



## CLINICAL SCHOLARSHIP

### ICU Nurses' Oral-Care Practices and the Current Best Evidence

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#### Abstract

**Purpose:** The purpose of this study was to describe the oral-care practices of ICU nurses, to compare those practices with current evidence-based practice, and to determine if the use of evidence-based practice was associated with personal demographic or professional characteristics.

**Design:** A national survey of oral-care practices of ICU nurses was conducted using a convenience sample of 218 practicing ICU nurses in 2004–05. The survey instrument included questions about demographic and professional characteristics and a checklist of oral-care practices. Nurses rated their perceived level of priority concerning oral care on a scale from 0 to 100. A score was computed representing the sum of 14 items related to equipment, solutions, assessments, and techniques associated with the current best evidence. This score was then statistically analyzed using ANOVA to determine differences of EBP based on demographic and professional characteristics.

**Findings:** The most commonly used equipment was gauze pads (84%), followed by tongue depressors (55%), and toothbrushes (34%). Chlorhexidine was the most common solution used (75%). Less than half (44%) reported brushing their patients' teeth. The majority performed an oral assessment before beginning oral care (71%); however, none could describe what assessment tool was used. Only 57% of nurses reported documenting their oral care. Nurses rated oral care of intubated patients with a priority of  $67 \pm 27.1$ . Wide variations were noted within and between units in terms of which techniques, equipment, and solutions were used. No significant relationships were found between the use of an evidence-based protocol and demographic and professional characteristics or with the priority given to oral care.

**Conclusions:** While nurses ranked oral care a high priority, many did not implement the latest evidence into their current practice. The level of research utilization was not related to personal or professional characteristics. Therefore attempts should be made to encourage all ICU nurses to introduce and use evidence-based, oral-care protocols.

**Clinical Relevance:** Practicing ICU nurses in this survey were often not adhering to the latest evidence-based practice and therefore need to be educated and encouraged to do so in order to improve patient care.

Some members of the Israeli Cardiology and Critical Care Nursing Society took the initiative to organize a work group dedicated to promoting critical care nursing research and evidence-based practice. The group first heard lectures about evidence-based practice and how it can clinically affect patient care and how to critically review the literature. Following these lectures, the group conducted lengthy discussions about the purpose of the group and what projects could be realistically completed. Members of the group came to the conclusion that they wanted to conduct a national project related to a clinical area that is exclusive to nursing, could apply to all types of intensive care units, had some evidence in the literature, and could affect patient outcomes.

At the time of the beginning of the project (late 2003 to early 2004), several studies were published that found that poor oral hygiene might be associated with an increased risk for pneumonia with its concomitant increased morbidity and mortality. One specific article caught the attention of the group (Grap, Munro, Ashitani, & Bryant, 2003). These authors reported that intensive care unit (ICU) nurses' oral care practices were not documented nor were they in accordance with the most recent evidence. Oral care of intubated patients was then chosen as the topic for the project. Members of the group also believed that no consistent practices related to oral care existed, even within the same unit, and that most nurses had little or no knowledge of the current best evidence-based practice. Because the primary purpose of the group was to promote evidence-based practice, members were interested in determining what factors could be associated with the use of evidence in practice so that future interventions could be directed toward those groups to improve clinical practice and patient care. Therefore the purpose of the project was three fold: (a) to describe oral-care practices of ICU nurses, (b) to compare those practices to the current evidence, and (c) to determine whether personal demographic or professional characteristics were related to evidence-based, oral-care practice.

## Background

Ventilator-associated pneumonia (VAP) is considered to be the most common nosocomial infection (Vincent, 2004) and has been found to be a major cause of morbidity and mortality in ICUs (Bercault & Boulain, 2001; Elward, Warren, & Fraser, 2002; Rello et al., 2002). In a review of VAP literature, Chastre and Fagon (2002) concluded that VAP is a complication in 8%–28% of patients receiving mechanical ventilation and causes a high mortality rate of 24%–50%.

