Oral Hygiene Practices in Non-Ventilated Intensive Care Unit Patients

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ORAL HYGIENE PRACTICES IN NON-VENTILATED INTENSIVE CARE UNIT PATIENTS

by

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ABSTRACT

Introduction: Oral hygiene is a significant aspect of nursing care. Endocarditis, stroke, lung cancer, and hypertension have been associated with poor oral hygiene. Research exploring oral care practices for mechanically ventilated patients is well documented. In contrast, oral hygiene for the non-mechanically ventilated acute care population remains underestimated. The purpose of this study was to establish a baseline of the type, frequency, and consistency of oral hygiene being performed on non-mechanically ventilated ICU patients and explore how the oral care provided was documented.

Methodology: A literature search was conducted and reported as a literature review. The databases CINAHL Plus with Full Text, MEDLINE, PsychINFO, Academic Search Premier, and Cochrane Database of Systematic Reviews were searched. Key terms used were "oral hygiene," "oral care," "oral intensity," "mouth rinse," "mouth care," chlorhexidine rinse and ICU, "intensive care unit," "critical care" and infection*, pneumonia*, NV, non-ventilat*, and nonventilat*. The articles' selection addressed type, frequency, consistency, and/or documentation of oral hygiene in ICU patients, particularly non-mechanically ventilated patients, if available. Inclusion criteria consisted of English language, and academic journal articles. No specified publication date was placed as a restriction. The results were limited to English language, academic journal articles, peer reviewed research articles, evidence-based articles or practices, and articles published within the last ten years (2006 to 2016). All articles on oral hygiene practices in the ICU or critical care population were included. Articles that did not relate to oral hygiene practices in acute care, ICU patients, or critically ill hospitalized patients

were excluded. Articles focused solely on the mechanically ventilated or intubated population were also excluded.

Results: The review yielded very few articles focusing solely on non-mechanically ventilated ICU patients. Nevertheless, resulting data showed four areas common to oral hygiene practices in non-mechanically ventilated patients in the ICU: type of documentation, type of products, frequency of care, and personnel providing care. Documentation was found to be lacking compared to personnel's self-reported frequency of oral care. Oral hygiene products were found to be consistent in non-mechanically ventilated patients, while there was no consistency of products used in the general acute care population. Oral hygiene was self-reported by staff members to have been performed an average of two to three times per day for non-mechanically ventilated patients. Oral hygiene self-reported frequency was found to be inconsistent among the general acute care population. Lastly, registered nurses (RNs) were the primary providers of oral hygiene to patients.

Conclusions: Findings support the existing gap in the literature on oral hygiene practices in non-mechanically ventilated patients in the ICU. Despite evidence documenting the impact of oral hygiene on health, further research is guaranteed.

DEDICATION

To Michael, my other half. What an incredible journey it has been with you. Thank you does not encompass all that you have done for me. I would not be where I am today had it not been for your unwavering support. You have been such a blessing in life and I look forward to the many years to come.

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INTRODUCTION

Oral hygiene is a significant aspect of nursing care. Most healthy adults' oral flora consist of aerobic *Viridans streptococci*; however, in critically ill patients oral flora progresses within 48 hours of hospitalization into various destructive organisms including *Staphylococcus aureus, Haemophilus influenzae, Acinetobacter baumanii, Pseudomonas aeruginosa,* and *Streptococcus pneumoniae* (Munro & Grap, 2004). These virulent bacteria suggest the need for meticulous oral care in these patients.

The oral cavity is a portal of entry and adequate area of growth for microbes (National Institute of Health [NIH], 2000). These microbes can accumulate and lead to dental plaque. Dental plaque can become calcified, allowing more bacteria and toxins to accumulate and be absorbed (Berry & Davidson, 2006). This outcome can be detrimental to a patient's health. Plaque components may be introduced into the bloodstream causing bacteremia and other disorders. One particularly potentially lethal outcome is infective endocarditis. This disorder can result from poor oral hygiene and periodontal disease (Lockhart, 2012).

Periodontal disease is an inflammatory gum disease that results from poor oral hygiene (American Dental Association, 2011). It is extremely prevalent among adults affecting nearly half of adults in the United States aged 30 years and older (Eke, Dye, Wei, Thorton-Evans, & Genco, 2012). This disorder and its associated inflammation have been linked to several medical conditions including heart disease and stroke (American Academy of Periodontology, 2015). Additionally, a meta-analysis by Zeng et al. (2016) in over 300,000 participants showed that periodontal disease was associated with a significant risk of lung cancer, particularly in females.

More recently, poor oral hygiene has been shown to potentially be an independent risk factor for hypertension. Hypertension impacts millions of individuals and can result in renal failure, myocardial infarction, and stroke. Oral hygiene practices were surveyed in nearly 20,000 individuals over a two-year period (Choi, Han, Park, & Park, 2015). It was concluded that frequent tooth brushing after each meal was associated with a lower incidence of hypertension. It is also thought that maintaining good oral hygiene may lead to more controlled hypertension. These disorders demonstrate the importance of oral care not solely as a comfort measure, but also as an intervention for patient's physical well-being.

BACKGROUND

Oral health is defined as the absence of persisting mouth and facial pain, tooth decay and loss, oral and throat cancer, periodontal disease, and mouth sores among other oral disorders (World Health Organization [WHO], 2016). Unfortunately, many hospitalized patients do not meet this criteria of oral health. Coming into the hospital, patients' oral care may have been suboptimal and will only worsen as time progresses without proper attention. Thus, oral hygiene is suggested to be one of the many key nursing interventions that should be performed routinely and thoroughly on hospitalized patients.

Numerous research studies have explored oral care practices to be included in care bundles for ventilated patients to prevent ventilator-associated pneumonia (VAP). In intensive care unit (ICU) patients, dental plaque builds significantly among ventilated patients, thus creating a significant reservoir for bacteria. Because of this plaque buildup and its potentially detrimental consequences, the oral care component added to the VAP care bundle was aimed to decrease the incidence of VAP. The bundle was designed to minimize the impact of this buildup and includes the daily use of a chlorhexidine antiseptic solution, sometimes twice a day. The Food and Drug Administration (FDA) suggests specifically providing a 0.12% chlorhexidine mouth rinse daily for patients (Institute for Healthcare Improvement, 2012).

In contrast, oral hygiene recommendations for the non-mechanically ventilated acute care population are less specific and inclusive. The current care recommendations include developing a comprehensive oral hygiene program for patients in the acute care setting. Teeth, gingivae, and lingual surface should be brushed a minimum of twice a day as well as the application of oral moisturizer to lips and oral mucosa every two to four hours. Additionally, a 0.12% oral

chlorhexidine gluconate should be used twice daily on patients undergoing cardiac surgery during the perioperative period (American Association of Critical Care Nurses, 2007).

The Acute Physiology and Chronic Health Evaluation (APACHE) IV model is a tool utilized in the ICU to predict critically ill patient's length of stay (Zimmerman, Kramer, McNair, Malila, & Shaffer, 2006). Using the most recently developed APACHE IV model, Zimmerman et al. (2006) determined that an average ICU stay was around 3.86 days in the United States. Needleman et al. (2012) assessed the oral health of patients at the initial admission, at week one, and at week two in a critical care unit consisting partially of ICU patients (what you had before is considered passive writing. It is discouraged in professional/scholarly writing. Note how I changed this to active style). The majority of the patients in the study were non-mechanically ventilated throughout their stay. They concluded that the oral health in these patients showed a statistically significant deterioration within the first week of their stay compared to the initial admission and week two. In a retrospective study on 97 ICUs in the United States to determine ICU occupancy as well as hourly bed occupancy for patients on mechanical ventilators, Wunsch et al. (2013) found that 71 percent of ICU beds were filled with non-mechanically ventilated patients. If these findings are true for most ICUs, it is compelling that despite such a large prevalence of non-mechanically ventilated patients, standards for oral hygiene are not specifically designed for this population.

Numerous factors contributed to this decline in oral health. Pharmaceuticals, which are so widely used, can potentially adversely affect the oral cavity and its functions (NIH, 2000). These effects include taste alterations, inflammation of soft tissue in the mouth, oral sores, enlarged gum tissue, and xerostomia, leaving the oral area susceptible to infection ("For the

dental patient", 2005). Medications can also cause immunosuppression in patients. Examples of these medications include but are not limited to cyclosporine, prednisone, dexamethasone, azathioprine, and basiliximab (Meier-Kriesche et al., 2006). Those who are immunocompromised or hospitalized are at a higher risk for morbidity as a result of oral infections (NIH, 2000). Additionally, the natural virulent progression of oral flora during hospitalization contributes to the likelihood of a patient having poor oral health.

