

EDUCATING CRITICAL CARE RNS IN USING A BEDSIDE ORAL
HEALTH EXAM

by

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As members of the DNP Project Committee, we certify that we have read the DNP project prepared by Landon Charles Richardson, titled Educating Critical Care RNs in Using a Bedside Oral Health Exam and recommend that it be accepted as fulfilling the DNP project requirement for the Degree of Doctor of Nursing Practice.

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Final approval and acceptance of this DNP project is contingent upon the candidate's submission of the final copies of the DNP project to the Graduate College.

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DEDICATION

This accomplishment is dedicated to the underdogs. If you know me, you know why.

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ABSTRACT

Background: The methods and frequency of oral care implemented by ICU protocols varies between facilities and sometimes even between units within a facility. It is common that these protocols prescribe a set method and frequency of oral care in a one-size fits all approach.

Evidence suggests that a nurse-driven oral care protocol based on the data derived from using a bedside oral health exam can reduce VAP, increase nursing role satisfaction, and save money in supplies and improved patient outcomes.

Objective: The purpose of this project was to introduce a bedside oral health exam and obtain feedback on staff's perception of implementing an oral care protocol based on the assessment. Education enhancing the current-standing oral care protocol was also included to enrich nurses' effectiveness in the oral care they currently provide.

Design: Descriptive study completed to determine ICU nurses' perceptions of an oral health assessment-driven oral care protocol for mechanically ventilated patients compared to their current protocol and to emphasize the importance of mechanical oral debridement and maintaining proper mouth moisture. Rounding individualized education was presented as a narrated PowerPoint presentation.

Setting: Maricopa Medical Center trauma, surgical, and medical ICU units in October 2019.

Participants: 31 full-time ICU nurses at MMC in Phoenix.

Measurements: Nurses were administered a knowledge-based three question pre-test to validate need for education and given a six question post-education survey in a 5-point Likert-scale style questionnaire.

Results: The average total score for the pretest was 24.73% overall and only 6.45% correctly answering knowledge questions regarding oral care frequency, and proper intervention for foul smelling oral secretions. The survey responses regarding perception of benefit of this program had a mean score of 4.62 with '1' being strongly disagree and '5' being strongly agree. There were no disagree responses and only nine total neutral responses out of 186.

Conclusion: The data validated that there was opportunity to enhance knowledge in the proper implementation of oral care. The survey data showed strong favorability among nurses and indicated a readiness to adopt an assessment-driven oral care protocol and felt it would be beneficial to patients by reducing VAP rates and would increase nursing compliance and role satisfaction.

INTRODUCTION

Nosocomial infections are among the leading contributors to increased length of hospital stay, morbidity, and mortality among adult intubated patients in the intensive care unit (ICU). Nurses work under increasingly complex protocols in an ever-changing environment of high-stakes. Performing as a competent critical care nurse requires strong clinical knowledge in addition to technical skill. Doctoral-prepared nurses are considered clinical experts and are responsible to provide education to various practitioners. The use of nurse-driven assessments and protocols augment the bedside nursing efforts and enhance successful patient outcomes. In the modern healthcare environment, much scrutiny is present regarding fiscal responsibility and patient outcomes. The call to healthcare is to work smarter, not harder.

Background Knowledge

Ventilator associated pneumonia (VAP) ranks first among causes of nosocomial-related deaths (Bahart, 2009). Numerous contributing factors have been investigated in attempt to identify opportunities for improvement of VAP rates. VAP is categorized as any pneumonia emerging greater than 48 hours after a patient has been intubated and started on mechanical ventilation without evidence of a previously incubating pulmonary infection (Koenig & Truwit, 2006). Mortality rates increase by 33-50% with incidence of VAP (Yardanur & Yagmur, 2016). While reducing patient mortality is an obvious priority, there are additional concerns to consider such as a suggested three-fold increase in hospital costs associated with VAP due to a noted four-fold increase in length of stay when compared to non-VAP patients (Alp et al, 2012).

Reduction of VAP through the implementation of clinical practice guidelines (CPG) founded in Evidence Based Practice (EBP) reduces mortality and morbidity of critically ill

patients (Cocanour, Peninger, Domonoske, et al., 2006). There are practice variances across the country and even between ICU units at a single location, but most are rooted in the major recommendations of various CPGs. Klomas et al. published an updated strategy guide to prevent VAP in 2014 under a sponsorship from the Society for Healthcare Epidemiology of America (SHEA), the infectious Disease Society of America (IDSA), the American Hospital Association (AHA), the Association for Professionals in Infection Control and Epidemiology (APIC), and the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). The purpose of this CPG was to highlight clinically practical recommendations from the more comprehensive published guidelines available. The aim was to simplify the great abundance of information into useful form. One of the greatest contributors to these recommendations was the American Thoracic Society, based on the guidelines they recommended for management of ventilator patients to reduce VAP (2005).

Several common recommendations exist across the available literature. The most nursing-relevant suggestions include keeping head of the bed at 30 degree or greater, assessing for readiness to extubate, eliminating sedation as fast as possible, use of closed/ in-line endotracheal suctioning, and performing proper oral care (Klompas et al., 2014). There is strong evidence that links oral care of mechanically ventilated patients to reduction in VAP (Shi, Xie et al. 2013; Wang et al., 2013). There is no disputing literature suggesting contrary. What *is* disputed is the best recommendation related to technique, frequency, tools, and surveillance methods of oral care performance. The standard approach (with exceptions) among local intensive care units is the implementation of a VAP bundle which includes a prescribed oral care technique with a single selected tool uniformly across the entire population of adult mechanically ventilated

patients. This approach lacks the benefits of allowing nurse discretion and clinical judgment in patient-specific care.

What has been determined is that oral care is most effective when tailored to individual patient circumstances based on an oral health assessment (Prendergast, 2013). Despite this evidence, common practice is among ICU units is an oral care protocol that has prescribed methods, tools, and frequency without exception or inclusion of an oral health screening tool. An additional finding reflected in the literature suggests that when nurses performed an oral health assessment in the ICU, there was a lack of standardized validated technique and inconsistency even among individual nurses (Mori et al., 2016; Özveren, H., & Özden, D. 2015). This factor was identified as an opportunity for improvement in VAP reduction as oral care has proven to be a major factor in reducing VAP rates. Education and introduction of a validated bedside oral health assessment for ICU nurses will aid in filling this knowledge gap and help guide nurses in providing the best individual oral care interventions and improve nursing satisfaction and autonomy while reducing VAP with very little cost and effort (Mori et al., 2006; Prendergast, 2013).

Surveillance Problem

Patients on mechanical ventilation are vulnerable to a host of complications and are dependent upon hospital staff to navigate them safely to recovery. One of the difficulties in addressing VAP prevalence and reduction is the lack of uniformity in surveillance strategy between hospitals and even within ICU units (Klompas et al., 2014). This problem is as ubiquitous in the Arizona region as other geographical regions and mirrors the general ICU population in variant VAP surveillance and standard quality of care measurements. Nationally,

there is a recognized inconsistency in the way cases of VAP are diagnosed and validity is often questionable (Rabello, Araujo, & Magalhaes, 2018). This is due in part to a contrast between controlled surgical intubations that occur in the operating room and emergent unplanned intubations in the ICU. It is more likely that an emergent ICU intubation is identified as a VAP due to incomplete pre-intubation diagnostics that would identify incubating pneumonia. The chaotic nature of events leading to emergent intubation can further confound the validity of VAP statistics due to the introduction of additional clinical variables and co-morbidities. Klompas et al. (2014) recommend that hospital policy include specific criteria for identifying VAP and implement standardized diagnostic methods such as inclusion of pre-intubation chest radiograph and planned repeat chest X-ray at 48 hours post-intubation for comparison. For these reasons, less emphasis will be placed on tracking VAP rates and more effort will focus on the educational success and its effect on nursing confidence and role satisfaction.

