

## **ORAL CARE INTERVENTIONS IN CRITICAL CARE: FREQUENCY AND DOCUMENTATION**

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- **BACKGROUND** No data have been collected to describe the products, methods, and frequency of oral care needed to reduce dental plaque, oral colonization, and ventilator-associated pneumonia in critically ill patients.
- **OBJECTIVES** To describe the frequency of use of oral care interventions reported by nurses in several intensive care units in a large southeastern medical center.
- **METHODS** Staff members completed a written survey describing their oral care practices, and oral care interventions were recorded from the unit's flow sheet for the previous 24 hours for all patients at 5 randomly selected times during 1 month.
- **RESULTS** Most respondents (75%) reported providing oral care 2 or 3 times daily for nonintubated patients, and 72% reported providing care 5 times daily or more for intubated patients. However, oral care was documented on the unit's flow sheet a mean of 1.2 times per patient. Reported use of toothpaste and a toothbrush was significantly greater in nonintubated patients ( $P < .001$ ), and use of a sponge toothette was significantly greater in intubated patients ( $P < .001$ ). Nurses' mean rating of oral care priority was 53.9 on a 100-point scale.
- **CONCLUSIONS** Despite evidence that they are ineffective for plaque removal, sponge toothettes remain the primary tool for oral care, especially in intubated patients in intensive care units. Nurses report frequent oral care interventions, but few are documented. Education and focus on good oral care strategies are required; nursing research to delineate the best procedure for all patients in intensive care units is needed. (*American Journal of Critical Care*. 2003;12:113-119)

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Patients' oral care is a key component of nursing care. Oral care is often considered primarily an intervention for patients' comfort, a characteristic that may reduce its priority and thus its frequency. Information about the frequency and type of oral care provided to critically ill patients will guide the development of nursing interventions that may improve outcomes in these patients.

Oropharyngeal colonization is associated with several systemic diseases, including cardiovascular disease,<sup>1</sup> chronic obstructive pulmonary disease,<sup>2,4</sup> and in the intensive care unit (ICU), ventilator-associated pneumonia (VAP).<sup>5</sup> In the United States, nosocomial pneumonia ranks second in morbidity and first in

mortality among nosocomial infections.<sup>6</sup> The treatment of nosocomial pneumonia adds 5 to 7 days to the hospital stay of surviving patients and billions of dollars to healthcare costs.<sup>7,8</sup> VAP occurs in 9% to 24% of patients with various pulmonary disorders.<sup>9</sup> The reported mortality rate of VAP varies between 54% and 71%, and mortality is particularly high in pneumonia attributed to *Pseudomonas* or *Acinetobacter*.<sup>7,10,11</sup>

Risk factors for VAP include the presence of an endotracheal tube and continuous ventilatory support.<sup>12</sup> It is well established that presence of an endotracheal tube allows the direct entry of bacteria into the pulmonary tract, impairs the cough reflex, slows the action of the mucociliary escalator, and promotes excessive secretion of mucus.<sup>12</sup> Continuous ventilatory support maximizes the risk for nosocomial pneumonia.<sup>7</sup> Additional risk factors include enteral nutrition therapy,<sup>13-15</sup> lack of elevation of the head of the bed and the patient's position,<sup>16,17</sup> and dental plaque.

One of the most critical risk factors for the development of nosocomial pneumonia in patients who are receiving continuous ventilatory support (ie, VAP) is colonization of the oropharynx.<sup>18,19</sup> Several factors increase bacterial colonization of the oropharynx in critically ill patients receiving mechanical ventilation. Within 48 hours of hospital admission, the composition of the oropharyngeal flora of critically ill patients undergoes a change to predominantly gram-negative organisms, constituting a more virulent flora that includes potential VAP pathogens.<sup>20,21</sup> Microorganisms are concentrated in dental plaque. Dental plaque may serve as a reservoir for pathogens in patients with poor oral hygiene,<sup>22</sup> and dental plaque of patients in the ICU is colonized by potential respiratory pathogens such as methicillin-resistant *Staphylococcus aureus* and *Pseudomonas aeruginosa*.<sup>5</sup> This process of oral colonization usually precedes pulmonary colonization, which leads to VAP. Reducing the number of microorganisms in the mouth reduces the pool of organisms available for translocation to and colonization of the lung. Previous research<sup>18</sup> indicates that vigorous oral hygiene is necessary to reduce oral colonization. Toothbrushing is effective in reducing the number of oral microorganisms, but toothbrushing, even though it is an independent nursing action, is not routinely performed in critically ill patients.