SIGNIFICANCE

Oral hygiene that is appropriately performed shows to potentially be both a health preventative and cost-effective measure, particularly in those who are critically ill. Poor oral hygiene may play a role in the development of hypertension, lung cancer, and heart disease, among a multitude of other disorders (American Academy of Periodontology, 2015; Choi et al., 2015; Zeng et al., 2016). The cost and number of lives that could be saved from a lower incidence of these disorders are immense. The annual indirect and direct estimated cost of hypertension is estimated to be $48.6 billion, with heart disease costing $207.3 billion (Mozaffarian et al., 2016). Moreover, lung cancer is the leading cause of cancer death among both women and men (American Cancer Society, 2016). These disorders associated with poor oral hygiene illustrate the magnitude proper oral care plays in patient's health and economic costs.

Quinn and Baker (2015) showed oral hygiene to be a statistically significant measure in preventing hospital-acquired pneumonia in non-mechanically ventilated patients for one year. The cost of oral hygiene preventative measures was $117,600 compared to the cost saved from hospital-acquired pneumonia, which was upwards of $2.4 million. Sixty cases of non-mechanically ventilated hospital-acquired pneumonia were prevented. The study hospital's return on investment was remarkable. It is evident that the cost of oral hygiene preventative measures pale in comparison to the cost of fixing the disorders poor oral health may cause.

The disorders associated with oral hygiene have an extensive impact on patients in the ICU. ICU patients are at a higher risk for hospital-acquired infections compared to other hospitalized patients due to the wide use of invasive procedures in the ICU as well as patients'

immunocompromised standing (Inweregbu, Dave, & Pittard, 2005). Many other disorders may specifically affect ICU patients intrinsically. *Staphylococcus aureus* for instance is the most predominant cause of infective endocarditis (Fernandez Guerrero, Gonzalez Lopez, Goyenechea, Fraile, & de Gorgolas, 2009) a rising problem in the ICUs (Sharma, Candilio, & Hausenloy, 2011). Likewise, many other conditions prevalent among ICU patients can be attributed to oral care as a risk factor.

PROBLEM

There has been much research done on the oral hygiene practices on mechanically ventilated patients in the ICU. Oral hygiene has been shown to prophylactically lower the incidence of VAP (Cuccio et al., 2012). In comparison, little research exists on oral hygiene practices in non-mechanically ventilated ICU patients, despite compelling evidence demonstrating the protective and prophylactic effects of good oral health. Further research is still needed to examine current oral hygiene practices in non-mechanically ventilated ICU patients and to address the lack of specific oral care guidelines.

PURPOSE

The purpose of this study is to establish a baseline of the type, frequency, and consistency of oral hygiene being performed on non-mechanically ventilated ICU patients. The study will also explore how the oral care provided is documented.

METHODS

An initial literature search was conducted and the findings are reported as a literature review. The databases CINAHL Plus with Full Text, MEDLINE, PsychINFO, Academic Search Premier, and Cochrane Database of Systematic Reviews were searched. Web of Science was utilized as a supplemental database upon finding an appropriate article to search for further similar articles. The references of articles chosen were also searched in order to expand the findings.

Key terms that were used for the search were: "oral hygiene," "oral care," "oral intensity," "mouth rinse", "mouth care," chlorhexidine rinse and ICU, "intensive care unit," "critical care" and infection*, pneumonia*, NV, non-ventilat*, and nonventilat*. The articles selected for the literature review each addressed one or more of the following: type, frequency, consistency, and/or documentation of oral hygiene in ICU patients, particularly non-mechanically ventilated patients, if available. Articles that did not specify non-mechanically ventilated ICU patients and instead specify the general ICU population were still included due to limited findings.

There was first a preliminary search performed to find articles solely on oral hygiene practices in non-mechanically ventilated ICU patients. Inclusion criteria consisted of English language, and academic journal articles. No specified publication date was placed as a restriction due to few findings. Peer reviewed articles were prioritized search criteria when exploring the databases; however, they were not an inclusion criteria in order to widen the search results.

After these articles were collected, a secondary search was conducted to expand the findings. The same key terms were used. The results were limited to English language, academic journal articles, peer reviewed research articles, evidence-based articles or practices, and articles published within the last ten years (2006 to 2016). All articles on oral hygiene practices in the ICU or critical care population were included in this study. Articles that did not relate to oral hygiene practices in acute care, ICU patients, or critically ill hospitalized patients were excluded. Articles focused solely on the mechanically ventilated or intubated population were also excluded. See Figures A1 and A2 for further details.

RESULTS

This literature review yielded very few articles focusing solely on the non-mechanically ventilated ICU population. Instead, most articles either conducted studies on oral hygiene practices in the general ICU population or in mechanically ventilated ICU patients due to the heavy research focused on preventing VAP. The results are divided first by population into non-mechanically ventilated (or non-intubated) ICU patients versus the general ICU population (not specifying mechanical ventilation status). The results are then further separated based on the type, frequency, as well as documentation of oral hygiene. This is followed by the personnel that performed the oral care on patients.

Type of Oral Hygiene Provided to Non-Ventilated ICU Patients

The type of oral hygiene provided to patients refers to the specific products and methods used to cleanse patient's oral cavities. The studies rendered consistent findings in the type of oral care products used in non-mechanically ventilated patients. Methods of how the oral cavity was specifically cleansed or the time spent cleansing were not specified in the findings.

In a survey developed and given to health care personnel in one quantitative study, it was found that toothbrushes and toothpaste were significantly used more frequently ($p < .001$) in non-mechanically ventilated patients (Grap, Munro, Ashtiani, & Bryant, 2003). Despite toothbrushes being more commonly used than toothettes in the non-mechanically ventilated population, it was found that they were not uniformly utilized. Toothbrushes are the more preferred oral cleansing tool and can readily remove plaque, while toothettes are less effective in doing so (Grap et al., 2003). The use of other oral hygiene products including isotonic sodium

chloride solution, hydrogen peroxide, mouthwash, and chlorhexidine did not vary significantly between the non-mechanically ventilated and mechanically ventilated population (Grap et al., 2003). All of these products were used at some point during the study in non-mechanically ventilated patients.

Hanneman and Gusick (2005) reported fairly consistent findings based on their replicated cross-sectional study. It was found from the survey given to nursing personnel that the type of oral hygiene products utilized significantly varied ($p < .001$) between non-mechanically ventilated and mechanically ventilated patients. Toothbrushes, toothpaste, as well as mouthwash were more often the products of choice in non-mechanically ventilated patients (Hanneman & Gusick, 2005). It did not appear in either of the studies that a specific oral care program had been implemented, thus it is unknown how the nursing personnel chose the products used. While some products were favored more in the non-mechanically ventilated population, nearly all products were used at some point in this population, thus suggesting inconsistencies. These findings are slightly inconsistent with current practice guidelines, which state that a comprehensive oral hygiene program should be developed for those in an acute care setting (American Association of Critical Care Nurses, 2007).

Frequency of Oral Hygiene Provided to Non-Ventilated ICU Patients

Nursing staff self-reported frequencies of oral hygiene appear to be inconsistent with actual documented oral hygiene practices. Nurses may want to provide frequent oral care (as seen in the surveys); however, due to time constraints and other extraneous variables, they are not doing so. According to the survey Grap et al. (2003) dispersed, nursing staff reported performing oral hygiene an average of two to three times a day for non-mechanically ventilated

patients. In comparison, the majority of staff reported performing oral hygiene an average of five or more times a day in mechanically ventilated patients.

Another questionnaire found that nurses self-disclosed performing oral hygiene an average of three times each day in non-mechanically ventilated patients (Hanneman & Gusick, 2005). Alternatively, the same staff reported performing oral hygiene more often (4.2 times per day) in mechanically-ventilated patients. The difference between the two population frequencies was found to be statistically significant ($p < .001$).

Documentation of Oral Hygiene Performed on Non-Ventilated ICU Patients

Based on the article consensus, it was apparent that documentation of oral hygiene is substandard compared to how often personnel claim to have performed the oral care (Grap et al., 2003; Hanneman & Gusick, 2005). The specifics of type of product used and type of personnel that performed the care were also lacking in documentation.

On the contrary to the survey results from Grap et al. (2003), the prospective review of documentation performed in the same study found that oral hygiene was only documented an average of 1.2 times a day per patient (not specifying mechanical ventilation status). This is far less than the supposed two to three times nurses self-reported oral hygiene to be performed in non-mechanically ventilated patients. This study did not include the type of personnel that performed the care. Only in nine of 170 patients were the actual products used specified in the documentation collected. These products included chlorhexidine, nystatin, as well as a hydrogen peroxide mixture (Grap et al., 2003).

Hanneman and Gusick (2005) performed a prospective collection of bedside data that rendered similar findings. Oral hygiene was documented far fewer times in non-mechanically ventilated patients (an average of 1.8 times a day) compared to the self-reported frequency of three times a day for these patients. The average documented frequency of oral hygiene on mechanically ventilated patients was 3.3 times per day. It was found in the study that mechanical ventilation status ($p < .001$) and unit ($p = .006$) had a significant effect on how frequently the oral hygiene was documented (Hanneman & Gusick, 2005). In each unit, oral hygiene was consistently documented more often in mechanically ventilated patients. Unsurprisingly, the pulmonary ICU was found to have the most frequent documentation of oral care (Hanneman & Gusick, 2005). This seems rather intuitive, as a pulmonary unit would be focused on preventing further respiratory compromise. Interestingly, although the larger majority (64 percent) of patients in the study were non-mechanically ventilated, oral hygiene was still performed less frequently on them (Hanneman & Gusick, 2005).