The unit VAP bundle at the implementation site is the primary influence on the methods of nursing oral care implementation. In addressing any new changes to unit policy, local factors that must be considered are cost, ease of integration into current practice, and trackability. There is not clear evidence which would indicate superiority of twice-daily vs once-daily oral care although some studies have shown a significant VAP reduction related to the increased frequency (Shi, Xie et al. 2013; Wang et al., 2013). Policy concerning oral care frequency should also consider bedside nursing perspective and patient population. For example, it may not be appropriate to implement twice-daily CHG in certain populations such as trauma patients with multiple facial fractures who may experience additional anxiety or pain unnecessarily from the increased oral care. Increased aspiration may occur due to patient agitation and increase VAP

rates, which is counterproductive. Interruption in workflow and documentation requirements must also be considered.

Knowledge Gap and Role Satisfaction

Bedside nurses are at the front line of patient care and are key integral players in nearly every aspect of support for the ventilated intensive care patient. Ability to provide adequate and competent care depends on the possession of all essential knowledge elements of the tasks and must be supported in their ability to perform said tasks. One significant task of the bedside nurse in managing the ventilated patient is performing oral care.

Oral care is essentially a universal intervention among intubated patients and performed exclusively by nursing. Such care is most frequently driven by protocols prescribing frequency, methods, and equipment of execution in a one-size-fits-all approach. These universal protocols eliminate aspects of nurse discretion and often fail to address patient-specific details that could better benefit from an adjusted frequency, method, or tool of oral care. Implementation of an individualized exam-driven oral care protocol achieved a nearly 50% reduction in VAP by actually decreasing oral care frequency for many ventilated patients (Pendergrast, Kleiman, & King, 2013). Identification of such patient-specific indicators necessitates a thorough oral health assessment and a knowledge of the proper interpretation of those assessment findings to determine best practice. Many current protocols do not include a standardized oral health assessment to drive oral care (Hsu et al., 2011). In discussing with ICU nurses from various hospitals, most had never even heard of a nurse-driven protocol or use of a standardized bedside oral health exam. The currently implemented protocol at this implementation site did not include elements of oral health assessment nor its influence on various oral care interventions.

In addition to driving improved patient outcomes, a nurse-driven process increases RN feelings of autonomy and satisfaction with their role (Pendergrast, Kleiman, & King, 2013). When the process is influenced by nursing discretion, protocol compliance is increased, and resources are utilized in more productive ways (East & Jacoby, 2005). Furthermore, staff retention can increase, and nursing burnout is reduced when nurses feel empowered and supported (Linnen & Rowley, 2013). Increasing nursing knowledge and proper assessment and technique for individualized oral care considerations can be reasonable assumed to increase nursing satisfaction and improve patient outcomes while reducing costs and increasing staff retention (Spence-Laschinger et al., 2009). Such an intervention is simple to implement, low-risk, and very cost effective.

Site-Specific Details

Maricopa Medical Center is an inner-city academic public hospital with Level I trauma status. It is a full-service 449-bed hospital that sees roughly 20,000 inpatient admissions annually. The project was implemented on three units within the facility consisting of a 13-bed trauma/surgical ICU, a 13-bed medical ICU, and a progressive care unit that supports long-term ventilator-dependent patients. The population among all units was adult and excluded the Arizona Burn Center ICU due to the increased sensitivity of that population, but many of the burn staff float between units so were captured in the data as well. Patient:nursing ratio among the units is typically 2:1 and staff vary in level of experience and education but are required to have ACLS and CPR certification. Many of the nurses carry CCRN and TNCC credentials as well.

The current oral care protocol for ventilated patients includes use of Sage products consisting of oral swabs to be used every two hours on every patient. The kits include a disposable toothbrush with a sponge on the back of the toothbrush head to be used for brushing and oral debridement every 12 hours. The disposable swabs and brushes can connect to wall suction so that secretions can be cleared from the oral cavity. They are packaged in singular bundles of 12 kits intended to be used every two hours, which equates a 24-hour supply in each bundle. They are hung at the patient bedside at midnight each day and expected to be gone by the following midnight if the protocol is followed. One of the methods of tracking oral care is for rounding auditors to tally up the oral care kits remaining hanging at any given point of the day and ensuring the proper number have been used.

Purpose and Intended Improvement

The purpose of my project was to introduce a bedside oral health assessment with accompanying education to address the identified knowledge gap and lack of standardized, validated assessment tools. Secondly, this effort was intended to increase ICU nursing role satisfaction and reduce VAP. Pendergrast, Kleiman, & King (2013) implemented a bedside oral assessment tool that effectively reduced VAP and increased staff satisfaction while creating a 66% reduction in monthly costs associated with oral care. Despite this study and others which indicate that a validated tool to assess oral health and customize oral care is most effective, many units continue to adopt the one-size fits all approach with chlorhexidine gluconate or other standardized oral solutions at a prescribed interval of every 2 hours without inclusion of a standardized oral health assessment specific to mechanically ventilated ICU patients and oral care indicators.

Significance to Nursing

Doctoral nurses are viewed as leaders and clinical experts. As such, it is expected that they participate in the formation and execution of staff competencies in the inpatient environment. Numerous tools are available to enhance education efforts. Providing education to ICU nurses and implementing a standardized oral assessment tool can successfully reduce incidence of VAP (Prendergast, Kleiman, & King, 2013). There is an associated reduction in cost, mortality, and length of stay when VAP rates are reduced (Cocanour, Peninger, Domonoske et al. 2006). Improvement in oral health assessment and appropriate oral care increases nurse autonomy (and job satisfaction) which is a secondary benefit to nurses and unit managers alike (Prendergast, Kleiman, & King, 2013). Besides the cost savings of reduced hospital stays and complications, there was a reduction in supply costs when focus was placed on individualized oral assessment and use of simple oral care tools rather than standardized pre-packaged oral care products (Prendergast & Hinkle, 2018). The potential cost savings of an effective VAP reduction using oral care vastly outweighs the costs of process implementation (Cutler & Sluman, 2013). In the article published by Prendergast, Kleiman, and King, a noted cost savings of 65% monthly was noted for oral hygiene supplies and VAP rates declined by half (2013). Assuming a perpetuated reduction in VAP, the savings over time is a clear net gain for the facility. It is important that stakeholders understand this point.

Project Question

The study question is "Does increasing nursing knowledge regarding use of a standardized bedside oral health assessment aid in the reduction of Ventilator associated pneumonia (VAP) by improving role satisfaction among ICU nurses who care for

mechanically ventilated patients?” This project was to increase nursing knowledge by developing an educational intervention to address knowledge deficiencies regarding oral health assessment and its implications in guiding oral care.

Theoretical Framework

The Iowa Model of EBP was first published by Marita Titler and her team in 1994 and has since been widely adopted and disseminated in hospitals, academic institutions, public health, and EBP research programs (Rycroft-Malone & Bucknall, 2011). Since its original creation in 1994, it underwent major revision in 1998 to better align with modern quality improvement and EBP literature (Titler, Kleiber, Steelman et al., 2001). It was developed as a practice model to address the need for clinician aid in implementing guidelines to improve patient outcomes. The Iowa Model addresses the need for sustaining change by suggesting the director “Identify and engage key personnel” (Buckwalter, Cullen, Hanrahan et al., 2017). It encourages clinicians to question current practice and find ways to improve upon them with emphasis on collaborative interdisciplinary efforts and research. It also places emphasis on the need for organizational support for EBP implementation to be successful.