Unfortunately, although the importance of oral care in the ICU has been reported,<sup>5,23,24</sup> little has been determined about the effects of oral care interventions in critically ill patients. Evidence-based protocols for oral care of critically ill patients are not available, and oral hygiene measures are generally directed toward patients' comfort rather than removal of microbes.<sup>25</sup>

The lack of published protocols for oral care in intubated patients has been noted in the clinical nursing literature.<sup>26</sup> Definitive scientific studies relating oral care interventions to VAP have not been done. In a recent comprehensive research review of evidence-based practice related to strategies to prevent VAP, Hixson et al<sup>25</sup> noted that even though oral hygiene is considered standard nursing care, it is often neglected in critically ill patients or performed by quickly swabbing the mouth. Hixson et al called for studies evaluating the effectiveness of various methods of oral care.

The purposes of this project were to describe oral care interventions reported by nurses and to determine how often these interventions are documented in medical records.

## Research Methods

### Setting and Sample

Data were collected in the medical respiratory, surgical trauma, and neuroscience ICUs at a large southeastern academic medical center. The study was approved by the institutional review board for protection of human subjects. Two samples of subjects were included in this study: nursing care providers in the ICU and critically ill patients. ICU nursing staff participated through completion of a survey. The total number of nursing staff employed (including registered nurses, licensed practical nurses, and patient care technicians) was obtained from the nurse manager for each unit; 170 nursing care providers were surveyed.

The sample of critically ill patients was drawn from the ICU population, which is approximately 60% male and 40% female and ethnically diverse (approximately 48% African American, 47% white, and 5% of other ethnic heritage). All patients 18 years old or older present in the units on 5 randomly selected data collection days during a 1-month period were included in the sample. Data for critically ill subjects were obtained from their medical records.

### Oral Care Survey

A copy of the oral care survey we designed was placed in each staff member's unit mailbox with a description of the study and a request that the staff member complete the survey. Large envelopes were placed in each unit for return of the completed surveys. One week later, a second survey was placed in the same mailboxes (a different color of paper was used to indicate it was a second copy) with a request that staff members complete it if they had not completed the first survey. Demographic data, including position (registered nurse, licensed practical nurse, or patient care technician), years of nursing experience,

years of experience in the current ICU, years of ICU nursing experience, and highest nursing education were included in the survey, but in order to maintain confidentiality of respondents, no information that could identify individuals was requested.

The survey asked how often the respondent generally performed oral care for nonintubated patients and for intubated patients. On a 100-mm analog scale (with the origin representing 0% of the time and the endpoint representing 100% of the time), respondents were asked to estimate how frequently toothbrushes, toothettes, mouthwash, isotonic sodium chloride solution, toothpaste, peroxide mixture, chlorhexidine, or other products were used in their provision of oral care to nonintubated patients. Identical questions were asked about their provision of oral care to intubated patients. Respondents were also asked to respond on a 100-mm analog scale to the question, "Considering all interventions you complete for critically ill patients, rate the priority of oral care interventions on a scale of 1-100 (1 being low priority, and 100 being highest priority)." Space was provided for respondents to write comments.

Responses to the questions about frequency of oral care were tabulated. Responses to questions about frequency of use of particular oral care products were quantified by measuring the distance in millimeters from the origin of the response line to the respondent's mark on the line.

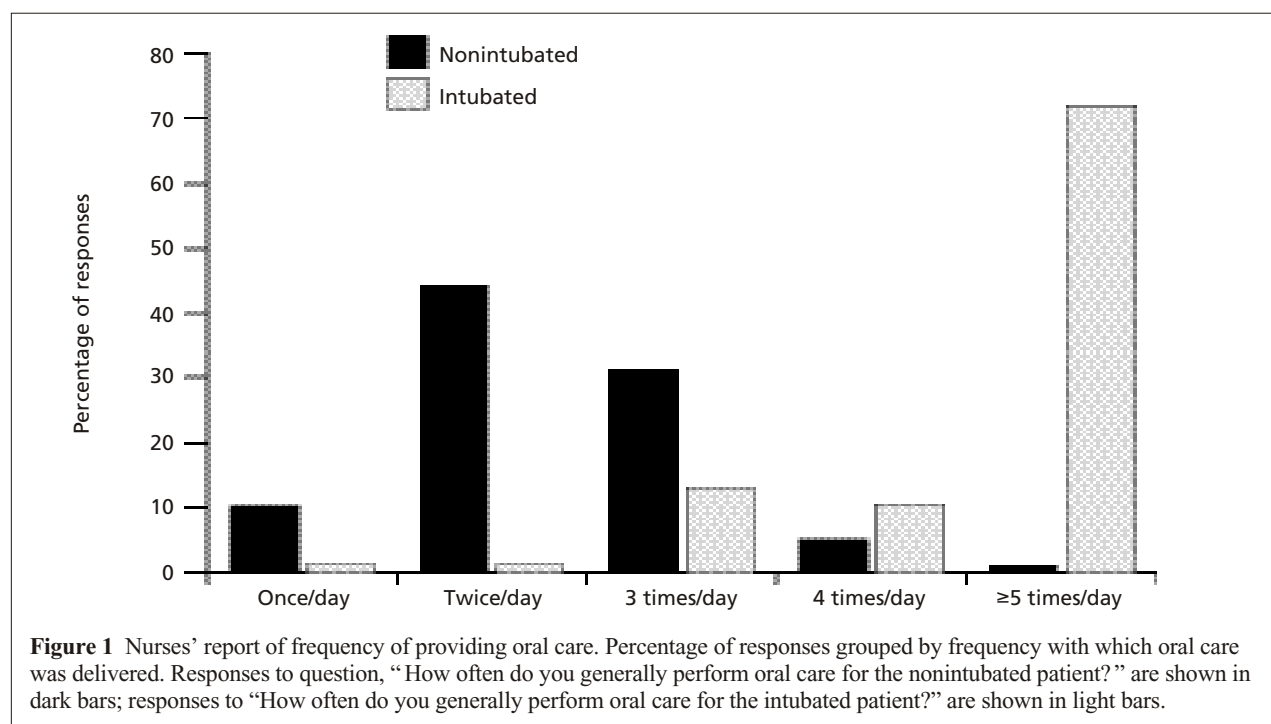
### Frequency of Documented Interventions

