Fall 12-6-2021

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DOI: https://doi.org/10.46409/sr.YCSY4821

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This Manuscript Partially Fulfills the Requirements for the

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November 19, 2021

Abstract

Practice Problem: Patients diagnosed with non-mechanically ventilated aspiration pneumonia can result in increased levels of care, longer lengths of stay, and are 8.4 more likely to die while hospitalized. Oral hygiene protocols have led to promising outcomes, evidenced by fewer cases of aspiration pneumonia in adult patients on medical surgical units.

PICOT: The PICOT question that guided this project was in adult non-mechanically ventilated hospital patients, does an Oral Hygiene Protocol (OHP) compared to current practice affect hospital acquired aspiration pneumonia during hospitalization.

Evidence: Fourteen studies met inclusion criteria that support the implementation of an evidence – based oral hygiene protocol in adult patients on a medical surgical unit.

Intervention: Implementation of an OHP included education and training about enhanced oral hygiene and the direct correlation to hospital acquired aspiration pneumonia. Nursing staff were required to perform and document oral hygiene care at least once each shift in the electronic health record (EHR). The incident rates of aspiration pneumonia after hospitalization were obtained pre- and post-implementation.

Outcome: There were no case of non-mechanically ventilated aspiration pneumonia during the project period. The highest rates of compliance with documenting oral hygiene care by the nursing staff was during week one at 32% ($n = 6$) and week two at 5% ($n = 1$).

Conclusion: The results of this project may provide support for establishing enhanced oral hygiene care for adult patients on medical surgical units to decrease the incidence of non-mechanically ventilated aspiration pneumonia.

Implementation of an Oral Hygiene Protocol for Adult Patients on Acute Care Units

Poor oral hygiene can be the gateway for respiratory and cardiovascular infections. Oral care is a simple, yet important component of personal hygiene and good oral health. However, the current nursing practice did not use the best evidence-based interventions to improve our inpatient population's oral hygiene care. The 430-bed Medical Center (MC) has used oral care protocols in the Intensive Care Unit (ICU) to reduce hospital-acquired infections (HAI), but there was no standard process in place for non-mechanically ventilated patients on the medical surgical units. There was evidence to support that implementing oral hygiene protocols can reduce HAIs including aspiration pneumonia. Yet, despite the growing awareness of the importance of good oral hygiene in reducing hospital-acquired respiratory infections, there are currently no regulatory agencies that require tracking aspiration pneumonia or any incentives to reduce risk factors with interventions that improve oral care (Munro & Baker, 2018).

Comprehensive oral hygiene interventions are designed to remove food debris and harmful bacteria that can be aspirated and lead to pneumonia. Aspiration pneumonia requires transfer to the ICU, extensive antibiotic therapy treatment, and increases the length of patients' stay and the facility's costs. This paper examined the literature that related to oral hygiene protocols in adult patients admitted to acute care medical surgical units. This paper introduced literature that confirmed that the absence of good oral hygiene care in non-mechanically ventilated patients from nursing staff may lead to other complications, such as aspiration pneumonia (Murray & Scholten, 2018), and provided evidence that a standardized oral hygiene protocol (OHP) may reduce those complications.

Significance of the Practice Problem

Non-mechanically ventilated aspiration pneumonia is a type of hospital-acquired infection (HAI) that can have a tremendous effect on the healthcare system. The most prevalent complications include increased transfers to the ICU, higher incidents of 30-day readmissions, and increases in median hospital costs (Craven, 2016). In the United States, the average length of stay for patients diagnosed with aspiration pneumonia while hospitalized increased by five days resulting in an average of $30,056 per patient per 1,000 hospital days in associated costs (Wu et al., 2017). Failure to detect aspiration pneumonia can also lead to death and may be preventable. Hu et al. (2014), indicated that aspiration pneumonia is the most common type of aspiration-related syndrome that leads to death and may go undetected by health care team members.

The incidence of HAIs, such as non-mechanically ventilated aspiration pneumonia has been increasing in recent years. The most current Hospital Prevalence Survey the Centers for Disease Control (CDC) conducted indicated that 3% of hospitalized patients were diagnosed with one or more HAIs. The same study stated that 687,000 patients had HAIs and more than 72,000 died as a result of those infections (CDC, 2015). Another study determined that patients who were diagnosed with hospital acquired non-ventilated aspiration pneumonia (HANV- HAP) required transfer to the ICU, which made them 8.0 times more likely to require mechanical ventilation, had longer lengths of stay, and were 8.4 times more likely to die while hospitalized than were patients who did not develop HANV-HAP (Micek et al., 2016).

The adoption of oral hygiene protocols has led to promising outcomes, as evidenced by fewer cases of aspiration pneumonia in adult acute care patients. However, nursing staff do not prioritize and often overlook proper oral care. Studies have shown that nurses may not perform oral care for their patients on a regular basis because of lack of time or because they are no longer aware of the importance of continuing good oral health even while admitted to an

inpatient unit (Salamone et al., 2013). Another factor may include the availability of oral care products. Warren et al. (2019), stated that some oral care kits lack the basic essentials to perform mouth care and staff have expressed dissatisfaction with not having the proper tools readily available.

PICOT Question

The PICOT question that guided this project was, in adult non-mechanically ventilated hospital patients on a medical surgical unit (P), how does initiation of an Oral Hygiene Protocol (OHP) (I) compared to the current practice (C) affect the reduction of aspiration pneumonia rates (O) within eight weeks (T)?

Population

The population for this project included non-mechanically ventilated patients 18 years old and older who were admitted to a 20-bed acute care medical surgical unit in the MC.

Intervention

The intervention included introducing a standardized OHP, which outlined the oral care supplies, the frequency of oral hygiene care, and oral care documentation in the EHR.

Comparison

There was no standard practice for non-mechanically ventilated patients on the acute care medical surgical units. The comparison for this question were the cases of aspiration pneumonia on the medical surgical unit before implementation of the OHP.

Outcome

The project outcome was to determine the success of an OHP on decreasing aspiration pneumonia rates after the staff received education about the importance of oral hygiene care, were trained how to follow the OHP, and document performed oral hygiene care.

Timeframe

The project time for this intervention took place over an eight-week period after approval from the Evidence-based Practice Review Council (EPRC) and the facility's Institutional Review Board (IRB).

Evidence-based Practice Framework and Change Theory

Johns Hopkins Nursing Evidence-based Practice Model

The Johns Hopkins Nursing Evidence-based Practice Model (JHNEBP) was the theoretical framework chosen for this project and guided decision making through a three-step process, referred to as PET: Practice question, Evidence, and Translation (Dang & Dearholt, 2017).

The PET process was instrumental in recruiting an interdisciplinary team (Dang & Dearholt, 2017). Its members developed the EBP question and scope, assigned responsibilities, and scheduled meetings, which represented the *practice question* phase of the model. During the *evidence* phase, the project manager (PM) conducted literature searches related to current nursing practice of oral hygiene on acute care units. After analyzing the research, practice recommendations were developed. Finally, an action plan to implement the protocol on a pilot unit was developed to *translate the evidence* into practice. Structural, process, and outcome measures were reported to key stakeholders together with a plan to disseminate the OHP throughout the facility.