Several reports of studies have been published that indicated that oral decontamination might be associ-

ated with decreased risk for VAP (Bergmanns et al., 2001; Hubmayr, 2002; van Nieuwenhoven et al., 2004). Therefore, nurses could directly affect the level of VAP by providing effective oral care to decrease this contamination.

Some investigators have shown that nurses based their oral-care practices on tradition, used many different techniques and products for oral care, and had no uniform method of oral assessment (Binkley, Furr, Carrico, & McCurren, 2004; Bowsher, Boyle, & Griffiths, 1999; Curzio & McCowan, 2000; Evans, 2001; Furr, Binkley, McCurren & Carrico, 2004; Grap et al., 2003; Jones, Newton & Bower, 2004; McNeill, 2000; Munro & Grap, 2004; Munro & Grap, 2004; Stiefel, Damron, Sowers & Velez, 2000; White, 2000). Grap et al. (2003) concluded that ICU nurses' oral-care practices were not documented nor were they in accordance with the most recent evidence. Similar results were found in several later studies conducted in the United States (Binkley et al., 2004; Cutler & Davis, 2005; Hanneman & Gusick, 2005) and in a survey of 59 European ICU nurses (Rello et al., 2007); but not by Jones et al. (2004) who found that UK nurses did perform appropriate oral care methods.

When our evidence-based nurse (EBN) group was trying to decide which protocol to recommend, we found no consensus in the literature about what was the best evidence related to oral care. In a recent systematic review, Berry, Davidson, Masters, & Rolls (2007) concluded that scarce evidence exists related to oral care practices of intubated ICU patients. The Centers for Disease Control and Prevention (CDC) staff have developed guidelines for preventing VAP (R). These guidelines include hand washing; education of healthcare workers about nosocomial pneumonia and its prevention; wearing of gloves; sub-glottic suctioning; head of bed elevation; and use of chlorhexidine for cardiac-surgery patients.

The last element of the CDC guideline for preventing VAP is the development of a comprehensive oral-hygiene program; however, details are lacking about what the program should include. Another relevant set of guidelines from the CDC and the American Association of Critical Care nurses is the "ventilator bundle," that includes steps to reduce the incidence of VAP for mechanically ventilated patients. This bundle includes elevating the head of the bed, continuous subglottal suctioning, changing ventilator circuit no more than every 48 hours, and hand washing before and after contact with each patient. This protocol does not even mention oral care (Tolentino-DelosReyes, Ruppert, Shyang-Yun, & Shiao, 2007). Therefore, even though, in principle, oral care is considered of great importance to intubated and ventilated patients, its place in many guidelines related to these patients is unclear.

Many studies have been conducted in order to determine what barriers are associated with a lack of evidence-based practice (EBP). Most of these studies have used the Barriers questionnaire developed by Funk and colleagues (1991), which groups these barriers into four basic categories: qualities of the research; presentation and accessibility of the research; setting or organizational barriers and limitations; and nurses' research values, skills, and awareness. Few researchers have investigated whether individual characteristics of nurses may be related to such perceptions.

In many other countries around the world, there is access to nursing research (for example access to the Internet), but the culture of nursing research is not well developed. Ricart and colleagues (2003) comment that variability in following evidence-based guidelines may be because of differences in training or cultural aspects of the country. In a recent article, Rassin (2008) found that nursing research was rated last in a list of 20 professional values among Israeli hospital nurses.

This result is not surprising given the fact that nursing research capacity and exposure is relatively low in Israel (Ehrenfeld, Itzhaki, & Baumann, 2007; Glazer & DeKeyser, 2000). Most research is conducted by nurses obtaining an advanced degree and no national mechanisms are in place for designated funding for nursing research or for promoting EBP.

Because no information was available about the current state of evidence-based oral care practice in Israel, the group decided to conduct a survey describing current oral-care practices of ICU nurses with intubated patients and to determine whether evidence-based practices were related to personal demographic or professional characteristics.