In one retrospective medical review, oral hygiene was found to be performed in only 85.9 percent of non-mechanically ventilated patients versus performed in 93.1 percent of mechanically ventilated patients (Goss, Coty, & Myers, 2011). Out of the population sample, the larger majority (59.4 percent) were non-mechanically ventilated. Documentation also revealed that those who were mechanically ventilated received oral hygiene significantly more often ($p < .001$) per 24 hours (5.57 times) than those who were non-mechanically ventilated (3.54 times) (Goss et al., 2011). Mean time between oral hygiene interventions for non-mechanically ventilated patients was 3.17 hours (Goss et al., 2011). Documentation of specifics of oral

hygiene was lacking due to limited space; and the documentation was not inclusive of the personnel that performed the care.

Personnel that Performed Oral Hygiene on Non-Ventilated ICU Patients

Both nurses and nursing assistants play a prominent role in providing oral care to patients. Nurses must undergo a certified nursing program and pass a variation of the NCLEX (National Council Licensure Examination) in order to practice. Nursing assistants require far less schooling and generally undergo a short training program. According to the article results, it seems as though nurses were the primary care providers of oral hygiene in non-mechanically ventilated critically ill patients (Grap et al., 2003; Hanneman & Gusick, 2005).

Grap et al. (2003) had the majority of personnel in the study's survey respond by stating that 97 percent of those who performed the oral hygiene care were registered nurses (RNs). Out of all personnel, 70 percent held a baccalaureate degree. The average nursing experience was 10.5 years, and specific ICU experience was 8.4 years.

In Hanneman and Gusick (2005) the majority (82 percent) of respondents to the survey that provided the oral care were nurses, 17 percent were patient care assistants, and one percent did not specify. Of all personnel, 64 percent held a baccalaureate degree. However, when looking specifically at the nurses that responded, 78 percent held a baccalaureate degree. The average nursing staff experience was 13.5 years with an average of ten years specifically in an ICU setting and 6.2 years in the unit that they were surveyed in (Hanneman & Gusick, 2005).

Type of Oral Hygiene Provided to the General ICU Population

Based on the articles not specifying patient's mechanical ventilation status in the ICU, it was evident that the type of oral hygiene products chosen by staff members were inconsistent, showing a lack of standard of care for patients. The most frequently used products found among the articles were spatulas, toothbrushes, and gauze (Miranda, Monteiro de Paula, Concalves Barbosa de Castro Piau, Paganini Costa, & Barreto Bezerra, 2016), foam swabs (Ozveren & Ozen, 2015; Turk, Kocacal Guler, Eser, & Khorshid, 2012), and a depressor with gauze (Ozveren & Ozen, 2015). The common solutions used among staff members in the studies were chlorhexidine (Miranda et al., 2016), mouthwash (as well as mouthwash with chlorhexidine) (Rello et al., 2007), and sodium bicarbonate (Ozveren & Ozen, 2015; Turk et al., 2012).

In one cross-sectional survey, spatulas, toothbrushes, and gauze were found to be the most frequently used products (Miranda et al., 2016). In comparison, only a small percentage of staff (28.2 percent) solely used toothbrushes. To chemically control biofilm, most staff members claimed to use 0.12 percent chlorhexidine and the minority used 0.12 percent toothpaste and chlorhexidine.

In one European study, mouthwash was found to be the most frequently used product (88 percent) with 61 percent being used with chlorhexidine (Rello et al., 2007). Manual toothbrushes, foam swabs, and moisture agents were used less frequently. Despite toothbrushes being one of the most optimal tools to cleanse the oral cavity, the study participants did not comply with this standard of practice. This lack of compliance may be due to barriers in the study, seeing as over half of staff stated that they needed improved supplies and 37 percent stated that toothbrushes were not available to use (Rello et al., 2007).

In one questionnaire given out to 101 nurses in eight different ICUs, sodium bicarbonate was found to be the most commonly used product followed by moisturizing agents (Turk et al., 2012). The other products used far less frequently were chlorhexidine, fluoride toothpaste, water, nystatin, hydrogen peroxide, and saline. The majority of nurses used a foam swab when asked how they cleansed the oral cavity. Gauze pads and tongue depressors were the next most frequently used, followed by suction and a toothbrush. Coinciding with the lack of nurses claiming to use toothbrushes, only 34.6 percent of nurses claimed to brush the patient's teeth and 16.8 percent solely rinsed their mouth.

Despite this lack of compliance with evidence-based practices that suggest using a toothbrush, the larger majority (86.1 percent) of nurses claimed to decontaminate the mouth with a solution. Turk et al (2012) found 30.6 percent of respondents claimed to use two or more methods when cleansing the oral cavity. Significant differences ($p=0.000$) were noted among toothpaste usage as well as mouth moisturizer varying in the units. Depending on the unit, significant differences among chlorhexidine ($p=0.000$), foam swabs ($p=0.000$), toothbrushes (0.019), and tongue depressors with gauze pads covering them ($p=0.000$) also existed (Turk et al., 2012).

Ozveren and Ozen (2015) performed a recent cross-sectional study and found that sodium bicarbonate was the most widely used solution, followed by chlorhexidine, moisturizing agents, saline, and lastly hydrogen peroxide. As far as products go, foam swabs were the most frequently used, followed by suction foam swabs, suction toothbrushes, and mouthwash. Toothpaste/toothbrushes were also found to have been used only by 14.1 percent of the staff. The usage of product type significantly varied among the hospitals surveyed ($p=.008$). Over half

of the nurses also used a depressor wrapped in gauze. Coinciding with such a small percentage of nurses choosing a toothbrush as their product of choice, only 21.6 percent brushed the patient's teeth and another small percentage just rinsed the mouth without anything else. The larger majority though (92.4 percent) wiped with a solution (92.4 percent).

Additionally, Chan and Hui-Ling Ng (2012) performed a larger cross-sectional study with a larger sample size (n=244). It was found that over half of the staff surveyed chose the oral care products purely based on availability. The smaller percentage actually thought about what the oral cavity conditions were of the patient and chose products based off this assessment.

Frequency of Oral Hygiene Provided to the General ICU Population

In the general ICU population, staff seemed to provide oral care simply whenever they saw fit to provide it (Ozveren & Ozen, 2015; Turk et al., 2012). Another common occurrence of self-reported oral care frequency was two to three times, or less than four times daily (Miranda et al., 2016; Rello et al., 2007; Turk et al., 2012).

The majority of staff members in one study claimed to perform oral care twice daily (46.5 percent) and 33.8 percent claimed to do so three times or more daily (Miranda et al., 2016). Another study's personnel claimed to perform oral hygiene mostly between two and three times daily (Rello et al., 2007). An additional 20 percent of the staff claimed to perform the care only once daily.

Oral care was self-reported to have been performed under four times per day by the larger percentage of nurses (Turk et al., 2012). Following this, nearly one fourth of nurses claimed to perform the care every two to four hours. Another 32.6 percent of nurses stated that they only

performed oral care "when it was required" (Turk et al., 2012. p. 350). The frequency of oral hygiene and each unit had a statistically significant relationship (p=0.000).

Ozveren and Ozen (2015) performed a cross-sectional study, giving questionnaires out to nurses. The largest percentage of staff only performed oral care when necessary. The majority remainder of the staff performed the care two to three times daily as well as every six hours (four times daily). A significant difference ($p < .001$) was noted among the methods and frequency of oral care among hospitals. Additionally, over three fourths of the staff said that they performed oral care regularly, while the other quarter claimed to not perform it.

Documentation of Oral Hygiene Performed on the General ICU Population

Interestingly, there was a severe lack of articles focusing on oral hygiene documentation (actual practices that occurred) in the general ICU population. One study, however, did show what aspect of oral care assessments nurses claimed to be most likely to document. Chan & Hui-Ling Ng (2012) found that nurses said they were most likely to document assessing the oral cavity rather than document teeth condition, dentures, and/or halitosis. Likelihood of nurses to document the lips and tongue followed closely behind the oral cavity in terms of importance of documentation.

Personnel that Performed Oral Hygiene on the General ICU Population

Similarly to the non-mechanically ventilated population articles, many of the articles on the general ICU population came to the consensus that most oral care providers and those surveyed were RNs (Chan & Hui-Ling Ng, 2012; Ozveren & Ozen, 2015; Rello et al., 2007; Turk et al., 2012).

In a quantitative study by Rello et al. (2007), the majority of providers of oral care were RNs. Most of the RNs had a three year degree and small percentages held a bachelor's or master's degree. Another study, Turk et al. (surveying only nurses), found the majority had between one to ten years of general nursing experience as well as specific ICU nursing experience (2012). Almost the entire nursing staff held a Baccalaureate degree. Additionally, the majority of nurses responding to the survey were between the ages of 20 to 35.