Rogers' Diffusion of Innovation Change Theory

Rogers' diffusion of innovation model also guided the change in EBP, while attributes of innovation supported facilitation of the adoption of change (Mohammadi et al., 2018). The first stage offered an opportunity to increase the nursing staff's awareness by introducing them to the

problem and the upcoming practice change. During the second and third stages, views were formed about the change, both favorable and unfavorable, and feedback was solicited. The next stage included disseminating the protocol throughout both acute care and long-term care facilities. During the final stage, the change's successful adoption was documented by sustained use of oral hygiene care and a decrease in the number of patients diagnosed with NVAP.

Evidence Search Strategy

A comprehensive literature review was performed to identify the evidence that supported the following PICOT: In adult non-mechanically ventilated hospital patients on a medical surgical unit, how does initiation of an OHP compared to current practice, affect the reduction of aspiration pneumonia rates within eight weeks?

The primary databases used in this search were the: *Cumulative Index to Nursing and Allied Health Literature (CINAHL), Joanna Brigg Institute (JBI), and PubMed*. The search terms and keywords that were used with Boolean Operators for all searches included: *Acute care* OR *adult medical surgical unit* OR *hospitalized patients 18 years or older* AND *non-ventilated aspiration pneumonia* (NVAP) OR *aspiration* OR *pneumonia* AND *oral biofilm* OR *oral hygiene* OR *oral care*. In addition, manual searches were conducted using the reference lists in several related articles. Inclusion criteria for all searches were: English language, peer-reviewed articles, and publication date frame of 2013 to 2021. This literature review focused primarily on including articles with high levels of evidence and grading based on the JHNEBP appraisal tool. Exclusion criteria for the literature search included pediatric units, long-term care, or residential care facilities - except for studies that included both long-care units and acute care units - mental health units, ICU patients, Ventilated Aspiration Pneumonia (VAP), enteral nutrition, community acquired aspiration pneumonia (CA-AP), and the Emergency Department (ED). Exclusion

criteria also included oral care performed as part of home health service. The search terms and keywords yielded a total of 450 articles through various electronic searches and eight articles were obtained through manual searches. After a meticulous review of the full text, a total of 14 articles met inclusion the criteria for this project.

Evidence Search Results

The literature review was conducted to develop an EBP recommendation to improve oral hygiene care in hospitalized non-mechanically ventilated adult patients through development, implementation, and adoption of a standardized OHP. The search resulted in 450 citations as follows: CINAHL, 50 citations; Joanna Briggs Institute (JBI), 127 citations; and PubMed 273 citations. Manual searches of reference lists included an additional eight articles. The abstracts of the 458 articles were carefully reviewed for relevance according to the following inclusion criteria: (a) Hospitalizations in an inpatient medical surgical unit; (b) patients ≥ 18 years of age; (c) diagnoses of non-mechanically ventilated aspiration pneumonia that was not present upon admission; (d) daily oral hygiene or oral care protocols, and (e) reports that measured patient health-related outcomes objectively.

Duplicate articles were removed after the initial review of titles and abstracts was completed and a total of 439 articles were analyzed. An additional 410 articles were excluded, as they did not meet the inclusion criteria. A total of 29 full text articles were assessed for eligibility. A further review excluded 15 full-text articles that were unrelated to the PICOT question. The final 14 articles will be included as supporting evidence for this project, as shown in Figure 1.

The 14 articles were assessed for level of evidence based on the JHNEBP Evidence Level and Quality Guide (2017), as shown in Table 1. The 14 articles presented varied levels of

evidence. Four were scored level I (experimental study or randomized controlled trial). Six were scored II (randomized controlled trials or systematic review of RCTs, with or without meta-analysis). One qualitative study with a meta-analysis and one non-experimental, exploratory study were scored a level III. One clinical practice guideline article was scored level IV after assessment and one experimental, quality improvement interventional study was scored level V. All articles were appraised as quality A or B. A is high quality that offered consistent recommendations for practice with reference to scientific evidence. B is good quality, with reasonably consistent results. These studies offer reasonably consistent recommendations that contains some reference to scientific evidence (Dang & Dearholt, 2017). The summary of primary research evidence is shown in Appendix A.

Themes with Practice Recommendations

The literature review revealed oral care strategies that are consistent with EBP to decrease aspiration pneumonia in non-mechanically ventilated patients. The themes (See Figure 2) included using a standardized OHP, staff education and training, and integration of technology using electronic health records (EHR) to document care. The JHNEBP Evidence Level and Quality Guide was used to identify high-quality, evidence-based resources in the literature reviewed. A summary of the literature, including the studies' level and quality of evidence, can be found in Appendix A, and subsequently the systematic reviews can be found in Appendix B.

Oral Hygiene Protocol

One intervention to decrease aspiration that was found to be most effective was using a standardized OHP. Nine studies used OHPs that included oral care kits consisting of American Dental Association (ADA) - approved dental products (Jenson et al., 2018; Kaneoka et al., 2015; Micek et al., 2016; Munro & Baker, 2018; Quinn et al., 2014; Satheeshkumar et al., 2020;

Schutte & Warren, 2020; Talley & Lamb, 2016; U.S. National Library of Medicine, 2015; Warren et al., 2019). The kits include toothbrushes, toothpaste, non-alcoholic mouth wash, dental floss, and mouth and lip moisturizer for patients with dentition. Another kit for patients with partials and dentures includes denture cups, denture cleaning tablets, non-alcoholic mouth wash, and mouth and lip moisturizer. Increased frequency of oral hygiene was also part of the standardized protocol. Quinn et al. (2014) found that when oral hygiene care rates are outlined in the protocol, oral care frequency at least once a shift increased from 27% to 80% for non-mechanically ventilated patients when increased oral care was implemented to reduce aspiration. Warren et al. (2019) found that oral hygiene interventions performed four to six times daily reduced colonized bacteria in the oral cavity. Jenson et al. (2018) adopted a frequency practice for patients with and without dentures before each meal and at bedtime. Thus, the evidence found in this literature supports the use of standardized OHPs to reduce the incidence of aspiration pneumonia in non-mechanically ventilated patients.

Staff Education

The second theme that emerged in the review was development and implementation of staff education (Jenson et al., 2018; Klein, 2017; Quinn et al., 2014; Warren et al., 2019). Focusing on reducing microorganisms in the oral cavity through frequent, effective oral care was vital (Quinn et al., 2020; Warren et al., 2019). Researchers have used the Influencer Model to promote understanding of the importance of oral hygiene in preventing NV-HAP (Munro & Baker, 2018; Quinn et al., 2014). One study indicated that staff were more receptive to adopt a standardized OHP after they received training and education in proper oral hygiene practices (Schutte & Warren, 2020). Clinical nurse specialists (CNS) were employed to provide education to both licensed and unlicensed assistive personnel (UAP) on the new protocol through in-

services and literature on oral hygiene and bacterial colonization (Jenson et al., 2018; Warren et al., 2019). Following an RN reassessment each shift, Klein (2017) determined that teaching RNs and CNAs to delegate responsibilities increased the number of patients who received oral care. Education also focused on increasing the frequency of oral hygiene on the part of clinical staff as a preventative measure to reduce aspiration pneumonia (Jenson et al., 2018; Klein, 2017; Talley & Lamb, 2016; Tesoro et al., 2018).