The Iowa Model has been used extensively in acute care settings to implement EBP projects. It has also been adopted by the Advanced Practice Institute of EBP designed specifically for nurse leaders (Rycroft-Malone & Bucknall, 2011). Using the Iowa Model, EBP guidelines are developed by a working group after a problem is identified. The “triggers” are classified as “problem” or “knowledge” triggers. Problem triggers include practice issues of a more clinical basis, best addressed by inclusion of clinicians such as practitioners on the team (Habraken, Van der Schaaf, Leistikow & Reijnders-Thijssen, 2009). The knowledge triggers are

issues more related to theory or philosophy and require the focus of scientists and researchers. The inclusion of both clinicians and scientists from multiple disciplines ensures a more complete evaluation of the problem.

Once a problem has been identified and triggers have been evaluated, the problem is determined to be of organizational concern or not. If it is not considered an organizational priority, it is taken back to the drawing board for further evaluation of triggers. If it does align with organizational goals, the team assembles and evaluates relevant literature for review. After consideration of existing evidence, a practice recommendation is made and compared to the currently implemented practice to identify disparities and determine if there is a enough available information to implement the change (Polit & Beck, 2012). If it is determined the research base is insufficient, additional evidence such as case reports, expert opinion, and theory are considered. If there is enough basis of evidence for change, the change is implemented as a pilot on select units.

The piloting process requires that expected outcomes be determined for later evaluation of impact. Baseline data must be collected for accurate comparison prior to implementation. Once the pilot has been in effect its predetermined amount of time, it is evaluated in terms of both process success and outcome measures. At this point the team can modify the guideline as determined appropriate, and either repilot the changes, or if the practice is appropriate for adoption to practice, can be implemented in remaining units as standard policy. If the team finds that the pilot is inappropriate for adoption, the problem is reconsidered for new knowledge and returns to the trigger-identification step of the process.

Application

The Iowa Model is appropriate for use in implementing an oral health assessment tool for VAP prevention in adult ICU patients as it assists in application-oriented implementation of EBP (Buckwalter, Cullen, Hanrahan et al., 2017). Implementation of change in ICU is tough since staff are managing emergent life-or-death patient priorities and inconsistent implementation of evidence-based practice in critical care occurs worldwide (Dawson & Endacott, 2011). In fact, Resar discovered that only 50% of implemented guidelines were received by patients (2006). This indicates a need for very thorough planning and preparation prior to beginning this CPG execution.

Applying the Iowa Model to this EBP implementation begins with evaluating the problem by carefully considering factors including both the nature of the problem and staff readiness for change according to Roger's theory diffusion of innovation (Rogers, 2003). This is shown to improve the quality of outcomes and is consistent with the Iowa Model's emphasis on multidisciplinary involvement in EBP implementation. Failure to represent all affected disciplines may prove a barrier to promoting and developing evidence-based institutional protocols (Zaccagnini & White, 2017).

An important step consists of a comprehensive literature search and review of currently recommended CPG sets as well as consideration of what similar units may be doing locally and their successes/failures if possible. This includes review of VAP literature and specifically oral care practices and their outcomes. The evidence must be graded in areas of effectiveness, appropriateness, and feasibility the bundle can be formed based on the EBP standards identified.

The implementation of a pilot consists of selecting a few ICU units to utilize the intervention and includes rounding education pre and post implementation. The timing of the implementation must avoid overlapping other initiatives to avoid change fatigue (Barnsteiner, Prevost, 2002). Comprehensive written materials as well as tip-sheets for quick reference shall be provided to all affected staff. Unit-based leadership is instrumental to both the implementation and the ongoing evaluation of the process and outcomes (Barnsteiner & Prevost, 2002). Success when implementing a VAP intervention has been shown to be poor when it does not involve ongoing efforts to reassess progress and adapt as necessary (Cocanour, Peninger, Domonoske et al., 2006). Over-time, staff tend to become increasingly lax if there is not ongoing education and reminders following a new change (Grimshaw et al., 2012).

The Iowa Model is a well-established and effective EBP implementation method and is appropriate for addressing VAP reduction by introduction of a standardized oral health assessment tool. Utilization of the Iowa Model is likely to improve effectiveness of the bedside assessment tool implementation and is also likely to benefit ongoing improvement efforts. Further evaluative and refinement efforts are warranted due to the ambiguity of results pertaining to various oral care methods and unique unit characteristics such as staff readiness for change. Causation of VAP is multifactorial in nature and justifies a careful and well-planned approach for implementing bundled VAP-prevention strategies. Efforts to reduce VAP are likely to align with organizational goals and thereby gain support due to the associated costs and morbidity. VAP remains a highly relevant problem with significantly affected patient outcomes among mechanically ventilated patients worldwide.

Synthesis of Evidence

My project question is "Does increasing nursing knowledge regarding use of a standardized bedside oral health assessment aid in the reduction of ventilator associated pneumonia (VAP) and improve role satisfaction among ICU nurses who care for mechanically ventilated patients?"

UpToDate contains several clinical practice guidelines which are relevant to the clinical question. One that directly addresses VAP prevention is titled "Risk factors and prevention of hospital-acquired and ventilator-associated pneumonia in adults" (Klompas, 2018).

The clinical practice guideline (CPG) was last updated on June 4, 2018 utilizing a meta-analysis of the most current data available. The most current literature included in the review was published May of 2018. Based on the recent revision, there is no need to update the CPG to include more current data.






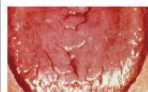












The guideline is authored by a physician who is recognized as an expert on the subject, Dr. Michael Klompas MD, MPH. The CPG is extensively scrutinized by physician editors and peer reviewers for accuracy and completion of the literature search. Of note, the CPG is authored and reviewed exclusively by MDs, which may reflect a poor interdisciplinary consideration and fails to consider varying scopes of practice. The recommendations are absent any specific disciplinary guidelines, which represents a potential weakness of the CPG as the lack of consideration for affected scopes of practice creates tension in the development process of practice guidelines (Institute of Medicine, 2011). Specifically, its development lacks any nursing participation, which may create a barrier to promoting and developing

evidence-based institutional protocols at the implementation level (Zaccagini & White, 2017). The CPG could be strengthened by a revision which includes the perspective of additional healthcare disciplines.

One major deficiency that has been identified in the literature is a lack of consistent oral care assessment protocol between intensive care units and utilization of a great variety of tools and oral care solution between facilities (Ozeveren & Ozden, 2015). Their research indicated a need for further training in the area of oral health assessments and interventions in ICU among intubated patients. A team at Barrow Neurological Institute at St Joseph's Medical Center in Phoenix introduced a Bedside Oral Exam (BOE) to guide oral care among adult ICU patients on mechanical ventilation (Prendergast, Kleiman, & King, 2013) (Figures 1, 2 & 3). With this implementation they noted a reduction in VAP from 4.21 to 2.1 per1000 ventilator days and a cost savings of 65% on a monthly basis (Prendergast, Kleiman, & King, 2013). They were also able to identify increased staff satisfaction with the option of using multiple oral care products as indicated, rather than a one-size fits all approach (Prendergast, Kleiman, & King, 2013). Additional literature indicates that oral assessment is vital and requires reliable and validated instrumentation (Prendergast & Hinkle, 2018). It has also been established that oral care should be based on the patient's condition and unique risk factors (Yildiz, Durna, & Akin, 2013). The evidence certainly indicates that nurses working in critical care need to develop and implement oral care assessments in order to reduce VAP. Despite the robust literature indicating a need for dynamic, individualized care many units continue to utilize a singular methodology for oral care.