In a cross-sectional study by Ozveren and Ozen (2015), all of the participants surveyed were nurses. The large majority had undergraduate education training. Nearly three fourths of nurses had between one and ten years of service experience. A large percentage (77.8 percent) of nurses performed an oral assessment; however, over half of the respondents did not have an oral care protocol.

Additionally, another study showed that the majority of nurses surveyed were RNs with the small remainder being enrolled nurses (ENs) (Chan & Hui-Ling Ng, 2012). Out of the nurses surveyed, one third had a diploma and nearly half had a graduate level education. The remainder had a certificate (13.8 percent), an advanced diploma (12.1 percent), and a postgraduate education (0.8 percent). The study also found that nurses' educational level was directly correlated to their knowledge, thus the more education, the higher the oral care knowledge ($p=.019$) (Chan & Hui-Ling Ng, 2012). The largest self-perceived barrier to providing oral care to patients was an uncooperative patient. Alarmingly, over half (60 percent) of the nurses did not have time to perform oral assessments.

In contrast to the majority of studies, one showed that the majority (57.8 percent) of oral care providers were nurse technicians and only 22.5 percent being nurses (Franco Miranda et al., 2016). Nearly half of the staff had between one to three years of ICU experience with 7 percent having a graduate degree, 35.2 percent having a postgraduate degree, 26.8 percent being ICU certified, 16.9 percent having postbasic critical care qualifications, and 14.1 percent not specifying. The majority of staff worked 12 hour shifts.

DISCUSSION

The eight articles found in this study gave an overview of oral hygiene practices in both the non-mechanically ventilated and general acutely ill population. All of the articles were peer-reviewed and were performed in an acute hospital setting, each addressing various aspects of oral care. The majority of articles (*n*=5) utilized surveys/questionnaires to find oral hygiene practices. Other articles (*n*=2) used both surveys and documentation reviews and the remainder (*n*=1) utilized just documentation to find oral hygiene practices. The latter two seemed to be the more reliable method of relaying true practices (as seen by documentation).

It was found in the articles that oral care products used in non-mechanically ventilated patients were fairly consistent and showed compliance with evidence-based practices (the use of toothbrushes), although other products were used at times. On the other hand, oral care products for the general ICU population were extremely inconsistent. This lack of consistency of products demonstrates a lack of standard of care for patients that needs to be addressed.

Based on the non-mechanically ventilated ICU patient articles, it was apparent that oral hygiene was performed significantly less frequently in this population compared to those who were mechanically ventilated. This is most likely due to the abundant research that has gone into education of VAP prevention methods, thus oral care is more of a priority in mechanically ventilated patients. The studies showed that oral care was performed an average of two to three times per day in non-mechanically ventilated patients. Although this is accordance with current guidelines, these practices were just self-reported and not actually done.

Numerous factors likely affected the self-reported oral hygiene performance frequency on the non-mechanically ventilated population. For one, the frequency of oral care was likely inversely related to the acuity level of patients. Grap et al. (2003) found that several nursing staff members stated in a comment section in the survey that the higher acuity level of patients, the less they were able to perform oral hygiene.

Priority level perception of oral hygiene seemed to play a role in how often the care was performed. One survey found that nurses ranked oral hygiene to have a priority rating of 53.9 on a scale of 1 to 100 (with 100 being of highest importance) (Grap et al., 2003). These same nurses self-reported performing oral hygiene an average of two to three times per day on non-mechanically ventilated patients. Another study found that the priority rating was quite higher at 71 (based on a scale of 0 to 100 with 100 being of highest priority) and nurses self-reported performing oral hygiene a slightly more frequent average of three times per day (Hanneman & Gusick, 2005). Based on these findings, it seemed as though those who perceived oral hygiene to be of more importance, performed it more often (or think they do). This also could have been due to the study performed in Hanneman and Gusick being at a Magnet level hospital, meaning higher levels of educated nurses (2005).

The frequency of oral hygiene performance was also likely dependent on the time nursing personnel have and the staffing available. Grap et al. (2003) found that several nursing staff commented stating that the more time and staff members they had available, the more often they could perform oral hygiene. In another study, oral hygiene was found to have been performed more frequently during the hours of 2000 to 0400 (Goss et al., 2011). This may have been due to more time availability to perform this care during evening and nighttime shifts.

The articles performed on the general acute care population were again inconsistent in findings on oral care frequency. Despite proper performance of oral care in some of the studies, others found that staff members reported performing oral care only when it was needed. This is alarming, as only performing the care when it was required/needed was extremely subjective and could have even meant that oral care was not performed during the shift if the staff member did not see fit to provide it.

Looking at the documented oral care practices in the non-mechanically ventilated and general ICU population, it was extremely lacking. Only three articles examined staff member's documented oral care practices, so actual occurrences of oral care in the remaining articles were unknown. Two out of the three articles showed that oral care performance was under two times per 24 hour period, which was not in accordance with AACN guidelines. The third article was in accordance with current recommendations. Further resources on education need to be spent in order to increase knowledge on oral care so it will be performed more frequently, as it should be.

For both the non-mechanically ventilated and general critically ill population, it was found that the majority of the time RNs were the providers of oral care to patients. One would think that since RNs have a higher level of education than nursing assistant personnel that oral care performance would be consistently adequate, however, this was not the case. This is clinically relevant as future education should potentially be targeted to RNs, seeing as they were the primary providers of this care.

LIMITATIONS

The most evident limitation of this literature review was the lack of articles focusing on non-mechanically ventilated ICU or critically ill patients. Only three articles were found that analyzed oral care practices specifically in non-mechanically ventilated patients. Additionally, these articles on the non-mechanically ventilated population were outdated (the most recent being greater than five years old). The details of mechanical ventilation status in the remaining five other articles are also unknown, so it was unreasonable to make the generalization that the practices seen in those articles were ones common to non-mechanically ventilated patients.

Due to the lack of literature available, this literature review kept articles performed in other countries besides the United States (*n*=5). Variables between the different countries such as education differences should be kept in mind when reviewing these results. Nurses may potentially have different educational training in other countries. For instance, in Singapore an RN licensure is either attained by completing a three year diploma program (and ENs attempting to upgrade to become an RN) or a two year accelerated diploma program (Chan & Hui-Ling Ng, 2012).

The literature review was also lacking higher quality articles (Randomized Controlled Trials [RCTs] and Systematic Reviews) due to the scant amount of literature available. When searching through the databases, higher level studies performed seemed to be on the outcomes of an oral care trial on infection rates with a specific product, not on the current practices that are (or are not) occurring. Many of the articles chosen for this literature review (*n*=5) consisted solely of questionnaires given to staff members. Questionnaires allow much room for bias, as

seen in the few articles that did perform both a questionnaire and a medical record review (Grap et al., 2003; Hanneman & Gusick, 2005). It was apparent that documentation did not meet the oral care expectations that nurses self-reported.

Despite these few limitations, the research found addressed the current gap in the literature and serves as a stepping stone for future research on this topic and particular population.

IMPLICATIONS FOR FUTURE PRACTICE

The lack of articles addressing oral hygiene practices in non-mechanically ventilated ICU patients clearly demonstrates that there is a gap in the literature on this population. Despite strong evidence illustrating the positive impact proper oral care can have on non-mechanically ventilated patients, no recent studies have been performed illustrating current practices. With the most recent study on non-mechanically ventilated patients being from over five years ago in 2011, the current practices are unknown.

It would be beneficial for a current observational study and/or a prospective medical record review to be performed on non-mechanically ventilated critically ill patients analyzing oral care practices. Surveys are subjective and allow for biased views, as seen in the articles in which nurses perceive performing oral care more often than it is actually being done (proven by documentation). If current studies prove the same results seen in this literature review, time and resources need to be spent educating nurses and nursing personnel on the benefits of oral care in all acutely ill patients and not solely the mechanically ventilated population.

Recommendation of a standard of practice for the non-mechanically ventilated population certainly needs to be attained as well. A potential bundle of oral care should be created for the non-mechanically ventilated population and further studies may be performed examining the effectiveness of this bundle. Studies showed that many staff members did not have an oral care protocol to follow (Ozveren & Ozen, 2015; Turk et al., 2012). Many studies also did not state whether or not there was a protocol. With no protocol, how do staff members know what oral care product should be given to patients for the best results? Some studies also showed that

products were usually chosen based on availability or just based on the nurse's choice, rather than actual assessment, which is alarming (Chan & Hui-Ling Ng, 2012; Turk et al., 2012). Again, education is vital (and needed after seeing these results) in teaching staff to first assess the patient before providing the oral care.