Integration of Information Technology

Finally, integrating a standardized template in the EHR proved to be an effective documentation tool for RNs and UAPs. In collaboration with information technology specialists at several facilities, researchers developed improved documentation templates that were easy and convenient to use, and that standardizing an oral care documentation template supported compliance and sustainability (Jenson et al., 2018; Klein, 2017; Munro & Baker, 2018; Quinn et al., 2014; Schutte & Warren, 2020). Warren et al. (2019) and Quinn et al. (2020) concurred that oral care templates were instrumental in developing audit tools and reports to monitor documented oral care interventions.

Practice Recommendations

After analyzing the 14 articles that emerged from the search strategy, the PICOT question about introducing a standardized OHP in adult non- mechanically ventilated patients on a medical surgical unit was supported. The articles presented clear, substantial evidence to support an EBP project. The intervention was introduced by providing standardized ADA - approved oral care kits and denture care kits to the pilot unit, developing competency-based education and training for licensed and unlicensed nursing staff, and creating an oral hygiene documentation template in the EHR system. To validate the findings further, articles were graded using the

JHNEBP Level and Quality Guide. Twelve articles, levels I to III, grades A and B, included compelling evidence that supported using standardized OHPs, improving staff education and training, and developing oral hygiene documentation templates within the EHR. Two additional studies provided concrete evidence that supports the idea that increasing staff knowledge about the association between aspiration pneumonia and oral pathogens through education and training is critical to successful implementation and sustainability.

Project Setting

The project setting was a 20-bed adult, acute care medical surgical unit in a Veterans Health Administration facility that has semi-private and private rooms available. The project unit included a nurse manager (NM), assistant nurse manager (ANM), registered nurses (RN), nursing assistants (NA), and a medical support assistant (MSA), as well as other supportive ancillary resources. The unit cares for, and treats, surgical cases, and patients with a variety of health conditions.

Organizational Structure and Culture

The Medical Center is a 430-bed, two-division facility that employs more than 2,500 people who serve approximately 46,000 veterans annually (*VA Augusta Health Care,* 2020). It is comprised of medicine, surgical, and spinal cord units as well as the ED and outpatient surgery clinics. The Veteran Administration Medical Center (VAMC) is also affiliated with several colleges and universities that provide medical and allied health training to more than 700 students and residents each year (*VA Augusta Health Care,* 2020).

The facility's mission "… to be recognized as a leader in quality patient care, veteran experience, employee engagement, and medical education and research" will guide the implementation of this DNP change project (*VA Augusta Health Care* 2021, para. 1). The

intervention affected the daily practice of direct patient care staff who required managers and leaders' support. Smith et al. (2019) reported that support from colleagues, interprofessional teamwork, and diplomacy can facilitate an intervention's adoption throughout an organization.

Organizational Need

One acute care unit was selected after data revealed that it had an increased incidence of hospital-acquired pneumonia. An OHP is used in the ICU; however, it is not used throughout the organization. A Strengths, Weakness, Opportunities, and Threats (SWOT) analysis (see Figure 3) revealed the recent implementation of an Evidence-based Practice Council, strong commitment to veteran experience, and improving clinical outcomes as strengths. The most prevalent weaknesses were a lack of standardized oral hygiene processes for non-mechanically ventilated patients, inadequate staffing, and a lack of accountability that creates a culture of slow change. Opportunities identified included improving nursing engagement and clinical outcomes and decreasing harm to patients. Finally, threats included nursing staff's reluctance to change, prolonged incidence of inadequate staffing, and shortages of necessary supplies.

Stakeholders

The key stakeholders for this project included the Medical Center administration and leadership. The five-member team, referred to as the PENTAD, is comprised of the director, associate director, chief of staff, assistant director, and the associate director of patient care services (ADPCS). Other stakeholders included logistics, informatics, dentistry, the nurse manager (NM) and assistant nurse manager (ANM), bedside nursing staff, a medical support assistant (MSA) and most importantly, the veterans. Engagement with stakeholders provided an opportunity to promote interprofessional collaboration by building a relationship to achieve the organization's goals, the intervention's long-term success, shared responsibility, mutual

authority, and accountability for success (Green & Johnson, 2015). Silver et al. (2016) indicated that a change project's success requires a significant investment in time and effort to achieve positive results. Monthly meetings, chart audits to verify that documentation was complete, and monitoring oral care supplies were benchmarks that were implemented to evaluate and sustain the change.

Implementation

Rogers' diffusion of innovation change model was used to guide this evidence-based sustainable change project. The five stages of adoption include knowledge or awareness, persuasion or interest, decision or evaluation, implementation or trial, and confirmation or adoption (Rogers, 2003, as cited in Kaminski, 2011). (See Figure 4). Dearing and Cox (2018) defined diffusion as "the social process that occurs among people in response to adapting to an innovation such as a new evidence-based method that extends or improves health care" (p. 1). Reluctance to change is common when a new practice or concept is introduced. The thought of changing to an unfamiliar process may lead to feelings of uncertainty and confusion. Sherman (2011) stated that the reaction to change can be emotionally exhausting, as nurses may become insecure about their work. However, effective learning and development empower and enhance the nursing staff's capabilities (Chaghari et al., 2017).

The change model's *awareness* stage was essential to mitigating the risk of increased stress and anxiety on the part of the nursing staff on the pilot unit. The project team invited several staff members to participate as unit champions. The goal was to have at least one unit champion for each shift. Allowing bedside nurses to participate in the project presented an opportunity to build confidence in the process and promote acceptance from the other staff (McKnight & Moore, 2020). The PM also used this stage to increase *interest* in the intervention

by presenting the current incident rates during a staff meeting, allowing staff to complete a voluntary oral care survey (Appendix C), introducing the OHP to staff, and engaging with leadership during the morning leadership huddle. Introduction of the protocol (See Appendix D) described the procedure, listed the ADA-approved equipment to use, and stated the frequency with which oral care should be performed for patients with dentition and dentures. Sharing the pilot unit's current NV-HAP rates, the intervention, and goals with staff, and engaging with leadership encouraged development of a culture within the organization that supported adoption of the practice change (Gesme & Wiseman, 2010).

