

## Oral Care in the Intensive Care Unit: A Review

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### Abstract

Oral care for patients in the hospital's Intensive Care Unit (ICU) is important, but this is usually the responsibility of nurses without sufficient knowledge in oral care or comprehensive protocols to follow. The problems of maintaining oral care with oral intubation, performing oral assessment, guidelines for oral hygiene care, frequency of oral care needed, and suggested mouth care protocol followed by recommendations are presented and discussed in this paper.

**Keywords:** Intensive Care Unit, ICU, oral healthcare, oral intubation

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## Introduction

Patients in the Intensive Care Unit (ICU) have very specific care needs, demanding the highest standard of professional care. Frequently, the life saving nature of the ICU means the patient's oral care takes low priority, however, the significance and benefits of having adequate oral care for these patients has been emphasized and presented elsewhere.<sup>1-9</sup>

On reviewing nursing education programs, it was found oral care had a low priority.<sup>10</sup> This may partially account for the continuing low priority of oral care for patients in the ICU.<sup>11</sup> A patient's individual requirements for oral care should be taken into consideration as part of the admission assessment.<sup>2,12</sup> However, this does not always occur. Usually nursing care for critically ill patients includes some type of oral care, as the nurse has the responsibility for assessing, planning, implementing, and evaluating each patient's oral care needs. However, oral hygiene practices performed by nurses have been reported to be inconsistent and highly variable.<sup>6</sup>

The patient's oral comfort should also be considered.<sup>13</sup> Hallett,<sup>14</sup> in her work with the terminally ill, emphasized a sore mouth rated high on the patient's own list of distressing symptoms. In addition to the unpleasant odor associated with halitosis there is a social aspect of not having a clean mouth.<sup>11</sup>

A further point to be considered is the impact of poor nutritional status on the oral cavity. Orally intubated patients have to be artificially fed by either enteral or parenteral routes since they are unable to take anything by mouth. Horwood<sup>15</sup> discusses the importance of early initiation of

feeding for intensive care patients and lists reduced wound healing and reduced immunity to infection among the consequences of inadequate nutrition. Oral pain or discomfort experienced by the patient can discourage the intake of food and liquids as well as communication once the patient has been extubated.<sup>11</sup>

Therefore, it is essential ICU patients have sufficient oral care during their stay in the ICU to prevent oral problems and possible complications. The aim of this review is to present the problems of providing and maintaining oral care in the presence of oral intubation, the need to perform an oral assessment, and to offer guidelines for oral hygiene care for patients in an ICU environment.



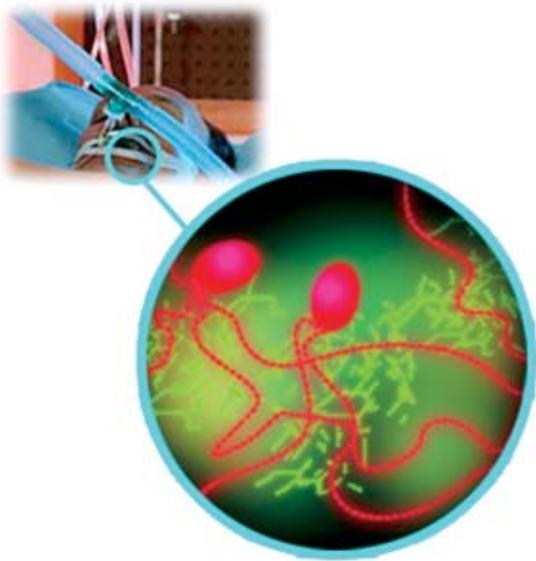
## Oral Intubation

ICU patients may require oral intubation to maintain a patent airway. However, it has been reported an endotracheal tube can induce potential complications for a patient.<sup>16</sup>

## Problems Associated with Oral Intubation

With severe illnesses the bacterial strains naturally present in the mouth can shift from being predominately gram-positive normal flora to anaerobic gram-negative strains.<sup>6,17</sup> Because organisms that colonize in the mouths of critically ill patients are virulent compared with organisms in the mouths of healthy individuals, the potential for infection is increased.<sup>2</sup> Critically ill patients also have impaired immunological deficiencies and may be unable to respond to bacterial invasion of the lungs.<sup>6</sup> Pathogens commonly responsible for nosocomial pneumonia in ICU patients were found to colonize in the dental plaque and oral mucosa





of these patients.<sup>3</sup> Therefore, good oral hygiene measures may prevent the spread of infection from the oral cavity to the lower respiratory tract.<sup>11</sup>