Bedside Oral Exam (BOE)

Perform each Shift

Category	Methods of Measurement	Numerical and Descriptive Ratings		
		1 Normal	2 Moderate Dysfunction	3 Severe Dysfunction
Swallow	Observe while patient swallows, check gag reflex	Normal swallow	Pain or difficulty with swallow	Unable to swallow <i>(intubated, absent gag)</i>
Lips	Observe	 Smooth, pink	 Dry or cracked	 Ulcerated or bleeding
Tongue	Observe appearance of tissue	 Pink, moist, papillae present	 Coated or loss of papillae with shiny appearance, with or w/o redness	 Blistered, cracked, or bleeding
Saliva	Observe Use tongue blade, touching the center of tongue and floor of mouth <i>(optional)</i>	 Watery	 Thick or ropy	 Absent
Mucous Membranes	Observe appearance of tissue	 Pink, moist	 Red or coated, no ulcers	 Ulcers with or w/o bleeding
Gingiva	Observe Use tongue blade, may gently press tissue with tip of blade <i>(optional)</i>	 Pink, firm	 Edema, with or w/o redness; with or w/o bleeding	 Bleeds easily
Teeth or dentures	Observe appearance of teeth or denture	 Clean or no teeth	 Local debris (between teeth)	 General debris, decay
Odor	Smell	Normal	Slightly to moderately foul	Strong foul odor

Modified from: Eilers, et al. (1988) "Development, testing, and application of the oral assessment guide." *Oncol Nurs Forum* 15(3): 325-30.

FIGURE 1. Bedside oral exam (BOE).

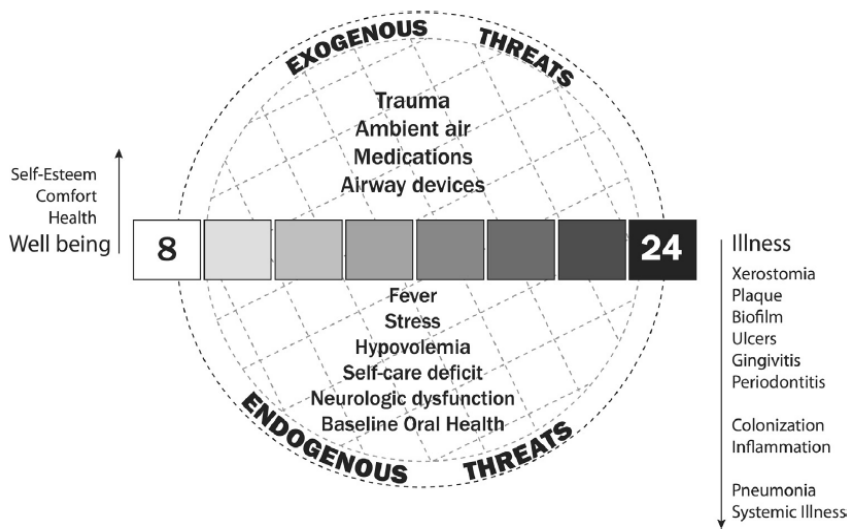




FIGURE 2. Threats to oral health

Barrow Oral Care Protocol

		Protocol 1: Score 8 - 10 Normal	Protocol 2: Score 11-14 Moderate Dysfunction	Protocol 3: Score 15-24 Severe Dysfunction
Oral Care	Brush teeth q 12 hours	✓	✓	✓
	Oral mucosal care	prn	q 4 hours	q 2 hours
	CHG	—	—	1 hour after toothbrushing swab CHG along gum line and surface of tongue
Methods	Brush teeth Rinse mouth or swab with damp sponge. Scrape tongue from back to front. Use Biotene®, brush back to front, inside/outside for 2 minutes. Conclude with mucosal care for comatose patients. Apply thin layer of petroleum jelly to lips*.		Oral mucosal care Rinse mouth or swab with damp sponge. Use new, dampened sponge and apply OralBalance® to tongue, oral mucosa. Apply thin layer of petroleum jelly to lips*.	
			If hardened debris present: Saturate sponge with OralBalance® and swab areas of debris. Wait 1 minute and swab or scrape to remove. Rinse. Apply fresh application of OralBalance®.	
*Per PCCM – thin layer of petroleum ok for patients on O2 and ventilator approved.				
Supplies and Storage	Tongue scraper, Biotene toothpaste, petroleum jelly	Store supplies in covered emesis basin. Emesis basin placed in drawer or cabinet. NO ORAL CARE SUPPLIES in bath basin.	✓ 	
	Pediatric toothbrush, electric toothbrush (if ETT/trached), swabs Oral Balance - Protocol 2, 3 CHG - If intubated, and/or Protocol 3			
Denture Care	Brush dentures every 24 hours. Keep in covered container (in water).			

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FIGURE 3. Barrow oral care protocol.

TABLE 1. Literature review source grid.

Project Question: Does nursing education regarding use of a standardized bedside oral health assessment aid in the reduction of Ventilator associated pneumonia (VAP) and improve staff satisfaction				
Categories of Sources	Major Scholars/Studies	Support main arguments	Counterevidence against arguments	Your thoughts
Clinical Report-cross-sectional study	Hanne, K., Ingelise, T., Linda, C., & Ulrich, P. P. (2012). Oral status and the need for oral health care among patients hospitalised with acute medical conditions. <i>Journal of Clinical Nursing</i> , 21(19pt20), 2851-2859. doi:doi:10.1111/j.1365-2702.2012.04197.x	Ninety-one percent of the newly admitted patients in this study had one or more oral health problems. Common oral problems, listed in order of the most frequent first, included the following: local plaque or debris, decayed teeth or damaged dentures and dryness and/or changes in the color of the tongue. There was a correlation between age and the number of oral health problems	No counterevidence found in literature.	Highlights the need for standardized oral health assessments of acutely hospitalized patients, which should begin as soon as the patient's condition allows. Without these oral health assessments, a number of oral problems may not be detected and may increase in severity.
Cross-sectional descriptive study	Hüsna, Ö., & Dilek, Ö. (2015). Turkish Nurses' Attitudes and Practices Regarding Oral Care. <i>International Journal of Nursing Knowledge</i> , 26(4), 163-169. doi:doi:10.1111/2047-3095.12060	Intensive care nurses perform oral care without an oral care protocol and assessment guideline, and that the methods and frequency of oral care and solutions and tools used for oral care differ from one institution to another.	Data may not be broadly generalized and was specific to sample in Turkey from 185 nurses at various local ICUs.	The results emphasized the need for continuing training in oral health assessment among ICU nurses but fails to link VAP as the outcome.
SHEA/IDSA practice recommendation	Klompas, M., Branson, R., Eichenwald, E. C., Greene, L. R., Howell, M. D., Lee, G., . . . Berenholtz, S. M. (2014). Strategies to Prevent Ventilator-Associated Pneumonia in Acute Care Hospitals: 2014 Update. <i>Infection Control and Hospital Epidemiology</i> , 35(8), 915-936. doi:10.1086/677144	Extensive guidelines for detecting and preventing VAP- addresses discrepancy between surveillance data and reported VAP rates with recommendations	Various sources provide alternate practice guidelines such as UpToDate and Harrison's Principles of Medicine.	Valid recommendations for VAP surveillance recommendations and comprehensive review of factors which play into VAP. Good for tracking VAP rates

