Introduction of a Waterless Hand Gel Was Associated With a Reduced Rate of Ventilator-Associated Pneumonia in a Surgical Intensive Care Unit

To the Editor:

Ventilator-associated pneumonia (VAP) is associated with substantial morbidity, mortality, and expense.[1,2] The Centers for Disease Control and Prevention and the Healthcare Infection Control Practices Advisory Committee recently published guidelines updating recommendations for the prevention of healthcare-associated pneumonia, including VAP.[3] Although the guidelines emphasize the importance of hand hygiene in preventing person-to-person transmission of bacteria, no preference is stated for the use of an alcohol-based waterless hand cleanser versus appropriate washing with soap and water.

In February 2003, our hospital instituted a new data collection system in the 16-bed surgical intensive care unit (SICU) to track VAP rates prospectively. In September 2003, an alcohol-based waterless hand gel (Endure 300 Cida-Rinse Gel, Ecolab, St. Paul, MN) containing 70% ethyl alcohol was introduced in that unit. We discuss the rate of VAP before and after the introduction.

Our institution is a 300-bed urban trauma center that serves a largely low-income population. The tool used for VAP surveillance was developed from the 2002 National Nosocomial Infections Surveillance (NNIS) System but was simplified based on institutional considerations.[4] This hospital has few highly immunocompromised patients in the SICU, and there are no patients undergoing bone marrow or solid organ transplantation. Therefore, a separate algorithm for immunocompromised patients was not used. Also, because primary data collection was performed by rotating ICU clinicians on morning rounds, a simple form was developed on which data from multiple patients could be entered on a single sheet.

Patients receiving ventilation were considered to have VAP if a chest radiograph showed a new or progressive infiltrate, consolidation, or cavitation and they met at least two of the following five criteria: temperature greater than 38°C (100.4°F) with no other source; leukocytosis (≥ 12,000 white blood cells/mm^3) or leukopenia (< 4,000 white blood cells/mm^3); new onset purulent sputum or change in the character of sputum, including increased secretions or suctioning requirement; crackles or bronchial breath sounds; or worsening gas exchange, increase in oxygenation or ventilation requirements, or both. ICU physicians recorded data for all patients receiving ventilation twice per week.

Rates were determined by dividing new cases of VAP by ventilator-days among patients at risk. Only the first instance of VAP in a given patient was counted, and patients no longer contributed ventilator-days to the denominator after a diagnosis of VAP. Patients who required reintubation were included and did contribute to the number of ventilator-days, provided that they had not developed VAP previously. Patients with a diagnosis of pneumonia within the first 48 hours after tracheal intubation were excluded to avoid counting patients with preexisting pneumonia. Patients who received ventilation between February 1 and September 15, 2003 (pre-gel period), were considered unexposed to hand gel. Patients who received ventilation between September 16, 2003, and March 31, 2004 (post-gel period), were considered exposed to hand gel. The seven patients whose ventilation spanned the September 15, 2003, cutoff date were considered unexposed, with data censored September 15, 2003.

Risks of VAP for the two exposure groups were estimated using the Kaplan–Meier product limit formula. Hypothesis testing for comparisons of survival curves for the two exposure groups was performed using the log-rank test. The association between exposure to hand gel and VAP was estimated using the Cox proportional hazards model. Statistical calculations were performed using STATA software (version 8.0; STATA Corp., College Station, TX).

During the pre-gel period, 242 patients had 262 episodes of ventilation. One hundred thirty-six ventilation episodes in 127 patients lasted at least 48 hours (mean, 8.9 days; median, 5.7 days). In the post-gel period, 241 patients had 277 episodes of ventilation. One hundred fifteen episodes in 100 patients lasted at least 48 hours (mean, 7.5 days; median, 4.7 days).