Assessment of the oropharynx and maintaining a favorable level of hygiene are difficult tasks to perform in both critically ill and in orally intubated patients due to lack of access to the oral cavity.<sup>18</sup> The orally intubated patient is at an even greater risk of colonization of organisms because mouth care is often hampered by the presence of tape, tubes, and bite blocks.<sup>6</sup> The oral endotracheal tube is required for ventilation and airway protection. The position of the tube and any anchoring devices may obscure the view of the oral cavity and limit access which hinders the actual process of cleaning.<sup>11</sup> Dislodging or displacing it may be life-threatening.<sup>6</sup> As a result, nurses are often reluctant to manipulate the tube for oral assessment and hygiene measures. In turn, fixation tapes quickly become heavily contaminated with pathogens in the presence of salivary disturbances and the difficulties associated with cleansing the mouth.<sup>19</sup> Oral assessment and care of the mouth is even more difficult in patients requiring prolonged intubation.<sup>2</sup>

Another aspect of maintaining the oral health of intubated patients is the impact of the use of drugs or procedures required to treat their medical condition that may have a detrimental effect on the oral cavity.<sup>11</sup> An example are drugs that cause xerostomia.<sup>15</sup> Intubated patients are forced to keep their mouths open and this may

lead to dryness of the oral mucosa.<sup>4,19,20</sup> It is also common practice in ICUs to keep patients dehydrated in order to improve respiratory and cardiac function.<sup>20</sup> However, this may also exacerbate xerostomia and increase the potential for oral infections.<sup>11</sup>

## Patient Management

### Oral Assessment

Despite the presence of the essential tools that can be used for oral assessment in ICUs, they are often not used. This may be due to a lack of time or knowledge on part of the bedside nurse as well as the lack of assistance for nurses in identifying particular problems such as candida or herpes simplex infections.<sup>21</sup> Collaborative interactions with dental hygienists could improve the nurse's knowledge and skill related to oral care.<sup>9</sup> Historically, the expertise of dental hygienists has not been routinely employed in either the care of the ICU patient or to advise the ICU nursing staff even though they possess the clinical expertise in practical oral care and the prevention of oral disease.<sup>9,22</sup>

A research-based protocol for oral care in the ICU setting is desirable.<sup>1-8,23</sup> Hayes and Jones<sup>19</sup> recommended the use of the BRUSHED Assessment Model (Figure 1). This model was made to prompt nurses to check for particular clinical signs during oral assessment.



Figure 1. The "BRUSHED" Assessment Model<sup>19</sup>

## Oral Hygiene Care

Oral hygiene in the ICU is a commonly performed nursing procedure in which the aim is to ensure that patients' mouths are cared for.<sup>20</sup> Pritchard and David<sup>24</sup> indicate mouth care is required to:

1. Achieve and maintain oral cleanliness
2. Prevent infection/stomatitis
3. Keep the oral mucosa moist
4. Promote patient comfort

According to the nursing literature, toothbrushes are not the tools of choice for oral care by nurses.<sup>25,26</sup> To the contrary, there is strong evidence to support the use of a toothbrush for the effective control of plaque and its associated complications; the toothbrush is recommended to be the tool of choice for mouth care.<sup>20</sup>

The practice of using a toothbrush for the maintenance of the oral hygiene of orally intubated patients is not widespread for reasons already discussed.<sup>11</sup> Generally, nurses have not been formally trained in assessing the oral status of patients in ICUs, and oral care protocols for these patients are not usually available.<sup>23</sup> It has been recommended dental hygienists be involved in nursing education programs<sup>27</sup> in order to improve the nurses' knowledge and ultimately their ability to provide better oral care. Fitch et

al.<sup>23</sup> recommended implementation of a well-developed oral care protocol by bedside nurses to improve oral health of patients in the ICU (Table 1).

