

Low-pressure Microcuff Adult Endotracheal Tube Reduces the Incidence of Ventilator-Associated Pneumonia

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Background: Ventilator associated pneumonia (VAP) is a leading cause of morbidity and mortality in ICU patients with rates of up to 15% of all hospital acquired infections^{1,2}. A new endotracheal (ET) tube Microcuff* (Kimberly-Clark) combats VAP with its design to reduce micro-aspirations in the intubated patient.

Methods: A retrospective review with historical control patient cohort was performed after a year long facility wide conversion to the Kimberly-Clark Microcuff Adult ET tube, which included all of the adult medical ICUs, operating rooms, and crash carts. Data was obtained from patients admitted to the adult ICUs from July 2006 to July 2008 who received mechanical ventilation for >24 hours with hospital-acquired pneumonia diagnoses occurring \geq 24 hours following intubation. From July 2006 to June 2007, the Mallinckrodt Intermediate Hi-Lo ET Tube was the standard ET tube and was considered the control group in our study. In July 2007, the Microcuff tube was implemented hospital-wide. During the two year study period 4022 patients were ventilated for greater than 24 hours without an initial diagnosis of pneumonia. Ninety two adult patients developed VAP and all were included in our study analysis. Of the 4022 patients that were mechanically ventilated for >24 hours, a computer generated randomized selection at a ratio of 4:1 (mechanical ventilated patients without VAP: mechanically ventilated VAP patients) was used to randomly select the study cohort. Patient demographics, comorbidities, total number of ICU days, length of mechanical ventilation, length of hospital stay, and mortality were examined.

Results: Among the adult patients intubated for 24 hours or longer, the rate of microbiologically confirmed VAP was reduced by 61% per vent day. During the first year of the Microcuff implementation there were 28 episodes of VAP in 14830 vent days, compared to 64 episodes of VAP in 13229 vent days the year prior. When normalized, this equates to a VAP rate of 1.9 episodes per 1000 vent days versus 4.8 episodes per 1000 vent days the year prior. The Microcuff tube was associated with a significantly lower incidence of VAP (Chi-Square Test, p-value < 0.05) and number of ICU days (Mann-Whitney U Test, p-value < 0.05). No significant differences were observed in length of hospital stay, length of mechanical ventilation, or mortality.

Conclusions: After the implementation of the Kimberly-Clark Microcuff ET tube, we have observed a clinically and statistically significant reduction in the incidence of VAP.

References:

1. National Nosocomial Infections Surveillance (NNIS) System Report, data summary from January 1992 through June 2004, issued October 2004. Am J Infect Control 2004;32(8):470-85.
2. Shorr AF, Kollef MH. Ventilator-associated pneumonia: insights from recent clinical trials. Chest 2005;128(5 Suppl 2):583S-91S.