At 5 randomly selected times drawn prospectively from a pool of dates during a 1-month period, oral care interventions (frequency of mouth care and type of solutions used) were recorded from the ICU flow sheet of the medical record for the previous 24 hours for all ICU patients. Demographic data, including age, sex, and ethnicity of the patients, were also collected.

## Results

### Oral Care Survey

Seventy-seven healthcare providers responded for a 45% return rate. Respondents were representative of the 3 ICUs. Most of the respondents were registered nurses (97%) and had a baccalaureate nursing degree (70%). Mean years of nursing experience was 10.5, and mean ICU years of experience was 8.4 years. Although most of the respondents (75%) reported providing oral care 2 or 3 times per day for nonintubated patients, 72% reported providing care 5 times per day or more for intubated patients (Figure 1). Reported use of isotonic sodium chloride solution, mouthwash, hydrogen peroxide mixture, and chlorhexidine did not differ significantly between nonintubated and intubated patients (see Table). However, reported use of toothpaste ( $P < .001$ ) and a toothbrush ( $P < .001$ ) was significantly greater in nonintubated patients, and use of a sponge toothette was significantly greater in intu-



bated patients ( $P < .001$ ). Nurses' mean rating (1 as lowest to 100 as highest) of oral care priority was 53.9 (Figure 2).

Space was provided for nurses to write in comments about oral care. Nurses generally acknowledged the importance of oral care, with comments such as, "We make an effort to do q4h [every 4 hours] mouth care because we know how it improves patient outcomes," and "I love a clean mouth for myself and my patients." Nurses cited difficulties with providing mouth care in the ICU, as noted in the following comments: "Mouthcare is very important to my care unless patient is unstable or no time for it." "Frequency of mouth care is dependent on acuity with nursing staff levels." "We do the best we can, considering patient acuity and time." "Mouth care is done more frequently when acuity is less and staff leveling is good."

### Medical Record Documentation

Documentation of oral care in the medical record, however, was at marked variance from nurses' self-reports of provision of oral care. In 170 ICU patients, documentation of oral care in the medical record (checked on flow sheet) during the preceding 24 hours was found 205 times (mean 1.2 times per patient). Application of chlorhexidine was documented in 3 ICU patients, use of nystatin was documented in 5 patients, and use of hydrogen peroxide mixture was recorded in 1 patient.

### Discussion

ICU nurses may be hesitant to provide oral care to patients who are intubated because endotracheal tubes may limit access to the oral cavity. The fear of dislodging or displacing the tube is also a deterrent.<sup>27</sup> Provision of oral care may be affected by the perception that oral care contributes less to patients' health and well-being (or has lower priority) than other nursing interventions for critically ill patients. Comments

by nurses in this project indicated that patients' acuity and staffing levels were important factors in provision of oral care.

