

# Oral hygiene care in critically ill patients



**Division of Nursing, Department of Interdisciplinary Health Sciences, Stellenbosch University, Tygerberg, W Cape**  
**Louise Human, BCur**  
**Janet Bell, MCur, BCur Hons (Critical Care), PgDN (Nursing Education)**

Oral hygiene care includes a combination of nursing activities that are often placed very low on the priority care list for a critically ill patient. This may have detrimental implications for the patient. A literature review was done to identify and describe the available evidence related to the beneficial effects of oral hygiene care and the way in which oral hygiene practices should be implemented for a critically ill patient. Various implications of poor oral hygiene care are highlighted, as well as the barriers that have been identified to preventing good oral hygiene care practice. A discussion of the available research evidence to guide oral hygiene care activities includes aspects of timing as well as recommended 'tools'. While some nursing-led research has been published on this topic, there is scope for further investigation into oral hygiene care practices in the critically ill.

*Mosby's Dictionary* defines oral hygiene as 'the condition or practice of maintaining the tissues and structures of the mouth. Oral hygiene includes brushing the tongue and teeth to remove food particles and residue, bacteria, and plaque; massaging the gums with a toothbrush, dental floss, or water irrigator to stimulate circulation and remove foreign matter; and cleansing dentures and ensuring their proper fit to prevent irritation. Dependent or unconscious patients are assisted in maintaining a healthy oral condition. Such care includes lubricating the lips and cleaning the inside of the cheeks, the roof of the mouth, and the tongue.'<sup>1</sup>

Oral care is a fundamental aspect of nursing that impacts on the health, well-being and comfort of patients.<sup>2</sup> Providing effective oral hygiene for patients in critical care units is particularly challenging as the patient's oral health may be compromised by medical conditions, treatment interventions, equipment, and the patient's inability to attend to his or her own oral care. The presence of an orogastric tube, endotracheal tube and other items necessary for the monitoring and management of a critically ill patient complicates the procedure. Some caregivers may even consider inserting the tools of oral care into a patient's mouth an invasion of the patient's privacy.<sup>3</sup> Oral hygiene care practices for a critically ill patient include assessment of the oral cavity, brushing the teeth, moisturising the lips and mouth and suctioning the mouth and oropharynx.<sup>4-6</sup> Related care practices are repositioning and securing of the endotracheal tube, tracheostomy care and endotracheal suctioning.<sup>6</sup>

Practical experience while working in critical care units has confirmed the authors' impression that oral

hygiene is not perceived by critical care nurses to be a very important patient care activity. There appears to be an accepted attitude that it is not noteworthy if oral hygiene care for a patient is neglected during a shift. But the experience and comfort of a clean mouth is one we all enjoy. Most people implement oral hygiene practices on a daily basis, such as brushing teeth and rinsing the mouth. Why then does it appear that oral hygiene care for the critically ill receives meagre attention?

The aim of this paper is to answer the following questions:

1. What are the beneficial effects of oral hygiene care in critically ill patients?
2. How should oral hygiene care practices be implemented?

## Methodology

A review of the literature on oral hygiene for critically ill patients, including nursing practices, was utilised in order to describe best nursing practice to guide the provision of effective oral hygiene care to the critically ill patient.

The objectives developed to conduct the review of literature on this aspect of patient care included the following:

- To describe the benefits of effective oral hygiene for the critically ill patient
- To identify barriers to effective oral hygiene in the critical care unit
- To describe the commonly used and the recommended methods of providing oral hygiene.

Critical care nursing reference books were consulted to develop a fundamental understanding of the nursing considerations around oral hygiene in the critically ill patient. A search of the electronic databases PubMed and ScienceDirect was done utilising key words *oral hygiene, critical care, intensive care unit*. This assisted in identifying the latest published research on oral hygiene and related practices by nurses in the critical care environment. Abstracts of articles published over the 10-year period 1997 - 2007 were extracted and read to determine their relevance to this study. Eleven relevant articles were identified and all were included in the review.