TABLE 1 – *Continued*

Categories of Sources	Major Scholars/Studies	Support main arguments	Counterevidence against arguments	Your thoughts
Descriptive Report	Prendergast, L. V., & Hinkle, L. J. (2018). Oral Care Assessment Tools and Interventions After Stroke. <i>Stroke</i> , 49(4), e153-e156. doi:10.1161/STROKEAHA.117.017045	Addresses the lack of evidence-based oral hygiene interventions- addresses oral biome, threats to oral health, and the use of a bedside oral assessment.	Population-specific to stroke patients but may be broadly generalizable	Specific to stroke patients but reviews the biology of oral microbial status and has practical information related to nurses using a bedside oral exam or other valid instrument to assess patient's oral health
	Prendergast, V., Kleiman, C., & King, M. (2013). The Bedside Oral Exam and the Barrow Oral Care Protocol: Translating evidence-based oral care into practice. <i>Intensive & Critical Care Nursing</i> , 29(5), 282-290. doi:10.1016/j.iccn.2013.04.001	Supports use of a bedside oral exam to assess patient oral health and individualize oral care specific to the patient condition- showed improved cost-savings and reduced VAP rates.	Many recommendations and current practices implement a singular approach as part of a VAP bundle which uses a singular approach such as chlorhexidine oral care at a prescribed interval in a one-size-fits-all approach.	Very relevant to the clinical question and also contains a standardized and validated tool for bedside oral exam that has been proven at facilities local to my planned implementation site.
Cost analysis	Ory, J., Mourgues, C., Raybaud, E., Chabanne, R., Jourdy, J., Belard, F., . . . Gerbaud, L. (2018). Cost assessment of a new oral care program in the intensive care unit to prevent ventilator-associated pneumonia. <i>Clin Oral Invest</i> , 22(5), 1945-1951. doi:10.1007/s00784-017-2289-6	Showed decrease in VAP rates and overall cost reduction during a year which favored the implementation overall.	Depending on costs of devices and comparison data, results may vary- more comprehensive studies needed.	Evidence shows that implementation of a new VAP strategy is economically viable and improves quality of patient care- this is relevant and applicable in considering addition of an oral assessment education

TABLE 1 – *Continued*

Categories of Sources	Major Scholars/Studies	Support main arguments	Counterevidence against arguments	Your thoughts
Book Chapter	Wise, M. P., & Williams, D. W. (2012). Oral Biofilms, Systemic Disease, and Pneumonia. In J.-L. Vincent (Ed.), <i>Annual Update in Intensive Care and Emergency Medicine 2012</i> (pp. 278-288). Berlin, Heidelberg: Springer Berlin Heidelberg.	Supports importance of routine oral inspection. Discussion of various inspection elements and clinical relevance. Does provide specific data regarding oral biofilm and pneumonia.	Geared to physicians for general diagnostic purposes such as identification of tumors and other local disease processes.	Good reference data for development of oral assessment elements and early detection of factors which contribute to development of Pneumonia based on oral health.
Descriptive cross-sectional study	Yildiz, M., Durna, Z., & Akin, S. (2013). Assessment of oral care needs of patients treated at the intensive care unit. <i>Journal of Clinical Nursing</i> , 22(19-20), 2734-2747. doi:10.1111/jocn.12035	Aimed to determine personal treatment-related variables for patients based on oral health assessments in an intensive care unit. Results showed direct improvement in patient oral mucosal health as an effect of nurses providing oral care oral care was optimized by individualized approach rather than a prescribed frequency and interval of care.	Many bundles and protocols recommend Q2 hour oral care among all mechanically ventilated ICU patients.	Very relevant data specific to individualizing oral care based on utilization of standard oral health assessment and implementation of nursing knowledge on appropriate interventions. Small sample of 60 in Istanbul may not be generalizable or strong enough to redirect conflicting recommendations.
Peer reviewed article	Koenig, S. M., & Truwit, J. D. (2006). Ventilator-associated pneumonia: diagnosis, treatment, and prevention. <i>Clinical microbiology reviews</i> , 19(4), 637-657. doi:10.1128/CMR.00051-05	Comprehensive discussion of hospital acquired pneumonia from mechanically ventilated ICU patients and provides diagnosis establishment definitions and risk data for VAP. Also addresses rapid initiation of antimicrobial treatment at early detection with recommendations.	No “Gold standard” for diagnosis has been established so there are varying opinions and recommendations.	Great reference point for diagnostic definitions and establishment of risks associated with mechanical ventilation among ICU patients.
Summary	Ridley, K. J., & Pear, S. M. (2008). Oral health assessment: a neglected component of comprehensive oral care.(INFECTION PROTECTION). <i>Healthcare Purchasing News</i> , 32(8), 37.	Brief review of specifics for hospital-acquired pneumonia, oral inspection, and standard precautions. Also addresses biofilm.		Great summary and overview of oral health factors that contribute to VAP and additional references for citation for data.

METHODOLOGY

The implementation of bedside staff education addressing standardized bedside oral examination and determination of proper oral individualized oral care is appropriate for any adult ICU unit managing intubated and mechanically ventilated patients. The education efforts can be enhanced by incorporating various team members to aid in the efforts but can be accomplished by a single individual if necessary. Implementation of new protocols can be difficult in the ICU since providers are prioritizing life-and-death decisions which can overshadow preventative considerations. It has been shown that recommended guidelines are only received by patients about 50% of the time (Resar, 2006). One way to increase buy-in for implementation is to form an interdisciplinary team of champions to carry the process from pre-implementation through execution and follow-up evaluation. The Iowa Model is consistent with this emphasis on multidisciplinary involvement and it is suggested that this model be used as a framework for the implementation process (Buckwalter et al., 2017).

Implementation of new intervention can be a costly endeavor. What is likely to be the most cost-extensive factor is wages for time spent in the preparation, implementation, and ongoing evaluation of the VAP protocol. Ideally the group would consist of volunteers during off-hours, but such an attempt is likely to have poor personnel involvement. More realistically, cost-effectiveness of staff time can be optimized through good agenda setting, note taking and attention to deadlines. Cost of supplies for this effort are likely to be minimal through utilization of simple printouts for educational references and desktop references which can be placed in common areas such as the staff restrooms and work lounges. There is not likely to be additional diagnostic costs associated with tracking VAP rates as common practice is daily chest

radiographs daily for intubated patients. These routine chest films are where the development of VAP is caught earliest and is the trigger for additional diagnostics such as respiratory cultures (Vincent, Souza, Barros & Cianferoni, 2010).

The potential cost savings of an effective VAP reduction using oral care vastly outweighs the costs of process implementation (Cutler & Sluman, 2013). Based on estimates provided by Cutler and Sluman, the additional cost of utilizing CHG was roughly \$500 over a 15-month period while the savings in treatment-costs from the VAP reduction was \$2244 (2013). This indicates a 4:1 savings-to-cost ratio in consideration of prevention costs versus treatments. The results echo the anecdote “an ounce of prevention is worth a pound of cure.” Assuming a perpetuated reduction in VAP, the savings over time is a clear net gain for the facility. The implementation of VAP bundles has been shown to fail without continuing efforts which include ongoing reassessment and adaptation as necessary (Cocanour, Peninger, Domonoske et al., 2006). The Iowa Model addresses this need for sustaining change and recommends that a director identify and engage the key personnel (Buckwalter et al., 2017). ICU staff tend to be territorial by nature and having an insider lead the changes may improve the process. A great strategy for overcoming this challenge is to incorporate the unit-based shared governance team in the implementation. They know the units, staff and can approach them from an end-user perspective Staff assessment using The transtheoretical model of organizational change may also guide in leading the organizational change (Pochaska, Prochaska, Levesque, 2001).