Throughout this phase, the PM collaborated with informatics to make any necessary changes to the oral care documentation template (Appendix E) already found in the VA Computerized Patient Record System (CPRS). The PM also worked in partnership with logistics and the central supply technician. Logistics personnel ordered VHA designed Oral Hygiene Care flyers and patient education brochures (See Appendix F). The central supply technician and nursing management determined the accurate PAR level of the ADA-approved oral care kits for the unit and designated an area for their storage. The kits were provided to the unit one week before project implementation. Subsequently, the Healthy Smiles for Veterans Video TMS Course: VA37675 training module and the Oral Care PowerPoint Presentation (Appendix G) designed by the VHA was assigned by the nursing education department two weeks before implementation. This provided an opportunity for staff to *evaluate* or *decide* whether they would adopt the initiative. Training was conducted during each shift, 0730-2000 and 1930-0800, for three days each week to ensure all staff had the opportunity to attend. During the course of the on-site training, staff also received instructions on the way to complete the oral care documentation template in the EHR. During this phase, the PM and nursing educators were

available to answer questions and concerns and provide additional resources when needed to increase the staff's knowledge and improve the prospect of 100% compliance in adopting the intervention.

After the two-week education and training period, the unit began the eight-week *implementation* phase, the goal of which was to have the staff adopt the intervention fully. The unit champions and the PM completed the oral care audit tracker (Appendix H). The PM continued to engage with staff throughout the eight-week implementation period to facilitate the final *adoption* phase. Communication with staff nurses was vital to sustain the change project, as maintaining a relationship with staff helped to create a healthy, productive work environment (Henderson, 2015). Allowing the staff to express their feelings, concerns, or issues with the intervention, and identify perceived barriers to following the protocol reduced the stress and anxiety that are often observed during times of change. Henderson (2015) indicated that staff should feel comfortable expressing their feelings, ideas, and mistakes without the fear of punishment or ridicule.

Results

The purpose of this EBP project was to implement an enhanced oral hygiene protocol (OHP) to reduce the incidence of non-mechanically ventilated aspiration pneumonia (NV-HAP) on a medical surgical unit. The OHP included the completion of oral hygiene care by nursing staff at least once each 12-hour shift and documentation in the EHR. After obtaining approvals from the USAHS EBP Project Review Council (EPRC) and the pilot facility, training and education for the nursing staff commenced for two weeks. A preliminary oral care survey was completed by licensed and unlicensed assistive personnel (UAP) to gauge their knowledge and readiness for the project. The *Healthy Smiles for Veterans* web-based training module was

completed by each staff member. First, face-to-face training with the project manager (PM) and the nursing educator was completed with 3-Unit Champions, 1 RN and 2 NAs. Subsequent training was done with an additional 14 RNs and 5 NAs.

Data Collection

Prior to implementation of the OHP, the PM collected data on the incidence of non-mechanically ventilated aspiration pneumonia on the pilot unit. Retrospective chart reviews were completed by hand one day each week by the PM to identify if nursing staff had documented oral hygiene care accurately for each shift using the oral care audit tracker (see Appendix H), an internally validated tool by the Veterans Health Administration (VHA). The audit tool indicated oral hygiene supplies had not been available at the bedside for every shift. Contact with nursing management confirmed inconsistent availability of oral hygiene care supplies, as they were not being stocked to the pre-determined PAR level. This issue was resolved after engaging with the chief of logistics and the central supply technician.

Statistical Analysis

Intellectus statistics software and Excel spreadsheets were used to conduct the statistical analysis and to organize the data to determine its clinical significance. De-identification of electronic and physical data was done to comply with HIPAA privacy standards and to meet ethical requirements. Physical and electronic security measures limited data access to the PM and pilot unit's nurse manager. Sign-in sheets from staff education and training were kept in a locked file cabinet in the PM's office.

Outcome Measures

The primary outcome measure was the incidence of non-mechanically ventilated aspiration pneumonia after admission to the pilot unit. Pre- and post- implementation data were

obtained. During the eight-week EBP project (July 18 – September 18), there were 2 cases of pneumonia as classified by the International Classification of Diseases (ICD) 10 diagnosis code (J18.8) after admission to the pilot unit in July (See Appendix I).

An assessment of the staff's knowledge and readiness was completed prior to initiating the OHP. Process measures included education and training both licensed and UAP on the importance of completing oral hygiene care once each shift and verifying nursing compliance with completing oral hygiene care and documenting care in the EHR. The percentage of staff that documented accurately was calculated using the chart audit tool, Microsoft Excel, and Intellectus software (2021). The data indicated the highest percentage of oral hygiene care documentation at 32% (*n = 6*) occurred week one. This was followed by week five at 11% (*n = 2*) and week two at 5% (*n = 1*). For weeks three, four, six, and seven, 0% (*n = 0*) of oral hygiene care was documented in the EHR (See Table 2).

The clinical significance of change is a direct result of its implications for existing practice (Ranganathan et al., 2015). This project's clinical significance can only be partially assumed due to the reduction in the incidence of aspiration pneumonia after admission and documented staff awareness of the importance of oral hygiene care. There were zero cases of pneumonia diagnoses after admission for August and September. However, despite educating the nursing staff about the importance of oral hygiene care and training them how to accurately document in the EHR, staff was often noncompliant with documenting performed oral hygiene care.

Impact

Oral hygiene care is essential to overall health and is a key component in providing comprehensive care for our patients. Methods for improving the quality of care for our inpatient

population can be attainable by educating and training staff, development of EBP standard operating procedures, and evaluating adherence to the policies and processes that are dedicated to reducing the incidence of non-mechanically ventilated aspiration pneumonia (NV-HAP). Data analysis authenticates the observation of reduction in incidence of NV-HAP during the project period; however, due to aforementioned concern with consistent implementation of the oral hygiene protocol to include failure to document provided care, the decrease as majorly attributed to the implementation is observational rather than verified.

Healthcare organizations should prioritize preparing nurses to be competent in oral hygiene care and disease prevention. The main goal of nursing care is to improve health outcomes as a result of providing nursing care (Liu et al., 2014). Nurses in acute care settings with competency in oral hygiene reduce the risk of patient mortality and produce improved outcomes (Coster et al., 2018). Introduction to enhanced oral hygiene care at the facility should be integrated into the onboarding process for nurses on acute care units and sustained by completing annual competency checks and skills-fairs. The pilot facility has adopted the Donna Wright Competency Model to evaluate necessary skills required by nurses that perform patient care. The development of competencies, verification methods, and how to identify deficits and process measures once identified will need to be addressed for sustainability (Wright, 2005). There are resources available for staff training and education in oral hygiene care (see Appendices C – I) as well as up-to-date oral care training materials from the American Dental Association (ADA).

One significant barrier that was identified in this EBP project was the inconsistent amount of oral care supplies being stocked on the unit. Nursing management indicated that the lack of supplies was a primary factor for nurses not being able to perform oral care. One recent

study indicated a 93.2% barrier in performing oral care for patients during hospitalization. The lack of oral care supplies accounted for 91.2% and absence of guidelines attributed 73.5%. Other barriers included a knowledge gap in oral care practice, training, and education, and gaps in management (Dagnew et al., 2020).