The literature review is presented under the following headings:

1. Oral health in critical illness
2. Barriers to oral care
3. Practices in delivery of oral care.

### Oral health in critical illness

Oral health is influenced by dental plaque, the presence and type of oral microbial flora and oral immunity.<sup>7</sup> The predominant aerobic oral organism in healthy adults is *Streptococcus viridans*. Owing to changes in oral enzyme levels, the oral flora of a critically ill patient changes to primarily Gram-negative organisms within approximately 48 hours.<sup>4,7</sup> This represents a more virulent flora that may include agents with the potential to cause ventilator-associated pneumonia (VAP), examples including *Staphylococcus aureus*, *S. pneumoniae*, *Acinetobacter baumannii* and *Pseudomonas aeruginosa*.<sup>7</sup> VAP is common among ventilated patients, with a mortality rate that generally ranges between 24% and 50% and may be as high as 74% in high-risk populations.<sup>4,6</sup>

There is evidence to suggest a link between colonisation of dental plaque with respiratory pathogens and VAP.<sup>2,4,5</sup> Dental plaque comprises the accumulation of oral micro-organisms embedded in bacterial and salivary products allowing the tenacious adherence of this complex to the tooth surface. When dental plaque matures and becomes calcified it contains a diverse microcosm of organisms and may serve as a reservoir for pathogens when oral hygiene care is inadequate or ineffective.<sup>4,7</sup> As many patients in the intensive care unit are immunocompromised, they have a predisposition to oral infections<sup>2,7</sup> that can further impact on their condition.

Research findings have shown that oropharyngeal colonisation is a critical risk factor for nosocomial pneumonia in ventilated patients.<sup>7</sup> In the critical care unit, deterioration of a patient's respiratory function may necessitate endotracheal intubation and mechanical ventilation. This life-saving intervention, requiring the insertion of an artificial airway, can place the patient at risk for direct introduction or

micro-aspiration of pathogens from the oral cavity into the lower part of the respiratory tract. The risk of nosocomial pneumonia among mechanically ventilated patients is as much as 21 times greater than among non-ventilated patients, and the mortality rate in these patients may exceed 50%.<sup>5</sup> The treatment of nosocomial pneumonia adds 5 - 7 days to the hospital stay of surviving patients and significantly increases health care costs.<sup>7</sup> Maintaining and improving oral hygiene through oral care interventions has become critical in preventing adverse outcomes such as VAP.<sup>5,7</sup>

Another consideration in maintaining the oral health of intubated patients is the impact of prescribed medications or treatment interventions required to manage their medical condition, as these may have a detrimental effect on the oral cavity.<sup>8</sup> Xerostomia, or dry mouth, may be caused by the presence of devices in the patient's mouth that keep the mouth open and is aggravated by stress and anxiety.<sup>4</sup> Xerostomia can be exacerbated by treatment interventions necessary in the critically ill patient, such as the need to maintain a slightly negative fluid balance to support cardiac and respiratory function,<sup>8</sup> or the use of medication such as opiates, anticholinergics and diuretics.<sup>4,8</sup> Xerostomia can result in reduced salivary flow and lead to microbial overgrowth and heavy dental plaque formation.<sup>7</sup>

### Barriers to oral care

One of the most significant factors impacting on the oral hygiene of a critically ill patient is simply their inability to perform this essential care aspect for themselves. Critically ill patients are usually totally dependent on nursing staff for their personal and oral care.<sup>2</sup> The provision of effective oral care for patients in critical care units is particularly challenging. The complexity of the patient's other treatment and care needs in a fast-paced environment may result in oral care having a lower priority for nurses than other aspects of care.<sup>2</sup>

The shortage of nurses in critical care units can result in the reprioritising of patient care versus tasks to be completed, with activities considered to be more urgent taking priority over activities (such as oral care) that are viewed as basic nursing, and it has been reported that when nurses' time is rationed, oral care is often the first practice to be deferred.<sup>5</sup>

Berry and Davidson identified particular key barriers to the achievement of optimal oral hygiene. These barriers are classified as mechanical, communication, and the nurse's perceptions.<sup>4</sup>

Mechanical barriers crowd the mouth of the ventilated critically ill patient. These may include an endotracheal tube, oral airway, oral gastric tube, and temperature probe.<sup>3,4</sup> Delivering effective oral hygiene in this confined, occupied space will challenge even an experienced critical care nurse.