Project Plan

The project aimed to address the knowledge gap among ICU nurses in regard to use of a consistent oral health assessment and its impact on oral care methods, frequency, and tools in

order to reduce VAP and increase role satisfaction and therefore protocol compliance. This was done by rounding education of bedside nurses in an ICU unit with a brief targeted PowerPoint presentation that provides information about the significance of the problem and instructs on proper use of a bedside oral health exam and its impact on oral care decisions. It took about 5 minutes to complete and was provided during 2-hour intervals 5 times throughout the week. A bedside document was also provided to the unit with visual representation of various assessment methods and findings for easy reference and application. This reference page served to further reinforce the provided education and support nurses in ease of use for application.

The education takes place in a busy intensive care unit which sees a wide variety of high-acuity, clinically complex critical care patients. This is to ensure inclusion of a nursing population who regularly manages ventilated patients and implements oral care. It is appropriate and relevant to both day and night shift nurses so will be provided at intervals which accommodate both. Geographic region is not relevant but due to limitations of the resources available for this project, it will be implemented locally in Phoenix, Arizona and limit to itself to a single site.

The presentation will be available to bedside ICU nursing staff on an individual or group basis during their shift and provided at the most convenient time with least interruption of workflow. This was provided as group and individual presentations in PowerPoint form. A staff signoff sheet will be used to track completion of the education and validate the number of nurses who participate. Participation will be completely voluntary, but participation will be encouraged with small incentives of candy bars and asked to complete the pretest and post-survey. All unit policies and protocols will be enforced, and no contradictory information will be provided which

would undermine current practices. The project will not involve any direct patient contact, but the efforts can be reasonably presumed to only improve VAP rates, without any evidence of potential patient harm in the design. Involvement will include ICU Registered Nurses without any inclusion or exclusion criteria related to level of education or professional certifications, or years of experience.

Methods of Evaluation

This project addresses a knowledge deficiency about the use of a bedside oral health exam to guide oral care for ventilated patients. Currently there is no standardized oral health assessment tool or scale in process at the facility and a brief knowledge-based pretest was used to validate this deficiency prior to providing the education. With the primary goal of increasing nursing role satisfaction and oral care compliance, pre-test and post-education survey data collection will be utilized to determine the effectiveness of the education and adequate reception by involved staff. This will consist of administering a competency exam before completion of education. The exam will consist of three multiple choice questions at application-level competence. In addition to the pre-test, participants will be asked to complete a brief survey upon completion of the education to assess changes in nursing job satisfaction. This survey will consist of six Likert-scale question ranking improvement or decline in various aspects of job satisfaction and personal investment in oral care and implementation of a bedside oral health exam. Additionally, an open-ended comment/feedback section to collect descriptive data and identify any common themes is included.

Due to the time constraints and limited scope of this project, it is unlikely that a trend will be identified or direct-impact observed in VAP rates. It is not expected that significant relevance

will be identified at this level of change during the short timeframe of this project, but recommendation for continuation of efforts and long term-trending may be beneficial. Baseline data can be compared to VAP rates over several months to monitor for efficacy in VAP reduction. Ongoing monitoring will include QI tracking of reported VAPs, flagged by positive radiographic evidence of pneumonia greater than 48 hours after intubation without evidence of previously incubating pneumonia or per local hospital policy and definition. Participating units will be consulted in regard to current practice for VAP surveillance and consistency in methods utilized will be respected.

The data obtained from the pre-test, survey, and staff feedback can be expected to appropriately provide all needed information to complete analysis for statistical significance and determination of positive vs. negative staff impressions.

Ethical Considerations

Regarding ethical considerations, this project does not involve patients as subjects, but rather as secondary beneficiaries through improved nursing care. Nurses involved in the education will be fully consented and unit leaders are fully involved and aware of content to avoid any conflicts of interest or conflicting information from local policy. This demonstrates respect for persons by maximizing autonomy and ensuing participation is completely voluntary. The aim of this project is to improve patient care and nurse autonomy in practice in a way that can reduce VAP rates. A thorough literature review, and involvement of hospital quality and management departments, helps ensure the safety of staff and patients from this education program. No risk has been identified in the literature and it is reasonable to assume a very favorable risk:benefit ratio. These elements demonstrate the principle of beneficence. The benefit

of this program could reduce VAP rates, which directly reduced mortality, morbidity, cost, and length of stay. VAP is a nearly universal concern in ICU units among intubated mechanically ventilated patients. As such, there is no unfair recruitment or targeting of the adult ICU population or nursing staff since the topic is relevant and does not single anyone out or assume comparably unhealthy VAP rates. The recommendations and education included in the presentation are relevant to all practitioners among this population. Furthermore, this project supports the shift from old medical ethics of paternalism to a more contemporary model of nursing autonomy.

RESULTS

Data Analysis and Outcomes

Rounding education was performed at Maricopa Medical Center on five separate days in two-hour blocks that spanned both day and night shifts staff across the medical, surgical, and trauma ICU. Staff participation was voluntary and at times the unit was busy and bedside staff were unavailable. The presentation was given to 31 ICU nurses, all of whom completed the pre-test and post-education survey.

The results of each pre-test question were analyzed against the correct answers with averages calculated for each response. Question 1 (Table 2) was regarding the proper method of oral care for a patient with a dry mouth, thick sticky oral secretions, and cracked lips. Some 61.29% of respondents answered correctly by choosing to utilize mouth moisturizers such as a saliva substitute.

TABLE 2. *An intubated and mechanically ventilated patient is noted to have cracked lips and thick sticky oral secretions. An appropriate evidence-based intervention would be...*

#	Answer	%	Count
1	Rinsing the patient's oral cavity with 5-10ml saline then suctioning afterward.	12.90%	4
2	Improving overall hydration status by increasing oral or IV fluid intake	25.81%	8
3	Coating the entire oral cavity and lips with saliva substitute or moisturizer and leaving it	61.29%	19
4	Decreasing the frequency of oral care performed to reduce agitation of oral tissues.	0.00%	0
	Total	100%	31

No respondents selected the option of decreasing oral care frequency, while just over a quarter of respondents thought it would be best to increase oral or IV fluid intake. Question 2 (Table 3) was an evaluation of nursing knowledge concerning evidence-based best practice for frequency of oral care performed on intubated mechanically ventilated ICU patients. Only two of the 31 respondents chose the correct answer, that oral care frequency was best determined by nursing assessment of their patient. A staggering 90.32% of respondents determined that performing oral care every two hours on all mechanical vented patients was the evidence-based recommendation.

TABLE 3. *Evidence shows the best patient outcomes when oral care is performed.*

#	Answer	%	Count
1	Every 2 hours for all intubated patients	90.32%	28
2	As indicated by an individualized oral health assessment	6.45%	2
3	Using Chlorhexidine Gluconate (CHG)	3.23%	1
4	Twice daily	0.00%	0
	Total	100%	31

Question 3 (Table 4) presents an intubated patient with foul smelling oral cavity and asks what the best evidence-based intervention would be. The correct answer was oral debridement and use of a tongue scraper, which only 6.45% of respondents successfully selected. The highest-selected answer was that use of an oral antiseptic such as chlorhexidine gluconate (CHG) would be the best intervention, 26 of the 31 respondents selected this answer.