It is difficult to determine if the decrease in patients diagnosed with pneumonia after hospitalization was attributed to the intervention. Inadequate oral care supplies and inconsistent nursing documentation of oral care are the primary limitations of this project. Improving communication and expectations with logistics, central supply technicians, and nursing management is warranted to continue this intervention over time. The 8-week time frame was also a limitation. Conducting weekly chart audits and obtaining NV-HAP rates for several more weeks may have provided a correlation between oral hygiene and a decrease in NV-HAP. A final limitation was related to staffing on the pilot unit. Nurses from other medical surgical units were often floated in to work on the pilot unit and they had not received education and training on the OHP. Nursing leadership and educators should include oral hygiene care in nursing orientation and the onboarding process to all inpatient care service areas.

Dissemination Plan

Dissemination

A change in practice will not be maintained if staff are unaware of the results; therefore, dissemination is an important element in the change project's success overall (Edwards, 2015). Dissemination plans included sharing the process and outcomes of implementing an evidence based OHP, on a local and national level. The PM, preceptor, Evidence-based Practice Council, and project team analyzed and evaluated the project results to identify whether the outcome measures indicated success and whether there were any barriers to implementation and

considerations for future ideas for successful implementation. The project results were shared with the medical surgical staff during their monthly staff meeting. The results were also communicated, written and orally, with the PENTAD leadership during the daily morning huddle.

A poster presentation that summarized the project details and outcomes and was accessible to the staff in both local VHA facilities. National dissemination throughout the VHA was accomplished by submission to the VHA intranet and monthly newsletter. With approval from the VHA, the protocol, education and training materials, timeline, and outcomes will be shared with local civilian hospitals and medical centers as well. This scholarly paper will be peer reviewed before submission to the *American Journal of Infection Control* and the *Journal of Clinical Nursing*. Finally, the manuscript has been submitted in full text to the SOAR@USA, an institutional repository to enhance the EBP intervention's accessibility.

Conclusion

The focus of this evidence-based change project was to implement a standardized OHP to reduce the incidence of aspiration pneumonia in adult non-mechanically ventilated patients. In addition to decreasing the NV-HAP rates, an OHP potentially reduced the length of stay and costs of treatment, as patients did not require higher levels of care, and had reduced rates of re-admission and improved outcomes.

Improving oral health outcomes was dependent upon the nursing staff. Hence, improving the nurses' awareness and perception of good oral hygiene was critical. Using the Rogers' diffusion of innovation change model to guide the change project expanded the staff's knowledge of disease prevention, effective oral hygiene care, and methods to mitigate the risk of aspiration pneumonia. The diverse training modalities, including written, face-to-face, and the

VHA Talent Management (TMS), increased the staff's understanding of the protocol, frequency and methods of oral care, and documentation requirements. The results of this change project provided support to establish an evidence-based practice OHP for non-mechanically ventilated adult patients throughout the VAMC and other inpatient healthcare facilities.

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Table 1

Level of Evidence

Author/Year	Study Design JH Level of Evidence	Grade of Evidence
Satheeshkumar, P. S., Papatheodorou, S., & Sonis, S. (2020)	Meta-analysis of RCTs and non-RCTs Level I	A
Munro, S., & Baker, D. (2018)	Quasi-experimental Level II	A
Quinn, B., Baker, D. L., Cohen, S., Stewart, J. L., Lima, C. A., & Parise, C. (2014)	Quasi-experimental Level II	A
Schutte, D. L., & Warren, C. (2020)	Qualitative with meta-synthesis Level III	A/B
Talley, L., & Lamb, J. (2016)	Quasi-experimental Level II	B
Jenson, H., Maddux, S., & Waldo, M. (2018)	Experimental, quality improvement Level V	B
Micek, S. T., Chew, B., Hampton, N., & Kollef, M. H. (2016)	Quasi-experimental Level II	B
Klein, C. J. (2017)	Quasi-experimental, non-RCT Level II	B
Warren, C., Medei, M. K., Wood, B., & Schutte, D. (2019)	Quasi-experimental Level II	A
Tesoro, M., Peyser, D. J., & Villarente, F. (2018)	Non-experimental, exploratory Level III	A/B
Kaneoka, A., Pisegna, J. M., Miloro, K. V., Lo, M., Saito, H., Riquelme, L. F., LaValley, M. P., & Langmore, S. E. (2015)	Mixed method Level I	B

Quinn, B., Giuliano, K. K., & Baker, D. (2020)	Clinical Practice Guideline Level IV	B
Giuliano, K. K., Baker, D., & Quinn, B. (2018)	Experimental, randomized controlled trial Level I	A
U.S. National Library of Medicine. (2015)	Experimental, non-randomized controlled trial Level I	A