## Methods

### Sample

A convenience sample of 218 practicing ICU nurses was obtained in 2004–2005. Members of the EBN group recruited nurses from their own ICUs, with some also recruiting nurses from other units within the same organization. Nurses in the survey worked in 12 different ICUs, 5 in general-respiratory ICUs, 3 in cardiovascular-surgical ICUs, 2 in neurosurgical ICUs and 2 in cardiac care ICUs.

### Instrument

The survey included two major sections. The first section contained questions about demographic and professional characteristics including age, gender, nursing education, years of ICU experience, postbasic ICU certi-

fication, type of ICU, work full or part time, and shifts worked.

The second section contained a checklist which included a listing of the current oral-care practices including type of equipment used, solutions used, technique, and the type and timing of oral assessment. Nurses were asked to check off all responses that applied to their practice. Some of the items on the checklist were based on current best evidence, for example the use of chlorhexidine or toothpaste; however, other items listed were not recommended, such as bicarbonate or lemon water. Nurses were also asked their perceived level of priority of oral care on a scale from 0 to 100. This question had a visual analogue format in which descriptors were placed at each end (highest priority=100; lowest priority=0) on a 10-cm line. Nurses were asked to mark an X on the place that corresponded with the level of priority they gave to oral care.

The survey instrument was based on the literature and constructed by a committee of experienced ICU nurses. Content validity of the tool was improved by including questions suggested by members of the EBN task force and consultants. The survey was also sent for review to an instructor of dental hygiene and to other ICU nurses for obtaining content validity. Reviewers were asked to suggest additional items or remove those which were listed. The final survey questionnaire was a conglomeration of the items suggested by the EBP group and those of the reviewers. The use of Cronbach's alpha for this tool was not deemed appropriate because the questionnaire is a checklist.

### Data Collection

Each member of the EBN group obtained both ethical and institutional approval to collect the data. Then group members explained the study to nurses in a staff meeting, obtained informed consent from participants, and distributed the questionnaires on an individual basis. Nurses were asked to return the questionnaires to an envelope placed in a convenient location on each unit.

### Data Analysis

Descriptive statistics, including measures of central tendency and dispersion and frequency data were used to describe the sample as well as responses to the oral-care practices survey. Not all participants completed all of the items—and these were not included in missing-data analyses.

An EBP score was also determined, which was defined as the number of items on the checklist that were checked off by the nurse and considered to be necessary for proper

oral care according to the literature. Supplies listed included a toothbrush, suction and suction catheter, toothpaste, chlorhexidine, and petroleum jelly (6 items). Technique items included care of the upper and lower mouth, tongue, and brushing of the patient's teeth (4 items). Assessment questions were about doing an assessment upon admission to the unit and at each shift (2 items). Use of an assessment tool and results of the assessment and oral care were to be charted accordingly (2 items)—for a total of 14 items.

Each nurse obtained a score corresponding to the total number of evidence-based items checked off (from 0–14). A higher score shows higher use of evidence-based practices. This total score was then correlated with demographic and professional characteristics to determine if such characteristics were associated with oral-care EBP. Data were collected on questionnaires that were delivered to one of the researchers, who then coded the data into an SPSS data file (Version 12). This score was then analyzed to determine whether a difference in EBP scores existed based on personal demographic or professional characteristics using ANOVA. Interval level independent variables were categorized as follows: age (years): 20–29, 30–39, 40–49, 50+; years of clinical experience (as RN, as an ICU nurse, and in this particular ICU): 0–5, 6–9, 10–14, 15–20, 20+; percentage of time worked: <50%, 50–75%, 75–99%, 100%. All other variables were categorical (gender, education, type of ICU).

## Results

The majority of the sample was female ( $n=172$ , 82%) with an average age of  $37.4 \pm 8.6$  years. Nurses were mostly registered nurses with a baccalaureate degree who had completed a postbasic certification course (see Table 1). According to the latest available statistics of the Nursing Division of the Israel Ministry of Health (Nursing Division, Ministry of Health, 2007), 76% of nurses in Israel are registered nurses; 25% have a baccalaureate degree or higher; and 41% have completed some form of postbasic certification. One tenth of nurses were male and 39% of all nurses were age 30–44 years. Nurses in this sample were better educated than the general population of Israeli nurses but otherwise seemed to be similar.