Nurses generally have inadequate tools for mouth care.<sup>4</sup> Often mouthwash and foam swabs rather than toothbrushes are available, or the toothbrushes provided are of poor quality, large, and not readily accessible.<sup>5</sup>

Communication barriers are related to both to language and treatment. Practice experience shows that the care activities related to oral hygiene can be made easier if the patient is informed about them and understands their intention; for example, the patient is able to comply with requests to open the mouth. Lack of patient compliance may be due to a language barrier, but also to the effects of sedation or other treatment interventions. Inability to speak once an endotracheal tube is *in situ* can cause irritation and frustration for the patient and lead to lack of compliance. A patient in pain may also be reluctant to comply.<sup>4</sup> Careful and thorough patient assessment will assist in identifying these barriers and improve the care experience for both patient and nurse.

Oral comfort and hygiene measures are important facets of nursing care for patients receiving mechanical ventilation.<sup>6</sup> No comprehensive guidelines exist that define the method and frequency of oral care in this situation, so great variability exists among nurses and there is a gap between oral care measures indicated and the actual care patients receive.<sup>6</sup>

Inadequate oral hygiene appears to have roots in the nurses' perceptions of these activities. Studies have reported that provision of oral hygiene is allocated a low priority in many undergraduate nursing programmes.<sup>4,9</sup> Jones *et al.*<sup>2</sup> found that 41% of nurses had received training in oral care during their initial nursing training and 48.5% received 'on the job' training, while a minority (14.5%) had attended a later training course on oral care. Fifty-nine per cent of nurses did not recall receiving any oral care training. More than half of the nurses participating in their study requested training in oral care (58%).

In a recent study, the length of critical care nursing experience did not correlate with quality of mouth care provided.<sup>4</sup> However, adequate time for procedures and the view that mouth care is an unpleasant task were noted as factors in quality oral hygiene provision.<sup>7,9</sup> This is supported by the view of Berry and Davidson<sup>4</sup> that although it is considered to be a basic nursing practice, oral hygiene is at risk of being relegated to a low priority when caring for a complex critically ill patient. Further reinforcement of this theme is provided by a survey in which 13.5% of nurses in the study rated oral care as a low priority.<sup>2</sup> A study by Munro *et al.*,<sup>7</sup> in which critical care nurses were asked to rate the priority they gave oral care in comparison with all other patient care activities they need to perform, showed that the nurses rated oral care at a mean of 53.9 on a 100-point scale.

This shortfall in the prioritisation of oral hygiene in the complex and highly technological critical care environment is possibly due to a deficiency in oral health knowledge or a lack of appreciation of its importance by registered nurses.<sup>4</sup> Furr *et al.*<sup>5</sup> reported in their conclusion that oral care education, having sufficient time to provide oral care, seeing oral care as a priority, and not viewing oral care as unpleasant are associated with providing better oral care. Focused education and training activities are necessary to stress the importance of this task to clinicians.<sup>4</sup>

The use of a standardised comprehensive protocol for oral care practices has been shown to impact on the completeness and frequency of oral care practices among critical care nurses.<sup>6</sup> Significant improvement in the frequency of all aspects of oral hygiene care activities was noted when the practice of critical care nurses was compared before and after the implementation of an oral hygiene care protocol.<sup>6</sup>

### Practices in delivery of oral care

There is no clear consensus on how frequently mouth care should be implemented.<sup>4</sup> In a study by Cutler and Davis,<sup>6</sup> where a standardised protocol was implemented to manage oral hygiene care practice, the recommended frequency for oral cleansing was 2-hourly, but they noted that in practice it varied between 2- and 4-hour intervals and recommend further investigation into this aspect.<sup>6</sup> This view is supported by other authors, who recommend that critical care nurses collaboratively develop evidence-based guidelines to inform best practice in the critical care unit.<sup>4</sup>

A substantial benefit was reported in the use of toothbrushes over foam swabs for the removal of dental plaque.<sup>4</sup> The normal adult toothbrush is too large to access the mouth of the intubated patient, so it is advisable to use a soft-bristled 'baby' toothbrush.<sup>4</sup> It provides better access to all regions of the mouth and can also be used to gently brush the tongue, and in edentulous patients, the gums.<sup>4,7</sup> Brushing teeth with a child-size brush is superior to foam swabs in removing dental plaque and bacteria.<sup>5</sup>

Despite this evidence, it was found that toothbrushes and toothpaste were used infrequently by almost 80% of respondents.<sup>5</sup> The use of toothpaste and a toothbrush was significantly greater in non-intubated patients, and use of a sponge toothette was greater in intubated patients.<sup>9</sup>