Some solutions and types of equipment used by nurses for oral care are not optimal.<sup>20</sup> Hydrogen peroxide and sodium bicarbonate effectively remove debris, but if not diluted carefully, may cause superficial burns. In a study<sup>28</sup> using hydrogen peroxide, significant mucosal abnormalities were reported and numerous subjective complaints were made. Foam swabs, which are commonly used to provide mouth care to patients who cannot provide self-care, are effective for stimulation of mucosal tissues but are ineffective in removing plaque.<sup>1,4,5,7,8,29</sup>

Tooth brushing with a fluoride toothpaste is advised for almost all patients.<sup>2,19</sup> Only a small minority of intubated patients should not have a toothbrush used such as those with severe ulcerations or profound clotting disturbances that cause gingival hemorrhage.<sup>30</sup> Edentulous intubated patients should have their tongue gently brushed to help maintain healthy mucosa.<sup>12</sup> Dentures should be kept clean in readiness for the patient following extubation.

**Table 1. Mouth care protocol.**<sup>23</sup>

<p><b>Preparation</b></p> <ol style="list-style-type: none"><li>1. Wash hands and don examination gloves.</li><li>2. Explain to the patient his/her mouth will be cleaned with toothpaste and mouthwash and then petroleum jelly will be applied to the lips.</li></ol> <p><b>Technique</b></p> <ol style="list-style-type: none"><li>1. Using a soft, pediatric-size toothbrush, brush the patient's teeth, gums, and tongue using Biotene<sup>®</sup> antibacterial dry mouth toothpaste (Biotene Inc, Rancho Dominguez, CA, USA).</li><li>2. If the patient has no teeth, brush the gums and tongue gently.</li><li>3. If an airway (i.e., bite block) is present, remove, clean, and replace it after mouth care is completed.</li><li>4. If the patient is unresponsive and/or has clenched the mouth shut, use a mouth prop to gently open the mouth.</li><li>5. Rinse the toothpaste from the patient's mouth with an alcohol-free mouthrinse using a irrigation syringe or swab and suction as needed. (Biotène mouthrinse (Biotene Inc., Rancho Dominguez, CA, USA), Perioaid<sup>®</sup> 35 (Dentaid Benelux, Housten, The Netherlands), or Crest<sup>®</sup> Pro-Health™ mouthrinse<sup>37</sup> (Procter &amp; Gamble Co., Cincinnati, OH, USA))</li><li>6. Apply Oral Balance (Laclede Inc., Rancho Dominguez, CA, USA) moisturizing gel to a gloved finger and gently massage into the mucosal membranes of the patient's mouth.</li><li>7. With a gloved finger, apply petroleum jelly to the patient's lips.</li></ol>
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For ease of use in intubated patients, a small-headed toothbrush may be beneficial.<sup>19</sup> Special autoclavable toothbrushes with built-in suction devices are available as are electric toothbrushes.<sup>31</sup> However, these devices have not been tested with intubated patients.



When tooth brushing is not possible, a foam stick soaked in chlorhexidine mouthwash can be effective in reducing plaque.<sup>30</sup> Chlorhexidine is efficient against gram-positive and gram-negative bacteria as well as fungi and yeasts.<sup>32</sup> Chlorhexidine also shows a high affinity for oral mucosa, dental surfaces, and saliva glucoproteins<sup>33</sup> and has a persistent bacteriostatic action lasting in excess of 12 hours.<sup>34</sup> Recently, an alcohol-free brand of 0.12% chlorhexidine solution (Perioaid® Dentaid Benelux, Houten, The Netherlands) has been developed and has shown to be as effective as rinsing with the alcoholic 0.2% chlorhexidine mouthrinse<sup>35</sup> and, therefore, is advocated for use. Two other alcohol-free therapeutic mouthrinses suggested for use are Biotène® antibacterial mouthwash<sup>23</sup> (Laclede Inc., Rancho Dominguez, CA, USA) and 0.07% cetylpyridinium chloride mouthrinse (Crest® Pro-Health™ Rinse (Procter & Gamble Co., Cincinnati, OH, USA)).<sup>36,37</sup> Otherwise, a foam stick with an antimicrobial agent is most useful for rinsing and moistening the mouth between brushings.<sup>2,16</sup>

It has also been stated 0.9% saline or water are just as effective as mouthwashes.<sup>2,15,18</sup> Disposable cotton swabs are often used for cleaning and moistening the patients' mouths and teeth in critical care units. Examples of these are lemons and glycerine swabs that stimulate production of

saliva initially but are acidic, causing irritation and decalcification of teeth;<sup>7,8,38</sup> therefore, choosing less erosive products is important. In an *in vitro* study<sup>39</sup> Lemon-Glycerine Swabsticks® (PDI, Orangeburg, NY, USA) and Lemon Glycerine Swabs® (Dansu A/S, Stenløse, Denmark) caused erosion, while Dentiswab cotton swabs (Dentiscand Pharma AB, Malmö, Sweden) and Cassisal® tablets (Dentiscand Pharma AB, Malmö, Sweden) did not and, therefore, could be recommended for mouth cleaning.