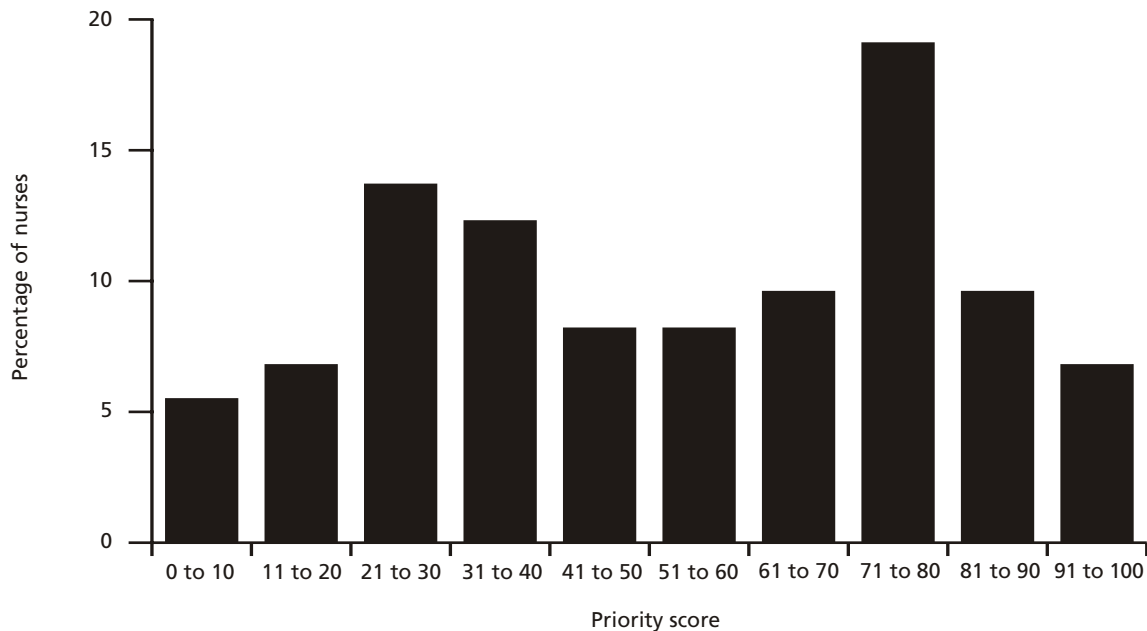
Not all oral care products are optimal. Nurses in this survey indicated frequent use of hydrogen peroxide solution. Hydrogen peroxide removes debris but if not diluted carefully may cause superficial burns. Lemon and glycerine swabs stimulate production of saliva initially but are acidic, causing irritation and decalcification of the teeth and resulting in rebound xerostomia.<sup>28-30</sup> Lemon and glycerine swabs were not used by nurses in the current study.

Foam swabs, which are commonly used to provide mouth care to patients unable to do their own care, are effective for stimulation of mucosal tissues but are ineffective in plaque removal<sup>28,29,31-34</sup> and most likely do not reduce risk of VAP. Pearson<sup>34</sup> reported that in healthy volunteers foam swabs were less effective at plaque removal than was toothbrushing and noted that the efficacy of foam swabs depended on the user's technique. A survey by Fitch et al<sup>35</sup> distributed to the nurses in the medical respiratory ICU revealed that most nurses provide mouth care to patients with a foam swab dipped in either water or mouthwash. The survey reported here, sampling in a variety of ICUs, indicates that the use of foam swabs and mouthwash continues to be a common intervention.

Toothbrushes are more effective in plaque removal and gingival stimulation than are foam swabs,<sup>32</sup> and toothbrushes are generally regarded as the best tool for oral care in healthy populations. However, Iacono et al<sup>36</sup> noted that the effectiveness of the toothbrush depends on use of the device "in a proper fashion for a sufficient duration of time and with adequate frequency." Our survey results indicate that toothbrushes were not uniformly used in nonintubated patients and were less commonly used in intubated patients. This finding is consistent with previous findings that toothbrushes are less commonly used than foam swabs in providing mouth care to hospitalized

Nurses' report of frequency of use of oral care products

	% use in			
	Nonintubated patients		Intubated patients	
	Mean	SD	Mean	SD
Mouthwash	76.3	27.5	81.9	22.5
Isotonic sodium chloride solution	9.0	19.2	18.9	27.6
Toothpaste	81.2	25.5	48.5	33.1
Hydrogen peroxide mixture	14.6	18.4	26.9	27.3
Chlorhexidine	21.3	25.4	30.9	24.6
Toothbrush	81.6	22.4	38.9	31.1
Toothette (foam swab)	54.4	32.9	91.5	13.5



**Figure 2** Nurses' ratings of importance of oral care. Percentage of nurses rating oral care priority by decile. Priority score indicates the response on a 100-mm analog scale to the question, "Considering all interventions you complete for critically ill patients, rate the priority of oral care interventions on a scale of 1-100 (1 being low priority, and 100 being highest priority)."

patients.<sup>28</sup> Pediatric toothbrushes may be easier to use than adult toothbrushes in intubated patients and improve quality of oral care.<sup>35</sup>

Although nurses' comments indicate that they value the contribution of oral care to patients' well-being, data from the medical record indicate that documentation of oral care is not congruent with nurses' self-reports of their oral care practices. Additional research is needed for the development of optimal oral care interventions for both intubated and nonintubated patients in the ICU.

#### ACKNOWLEDGMENT

This work was funded by a Virginia Commonwealth University Undergraduate Research Grant to Brooke Ashtiani and Sandra Bryant.

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