

## Head of Bed Elevation and Ventilator-Associated Pneumonia

Ventilator-associated pneumonia (VAP) is a common hospital-acquired infection.<sup>1</sup> Criteria for the diagnosis of VAP have been published<sup>2</sup> and widely adopted by hospital infection control surveillance programs. A number of clinical factors can make the diagnosis of VAP difficult in selected patient populations and bring the applicability of these diagnostic criteria into question.<sup>1,3,4</sup> These difficulties in determining how frequently VAP occurs, however, have not prevented the disease from being closely scrutinized. The impact of VAP on patient mortality may be difficult to estimate, but the development of VAP appears to increase the length of hospitalization and increase healthcare costs.<sup>1,5,6</sup> The consideration of VAP as a “preventable” infection by some healthcare regulatory agencies, and the impact of this designation on reimbursement have heightened interest in improving accuracy in the diagnosis and reporting of VAP.<sup>1-4</sup> These initiatives have also stimulated efforts to prevent or minimize the frequency of VAP, and a variety of “ventilator bundles” have been developed.<sup>7,8</sup> Guidelines for hand hygiene, oral care, ventilator circuit tube changes, sedation, and spontaneous breathing trials are included in many such bundles. Elevation of the head of the bed (HOB) to minimize aspiration, particularly in patients receiving enteral nutrition, is also a common component of ICU ventilator bundles.<sup>9</sup>

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In this issue of *RESPIRATORY CARE*, Wolken et al<sup>10</sup> have tested a simple hypothesis. Does a device that provides continuous monitoring of the position of the HOB with continuous nursing feedback improve adherence to maintaining HOB elevation > 30°? They demonstrate that continuous feedback of HOB position to the bedside nurse, using an in-room display and alarm, improved adherence in keeping the HOB properly positioned, compared with providing continuous monitoring to a central location. They also demonstrate that intermittent checks of the HOB position overestimate adherence, compared to total time spent at > 30°, when measured continuously with their device. Both of these conclusions make intuitive sense and are readily believable. If I provide a constant reminder for someone to perform a task, I have no doubt that they will perform that task more frequently than if I provide infrequent reminders. This is a fact with which every edu-

cator, administrator, and parent is familiar. An important unanswered question, however, is whether the documented 15% improvement in HOB adherence using continuous feedback results in a reduction of VAP in their ICU. The authors measure a statistically significant improvement in the process of care. Whether or not this increase in HOB elevation is clinically important remains unknown.

The authors imply that improving HOB adherence will lower their VAP rate, and if the next study will be designed to evaluate this relationship, the authors should be encouraged to complete it. One wonders what the optimal adherence rate should be for HOB elevation over a 24 hour period. The HOB will be lowered for patient care duties such as bathing, changing linens, changing patient position, and preparing for patient transfers. I suspect that if I included an ICU nurse as a coauthor, several other tasks that require lowering the HOB could be added to this list. Whether the adherence rate with HOB elevation should be more than the authors' measured rate of 76% of monitored hours remains an unanswered question. In the complex environment of the ICU, demonstrating an impact on VAP rate with a single intervention is a challenge. There are numerous factors that can influence the rate of VAP in any given ICU, including the type of patient (medical, surgical), severity of illness, use of ventilator protocols or bundles, sedation practices, anti-ulcer prophylaxis practices, use of early or delayed tracheostomy, nutrition practices, and use of subglottic suctioning tubes, just to name a few. The baseline rate of VAP will also impact the ability to detect a change with any single intervention. It has been a substantial challenge to conclusively demonstrate reductions in VAP with the use of multi-component ventilator bundles, much less a single component of a multi-component bundle.

Do the issues discussed above reduce the value of this device? Not necessarily. Elevating the HOB is a simple, inexpensive maneuver that may often be neglected, and increasing time spent upright is usually a good thing for hospitalized patients. This device may assist providers in increasing the time spent with the HOB elevated, particularly in those units where getting practitioners to elevate the HOB is problematic. Should all ICU beds have an alarm to notify providers that the HOB is < 30°? If it provides a real benefit to the patient in terms of outcome, then such an addition will be useful. If the device increases

cost of the bed, increases the time/expense spent monitoring/validating the device, or distracts providers from the essential tasks involved in caring for critically ill patients without materially affecting the occurrence of VAP, quality control departments may benefit from this system, but the patient will not. The authors have developed an imaginative solution to assist with keeping the HOB elevated. Future studies will hopefully define if improved adherence with HOB elevation translates into a tangible benefit to the patient.

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The author has disclosed no conflicts of interest.

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DOI: 10.4187/respcare.01797