APPENDIX A: LIST OF FIGURES

Figure A1: Preliminary Selection Method of Literature

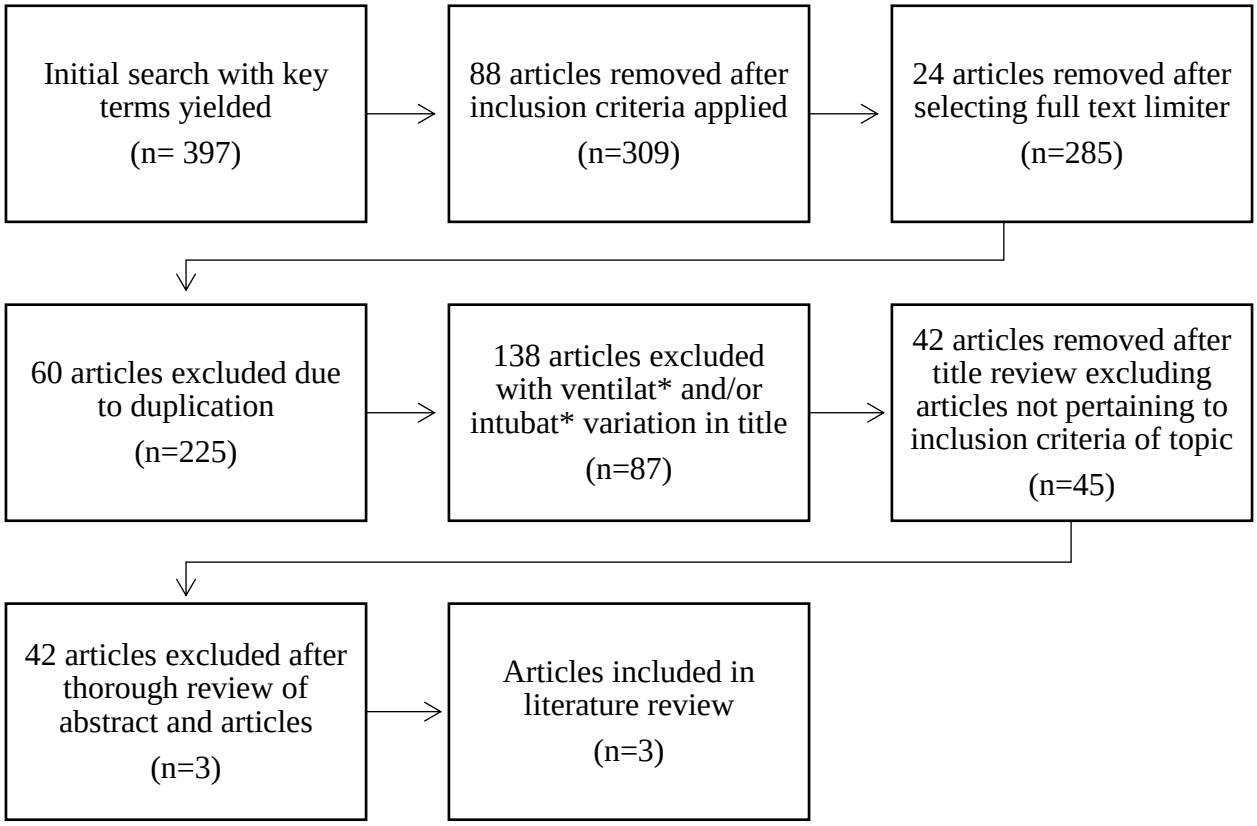

Figure A1.

Key terms: “oral hygiene" OR “oral care” OR “oral intensity” OR "mouth rinse" OR “mouth care” OR chlorhexidine rinse AND ICU OR "intensive care unit" OR "critical care" AND infection* OR pneumonia* OR NV OR non-ventilat* OR nonventilat*

Inclusion criteria: English Language and Academic Journal Articles

Databases searched: CINAHL Plus with Full Text, MEDLINE, PsychINFO, Academic Search Premier, and Cochrane Database of Systematic Reviews

Figure A2: Secondary Selection Method of Literature

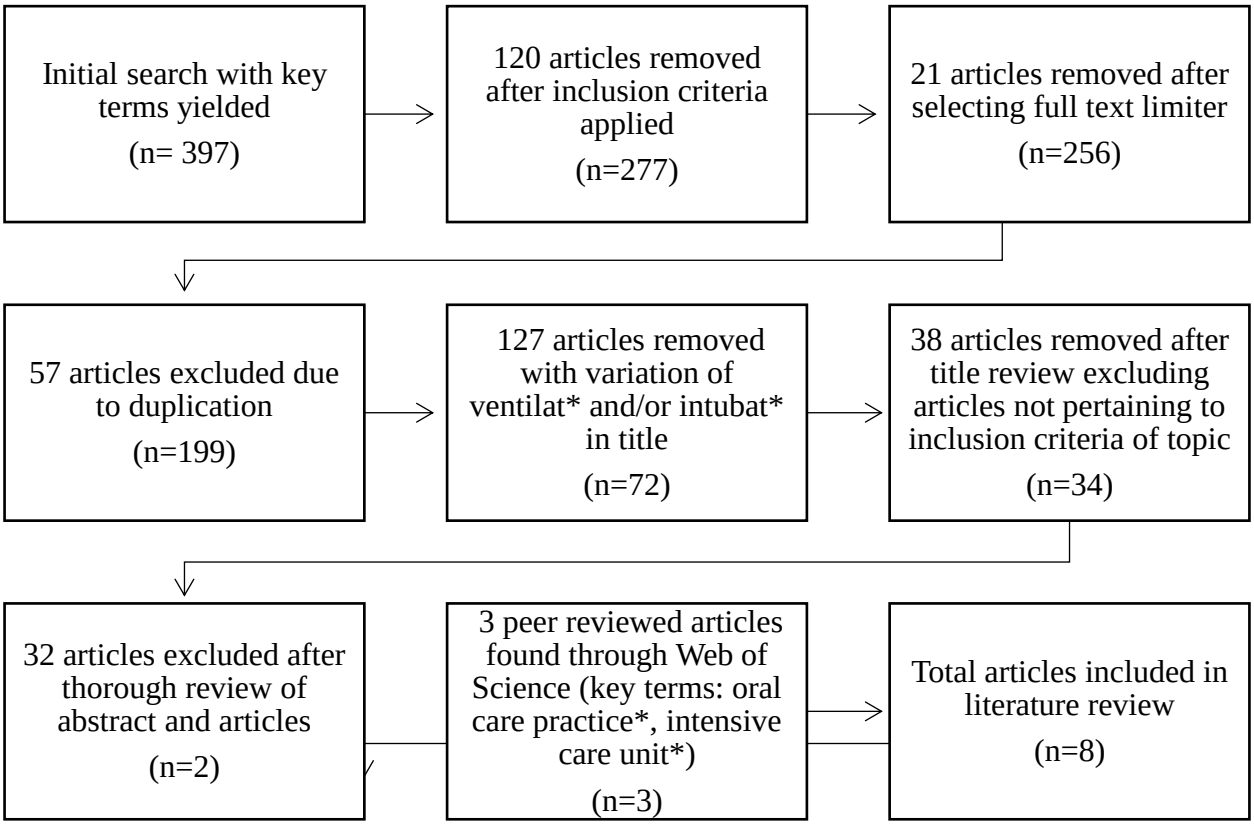

Figure A2.

Key terms: “oral hygiene" OR “oral care” OR “oral intensity” OR "mouth rinse" OR “mouth care” OR chlorhexidine rinse AND ICU OR "intensive care unit" OR "critical care" AND infection* OR pneumonia* OR NV OR non-ventilat* OR nonventilat*

Inclusion criteria: English Language, Academic Journal Articles, Peer Reviewed Research Articles, Evidence Based Articles, and Publication Date: 01/01/2006 to 09/31/16

Databases searched: CINAHL Plus with Full Text, MEDLINE, PsychINFO, Academic Search Premier, and Cochrane Database of Systematic Reviews

APPENDIX B: LIST OF TABLES

Table B1

Table of Evidence

Database	**Author(s)**	**Title**	**Journal/Year Volume/Issue/Pages/doi**	**Retrieved from (for electronic resources)**
Academic Search Premier	Goss, L. K., Coty, M. B., & Myers, J. A.	A review of documented oral care practices in an intensive care unit	Clinical Nursing Research/2011/Vol.20/(2)/ pp. 181-196/doi: 10.1177/1054773810392368	http://web.b.ebscohost.com.ezproxy.net.ucf.edu/ehost/command/detail?vid=14&sid=c087cf21-b98a-402c-aa0d-d6ba21ed7e77%40sessionmgr102&hid=115&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=59955630&db=aph
CINAHL Plus	Grap, M. J., Munro, C. L., Ashtiani, B., & Bryant, S.	Oral care interventions in critical care: Frequency and documentation	American Journal of Critical Care/2003/Vol.12/(2)/pp. 113-119	http://web.b.ebscohost.com.ezproxy.net.ucf.edu/ehost/command/detail?vid=15&sid=c087cf21-b98a-402c-aa0d-d6ba21ed7e77%40sessionmgr102&hid=115&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=106851265&db=rzh
CINAHL Plus	Hanneman, S. K., & Gusick, G. M.	Frequency of oral care and positioning of patients in critical care: A replication study	American Journal of Critical Care/2005/Vol.14/(5)/pp. 378-387	http://web.b.ebscohost.com.ezproxy.net.ucf.edu/ehost/command/detail?vid=13&sid=563c2706-3ca9-4c45-8cec-1c0af815a9d5%40sessionmgr120&hid=118&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=106528265&db=rzh