Some patients may need suction therapy. The aggressive use of rigid plastic suction tips during oral care should be discouraged to avoid oral trauma.<sup>40</sup>

### Frequency of Oral Hygiene Care

The frequency of oral hygiene for intubated patients is an area of controversy. Day<sup>12</sup> and Jenkins<sup>2</sup> suggest the frequency is based upon the scores from an "at risk" calculator, whereas Trenter et al.<sup>41</sup> recommend anywhere between two and four hours, depending on the patient's condition. The oral hygiene protocol suggested by Barnason et al.<sup>16</sup> of brushing every 12 hours and oral moistening at least every two hours while the patient remained intubated appeared effective but suggested more detailed research in this area is needed.

### Oral Care Protocol for ICU Patients

Fitch et al.<sup>23</sup> in their study used a mouth protocol (Table 1). The oral care provided in their study was performed by nurses and differed from routine oral care in several ways. First, a pediatric toothbrush was used which had the advantage of being small enough to remove plaque yet not disturb oral tubes. Its soft bristles reduce the potential for trauma and bleeding. In addition, the care products selected were alcohol-free and antibacterial to enhance the mechanical effects of oral cleansing without drying the mucous membranes. Although in Fitch et al.<sup>23</sup> they used Biotene, other alcohol-free antimicrobials can be suggested as Perioaid<sup>35</sup> or Crest Pro-Health mouthrinse<sup>37</sup> are also suggested. In the Fitch et al.<sup>23</sup> study Oral Balance® moisturizing gel was applied to the mucous membranes and then petroleum jelly was applied to the lips to reduce tissue drying. The nurses were able to complete the entire protocol in less than five minutes and

preferred this mouth care protocol to previous methods in use in the unit. The experimental protocol was effective in reducing inflammation, whereas routine oral care had a minimal effect on inflammation. They concluded the provision of a well developed oral care protocol by bedside nurses can improve the oral health of patients in the ICU. There were also positive correlations between scores for salivary flow, plaque, inflammation, bleeding, and purulence obtained by the nurses and scores obtained by the dental hygienist indicating nurses can appropriately assess the oral status of patients in the ICU in the study after proper training.

### Recommendations

The following are recommended for the oral care of ICU patients:

1. ICU patient's individual requirements for oral care should be considered as part of the admission assessment.
2. Education of nurses to provide skills in oral assessment and oral care is essential. The dental hygienist can train bedside nurses to improve the oral assessment and enhancement of oral care for ICU patients.
3. The use of an assessment model such as the "BRUSHED" Assessment Model<sup>19</sup> is recommended for the immediate identification of oral problems for every patient and should be carried out daily.
4. The use of a comprehensive protocol such as the Mouth Care Protocol<sup>23</sup> presented in Table 1 has been shown to be effective and is recommended.
5. The frequency of oral care is an area of controversy and may depend more on the patient's condition. However, brushing every 12 hours and oral moistening at least every two hours while the patient remains intubated is recommended until further research is done in this area.
6. Some solutions and types of equipment used by nurses for oral care are not optimal and, therefore, caution must be applied if they are used. Examples include hydrogen peroxide and sodium bicarbonate, if not diluted carefully, may cause superficial burns. Lemons Glycerine Swabs<sup>®</sup> can cause irritation and decalcification of teeth. Instead Dentiswab cotton swabs and Cassisal<sup>®</sup> tablets are recommended. Foam swabs are ineffective in removing plaque, whereas the use of a soft pediatric toothbrush is recommended instead.
7. Further research is needed to determine the most effective way to perform oral hygiene care in critically ill patients as well as deciding on the most appropriate frequency of oral care. Research is also needed to determine the impact of oral health and improved oral health status on patients' outcome.

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