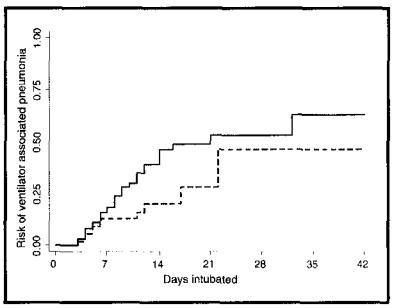

FIGURE. Survival analysis of the risk of ventilator-associated pneumonia during the two periods.

In the pre-gel period, there were 37 cases of VAP per 1,319 ventilator-days (28.1 cases per 1,000 ventilator patient–days). In the post-gel period, there were 13 cases of VAP per 982 ventilator-days (13.2 cases per 1,000 ventilator patient–days). Survival analysis was used to compare the rates during the two periods (Figure). The survival curves, with VAP representing failure, were significantly different during the two periods ($P = .05$ by the log-rank test). The estimated hazard ratio for the post-gel period compared with the pre-gel period was 0.54 (95% confidence interval, 0.29 to 1.02; $P = .06$).

Use of waterless antiseptic handrubs may be more effective than handwashing in decreasing bacterial counts on the hands and in decreasing rates of some hospital-acquired infections.[5,6] These data add to previously published reports by specifically addressing the issue of VAP. However, this study has several limitations and its results should be interpreted cautiously. Because this was an observational before-and-after study, a causal effect of the introduction of hand gel on the reduction in VAP cannot be proved. Seasonality is a potential confounding factor, as are other temporal changes in care that may have occurred after introduction of the hand gel. We are unaware of substantial changes in the SICU, such as nurse staffing or patterns of antibiotic use, that could account for the effect, but such confounders were not carefully assessed in this retrospec-

tive study. The average length of ventilation was shorter in the post-gel period than in the pre-gel period. This may have been due in part to a decreased rate of VAP, but it may have affected the results of this study, despite the use of survival analysis techniques to take patient–ventilator time into account.

The rates of VAP calculated in this study should not be compared directly with published NNIS System rates, as data were collected using a modified tool and a clinical definition only, which may decrease the specificity of the diagnosis. Also, the manner in which the rate denominator was calculated should be noted, as different methods of calculation can lead to substantially higher or lower reported values.[7] However, our data gathering is internally consistent and relatively easy to perform, which makes it a useful method for institutional quality improvement.

These limitations notwithstanding, the magnitude of the decrease in VAP (by approximately half) and the close temporal association with the introduction of a waterless hand gel make these results intriguing. This type of investigation can be compelling if the results are replicated at other hospitals and can be done with limited resources. Therefore, it is hoped that future reports will address this same issue, and this study should be interpreted in the context of all available data.

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Medical News

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Single-Bed Rooms as the Minimum Standard Is Among Comments Being Sought by the American Institute of Architects on Proposed Construction Guidelines

On November 1, the American Institute of Architects (AIA) opened the public comment period on the proposed 2006 edition of the *Guidelines for Design and Construction of Hospital and Health Care Facilities.* One of the most significant proposed changes would make single-bed private rooms the minimum standard for new hospital construction. Section 7.2.A1 calls for single-bed patient rooms (unless the functional program demonstrates the value of a multi-bed arrangement). The guidelines revision committee performed extensive research prior to proposing a minimum standard of single-bed patient rooms, examining issues such as costs, infection control, patient falls, and therapeutic impact.

The guidelines describe minimum program, space, and equipment needs for all clinical support areas of hospitals, nursing homes, freestanding psychiatric facilities, outpatient and rehabilitation facilities, and long-term–care facilities. They also include the minimum engineering design criteria for plumbing, medical gas, electrical, heating, ventilating, and air conditioning systems. Comments are due before January 31, 2005, from the AIA web site at www.aia.org. The final guidelines are expected to be published in early 2006.

An overview of the single-bed room issue and access to the single versus multiple occupancy patient room study commissioned by the Facilities Guidelines Institute are available at www.premierinc.com/safety.