TABLE 4. *As you prepare to perform oral care on your intubated and mechanically ventilated patient, you notice a strong foul odor emanating from the oral cavity. This indicates the patient will most likely benefit from...*

#	Answer	%	Count
1	Using an oral antiseptic such as chlorhexidine gluconate	83.87%	26
2	Application of a saliva substitute or moisturizer	3.23%	1
3	Oral debridement using a tongue scraper	6.45%	2
4	Vigorous toothbrushing with regular toothpaste	6.45%	2
	Total	100%	31

The post-education survey question responses were evaluated for obvious trends and analyzed by percentages. Question 1 (Table 2) was to determine if staff felt that the education would allow them to better utilize the elements of the current oral care protocol at Maricopa Medical Center. Ninety-three percent of respondents indicated affirmatively that the education empowered them to better utilize the product and protocol already in place. Question 2 (Table 3) evaluated nurses' attitude toward the effectiveness of utilizing a bedside oral health exam to drive their oral care interventions. 87% of the nurses surveyed agreed that the use of a standardized oral health assessment would aid in determining appropriate interventions for oral care. The next survey question determined nurse's faith in the impact of oral care on VAP reduction. 97% of respondents agreed that oral care was an important factor in the development

or prevention of VAP, with one respondent remaining neutral. Nobody who was surveyed disagreed.

Survey questions 4-6 were intended to quantify the impact a nurse-driven oral care protocol would impact role satisfaction, and nurse adherence to such a protocol. Question 4 showed that 87% of respondents felt that incorporating an oral health assessment to drive oral care would increase their role and job satisfaction. Four respondents were neutral, none disagreed.

TABLE 5. *The information presented allows me to better utilize the products and protocol currently in place at Maricopa Medical Center.*

#	Answer	%	Count
1	Strongly Disagree	3.23%	1
2	Disagree	0.00%	0
3	Neutral	3.23%	1
4	Agree	22.58%	7
5	Strongly Agree	70.97%	22
	Total	100%	31

Mean 4.58

The results of survey Question 5 showed that 80% of the nurses felt more likely to adhere to an oral care protocol that was driven using an oral health assessment. Again, four respondents were neutral, and none disagreed. The final survey question evaluated nurse's attitude regarding the impact of a nurse-driven oral care protocol on patient outcomes. A remarkable 90% of respondents agreed that such a protocol would benefit patients. Three respondents remained neutral and, again, none disagreed. The mean score for the survey questions was 4.66 on a scale of '1' being strongly disagree and '5' being strongly agree.

TABLE 6. *Implementation of a standardized bedside oral health exam allows nurses to choose appropriate oral care interventions.*

#	Answer	%	Count
1	Strongly Disagree	6.45%	2
2	Disagree	0.00%	0
3	Neutral	6.45%	2
4	Agree	9.68%	3
5	Strongly Agree	77.42%	24
	Total	100%	31

Mean 4.52

TABLE 7. *Oral health is an important factor in the development of ventilator associated pneumonia.*

#	Answer	%	Count
1	Strongly Disagree	0.00%	0
2	Disagree	0.00%	0
3	Neutral	3.23%	1
4	Agree	12.90%	4
5	Strongly Agree	83.87%	26
	Total	100%	31

Mean 4.81

TABLE 8. *Increased nursing autonomy and allowing oral care discretion based on a standardized oral health assessment would increase my role and job satisfaction.*

#	Answer	%	Count
1	Strongly Disagree	0.00%	0
2	Disagree	0.00%	0
3	Neutral	12.90%	4
4	Agree	19.35%	6
5	Strongly Agree	67.74%	21
	Total	100%	31

Mean 4.55

TABLE 9. *I am more likely to adhere to an oral care regimen that is driven by my own assessment.*

#	Answer	%	Count
1	Strongly Disagree	0.00%	0
2	Disagree	0.00%	0
3	Neutral	12.90%	4
4	Agree	12.90%	4
5	Strongly Agree	67.74%	23
	Total	100%	31

Mean 4.61

TABLE 10. *I believe patients benefit from a nurse-driven oral care protocol.*

#	Answer	%	Count
1	Strongly Disagree	0.00%	0
2	Disagree	0.00%	0
3	Neutral	9.68%	3
4	Agree	16.13%	5
5	Strongly Agree	74.19%	23
	Total	100%	31

Mean 4.65

DISCUSSION

Two of the most drastic results were regarding the pre-test responses. For question 2, this is not surprising as most ICU protocols, including the one at Maricopa Medical Center, prescribe oral care every 2 hours on all mechanically vented patients without variance. But for question 3, the choice to use CHG was an interesting response as the current oral care protocol at Maricopa Medical Center does not standardize the use of CHG but does use a more generic antiseptic solution of benzyl chloride in their oral care kits. This indicated a lack of understanding among the nurses of the importance of oral debridement.

Relationships of Results to Framework, Aims and Other Evidence

The results of the survey questions indicated a highly favorable response by nurses to the idea of an oral care protocol driven by the use of a standardized bedside oral health exam. Nurse-

driven oral care protocols have been shown to increase nursing role satisfaction by enhancing nurse autonomy. The increased nursing role satisfaction and investment in the protocol increases nurse compliance. The increase in nurse compliance with oral care has the potential to decrease patient VAP rates and has proven successful in other facilities who have shifted to this model. There is also evidence that increased nursing compliance results in major cost savings by reducing VAP and secondarily by reducing supply waste. These outcomes are in line with hospital initiatives and the overall modern healthcare culture.

Implementation of a nurse-driven oral care protocol requires a comprehensive interdisciplinary approach and is appropriately guided by the Iowa Model to be successful. The inclusion of key players such as respiratory therapy, physicians, management, shared governance, educators, and bedside nurses is ideal. With the survey data reflecting staff readiness to adopt this change, such an effort has high potential to result in increased nursing satisfaction, reduced VAP rates, and major cost savings. This can be accomplished in a relatively simple way that minimally disrupts staff workflow and seamless integration into unit protocol. There is low risk of adverse patient or staff effect from the implementation of a nurse-driven oral care protocol.

Impact of Results on Practice

Nurses are inherently driven by a desire to improve the lives of those around them. This principle of beneficence is at the root of most nursing actions. The frustration of many nurses is that they feel uninvested in many of the protocols and initiatives of their employers for various reasons. This lack of investment often results in low compliance, product waste, and decreased nursing morale. The results of this intervention show that implementation of a nurse-driven

bedside oral exam would be likely to increase nursing oral care compliance, role satisfaction, and simultaneously optimize use of oral care supplies and reduce waste. The increase in oral care compliance can have an impact of ultimately reducing VAP rates, which can reduce length of patient stay and decrease hospital costs.

Strengths

One of the major strengths of this project was the inexpensive and low-risk nature of the content. The total cost of this in-service was in the form of participation incentive with approximately \$30.00 worth of candy provided during the presentation and a \$50.00 Visa gift card provided randomly to one participant in the form of a raffle upon completion of the intervention. In a busy healthcare system such as Maricopa Medical Center, it is important to be considerate of staffing time as the very nature of ICU requires all of the nurse's time and attention. The content provided to the nurses took an average of about five minutes of presentation and perhaps one or two additional minutes for the pre-test and survey. Staff was very appreciative of the low-demand nature of this in-service and it increased their participation to know it would not take a significant amount of time. The low cost and time demand of this project made it feasible to implement universally without substantial strain on the ICU units.

An additional strength of this project was that the risk to patients was nullified by focusing on process improvement through nurse empowerment rather than specific elements of patient care. This minimized any detrimental impact to patient wellbeing. Even if this project were without and advantageous gain, it was designed and executed in a way that would not potentiate any patient harm. It could only improve patient care.

Based on the feedback received in the surveys, implementation of an oral care protocol that is driven by a bedside oral health assessment is likely to be successful in the implemented units. While there were a few of the participating nurses who remained neutral to the idea, none were opposed and the vast majority agreed that they were likely to be compliant to such a protocol, that it increased their role satisfaction, and that it would improve patient outcomes. Coupling the low cost, low risk, and high likelihood for success, this project shows strong evidence of a potential unit improvement opportunity.