Database	Author(s)	Title	Journal/Year Volume/Issue/Pages/doi	Retrieved from (for electronic resources)
Academic Search Premier	Miranda, A. F., Monteiro de Paula, R., Goncalves Barbosa de Castro Piau, C., Paganini Costa, P., & Barreto Bezerra, A. C.	Oral care practices for patients in intensive care units: A pilot survey	Indian Journal of Critical Care Medicine/2016/Vol.20(5)/pp.267-273/doi:10.4103/0972-5229.182203	http://web.b.ebscohost.com.ezproxy.net.ucf.edu/ehost/command/detail?vid=16&sid=563c2706-3ca9-4c45-8cec-1c0af815a9d5%40sessionmgr120&hid=118&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=115267604&db=aph
Academic Search Premier	Rello, J., Koulenti, D., Blot, S., Sierra, R., Diaz, E., de Waele, J. J., &… Rodriguez, A.	Oral care practices in intensive care units: A survey of 59 European ICUs	Intensive Care Medicine/2007/Vol.33(6)/pp.1066-1070/doi:10.1007/s00134-007-0605-3	http://web.b.ebscohost.com.ezproxy.net.ucf.edu/ehost/command/detail?vid=17&sid=563c2706-3ca9-4c45-8cec-1c0af815a9d5%40sessionmgr120&hid=118&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=25200891&db=aph
Web of Science	Turk, G., Kocacal Guler, E., Eser, I., & Khorshid, L.	Oral care practices of intensive care nurses: A descriptive study	International Journal of Nursing Practice/2012/Vol.18(4)/pp.347-353/doi: 10.1111/j.1440-172X.2012.02045.x	http://eds.a.ebscohost.com.ezproxy.net.ucf.edu/eds/detail/detail?vid=12&sid=0d198f6c-d24a-4f1a-960d-04bba55400f8%40sessionmgr4007&hid=4103&bdata=JnNpdGU9ZWRzLWxpdmUmc2NvcGU9c2l0ZQ%3d%3d#AN=104483625&db=rzh

Database	Author(s)	Title	Journal/Year Volume/Issue/Pages/doi	Retrieved from (for electronic resources)
Web of Science	Ozveren, H., & Ozen, D.	Turkish nurses' attitudes and practices regarding oral care	International Journal of Nursing Knowledge/2015/Vol.26(4)/pp.163-169/doi:10.1111/2047-3095.12060	http://eds.a.ebscohost.com.ezproxy.net.ucf.edu/eds/detail/detail?vid=10&sid=0d198f6c-d24a-4f1a-960d-04bba55400f8%40sessionmgr4007&hid=4103&bdata=JnNpdGU9ZWRzLWxpdmUmc2NvcGU9c2l0ZQ%3d%3d#AN=110221783&db=rzh
Web of Science	Chan, E., & Hui-Ling Ng, I.	Oral care practices among critical care nurses in Singapore: A questionnaire survey	Applied Nursing Research/2012/Vol.25(3)/pp.197-204/doi:10.1016/j.apnr.2010.12.002	http://eds.a.ebscohost.com.ezproxy.net.ucf.edu/eds/detail/detail?vid=8&sid=0d198f6c-d24a-4f1a-960d-04bba55400f8%40sessionmgr4007&hid=4103&bdata=JnNpdGU9ZWRzLWxpdmUmc2NvcGU9c2l0ZQ%3d%3d#AN=104480755&db=rzh

Table B2

Literature Review Data Abstraction Table

Article	**Methods**	**Results & Conclusions**	**Implications for Practice**
A review of documented oral care practices in an intensive care unit	A retrospective descriptive study examined nursing documentation of oral hygiene in a neuroscience ICU in an academic medical facility. A cluster sample was obtained throughout a six month period. Sample size of n= 143 was used. A data collection tool was utilized which collected the patient's ventilation status, documentation, and frequency of oral care among others.	**Types of Oral Care:** Not applicable in this study. **Frequency/Consistency of Care:** Not applicable in this study. **Documentation:** Documentation in the study showed that oral care was performed on 89 percent of ICU patients with a frequency of one to eight hours. Patients receiving mechanical ventilation had oral care performed a more significantly number of times (5.57) compared to non-mechanically ventilated patients (3.54 times) per 24 hours, according to the documentation. In non-mechanically ventilated patients, the mean time between oral care was 3.17 hours and the average patient age was 54.3 years old, with the majority admitted for neurology services	Documentation needs to be more detailed in the future with specifics of products used and personnel that performed the care shown. A standard of care (frequency of oral care and type of products in addition to a toothbrush) needs to be implemented for non-mechanically ventilated patients. Additionally, a prospective observational study would be beneficial in the future (to decrease the risk of bias).

Article	Methods	Results & Conclusions	Implications for Practice
		(44.7%). It was also concluded that trauma patients received more oral care (5.26 times) versus neurology patients (3.63 times). Oral care was performed on 85.9 percent of non-mechanically ventilated patients versus 93.1 percent of mechanically ventilated patients. Oral care was performed more frequently between 8 p.m. and 4 a.m. (56 percent of all interventions). The median time to the first oral care intervention was 3.2 hours for non-mechanically ventilated patients. **Personnel to Perform the Care**: Not applicable in this study. **Conclusion:** Although the study differentiated between the non-mechanically versus mechanically ventilated ICU population, only the documentation of oral care was examined. No details on the oral care existed besides documented frequency. Oral	

Article	Methods	Results & Conclusions	Implications for Practice
		care was performed significantly more often (seen in documentation) on mechanically ventilated patients and performed more frequently at night.	
Oral care interventions in critical care: Frequency and documentation	A survey was distributed to nursing care providers (sample size of n=77) throughout three ICUs at an academic medical center. They were surveyed on two separate occasions using a 100 mm analog scale and asked about frequency, type, and priority of oral hygiene in intubated versus non-intubated patients. A prospective review of the documentation was also performed five random times (throughout one month) assessing oral hygiene documentation (frequency and type of care). Demographic data of patients were included.	**Types of Oral Care:** Use of substance to cleanse the oral cavity (isotonic sodium chloride, mouthwash, hydrogen peroxide, and chlorhexidine) did not significantly vary between the two populations. Use of toothbrush & toothpaste were significantly greater in non-intubated and intubated patients. Mouthwash and toothpaste were used more than isotonic sodium chloride solution, hydrogen peroxide, and chlorhexidine in non-intubated patients. **Frequency/Consistency of Care:** The majority (75 percent) of staff reported providing oral care two to three times per 24 hours for non-intubated patients, while 72 percent	Although nursing personnel used toothbrushes and toothpaste frequently in non-intubated patients, they were not used uniformly with no details given on how the care was performed. Toothbrushes are the recommended item of choice by the AACN, so this standard needs to be upheld. Education should be given to personnel demonstrating the effects of oral care on the non-intubated population and the current AACN oral care guidelines. In addition, nurses should be taught the importance of documenting/performing oral care more frequently (as seen by the high self-reported frequency compared to the low documented frequency).

Article	Methods	Results & Conclusions	Implications for Practice
		reported providing oral care five or more times per 24 hours for intubated patients. **Documentation:** Documentation of oral care was performed a total of 205 times, creating an average of oral hygiene performed 1.2 times per patient in 24 hours. This differs from the supposed two to three times for non-intubated and five plus times for intubated patients. **Personnel to Perform the Care**: Almost the entire staff that provided oral care to patients were RNs (97 percent) and most (70 percent) had a bachelor's degree. Mean ICU experience of 8.4 years. Oral hygiene was rated an average of 53.9 as a priority for nurses (100 being the most important). Comments made by nurses seemed to come to the consensus that proper oral hygiene was performed when staff levels were higher.	The mouth should be brushed a minimum of twice daily in the critically ill population and this study shows that it was performed far less per patient. Nurses may want to perform oral care this often, however, for some reason it is not being done. Randomized objective observances and questionnaires asking barriers to oral care could prove to be beneficial in gaining a more accurate picture of oral care logistics.

