

## 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.<sup>1-7</sup> (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.<sup>1,2,8-13</sup> (Level VI)
- ☑ Do not routinely change, on the basis of duration of use, the patient's ventilator circuit.<sup>1,14-17</sup> (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)<sup>1,2,18-20</sup> and those intubated for < 24 hours are at 3 times the risk of VAP.<sup>20</sup> Other risk factors for VAP include decreased level of consciousness, supine positioning with HOB flat, use of H<sub>2</sub> antagonists and antacids, gastric distention, presence of gastric or small intestine tubes, enteral feedings, and a trauma or COPD diagnosis.<sup>1,18-22</sup> VAP is reported to occur at rates of 10 to 35 cases / 1000 ventilator days, depending on the clinical situation.<sup>1,19</sup>
- Morbidity and mortality associated with the development of VAP is high, with mortality rates ranging from 20 to 41%.<sup>20,23-25</sup> Development of VAP increases ventilator days, critical care and hospital lengths of stay (LOS) by 4, 4 and 9 days, respectively,<sup>18,23,26</sup> and results in > \$11,000 additional costs / VAP case.<sup>18,25,27</sup>
- Micro or macro aspiration of oropharyngeal and/or gastric fluids are presumed to be an essential step in the development of VAP.<sup>1,2,12,28</sup> Pulmonary aspiration is increased by supine positioning and pooling of secretions above the ET tube cuff.<sup>1,3,19</sup>
- Compared to supine positioning, studies have shown that simple positioning with HOB elevation to 30° or higher significantly reduces gastric reflux and VAP,<sup>3-7</sup> yet national surveys and reports in the literature describe poor compliance rates with HOB elevation in critical care units.<sup>20,29-34</sup>
- Studies on the use of special ET tubes which remove secretions pooled above the cuff with continuous suction decrease VAP by 45 to 50 %.<sup>8-11</sup>
- Studies on the frequency of ventilator circuit changes have found no increase in VAP with prolonged use.<sup>14-17</sup>
- National regulatory and expert consensus groups include the AACN VAP Practice Alert interventions as critical to decreasing VAP rates.<sup>1,2,36,37</sup>

### AACN Grading Level of Evidence

- Level I. Manufacturer's recommendation only.
- Level II. Theory based-no research data to support recommendations; Recommendations from expert consensus group may exist.
- Level III. Laboratory or bench data only-no clinical data to support recommendations
- Level IV. Limited clinical studies to support recommendations.
- Level V. Clinical studies in more than one or two different populations or situations to support recommendations.
- Level VI. Clinical studies in a variety of patient populations and situations to support recommendations.

### 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.<sup>37</sup>

- Determine your unit's rate of compliance with the HOB elevation directive and use an ET tube with continuous suction above the cuff ([www.aacn.org/WD/Practice/Docs/PracticeAlerts/VAPAudit\\_HOB\\_Elevation01-2008.pdf](http://www.aacn.org/WD/Practice/Docs/PracticeAlerts/VAPAudit_HOB_Elevation01-2008.pdf))
- If compliance with HOB elevation is < 90%, develop a plan to improve compliance<sup>29,37-44</sup>
  - ⇒ 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 ([http://www.aacn.org/WD/Practice/Docs/PracticeAlerts/VAP\\_PPT\\_1-2008.ppt](http://www.aacn.org/WD/Practice/Docs/PracticeAlerts/VAP_PPT_1-2008.ppt))
  - ⇒ 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](http://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](http://www.aacn.org))
- Others:
  - ⇒ Methods for estimating HOB elevation ([www.aacn.org](http://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](mailto:practice@aacn.org)

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