Table 2

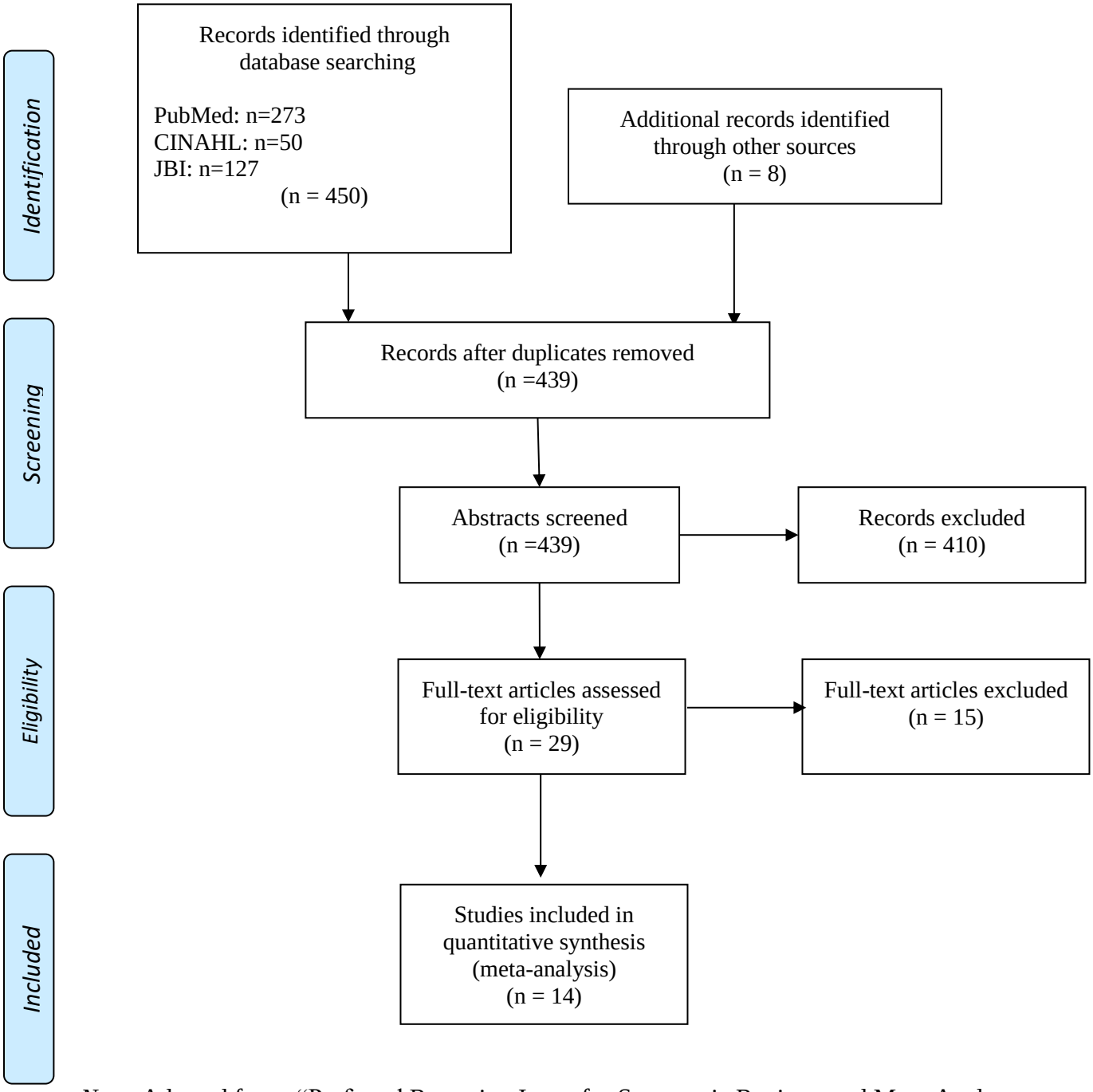
Frequency Table for Nominal Variables

	Audit Date						
Variable	09-14	09-01	08-25	08-10	08-03	07-27	Missing
Oral Care Documentation							
yes	0 (0%)	2 (11%)	0 (0%)	0 (0%)	1 (5%)	6 (32%)	0 (0%)
no	18 (100%)	16 (89%)	15 (100%)	16 (100%)	18 (95%)	13 (68%)	0 (0%)
Missing	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Total	18 (100%)	18 (100%)	15 (100%)	16 (100%)	19 (100%)	19 (100%)	0 (100%)

Note. Due to rounding error, percentages may not sum to 100%.

Figure 1

PRISMA Flow Diagram



Note. Adapted from: "Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement," by D. Moher, A. Liberati, J. Tetzlaff, and D. G. Altman, *PLoS Med 6*(7): e1000097 (doi:10.1371/journal.pmed1000097). Copyright 2009 by The PRISMA Group.