In surveys, critical care nurses have reported only a 38.9% frequency of use of a toothbrush to provide oral care to intubated patients.<sup>7</sup> Despite evidence that using a toothbrush is superior to foam swabbing, cotton and foam swabs are another commonly used method of mouth care. This experience is supported by studies that indicate that swabbing is still the

preferred method of oral care in critical care units.<sup>2,5</sup> Swabbing techniques are reported to have very little plaque-debriding ability.<sup>2,4</sup> The foam stick is useful for moisturising the oral cavity between brushings.<sup>2</sup>

Toothpaste is not considered crucial for plaque elimination, but the effects of topical applications of fluoride have long been considered essential in the prevention of decay.<sup>4</sup> Non-foaming toothpaste is preferred because it is more readily rinsed clear of the mouth, as any residue of toothpaste may have a drying effect on the mucosa.<sup>4</sup> Hanneman and Gusick<sup>10</sup> reported that the use of oral care products differed between intubated (sodium chloride, peroxide mixture, chlorhexidine) and non-intubated (mouthwash, toothbrush, toothpaste) patients.

A variety of mouth rinses are discussed in the literature, and a summary of these follows:

- **Chlorhexidine 0.1 - 0.2%** has an inhibitory effect against Gram-positive and Gram-negative organisms and yeast. Chlorhexidine has a slow-release property that maintains antimicrobial activity for up to 12 hours.<sup>4,8</sup>
- **Sodium bicarbonate mouthwash 1%** is a cleaning agent reported to reduce the viscosity of oral mucus, therefore enhancing the removal of oral debris. It is important to use it in the recommended concentration because it may cause mucosal irritation. However, to date there are no reported randomised controlled studies to support its use over any other mouth rinse in the critical care population.<sup>4</sup>
- **Hydrogen peroxide** is an acidic solution and must be correctly diluted before use because of a risk of mucosal irritation. Subjective complaints of discomfort and mucosal damage in groups of healthy participants receiving hydrogen peroxide mouthwashes have been reported.<sup>4</sup> With the benefit of toothbrushes established, the use of hydrogen peroxide-impregnated foam sticks cannot be recommended for use in the critically ill population.<sup>4</sup>
- **Sodium chloride** can promote healing of oral mucosal lesions because of its tendency to cause drying, but routine use as a mouth rinse is limited in the critical care setting.<sup>4</sup>
- **Water** can be used in combination with a small, soft-bristled toothbrush to clean the teeth and gums or as a sole agent to rinse and remoisten the oral cavity. Hospital tap water has been identified as a serious source of waterborne nosocomial infections, notably those attributed to *Pseudomonas*.<sup>4</sup> The use of small bottles of sterile water may be a cost-effective mouth rinse for use in intensive care patients.<sup>4</sup> Administration of ice chips is a way to reduce mouth dryness, make patients more comfortable, and manage bacterial overgrowth.<sup>3</sup>
- **Povidone-iodine.** Although povidone-iodine may be useful in treating mucosal wounds following

surgery, it is of questionable value as a regular mouth rinse for intensive care patients because it does not have an anti-plaque effect and prolonged use may result in a significant amount being absorbed.<sup>4</sup>

- **Lemon and glycerol swabs.** Although the initial effect may stimulate salivary flow, this mechanism may be exhausted in excessive use and result in xerostomia.<sup>4,7</sup> Owing to an acidic and decalcifying effect on tooth enamel, these swabs are no longer generally used for the provision of oral care in intensive care patients.<sup>4,7</sup>

Salivary substitutes are important agents in moisturising the mouth of the xerostomic patient. The substitute must contain the salivary enzymes lactoferrin and lysozyme, essential for boosting the natural immune process.<sup>4</sup>

Lips of intubated patients are at extreme risk of becoming dry and cracked. This is because the patient is unable to remoisten the lips naturally by passing the tongue around the lip surface. Petroleum jelly and lanolin are used to prevent lip dehydration, as they give an occlusive effect that reduces transepidermal water loss.<sup>4</sup>

Dental syringes with a curved nozzle can be useful to apply mouth rinses to intubated patients.<sup>4</sup> Use of a flexible suction catheter is advocated as it can reach the subglottic area and is essential for removing secretions pooled above the endotracheal tube cuff. Tongue cleaning is important to remove debris from the tongue. This procedure involves a forward-raking motion along the posterior region of the tongue, preferably with a small, soft-bristled toothbrush.<sup>4</sup>

## Conclusion

Oral hygiene is a complex and important procedure that should be done effectively on all patients. This is particularly true for critically ill patients who are immunocompromised and at risk of developing infections.

