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### Reducing Ventilator Associated Pneumonia (VAP):

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The role of oral hygiene in maintaining the health and wellbeing of mechanically ventilated patients in intensive care is evident. Patients in intensive care have complicated needs and poor oral hygiene may result in nosocomial- acquired infections such as pneumonia. Nevertheless, the importance of mouth care is not often reflected in ICU literature and practice (Prendergast et al. 2009). To date, there is no definitive protocol (Grap and Munro 2004) to guide healthcare providers in the most appropriate methods of oral care. The aim of this article is to identify the importance of and barriers to effective oral hygiene, as well as the implications of poor oral health and the most recommended methods of providing oral care in mechanically ventilated patients.

#### Introduction

Evidence shows that patients can become colonised with pathogenic bacteria within forty-eight hours of admission to intensive care unit. The oral cavity and its components especially dental plaque are perfect media in which bacteria can colonise (Prendergast et al. 2009). In addition, aspiration of oropharyngeal secretions is an independent risk factor for ventilator associated pneumonia (VAP) and is recognised as being a major cause of the acquisition of nosocomial infection in the ICU (Berry et al. 2007). However, some patients have oral health problems before admission to intensive care unit.

VAP is defined as pneumonia that develops in an intubated patient after forty-eight hours or more of mechanical ventilation (Kishimoto and Urade 2010). VAP is the second most common nosocomial infection, but it is the leading cause of death in ventilated ICU patients.

Key proposed practices in the prevention of VAP include:

- Semi-recumbent patient positioning;
- Selective digestive tract decontamination;
- Subglottal suctioning; and
- Dental plaque colonisation with respiratory pathogens reduction.

As most of the proposals above are fundamental nursing practices, it is clear that nurses themselves play a critical role in minimising VAP. However, in the current ICU environment, emphasis on oral health is often lacking in mechanically ventilated patients despite the fact that the literature shows that these patients are at the highest risk for the second most common nosocomial infection, pneumonia (Berry et al. 2007). In fact, (VAP) is the second most common nosocomial infection, but is the leading cause of death (Munro et al. 2009).

Aside from the staggering mortality rates, VAP also has a drastic affect on cost-effectiveness. Patients who develop VAP have a higher number of days on mechanical ventilation, a longer length of stay in intensive care and a doubling of the overall hospital stay. Oral care in mechanically ventilated patients has been identified as one of the preventative measures against acquiring ventilator associated pneumonia.

Risk factors affected by oral and dental care are:

- Bacterial colonisation of the oropharyngeal area; and
- Aspiration of subglottal secretions and colonisation of dental plaque with respiratory pathogens.

Therefore, implementation of a comprehensive oral care procedure may decrease the risk of acquiring VAP. However, McNeill (2000) argues that providing adequate oral hygiene for patients in ICU is particularly challenging, not least because of the problems of caring for very sick patients in a busy stressful environment, which may result in oral care having a lower priority for nurses than other aspects of care. In addition, Pearson and Hutton (2002) add that maintaining a healthy oral environment in an ICU patient can be problematic due to the presenting condition of the patient and the medical treatment provided. Many ICU patients are immune-compromised as well as have a predisposition to oral infections such as herpes simplex. On the other hand, Kishimoto and Urade (2010) and Berry et al. (2007) have demonstrated that bacteria responsible for VAP colonise on the oral mucosa and in the dental plaque of intubated patients; consequently providing adequate oral care should be a priority as it is very important in reducing incidences of VAP.

### Challenges

There are a number of simple challenges nurses encounter in their attempt to provide proper oral care: Inadequate tools (e.g. a normal sized adult toothbrush is often difficult to manoeuvre around all the obstacles in the patients' mouth such as endotracheal tube (ETT), tapes, oral gastric tube and a temperature probe) and simple logistics (e.g. the posterior area of the patient's mouth is rarely reached)

Standard toothbrushes cannot be used in patients who have bleeding gums and / or low platelets counts and extreme care should be taken when providing oral care for these patients, regardless of the tool used (Ruffell et al. 2008). It is advisable to use soft-bristled 'baby' toothbrushes, which not only provide greater access to all regions of the mouth but can also be used to cleanse patients tongues and gums.

There are various assessment tools available to assess patients mouths, but these assessment tools are not often used in practice due to lack of time or knowledge or because they fail to assist nurses in diagnosing oral problems (Abidia 2007; McNeill 2000). Collaborative interactions with dental hygienists could improve the nurses' knowledge and skill related to oral care, however, dental hygienists are not routinely employed in care of ICU patients to advise nursing staff (Abidia 2007). Additionally, studies on oral care methods in ICU have found that nurses do not use evidence based oral care methods in practice (Berry et al. 2007).

