
 - ⇒ Methods for estimating HOB elevation (www.aacn.org)
 - ⇒ For additional information/assistance, contact a clinical practice specialist with the AACN Practice Resource Network (PRN) via email at practice@aacn.org or via phone at 1-800-394-5995 x217.

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