Figure 2

Themes from the Evidence

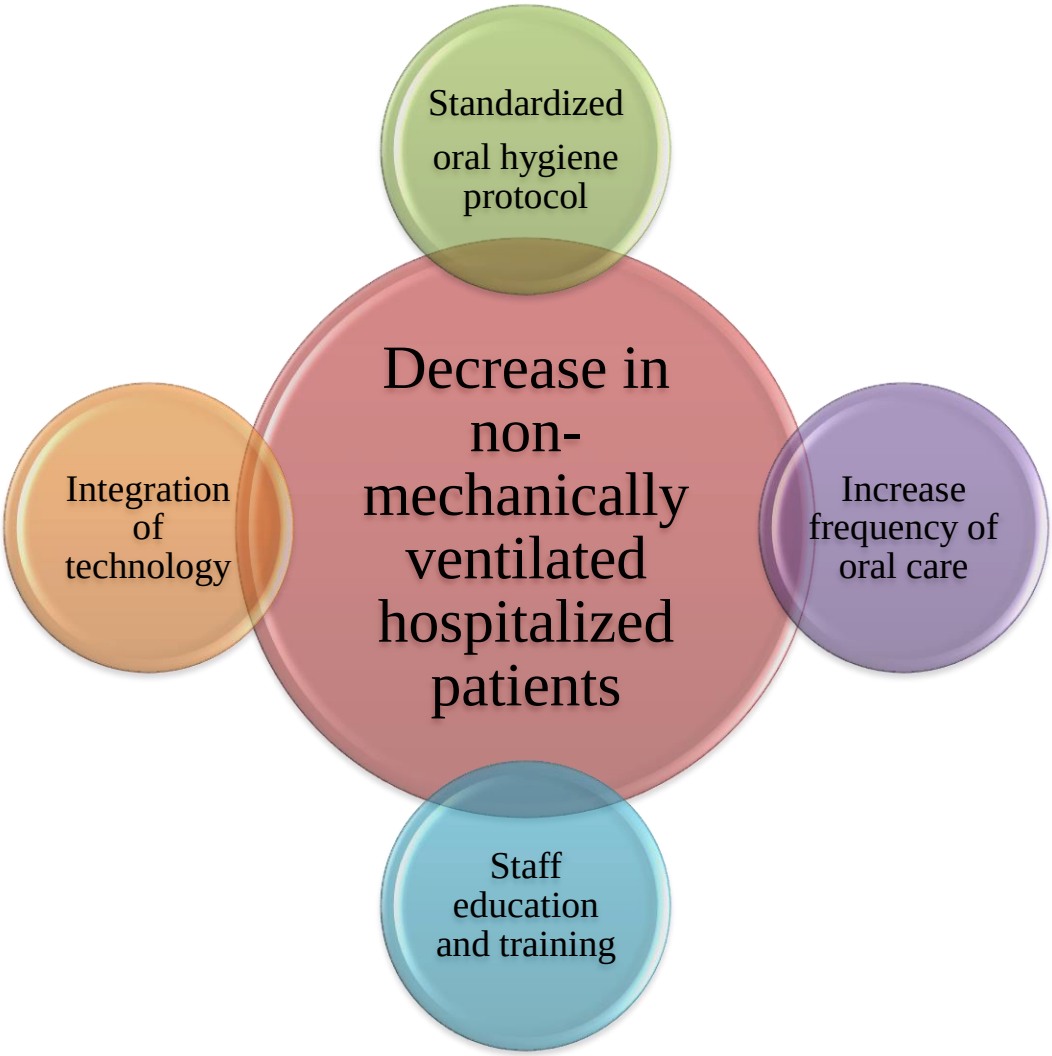


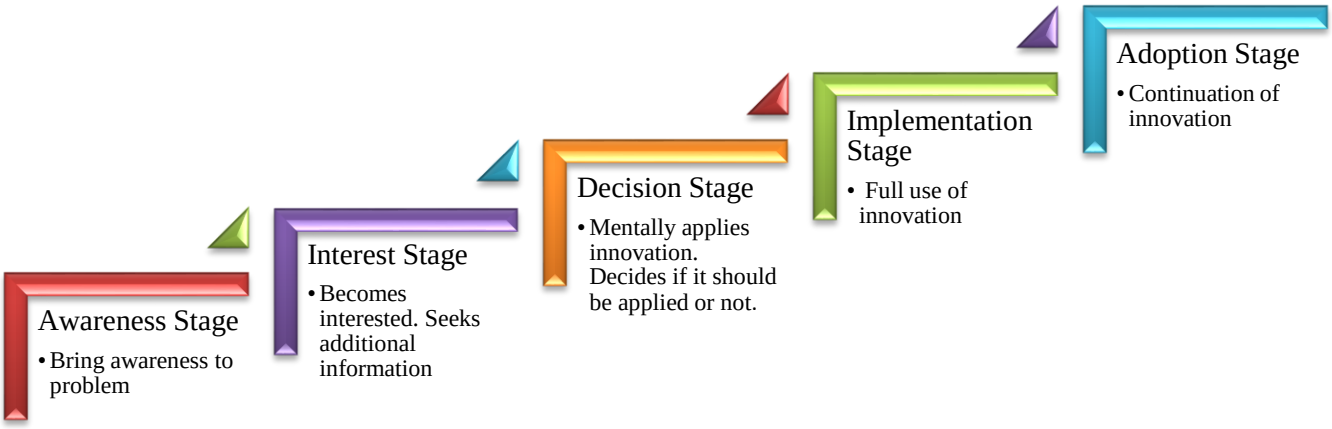
Figure 3

SWOT Analysis

Strengths	Weaknesses
• Implementation of Evidence-based Practice • Commitment to Veteran experience and improved patient outcomes • Interdisciplinary collaboration • Leading computerized health care records system	• Lack of standardized oral care process • Inadequate staffing • Culture of unit • Lack of accountability • Time consuming
Opportunities	**Threats**
• Adoption of evidence-based practice • Improved nursing engagement • Improved clinical outcomes • Decreased harm to patient • Decrease in associated costs	• Staff availability • Availability of supplies and equipment • Reluctance to change • Loss of revenue

Figure 4

Rogers' Diffusion of Innovation: Five Stage of Adoption



Note. The diagram depicts each stage of Rogers' diffusion of innovation. Staff may experience each phase of the change process after implementation of an oral hygiene protocol (OHP). Adapted from: "Diffusion of Innovation Theory," by J. Kaminski, *Canadian Journal of Nursing Informatics 6*(2). (https://cjni.net/journal/?p=1444). Copyright 2011 by Canadian Journal of Nursing Informatics.

Appendix A

Summary of Primary Research Evidence

Citation	**Design, Level Quality Grade**	**Sample Sample size Setting**	**Intervention Comparison**	**Theoretical Foundation**	**Outcome Definition**	**Usefulness Results Key Findings**
Munro, S., & Baker, D. (2018).	Quasi-experimental Interventional Study pre/post population data Retrospective study of 14,396 patient days, 2002-2012 Level II Grade A	No recruitment All male/female veterans No exclusion criteria Medical Surgical unit with average 397 admissions each month October 2017 to March 2018	Standardized oral care protocol compared to usual care Twice daily oral care provided using toolkits Influencer Model guided study Random nursing documentation chart audits CDC diagnostic criteria for HAP among non-ventilated patients Silness-Loe Plaque indexes was initially used to measure plaque but was discontinued because of patients frequenting off the unit	Increased oral care reduces NVAP and therefore reduces associated costs	Oral care that is consistent aligns with the values of the VA hospital Cost avoidance of over $2 million Reduced the risk of NVAP	Interventions resulted in $2.84 million cost avoidance 13 patient saved 19 months post-implementation Oral care increased by 75% pilot units Reduced NVAP 100% with an estimated $144,000 cost avoidance

Quinn, B., et al. (2014).	Quasi-experimental using retroactive comparatives Level II Grade A	May 2012 – April 2013 3 inpatient facilities	Nursing staff and patient education Implementation of oral care protocol	Improved oral care reduces risk of aspiration pneumonia	Significant findings that a standardized oral care protocol can reduce the risk of aspiration pneumonia in non-ventilated patients	The rate of NV-HAP decreased from 0.49 to 0.3 (38.8%) 8 lives were saved $1.72 million in cost avoidance 500 hospital days averted
Schutte, D. L., & Warren, C. (2020).	Qualitative with meta-synthesis Longitudinal, descriptive correlation with 2 independent groups Level III Grade A/B	33 item oral care questionnaire 1,300 nurses and patient care technicians 125 nurses completed questionnaire 74 nurses completed post-implementation	Implemented oral care protocol	Determine staff knowledge and attitude towards oral care Is there a significant difference in knowledge and attitude after oral care protocol is implemented	Implementation of evidence-based oral care protocol had a positive effect on nursing staff including oral care in the daily patient activities Barriers addressed before implementation	Before implementation 17% of nursing staff did not plan to include oral care in their patient care activity Staff knowledge of oral care increased from 87% to 97% Strategic plan to address barriers

		Survey one month before implementation 18 months post-implementation				and attitudes included training and education, pre-packaged oral care kits, and streamlined documentation
Talley, L., & Lamb, J. (2016).	Quasi-experimental Posttest-only analysis and nonequivalent comparison groups Level II Grade B	Two non-ventilated adult study groups 4 nursing units 347 preintervention patients Study done in 2010 337 postintervention patients Patient's age 18 and older Patients excluded if length of stay less than 3 days, NPO, ICU	Standardized oral care protocol Usual care including no standardized oral care HAP incidence Two or more radiographs with new or progressive infiltrate or consolidation Independent sample t-test with significance level of p=0.05	An oral care program may significantly reduce the incidence of patients diagnosed with hospital acquired pneumonia Training and educating the nurses on the importance of oral care increases successful adoption of oral care protocol	Decrease in hospital acquired pneumonia diagnoses Subtracting the cost of oral care kits, estimated return on investment during study $195,400 Reduced length of stay from 9.45 days to 6.92	Adoption of standardized oral care may reduce risk of hospital acquired pneumonia

Jenson, H., et al. (2018).	Experimental, Quality improvement program Pre- and post-interventional study Level V Grade B	Magnet-designated facility RNs and CNAs Convenience sample of patients before the intervention At 5,7-, and 9-weeks post intervention	Education in-service for nursing staff Implementation of oral hygiene protocol Adoption of daily oral care kit Statistical Package for Social Sciences (SPSS), version 22 Chi-squared to compare frequency, barriers, and benefits of performing oral care One-way NOVA for difference in documentation at 5,7, and 9 weeks	The significance of proper oral care as a preventative measure for decreasing non-ventilated aspiration pneumonia has shown positive outcomes Understanding the importance of oral care is the first step to practice change	No CNAs completed the surveys Barriers were identified Significant increase in staff documentation	Partnership with nursing staff and patients to increase oral care The lack of CNA participation affected results The study did not determine if the intervention was effective
Micek, S. T., et al. (2016).	Quasi-experimental Retrospective case control	January 2014 to December 2014 1,300 bed urban academic medical center	Comparison of patients with NVHAP and without NVHAP	Quantitative studies that may influence increased efforts that support	Strong association between non-ventilated hospital acquired	174 cases of NVHAP identified