The most commonly used supplies were gauze pads ( $n=182$ , 84%), followed by tongue depressors ( $n=118$ , 55%), and toothbrushes ( $n=73$ , 34%). Often nurses attach gauze pads to a tongue depressor to use for oral care—a practice that substitutes for the use of sponges or swabs attached to a stick sometimes done in other countries. Chlorhexidine was the most commonly used solution ( $n=161$ , 75%) followed by petroleum jelly ( $n=87$ , 40%), and toothpaste ( $n=72$ , 33%). Almost all nurses

**Table 1.** Sample Professional Characteristics ( $n=218$ )

Variable	<i>n</i> (Valid%)
Level of nursing education:	
LPN	8 (3.8)
RN	78 (36.6)
RN+BA	107 (50.2)
RN+MA/PhD	20 (9.4)
Missing data	5
Postbasic critical care certification:	
Yes	152 (72.4)
No	58 (27.6)
Missing data	8
Work full or part time:	
Full time	121 (56.5)
Part time	93 (43.4)
Missing data	4
Shifts worked:	
Permanent days	9 (4.2)
Permanent evenings	6 (2.8)
Permanent nights	13 (6.1)
Rotate shifts	186 (86.9)
Missing data	4

performed oral care ( $n=198$ , 91%); however, less than half ( $n=96$ , 44%) brushed their patients' teeth. Only 57% ( $n=120$ ) of nurses reported documenting oral care. On a scale of 0–100, nurses rated oral care for intubated patients with a priority of  $67 \pm 27.1$ , where 44% ( $n=96$ ) rated it on a priority of 90%–100%. The mean EBP score was 9/14 or 68%. All participants stated that no known written oral-care protocol existed on their unit (see Table 2).

No significant relationship was found between the use of evidence-based practices and demographic or professional characteristics or with the priority given to oral care.

## Discussion

While nurses ranked oral care as a high priority, many did not implement the latest evidence into their current practice. The level of evidence-based practice was not related to personal demographic or professional factors.

Perceived level of priority of oral care practices has been measured differently in different studies but for the most part many studies have shown that critical care nurses rate oral care with a moderate to high priority, including the nurses in this study (Binkley et al., 2004; Grap et al., 2003; Jones et al., 2004; Rello et al., 2007).

As in previous studies (Binkley et al., 2004; Grap et al., 2003; Rello et al., 2007; Ricart et al., 2003), the level of EBP has been questionable. Many nurses in this sample did not implement the latest evidence in their practice.

**Table 2.** Frequencies of Equipment and Solutions Used and Assessment Practices Related to Oral Care (90=218)

Practice	n (valid%)	Practice	n (valid%)
<b>Equipment:</b>		<b>Solution:</b>	
Gauze pad	182 (84)	Chlorhexidine	161 (75)
Tongue depressor	118 (55)	Sodium bicarbonate	90 (42)
Syringe	75 (35)	Petroleum jelly	87 (40)
Toothbrush	73 (34)	Toothpaste	72 (33)
Gloved finger	46 (21)	Lemon water	55 (26)
Suction	166 (77)	Glycerin	40 (19)
Suction catheter	156 (72)	Saline	30 (14)
		Sterile water	24 (11)
<b>Oral care practice:</b>			
Clean the tongue	196 (91)	Use assessment tool	5 (2)
Clean upper mouth	190 (88)	Document assessment and care	120 (57)
Clean lower mouth	187 (87)		
Brush teeth	95 (44)		
<b>Assessment:</b>			
Does oral assessment	205 (95)		
Does assessment on admission	53 (25)		
Does assessment before mouth care	153 (71)		
Does assessment each shift	70 (33)		

The American Association of Critical Care Nurses produced a "practice alert" based on the current best evidence, describing recommended oral care in the critically ill (American Association of Critical Care Nurses [AACN], 2007).

