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Do endotracheal tubes with suction above the cuff decrease the rate of ventilator-associated pneumonia, and are they cost-effective?

Tubos endotraqueais com aspiração suprabalonete diminuem a taxa de pneumonia associada à ventilação mecânica e são custo-efetivos?

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Endotracheal tube-associated pneumonia and ventilator-associated pneumonia (VAP) occur in approximately 10% to 25% of patients who require invasive mechanical ventilation for more than 24 hours; the incidence density rate varies between 9 and 15 cases per 1,000 days of mechanical ventilation. Mortality rates associated with VAP vary with the criteria used for diagnosis: the rates are lower if only clinical criteria are used, such as purulent discharge, fever or hypothermia, leukocytosis or leukopenia and progressive or new radiological infiltrate; the rates are progressively higher if microbiological criteria are used, such as a quantitatively positive bronchoalveolar lavage culture, and if gas exchange deteriorates to the point of requiring an increase in the fraction of inspired oxygen (FIO_2) and in positive end-expiratory pressure (PEEP).[1,2] Recently, Su et al. reported that serum levels of soluble triggering factor receptor expressed on myeloid cells (sTREMs) are important for diagnosing VAP in septic patients and that the serum levels of procalcitonin and the value of the clinical pulmonary infection score (CPIS) are important prognostic factors.[3]

Preventive measures have been shown to be effective in decreasing VAP occurrence and are increasingly being used and becoming more widespread in intensive care units (ICUs). These measures include raising the headboard angle of the patient's bed to 30°-45°, applying oral hygiene using chlorhexidine, daily awakening of the patient (stopping sedation once a day), using effective protocols for weaning from mechanical ventilation, observing hand hygiene for health professionals, using tracheal tubes impregnated with antiseptics, using tubes that allow the aspiration of secretions above the cuff and, increasingly, using non-invasive ventilation.[4]

The rationale for using tracheal tubes that allow the aspiration of secretions that accumulate above the cuff of the tracheal tube is that these secretions spread through microchannels present in the tube cuffs and are eventually aspirated into the patients' lungs, contributing to the occurrence of VAP. Tubes with suction above the cuff allow for the intermittent aspiration of these secretions, either with high pressure or continuously with pressures up to 20 mmHg, maintaining space above the cuff free of secretions and reducing the occurrence of microaspirations. Prospective and controlled studies in critically ill patients comparing the use of tubes with the possibility of suction above the cuff and traditional tracheal tubes have indicated decreased VAP incidence with the use of subglottic suction or suction above the cuff. An analysis of 2,213 patients from a total of 10 randomized trials using tracheal tubes with suction above the cuff exhibited a significant reduction in the incidence of VAP (relative risk: 0.56, 95% confidence interval [95% CI]: 0.45-0.69, $p<0.00001$) and early-onset

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VAP (relative risk: 0.23, 95% CI: 0.13-0.43, p<0.00001), a decrease in the duration of mechanical ventilation of 1.55 days (95% CI: -2.40 to -0.71 days, p=0.0003) and an increase in the time to VAP diagnosis of 3.90 days (95% CI: 2.56 to 5.24 days). A subgroup analysis suggests a significant reduction in VAP incidence when groups were separated for intermittent subglottic suction (relative risk: 0.49, 95% CI: 0.34 to 0.71, p=0.0001) and for continuous subglottic suction (relative risk: 0.49, 95% CI: 0.46 to 0.79, p=0.0003). Subglottic suction does not decrease the incidence of late-onset VAP, the length of stay in the ICU or hospital or hospital mortality.[5]

In this issue of the Revista Brasileira de Terapia Intensiva, Sousa and Santana[6] reports a critical analysis of these studies and suggests that the introduction of tubes that allow the aspiration of secretions from the subglottic space in Brazilian ICUs may reduce VAP incidence and may be cost-effective. Kelley et al. calculated that it is necessary to use tubes with suction above the cuff in 33 patients to prevent one episode of VAP, which indicates that this protocol would be cost-effective.[7]

Recently, Caserta et al.[8] published the results of a VAP prevention program implemented in a private ICU in São Paulo (SP), Brazil, which included the application of oral hygiene with chlorhexidine, the use of tracheal tubes allowing continuous aspiration of secretions above the cuff and the implementation of prevention measures recommended by international bundles. The authors reported a significant decrease in VAP incidence after the implementation of standard prevention measures (bundles); VAP incidence was further and significantly reduced with the introduction of washing of the patients' oral cavities with chlorhexidine. Analysis of the impact of introducing a tube with continuous subglottic suction revealed that there were no further reductions in VAP, which were already at extremely low levels. Thus, additional studies in ICU environments are needed to assess the degree of reduction in VAP levels and the cost-effectiveness of using tubes with subglottic suction or suction above the cuff, silver-impregnated tubes or tubes with cone-shaped cuffs (to decrease the spread of secretions through the cuff microchannels) associated with or independent of subglottic suction systems.[9,10]

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