### Toothbrushes vs. Foam Sticks

Many nurses are reluctant to use toothbrushes with toothpaste for cleaning the teeth of intubated patients, preferring instead to use foam sticks. However, the foam stick is not as effective in plaque removal as a soft, small-headed toothbrush (Prendergast et al. 2009; Rawlins 2001). However, when toothbrushes are not available, foam sticks soaked in chlorhexidine mouthwash may be a useful alternative to toothbrushes. Chlorhexidine is effective against gram-positive and gram-negative bacteria as well as fungi and yeast (Pineda et al. 2006). A controlled trial of 34 patients that compared the ability of foam swabs versus toothbrushes to remove dental plaque concluded that tooth brushing was preferred and should be taught to nurses and clinical support workers (Pearson and Hutton 2002). Other randomised controlled trials advocate the use of chlorhexidine mouthwash and gel in mechanically ventilated patients as it significantly reduces the incidence of nosocomial respiratory infections and pneumonia (Grap and Munro 2004). These studies also showed that this should be done after teeth brushing since it is more effective way of removing dental plaque.

Emphasis on the provision of mouth care is allocated a low priority in a number of nursing undergraduate programmes, and although it is considered basic nursing care, it is often a low priority when caring for a complex intensive care patient (Longhurst 1998). There is a lack of oral health knowledge and lack of appreciation of its importance by registered nurses, and the length of ICU experience does not correlate to the quality of oral care provided by nurses. To compound this deficit in knowledge, there is a lack of standardised protocols based on empirical evidence for mouth hygiene in ICU. Therefore, lack of evidence based guidelines to direct practice allows critical care nurses to perform oral hygiene according to their individual preferences (Moss 2004). Consequently, if a change in practice, supported by best evidence is to be accomplished, it is crucial that this evidence is adapted to the individual healthcare environment and one has a clear understanding of what evidence based practice means (Cook 2003; Grap 2003).

There is also a need for ICU clinicians to develop guidelines to inform practice and more education is required to stress the importance of oral care in intubated patients. Lastly, guidelines should be evaluated for their effect, value and usage, and reviewed and modified regularly to incorporate new evidence (Courtney 2005). By incorporating a comprehensive oral care protocol into the unit's current VAP reduction bundle practices, patients' lives can be optimised and financial resources can be saved.

Multiple methods exist to provide oral care however there is no clear consensus on how frequently mouth hygiene should be performed.

## Recommendations

- Oral care should be considered as part of the admission assessment in intensive care units. This should include assessing patients' oral cavity on admission as well as daily assessment of the lips, oral tissue, tongue, teeth and saliva of each patient. The initial assessment would allow identification of oral hygiene problems and for continued observation of oral health.
- Development of oral health protocols in intensive care units and staff education are very important. Additionally, the importance of oral care should be emphasised in nurse education programmes, along with training for healthcare assistants who may be delegated to provide oral hygiene in some areas. Although frequency of oral care remains an area of controversy and may depend on patient condition, brushing teeth every 12 hours should be recommended and oral moistening should be done at least every two hours and as required while the patient remains intubated. This will assist in the maintenance of healthy lips and gums. In addition, dryness and cracking of oral tissues and lips provide regions for bacteria proliferation. On the other hand, water-soluble moisturiser allows tissue absorption and added hydration.
- Development of standardised, reliable and valid oral assessment techniques and tools for assessing patients, documenting nurses' assessment of oral hygiene interventions, evaluating practice and improving the quality of care are required. Examples of assessment tools available are included in tables 1 and 2.
- Steps should also be taken to increase the awareness of the importance of oral care provisions for mechanically ventilated patients. In addition, oral care packs containing a very small, soft bristled toothbrush and toothpaste be widely available in intensive care units.
- Finally, the role of specialised oral care medicine services in diagnosing and treating oral diseases in ICU patients is unclear; hence further research is required to determine if nurses in ICU should liaise with oral care medicine services for advice and support when necessary.

## Conclusion

Critically ill patients usually have multiple risk factors, which make them prime candidates for the development of VAP. These factors include the patients level of consciousness, oral-pharyngeal or gastric colonisation and dental plaque.

It is clearly evident from the literature that further research is required regarding oral hygiene practices in intensive care, especially in the development of oral care protocols for ventilated patients.

Encouraging the general use of an oral care assessment tool is important and further oral care education to staff working in intensive care is required.

Despite the importance of providing oral care to mechanically ventilated patients in intensive care, high-level evidence from randomised controlled trials and systematic reviews reveal that practice is limited. Hence, there is a clear need for more research to develop guidelines to influence practice and more education is required to stress the importance of oral care in intubated patients. Lastly, guidelines should be evaluated for their effect, value and usage, reviewed and modified regularly to incorporate new evidence that becomes available.

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