Article	Methods	Results & Conclusions	Implications for Practice
		Conclusion: The study did differentiate between the non-intubated and intubated population. Toothbrush and toothpaste (although not uniformly used) were the most commonly used products in the non-intubated population. Additionally, documentation collected was inconsistent with the nursing care provider (NCP) survey answers. Oral care was documented far fewer times than how often nurses self-proclaimed to perform it.	
Frequency of oral care and positioning of patients in critical care: A replication study	Replication of Grap et al. (2003) study to determine repeatability using a survey and cross sectional replication study. Nine adult ICUs in a university affiliated hospital were utilized. Sample size of n=181 ICU nursing staff were surveyed on oral care practices (frequency and type) in intubated and non-intubated patients.	**Types of Oral Care:** Use of product differed significantly between the non-intubated and intubated population. Mouthwash, toothbrush, and toothpaste were used most frequently in non-intubated patients versus the stronger products (chlorhexidine, peroxide mix, and sodium chloride). **Frequency/Consistency of Care:**	Nurses and PCAs may not perceive oral care to be as important in non-mechanically ventilated/intubated patients based on the significant effect intubation status had on documented oral care frequency. Oral care was only documented to have been performed an average of 1.8 times per day in non-intubated patients, which is less than the recommended

Article	Methods	Results & Conclusions	Implications for Practice
	A prospective review of the data was also utilized. Oral care documentation was collected from the previous 24 hours four to eight weeks after the survey. Certified data collectors prospectively randomly selected seven days in August through September to collect data. Frequency and type of oral care used were collected from documentation on sample size of n=436 patients. Intubation status during the previous 24 hours was noted.	Non-intubated patients had a mean frequency of oral care self-reported by staff members of three times per 24 hours versus intubated patients having a mean frequency of 4.2 times per 24 hours. This difference was found to be significant. **Documentation:** The majority (62 percent) of patient's documentation surveyed were men and the number of non-intubated patients (64 percent) outweighed intubated patients (36 percent). Mean oral care frequency documented was 2.3. The mean documented frequency for non-intubated patients was 1.8, compared with the surveyed response of 3 times per 24 hours. In intubated patients, documented frequency was 3.3, versus the surveyed response of 4.2 times per 24 hours. In each unit, non-intubated patients had oral care documented less frequently than intubated patients.	minimum of twice daily. Oral care by unit may differ as well. The AACN came to the conclusion that 0.12 percent chlorhexidine gluconate reduces the rate of nosocomial pneumonia in post-op cardiac patients. However, in non-mechanically ventilated patients in the cardiac unit, chlorhexidine was not a widely used product. Instead, mouthwash and toothpaste were more common. However, in mechanically ventilated patients on the cardiac floor, chlorhexidine was the most widely used product. Of course not all patients may have been post-op thus explaining the low usage of chlorhexidine in non-mechanically ventilated patients, but this could be an area of potential research. In addition, nurses should be taught the importance of documenting/performing oral care more frequently in the

Article	Methods	Results & Conclusions	Implications for Practice
		Personnel to Perform the Care: The majority of responses (82 percent) were from nurses, with the other 17 percent being patient care assistants and the remaining did not specify job title. Mean experience as a nurse was 13.5 years and 10 years of ICU experience. 64 percent had a bachelor's degree. Mean oral care rating of importance was 71 (100 being the most important). **Conclusion:** This study did differentiate between the non-intubated and intubated population. Mouthwash, toothpaste, and toothbrushes were the most commonly used product in non-intubated patients. The majority of care providers were nurses. In each ICU, documentation of oral care was more frequent in intubated patients and did not match up to self-reported frequency. This study generally came to the same conclusions as Grap et al. (2003) study.	non-mechanically ventilated population (as seen by the high self-reported frequency compared to the low documented frequency). The majority of oral care providers were RNs, so educational resources should be spent on nurses.

Article	Methods	Results & Conclusions	Implications for Practice
Oral care practices for patients in intensive care units: A pilot survey	A cross-sectional survey was performed in two Brazilian hospital ICUs. Sample size of n=71 chosen by a convenience sample completed the peer reviewed survey. The survey assessed the oral hygiene protocol in the ICU, current practices, the frequency, and products used. Attitudes towards oral care and demographic data of nurses were also recorded.	**Types of Oral Care:** Spatulas, toothbrushes and gauze were the products used by the majority (49.3 percent) of staff followed by solely toothbrushes (28.2 percent). The majority (49.3 percent) used only 0.12 percent chlorhexidine to cleanse the oral cavities. **Frequency/Consistency of Care:** Of the staff members, 83.1 percent cleaned the oral cavities of ICU patients. Most staff members (46.5 percent) provided oral care twice daily, 33.8 percent provided it three times daily or more, and 8.5 percent of staff did so once daily. **Documentation:** Not applicable in this study. **Personnel to Perform the Care**: Of the providers of oral care, the majority (57.8 percent) were	Inconsistencies were noted in the study on types of oral care provided. Although a large percentage of staff used toothbrushes, they used them with spatulas and gauze which are not nearly as well researched. The majority of providers self-reported performing oral care two to three times daily, which is in accordance to guidelines. However, this response was not uniform, as almost 17 percent of staff did not claim to perform oral care. This was the only study in which nurses technicians made up the majority of oral care providers. This should be kept in mind when targeting staff members for education. An oral care protocol needs to be created and education should be given to staff members regarding this.

Article	Methods	Results & Conclusions	Implications for Practice
		nurse technicians and 22.5 percent were nurses, collectively totaling 80.3 percent. Doctors, physiotherapists, and speech therapists made up the remaining percentage. The majority of staff (45.1 percent) had between one to three years of ICU experience with most working 12 hour shifts (70.4 percent). Seven percent had a graduate degree, 35.2 percent had a postgraduate degree, 26.8 percent were ICU certified, and 16.9 percent had postbasic critical care qualifications. In terms of attitudes towards oral care, 80.3 percent claimed that they had adequate time to perform the care and 56.3 percent said they had been given enough training to provide this care. Over one third (35.2 percent) did not agree and believed they did not have enough training. Nearly one half (47.9 percent) of staff said they needed better supplies/equipment.	

Article	Methods	Results & Conclusions	Implications for Practice
		Conclusion: The results did not differentiate between mechanical ventilation status in this study and instead spoke of the general ICU population. The majority of oral care providers in this study were nurse technicians, followed by nurses. The larger majority of staff members claimed to perform oral care two to three times or more times per day. Spatulas, toothbrushes, and gauze were most often the product of choice.	
Oral care practices in intensive care units: A survey of 59 European ICUs	A questionnaire was given out to ICUs in Europe. The sample size of the study was n=59 ICUs (each ICU turned in one questionnaire). The survey assessed the following: type and frequency of oral care, attitudes of personnel providing the care, training behind the care (if any), and demographics.	**Types of Oral Care:** Mouthwashes (88 percent and 61 percent with chlorhexidine) were the most commonly used products. Moisture agents (42 percent), manual toothbrushes (41 percent), and foam swabs (22 percent) were used much less frequently. Nearly 27 percent stated they would use an electric toothbrush rather than a manual one.	This study showed that the products of choice were mouthwashes (with chlorhexidine at times) and that toothbrushes were not used nearly as often. This is not in compliance with current practice recommendations, as manual toothbrushes are a preferred cleansing tool and can remove plaque. The majority of staff members (most being RNs) did self-

Article	Methods	Results & Conclusions	Implications for Practice
		Frequency/Consistency of Care: Oral care was self-claimed to have been performed by staff once daily (20 percent), twice daily (31 percent), and three times daily (37 percent). **Documentation:** Not applicable in this study. **Personnel to Perform the Care**: The majority of providers of oral care were RNs (91.5 percent). Over three fourths pf staff had a three year degree, 1.7 percent had a bachelor's degree, and 6.8 percent had a master's. The majority of respondents (42.4 percent) stated that they received in-service oral care training. A large percentage of staff (63 percent) stated that they needed better supplies and 37 percent stated that toothbrushes were not available. Over half of staff (68 percent) stated they did not	report performing oral care two to three times daily, which is in accordance with current recommendations. A prospective study should be performed either observing nurses actual oral care practices or a review of the documentation should be performed. Self-reported frequency is often inaccurate (Grap et al., 2003; Hanneman & Gusick, 2005). Again, a standard of care needs to be implemented so staff members have an oral care protocol to follow.

Article	Methods	Results & Conclusions	Implications for Practice
		have oral care training during their time in nursing school. **Conclusion:** This study did not differentiate between non-mechanically ventilated and mechanically ventilated patients. The majority of oral care providers were RNs, with the larger percentage performing oral care two to three plus times daily. Mouthwashes were the most commonly used product among staff.	
Oral care practices of intensive care nurses: A descriptive study	A questionnaire was given out to a sample size of n=101 nurses. The study occurred in 2008 in eight different ICUs in Turkey. The "Oral Care Practices Survey" was given out to nurses between August and October. They were asked about demographics as well as current practices/views on oral care (solutions/methods, type, frequency, and oral assessment type used).	**Types of Oral Care:** Sodium bicarbonate was the most frequently used product (79.2 percent), with moisturizing agents following (47.5 percent). Chlorhexidine and fluoride toothpaste each were used by 9.9 percent of staff. Water was used by 7.9 percent of staff and nystatin by 5.9 percent. Hydrogen peroxide and saline both were used by 1 percent of staff. Most of the staff (82.2 percent) used a foam swab to cleanse the oral cavity.	Oral hygiene types of products used varied in each ICU, showing inconsistencies. A standard of oral care practice and program needs to be developed and implemented. Current AACN guidelines state that a protocol should be implemented along with the minimum teeth brushing of twice daily. All of the nurses claimed to not have an oral care protocol. The use of a toothbrush was

Article	Methods	Results & Conclusions	Implications for Practice
		Gauze pads and tongue depressors were both used by 49.5 percent of staff members. This use was followed by that of suction (13.9 percent) and a toothbrush (5 percent). Most nurses (86.1 percent) claimed to cleanse the oral cavity by rinsing/decontaminating via a solution. Only 34.6 percent of the nurses claimed to brush the patient's teeth and 16.8 percent just rinsed their mouth. Nearly one third (30.6 percent) claimed to use two or more methods when cleaning the oral cavity. There was a statistically significant relationship between toothpaste usage and the ICU ($p=0.000$) as well as mouth moisturizer and the clinics ($p=0.000$). There were significant differences among usage of chlorhexidine based on the clinics ($p=0.000$), foam swabs ($p=0.000$), toothbrushes (0.019), and tongue depressors with gauze pads covering them ($p=0.000$).	extremely low in this study along with one third of nurses claiming to provide oral care only when needed, showing the need for education of the nurses. Almost all of the nurses also claimed to provide the care without actually assessing the patient's oral cavity, which also demonstrates the need for teaching. Additionally, a prospective study would be beneficial to review the documentation and see what current practices really are.