AACN recommendations included developing an oral-care hygiene program which includes brushing patients' teeth, gums, and tongue at least twice a day, using a soft pediatric or adult toothbrush, moisturizing oral mucosa and lips every 2–4 hours, and in precardiac surgery patients—using oral chlorhexidine gluconate (0.12%) rinse twice a day. All of the nurses in our study stated that no organized protocols or programs related to oral hygiene existed on their units. Most did not brush their patients' teeth. It is not known what type of toothbrush was used among those that did brush their patients' teeth. However, almost all of the respondents (84–91%) claimed to clean their patients' tongue and upper and lower mouth. Petroleum jelly, a substance used to moisturize the lips, was used by many of the respondents; however, the frequency of use was not reported. The majority of nurses on all of the units reported using chlorhexidine, a substance that has received scientific support for use in a very limited population—precardiac surgery patients. This solution was not recommended for other patient populations.

A wide range of practices was found in this study among nurses working within the same unit and between units, partially because of the fact that no known written oral-care protocols existed. Several authors have commented on the importance of using written protocols in guiding oral care (Cason, Tyner, Saunders, & Broome, 2007; Cutler & Davis, 2005; Steifel et al., 2000).

None of the individual nurse characteristics in this study were found to be related to evidence-based practice or priority of oral care. The only characteristics found in the literature to be related to evidence-based practice were educational level, nursing position, and experience. Several investigators have found that the higher the level of academic nursing education, the more positive the attitude toward nursing research and EBP (Bonner & Sando, 2008; Bucknall, Copnell, Shannon, & McKinley, 2001; Fink, Thompson, & Bonnes, 2005; Furr et al., 2004; Hannes et al., 2007; Kajermo et al., 2008); however, Oh (2008) and Roxburg (2006) found the opposite results. In a recent study of Israeli hospital nurse values (Rassin, 2008), the findings were that nurses with a baccalaureate degree valued nursing research more than any other type of nurse, including those with a master's degree. The authors did not explain this result but the finding is in keeping with a discrepancy in the literature.

The literature is also ambiguous regarding the influence of nursing position on attitudes toward research and EBP. While several authors (Bonner & Sando, 2008; Egerod & Hansen, 2005; Oh, 2008) found that higher level positions were associated with more positive attitudes, Bucknall et al. (2001) found the opposite result. Oh (2008) determined that level of nursing experience was associated with more positive attitudes, while Furr et al. (2004) found the opposite. In these studies, the researchers defined attitudes toward EBP differently and the studies were conducted using different designs and in different cultures therefore conflicting findings are not too surprising. However, many of the studies using the barrier scale found that one of the greatest barriers to evidence-based practice was the nurses' assessment of her lack of skills related to use of research. Perhaps increased education, experience, and a higher position may be related to increased feelings of competence related to research.

Based on the results of this study, where no oral care protocols were reported and where there were no differences between nurses based on personal or professional characteristics related to the use of EBP, it is recommended that standardized, written, evidence-based protocols related to the oral assessment and care be introduced into all ICUs admitting intubated patients. Nurses at all levels should be informed and encouraged in its use. Further research could include investigating other

barriers related to EBP in this area and in this culture, as well as what other factors are associated with the introduction and use of evidence-based protocols.

## Conclusions

While nurses ranked oral care as a high priority, levels of EBP were found to be relatively low. Demographic and professional characteristics were not found to be associated with the use of EBP. Therefore, all nurses, regardless of personal characteristics, should be involved in educational programs related to oral care and evidence-based practice and should be encouraged to introduce and utilize written protocols based on the latest evidence in an attempt to decrease VAP on their units.

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### Clinical Resource

- Practice Alert of the American Association of Critical Care Nurses: [http://www.aacn.org/WD/practice/docs/oral\\_care\\_in\\_the\\_critically\\_ill.pdf](http://www.aacn.org/WD/practice/docs/oral_care_in_the_critically_ill.pdf)

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