It is essential that the potential pool of organisms in the mouth is reduced by good oral hygiene practices. This may help to reduce the translocation of organisms to the lungs via the endotracheal tube and decrease the risk of VAP.<sup>7</sup> Effective oral hygiene care practices in the critically ill patient play a role in infection prevention and control by limiting dental plaque colonisation and the development of nosocomial respiratory tract infections, and can reduce the negative effects of required therapy.

The most significant barrier to effective oral hygiene care practice is the perception of nurses regarding these activities. It has been noted in the literature that oral hygiene is given a low priority in comparison with other activities considered to be more important in the care of the critically ill patient. It is worth considering

whether this low prioritisation of oral care applies to other health care practitioners in the critical care environment. There is inadequate focus on oral hygiene education and training that may well reinforce the low priority applied to these activities by clinicians. When considering the impact of poor oral hygiene care on a critically ill patient, it is crucial that critical care nurses prioritise the basic but essential aspects of patient care of which oral hygiene forms part. Critical care nurses use their skill and knowledge within a technologically driven environment, but this should not diminish the important fundamental practices of patient care that are part of a professional nurse's practice domain.<sup>11</sup>

Effective oral hygiene care can be implemented with a small (child-sized), soft-bristled toothbrush and toothpaste, using water and a flexible suction catheter to cleanse the mouth after brushing. The teeth, gums and tongue should be gently cleaned. A family trying to deal with the stress of an admission of a loved one will usually not realise the place for a simple toothbrush in the care of the patient. In South Africa it is probable that many patients cannot afford to buy one. Providing patients with a small toothbrush as part of their admission to the critical care unit should be investigated as a strategy to assist in preventing complications that may develop from poor oral hygiene. It may well impact positively on the cost of care.

Oral hygiene care practices should be implemented from the time of admission of the patient into the critical care unit. With lack of evidence to determine the frequency of implementation of oral hygiene care,

the nurse should assess the needs of each patient and determine the frequency of interventions accordingly.

Oral hygiene must not be rated as a low priority by critical care nurses, and specific focus on education and training is needed to emphasise the importance of oral hygiene care. Further research is needed to determine the ideal frequency and timing of oral care practices and their relationships to infection prevention and control in patients receiving mechanical ventilation. There is a need for evidence-based guidelines for oral hygiene care in the critically ill patient.

This paper reports on a study that formed part of the requirements for the BCur Honours (Critical Care Nursing) programme.

1. Anderson DM. *Mosby's Medical, Nursing and Allied Health Dictionary*. 6th ed. St Louis: Mosby, 2002.
2. Jones H., Newton JT, Bower EJ. A survey of the oral care practices of intensive care nurses. *Intensive and Critical Care Nursing* 2004; 20: 69-76.
3. Triegeer N. Oral care in the intensive care unit. *Am J Crit Care* 2004; 13(1): 24.
4. Berry AM, Davidson PM. Beyond comfort: oral hygiene as a critical nursing activity in the intensive care unit. *Intensive and Critical Care Nursing* 2006; 22: 318-328.
5. Furr AL, Binkley CJ, McCurren C, Carrico R. Factors affecting quality of oral care in intensive care units. *Journal of Advanced Nursing* 2004a; 48(5): 454-462.
6. Cutler CJ, Davis N. Improving oral care in patients receiving mechanical ventilation. *Am J Crit Care* 2005; 14(5): 389-394.
7. Munro CL, Grap MJ, Kleinpell R. Oral health and care in the intensive care unit: state of the science. *Am J Crit Care* 2004; 13(1): 25-33.
8. Abidis RF. Oral care in the intensive care unit: a review. *J Contemp Dent Pract* 2007; 8(1): 1-8.
9. Grap MJ, Munro CL, Ashtiani B, Bryant S. Oral care interventions in critical care: frequency and documentation. *Am J Crit Care* 2003; 12(2): 113-118.
10. Hanneman SK, Gusick GM. Frequency of oral care and positioning of patients in critical care: a replication study. *Am J Crit Care* 2005; 14(5): 378-387.
11. Wilkin K. A critical analysis of the philosophy, knowledge and theory underpinning mouth care practice for the intensive care unit patient. *Intensive and Critical Care Nursing* 2002; 18(3): 181-188.