Article	Methods	Results & Conclusions	Implications for Practice
		Frequency/Consistency of Care: Oral hygiene was performed under four times each day by 44.5 percent of staff. 22.7 percent claimed to perform the care every two to four hours. Nearly one third of nurses (32.6 percent) said they performed oral care "when it was required" (Turk et al., 2012, p. 350). Additionally, a significance between the frequency of oral hygiene and clinics existed (p=0.000). **Documentation:** Not applicable in this study. **Personnel to Perform the Care**: The majority (93 percent) of the nurses who responded were between the ages of 20 to 35 and the remainder between the ages of 36 to 50. All of the nurses were female with 93 percent holding a Baccalaureate degree. Five percent and two percent had a two year degree	

Article	Methods	Results & Conclusions	Implications for Practice
		and master's degree, respectively. General nursing experience between one to ten years made up 77.2 percent of the population. 12.9 percent had less than one year of experience and 9.9 percent had greater than ten years. The majority (77.2 percent) of the population had between one to ten years of specific ICU nursing experience. 18.8 percent had less than one year and four percent had greater than ten years of ICU experience. Almost all of nurses (93 percent) claimed to not use any oral assessment tool and just performed the care. Every nurse stated that they did not have any oral care guidelines on their floors. Nearly three fourths (74.3 percent) believed they had enough time to do this care and 81.2 percent had adequate equipment. Most nurses (86.1 percent) believed the materials used were appropriate. Nearly half (49.5 percent) believed the	

Article	Methods	Results & Conclusions	Implications for Practice
		quality of care was sufficient and 48.5 percent believed it was partially sufficient. A large percentage of nurses (71.8 percent) having between one to ten years of general nursing experience believed to have enough time for oral care and this was statistically significant (p=0.031). Over half (61.3 percent) of nurses viewed oral hygiene as a high priority. **Conclusion:** This study did not specify the nurse's difference between practices in mechanically ventilated and non-mechanically ventilated ICU patients (just the general ICU population). Sodium bicarbonate and foam swabs were the most frequently used products. A large percentage of staff performed oral care under four times per day and many nurses performed the care only when it was required.	

Article	Methods	Results & Conclusions	Implications for Practice
Turkish nurses' attitudes and practices regarding oral care	A descriptive cross-sectional study was performed analyzing the attitudes and practices of oral care in nurses. Sample size of n=185 in four different adult hospital ICUs. A questionnaire was given to nurses in Turkey between April and June of 2012 analyzing nurse demographics, oral care details, and nurses' attitudes related to oral care.	**Types of Oral Care:** A significant difference (p=.001) was noted between the hospitals in using foam swabs (50.8 percent), mouthwash (16.8 percent), toothpaste/brushes (14.1 percent), suction toothbrushes (19.5 percent), and suction foam swabs (21 percent) (with p=.008). A depressor wrapped in gauze was used by 58.9 percent of nurses. Sodium bicarbonate was used by 69.2 percent of nurses, chlorhexidine by 38.4 percent of nurses, moisturizing agents by 33 percent, saline by 10.8 percent, and hydrogen peroxide by 5.9 percent. Nurses also stated they just wiped with solution (92.4 percent), 21.6 percent brushed the patient's teeth, and 8.1 percent just rinsed. **Frequency/Consistency of Care:** The largest percentage of staff (37.8 percent) performed oral care when necessary, 18.4 percent performed the care three	Hospitals had varied practices and products used to perform oral care along with over half of nurses stating they did not have a protocol to follow, suggesting the need for a better standard of practice. Toothbrushes were used by a small percentage of nurses demonstrating the need for further education of nurses. A large percentage of nurses provided oral care when necessary, which is alarming due to how subjectively that could be interpreted. These practices are inconsistent with current guidelines. In addition, a prospective observational study or review of the documentation would prove to be beneficial to see current practices.

Article	Methods	Results & Conclusions	Implications for Practice
		times a day, 17.3 percent performed it twice daily, 9.2 percent performed it once daily, and the remaining 17.3 percent every six hours. There was a significant difference (.001) between the methods and frequency of oral care between the hospitals. **Documentation:** Not applicable in this study. **Personnel to Perform the Care**: Of the total nurses surveyed, 65.4 percent had undergraduate education. Nearly three fourths (74 percent) had between one and 10 years of service experience. Over three fourths (78.9 percent) claimed to have had training on oral care. A large percentage (77.8 percent) of nurses claimed to perform an oral assessment while the other 22.2 percent did not. Over half (53.5 percent) responded stating that they did not have an oral care protocol, 41.6 percent had a protocol, and 4.9 percent had	

Article	Methods	Results & Conclusions	Implications for Practice
		one but did not use it. Three fourths (75.1 percent) claimed that they regularly performed oral care while the remaining 24.9 percent said it was not performed. There was a significant different (p=.001) between each hospital in terms of oral care performance, assessment, and implementation of a protocol. **Conclusion:** This study did not specify nurses' oral care practices on mechanically ventilated and non-mechanically ventilated patients and instead talked of the ICU as a general population. Foam swabs, a depressor wrapped in gauze, and sodium bicarbonate were the most frequently used products. Nurses provided the care and the larger majority had undergraduate education and between one to ten years of experience. Additionally, most nurses provided oral care when necessary, two to three times daily, or every six hours.	

Article	Methods	Results & Conclusions	Implications for Practice
Oral care practices among critical care nurses in Singapore: A questionnaire survey	A descriptive cross-sectional study design was used. A questionnaire was given out to nurses/nursing personnel (sample size of n=244) in four ICUs and one high dependency (HD) unit. The questionnaire was given out over two weeks in September of 2008 analyzing nurses' attitudes, knowledge, and practices all related to oral care.	**Types of Oral Care:** The study presented a case scenario of an intubated patient in order to see what types of products staff members used to provide oral care. Since this case study was not applicable to this literature review population type, this section was not included. However, questions of how nurses chose their oral care products were asked and included in this study. Over half (52.1 percent) of staff stated they chose the products based on availability versus 44.2 percent stating they chose based off oral cavity assessment. **Frequency/Consistency of Care:** Not applicable in this study. **Documentation:** In the survey, nurses claimed that they were likely to document assessing the oral cavity (87 percent), lips (84.3 percent), and tongue (72	Over half of the nurses stated that they chose oral care products based on availability, suggesting that more resources be spent on oral care products. Although many of the nurses claimed they would document assessment on the oral cavity, the response was not uniform. Nurses should be educated that they should document specifics on oral care including assessment. An EBP protocol was actually implemented after this survey at the facility. This protocol standardized oral assessments, documentation, and oral hygiene practices

Article	Methods	Results & Conclusions	Implications for Practice
		percent) compared to the teeth condition, dentures, and/or halitosis. **Personnel to Perform the Care**: Most of the nurses (81.4 percent) surveyed were RNs and the remainder were ENs. Almost all participants (96.7 percent) worked three-rotating shifts. 13.8 percent of nurses had a certificate, 33.3 percent had a diploma, 12.1 percent had an advanced diploma, and 40 percent and 0.8 percent reached a graduate and postgraduate education level, respectively. The largest barrier that nurses stated kept them from performing oral care (88.7 percent) was an uncooperative patient followed by hemodynamic instability (28 percent). Over half (60 percent) of nurses claimed to lack time to perform oral assessments. Nurses' knowledge was directly related to their educational level, as the more education the	

Article	Methods	Results & Conclusions	Implications for Practice
		nurse had, the higher oral care knowledge (p=.019). **Conclusion:** The study did not differentiate between the nurses' practice in non-mechanically ventilated and mechanically ventilated ICU patients and instead spoke of the population as a whole. Slightly over half of the participants chose oral care products based on the availability while the remainder chose based on the oral cavity conditions. Although the study did not analyze documentation, nurses were likely to document aspects of the oral cavity, lips, and tongue. The larger portion of staff providing the care were RNs with a large portion having a graduate degree.	

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