Prevention of ventilator-associated pneumonia with oral antiseptics

A systematic review shows a beneficial effect of oral antiseptic use in the prevention of ventilator-associated pneumonia. Questions remain on the frequency and technique of administration.

Overview: Pneumonia is an inflammatory condition of the lungs caused by bacterial, viral or fungal infection. Ventilator-associated pneumonia (VAP) can occur as a complication of mechanical ventilation, particularly when ventilation is needed for a prolonged period of time and in patients who are critically ill.

There is no generally accepted definition of VAP in patients undergoing mechanical ventilation, but it is often defined as pneumonia that develops 48 hours or more after intubation with an endotracheal or tracheostomy tube, and that was not present before intubation.

Patients who develop VAP are at risk of serious complications (for example, acute respiratory distress syndrome) and have a significantly longer duration of mechanical ventilation and intensive-care-unit (ICU) stay. VAP can affect between 10% and 30% of ventilated patients and mortality can be as high as 50% depending on factors such as recognition, diagnosis, identification of microorganisms and preventive measures to reduce its incidence.

Current advice: As part of its pilot work on patient safety, NICE recommends that oral antiseptics (for example, chlorhexidine) should be included as part of the oral hygiene regimen for all patients who are intubated and receiving mechanical ventilation.

New evidence: A systematic review and random effects meta-analysis assessed the effect of oral care with chlorhexidine or povidone-iodine on the prevalence of VAP compared with oral care without these antiseptics in adults (Labeau et al. 2011). The review included 14 randomised trials (2481 patients), 12 investigating the effect of chlorhexidine (2341 patients) and two of povidone-iodine (140 patients). The researchers used the American Thoracic Society’s definition of VAP – a pneumonia occurring following a minimum of 48 hours of assisted ventilation in patients with an endotracheal or tracheostomy tube.

Overall, antiseptic use resulted in a significant risk reduction of VAP (relative risk [RR] 0.67, 95% CI 0.50 to 0.88; p=0.004). Subgroup analysis based on type of antiseptic showed a significant reduction in cases of ventilator-associated pneumonia in the chlorhexidine studies (a 28% risk reduction compared with oral care without these antiseptics, 95% CI 0.55 to 0.94). Although povidone-iodine had a relative risk reduction of 61% (RR 0.39, 95% CI 0.17 to 1.36), this was not significant, therefore larger and standardised comparative studies of povidone-iodine are necessary to obtain more conclusive results.

Favourable effects were more pronounced in further subgroup analyses for chlorhexidine 2% solution (a RR reduction of 47%, RR 0.53, 95% CI 0.31 to 0.91), and in cardiosurgical studies (a RR reduction of 59%, RR 0.41, 95% CI 0.17 to 0.98). The current recommended dose by the US Centers for Disease Control and Prevention for cardiac surgery patients is 0.12%. Patients undergoing cardiac
surgery cannot be directly compared with patients who are critically ill in general because cardiac surgery is usually an elective procedure, patients are often in better physical condition and are intubated in the operating theatre under optimum and controlled conditions.

**Commentary:** "It is well recognised that aspiration of oropharyngeal secretions plays a major role in the development of VAP. It is therefore important to assess the benefit of a relatively simple measure such as oral decontamination with antiseptics in reducing the healthcare impact of VAP, both on the individual and on the healthcare economy as a whole.

"One of the biggest problems we have when performing and interpreting studies in this field is the heterogeneity of a clinically relevant definition. This is a well-conducted study, which recognises the common pitfalls of study heterogeneity and publication bias. Clinical and statistical heterogeneity between trials has been at least in part mitigated by adoption of a random effects model. It is unfortunate that there is no way of identifying if other preventive measures for VAP were used in the included studies and interpretation of studies on VAP will continually be affected by the lack of a consistent and clinically relevant definition.

"Given these provisos, this is an important review, which provides evidence of benefit for the use of oral antiseptics in the prevention of VAP. Oral decontamination is 1 of 6 high impact interventions (elevation of bed head, sedation level assessment, oral hygiene, subglottic aspiration, tracheal tube cuff pressure, and stress ulcer prophylaxis) as outlined in the Department of Health's care bundle to reduce VAP.

"This study supports and provides strong evidence of benefit for oral decontamination. What we don't fully know is the relative importance of each of these factors independently, although this review goes a long way to providing the evidence for oral decontamination. There is a general acceptance that it is adherence to the whole care bundle which is likely to have the most beneficial impact on reducing VAP.

"Clinical practice is already changing with the adoption of ventilator care bundles and these provide an opportunity for monitoring adherence and measuring quality as a marker of best practice guidance. The potential cost benefit may be more difficult to identify given the difficulty in agreeing an accepted definition. Outstanding questions remain with respect to the frequency and technique of administration of oral antiseptics, role of teeth brushing and appropriate concentration of chlorhexidine in general ICU patients compared with elective cardiac surgery patients. The jury is out on povidone-iodine at present although it appears that this may well be a useful alternative to chlorhexidine. It is also worth raising a word of caution that the more widespread use of antiseptics such as chlorhexidine will undoubtedly result in the more frequent occurrence of allergy related complications and anaphylaxis".

– Dr Andrew Bentley, Consultant in Intensive Care and Respiratory Medicine, University Hospital of South Manchester

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