Ventilator-Associated Pneumonia

Practice Alert Statements
 ✓ All patients receiving mechanical ventilation, as well as those at high risk for aspiration (eg, 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)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.1,10
• 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 >$1 000 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.1,2,19
• Compared to supine positioning, studies have shown that simple positioning with HOB elevation to 30° or higher significantly reduces gastric reflux and VAP.1,17 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 that 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.
• Ensure 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 compliance29,38-45
  ⇒ 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 HOE elevation to at least 30° in mechanically ventilated patients or patients at high risk for aspiration in any unit standing orders. Also include HOE 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 HOE 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/onlinedf.aspx)

**Audit Tools**

Measurement of compliance with HOE elevation in mechanically ventilated patients (www.aacn.org)

**Others**

Methods for estimating HOE elevation (www.aacn.org)

For additional information/accession, contact a clinical practice specialist with the AACN Practice Resource Network (PRN) via e-mail at practice@aacn.org or via phone at (800) 394-5995, ext 217.

**References**


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aimed at reducing the occurrence of ventilator-associated pneumonia. 


30. Berenholtz S, Pronovost P. Barriers to translating evidence into practice. 