A final strength of this project and educational content is that it is widely adaptable to use on any unit under their current protocol and with their current supplies. The pretest data shows that there is opportunity for increased nursing education regarding the oral care protocol they currently use and better utilization of the supplies already at hand. The focus of the educational content was on methods, not materials. These methods include oral debridement and maintaining proper mouth moisture. A variety of supplies and techniques can be used to accomplish this. The use of a bedside oral health exam can further individualize care and allow nurse discretion even in the absence of a dependent protocol for implementation.

Limitations

One significant limitation in the implementation of this project was that while it provided education regarding the use of a bedside oral health assessment to guide oral care in ventilated patients, it lacked the implementation of such a protocol at the time of rounding. The education does enforce the current protocol used at Maricopa Medical Center through better utilization of the available supplies and provided insight into methods of assessing oral health to make decisions, but the standing protocol does not allow such discretion to be utilized to guide oral

care. The data gathered by the surveys does represent staff sentiment regarding such a nurse-driven protocol and can be used as the basis to promote changes but would require a more extensive approach. The efforts of this project would be more successful if the momentum it generated was able to perpetuate into an immediately impending policy or protocol change.

The information from this rounding education enhances nursing knowledge but in order to fully implement the use of a bedside oral health assessment into practice, additional elements of workflow would need to be considered. A few such elements include integration of assessment data into the electronic medical record, access to a bedside reference for oral health assessment, and the presence of staff who could serve as champions on the unit for troubleshooting or questions. This project did not allow for the addressing of these issues and left staff with a one-time education then no follow-up source of information. The author's contact info was provided and reference material was provided by email post-rounding, but no plan for its integration into standard workflow was in place. Inclusion of EMR consideration requires the inclusion of key players such as informatics and educators as well as shared governance members to suitably address the implications and preferences in appropriately assimilating these fundamentals.

A final and significant limitation to this project was the lack of available baseline data regarding staff compliance, VAP rates, and nursing role satisfaction. Due to the unavailability of this data, the project was largely based on staff interviews and author's experience coupled with generalizable literature results. The project would have been meaningfully improved with this baseline data as a comparison point. No direct measurable outcome data was observed other than the influence of the education on staff perspectives and compliance. Additionally, a more

comprehensive pre-exam could better capture the extent of knowledge deficiency among staff, but the simple questionnaire was sufficient to establish need for the particular education provided.

Dissemination and Future Implications for Practice

The rounding education provided direction on the use of a bedside oral health exam and expanded on oral care methods which can be used based on that assessment. Certain elements of the assessment data cannot be integrated as intended due to conflicting standing facility policies such as mandatory Q2 hour oral care on all ventilated patients. The data obtained from this project indicate an opportunity for increasing nursing knowledge regarding oral care indications and methods beyond what was provided in this program. Baseline interviews with staff and this author's observations indicate that the current protocol and surveillance methods are leading to unnecessary supply waste due to a lack of nursing vestment and poor staff buy-in (although certainly not universally).

Future efforts could focus on integrating a bedside oral health exam into the oral care protocol in a way that would allow nurses to drive it based on patient assessments. The framework provided by Prendergast at Barrow's Neurological Institute form a great foundation for structuring such a protocol. A nurse-driven protocol is likely to be well adopted and increase oral care compliance in addition to reducing supply use and decreasing overall VAP rates.

APPENDIX A:
SURVEY QUESTIONS

Pre-Test

1. An intubated and mechanically ventilated patient is noted to have cracked lips and thick sticky oral secretions. An appropriate evidence-based intervention would be
 - a. Rinsing the patient's oral cavity with 5-10ml saline then suctioning afterward.
 - b. Improving overall hydration status by increasing oral or IV fluid intake
 - c. Coating the entire oral cavity and lips with saliva substitute or moisturizer and leaving it.
 - d. Decreasing the frequency of oral care performed to reduce agitation of oral tissues.

2. Evidence shows the best patient outcomes when oral care is performed
 - a. Every 2 hours for all intubated patients
 - b. As indicated by an individualized oral health assessment.
 - c. Using Chlorhexidine Gluconate (CHG)
 - d. Twice daily

3. As you prepare to perform oral care on your intubated and mechanically ventilated patient, you notice a strong foul odor emanating from the oral cavity. This indicates the patient will most likely benefit from...
 - a. Using an oral antiseptic such as chlorhexidine gluconate
 - b. Application of a saliva substitute or moisturizer
 - c. Oral debridement using a tongue scraper
 - d. Vigorous toothbrushing with regular toothpaste

Post-education survey - For the following statements please rate 1-5

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

1. The information presented allows me to better utilize the products and protocol currently in place at Maricopa Medical Center.
2. Implementation of a standardized bedside oral health exam allows nurses to choose appropriate oral care interventions
3. Oral health is an important factor in the development of Ventilator Associated Pneumonia
4. Increased nursing autonomy and allowing oral care discretion based on a standardized oral health assessment would increase my role and job satisfaction.
5. I am more likely to adhere to an oral care regimen that is driven by my own assessment.
6. I believe patients benefit from a nurse-driven oral care protocol.

Comments/Suggestions:

APPENDIX B:
OUTLINE OF EDUCATIONAL CONTENT

OUTLINE OF EDUCATIONAL CONTENT

- Bedside Oral Exam
 - Scale Elements and Methods
 - Swallow
 - Lips
 - Tongue
 - Saliva
 - Mucous Membranes
 - Gingiva
 - Teeth or dentures
 - Odor
 - Endogenous and Exogenous Factors
 - Exogenous- Trauma, Air, Medications, Devices
 - Endogenous- Fever, stress, hypovolemia, neurological dysfunction
 - Barrow Oral Care Protocol Sample Interventions
 - Oral care methods- Maintaining moisture and mechanical debridement
 - Oral care frequency-
 - Oral care supplies and storage
 - Denture Storage
 - Correlation between Barrows and Current MIHS policy application

APPENDIX C:

THE UNIVERSITY OF ARIZONA INSTITUTIONAL REVIEW BOARD LETTER



Human Subjects
Protection Program

1618 E. Helen St.
P.O. Box 245137
Tucson, AZ 85724-5137
Tel: (520) 626-6721
<http://rgw.arizona.edu/compliance/home>

Date: October 03, 2019

Principal Investigator: Landon Charles Richardson

Protocol Number: 1909008036

Protocol Title: Educating Critical Care RNs in Using a Bedside Oral Health Exam

Determination: Human Subjects Review not Required

Documents Reviewed Concurrently:

HSPP Forms/Correspondence: *determination_v2019-08-15-LCredits.pdf*

Regulatory Determinations/Comments:

- Not Research as defined by 45 CFR 46.102(l): As presented, the activities described above do not meet the definition of research cited in the regulations issued by U.S. Department of Health and Human Services which state that "Research means a systematic investigation, including research development, testing, and evaluation, designed to develop or contribute to generalizable knowledge. Activities that meet this definition constitute research for purposes of this policy, whether or not they are conducted or supported under a program that is considered research for other purposes. For example, some demonstration and service programs may include research activities. For purposes of this part, the following activities are deemed not to be research."

The project listed above does not require oversight by the University of Arizona.

If the nature of the project changes, submit a new determination form to the Human Subjects Protection Program (HSPP) for reassessment. Changes include addition of research with children, specimen collection, participant observation, prospective collection of data when the study was previously retrospective in nature, and broadening the scope or nature of the study activity. Please contact the HSPP to consult on whether the proposed changes need further review.

The University of Arizona maintains a Federalwide Assurance with the Office for Human Research Protections (FWA #00004218).

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