	Level II Grade B	Random sample of 696 control patients	Categorical variables compared using x^2 or Fischer exact test Mann-Whitney test	preventing NVHAP	pneumonia and mortality	Greater risk of hospital mortality Patients with non-ventilated hospital acquired pneumonia require intensive care (56.3% vs 22.8%) Longer length of stay (15.9 days vs 4.4 days)
Klein, C. J. (2017).	Quasi-experimental, non-randomized prospective design Level II Grade B	Intervention unit: medical telemetry, stroke designated unit Control unit: two medical surgical telemetry units 316 Nurses 144 CNAs Treatment group: 133 patients	Mandatory education Education material was scripted to ensure all staff received the same information Additional 10-minute education for treatment unit ANOVA testing before the units were combined t-test used for pre- and post-knowledge analysis	Research suggests adoption of evidence-based oral hygiene protocol outside of the ICU Patients benefit when nursing practice provides consistent oral care	Increasing staff perceptions on the importance of daily oral care would prove beneficial	CNAs curriculum should emphasize daily oral care Enhance communication between RNs and CNAs when delegating tasks

		Control group: 113 patients 3-month data collection period	Data analyzed using Statistical Package for Social Sciences (SPSS) version 19.0			
Warren, C., et al. (2019).	Quasi-experimental pretest/posttest Level II Grade A	Adult inpatient care units November 2014 to May 2015 November 2015 to May 2016	Staff and patient education was given Electronic health record modified to document oral care Evidence based oral hygiene protocol implemented Oral care for at-risk patients was delivered four times a day Patients not at risk received usual care oral care and kits Statistical Package for Social Sciences (SPSS) version 24	Improve patient outcomes through use of standardized oral hygiene protocol Non-ventilated hospital acquired pneumonia remains problematic for acute care facilities Connection between oral care and pneumonia	Significant improvement in pneumonia outcomes Reduction in cost avoidance Staff adherence with protocol will be ongoing to ensure sustainability	50% reduction in NV-HAP incidence 16 deaths avoided $1.04 million in cost avoidance
Tesoro, M., et al. (2018).	Non-experimental	Incidence in 2014	Clinical Looking Glass data mining program extracted Internal	Improvement in teamwork, communication,	837 cases of pneumonia	$8.2 million in health-related costs associated

	Descriptive, observational, retrospective review Level III Grade B	Patients 18 years or older Hospital admission 2014 Discharge following a diagnosis of pneumonia that was not present at time of admission	Classification of Diseases, Ninth Revision (ICD-9) codes CDC NV-HAP criteria had been met SPSS	and impact of oral care is a priority to improve patient outcomes	diagnosis after admission 49 not reviewed as patients were under the age of 18 205 cases met CDC NV-HAP criteria Oral care was not performed daily	with NV-HAP for 2014 15.6% required transfer to ICU Average hospital LOS was 24 days 24.9% of patient readmitted within 30 day of discharge 49.5% of patients had documented oral care by nursing staff
Quinn, B., et al. (2020).	Clinical practice guidelines Level IV Grade B		Drivers: 1- Reduce oropharyngeal pathogens 2- Reduce aspiration 3- Increase host defenses	Pneumonia is associated with germs from the oral cavity Preventive measures aimed at reducing the risk of aspiration	Implement evidence-based oral care to reduce aspiration risk Nurses are in key positions to improve	The inclusion of nursing staff in reducing the risk of aspiration pneumonia is critical Efforts are needed to increase nurses'

				pneumonia includes reducing oral pathogens, decrease aspiration of pathogens into the lungs, and support/strengthen patient's own defense mechanisms	patient care outcomes	knowledge of the connection between aspiration pneumonia and oral pathogens
Giuliano, K. K., et al. (2018).	Experimental, randomized control Level I Grade A	46 state participated Patients ≥ 18 years of age Diagnosis of pneumonia Initial sample N=133,595 LOS less than 48 hours excluded, final sample 119,075	4 comparison groups Groups 2-4 random sampling 5th group captured cases of VAP SPSS version 23 Mean differences analyzed using t tests with Bonferroni corrections x^2 used for significance testing	Recent study in Pennsylvania found NV-HAP more prevalent than VAP Greater economic burden Estimated cost for NV-HAP patients is $156 million compared to $86 million for VAP patients	Healthcare facilities should determine safe, effective methods to reduce or prevent NV-HAP	Incidence of NV-HAP in sample was 1.6% 3.63 per 1,000 patient-days Hospital length of stay range from 4 to 15.9 days Average cost associated with non-ventilated hospital acquired pneumonia

						$28,000 - $40,000 Mortality rate of 13.1%
U.S. National Library of Medicine. (2015).	Experimental Interventional, non-randomized Level I Grade A	32 participants 51 retrospective study group Adults ≥19 years or older Male or female Admission on medical surgical neuroscience unit Non-intubated Oral care dependent January 2012 to October 2012	Control group received enhanced oral care protocol Retrospective review of inpatient population who did not receive enhanced oral care protocol	HAP is the second most common nosocomial infection For surgical patients, HAP has a 55% increased length of stay and $31,000 per case in associated costs Standardizing oral hygiene protocols and increasing staff/patient awareness may reduce incidence of HAP	Oral care protocols may reduce the incidence of hospital acquired pneumonia Enhanced education and training is needed for staff and patients on the importance of routine oral care	2/32 study subjects acquired pneumonia while using oral hygiene protocol 13/51 retrospective study group acquired pneumonia

Legend: CDC, Centers for Disease Control; HAP, hospital acquired pneumonia; LOS, length of stay; NVAP, non-ventilated aspiration pneumonia; NV-HAP, non-ventilated hospital acquired pneumonia; VAP, ventilated associated pneumonia

Appendix B

Summary of Systematic Reviews

Citation	Quality Grade	Question	Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction and Analysis	Key Findings	Usefulness/ Recommendation/ Implications
Satheeshkumar, P. S., et al. (2020).	Level I Grade A	Is the nursing time, effort and instrumentation needed for an expanded oral hygiene program justified by a cost/benefit analysis; that is, how effective are expanded oral hygiene programs in modifying risk of NVAP? Are there specific risk factors which can prospectively identify	PubMed and Embase of clinical trials (randomized and non-randomized), observational (retrospective and prospective), and quasi-experimental	Inclusion: Experimental and observational studies: Reported NVAP as primary outcome Acute/ Chronic care facility adults ≥18 years of age not diagnosed as having pneumonia upon admission Intervention or exposure to enhanced oral hygiene Provided data as point estimates and measure of 95%	From eligible studies, independently, using pre-specified data extraction forms Record, study characteristics recorded by two independent members of the team and discrepancies resolved by discussion Methods, country, setting, duration of follow-up, sample size, number of patients randomized, number of patients evaluated, inclusion	CHX rinse in an enhanced oral regimen was ineffective Another study found dental professional involvement was favorable with a 35%risk reduction of NVAP Another study found nursing assistants dedicated to oral hygiene reduced NVAP outcomes compared to no oral care NVAP decreased by40% with combined	Good oral hygiene is just as effective as consistent hand washing Large, structured, randomized trials are needed with this specific intervention

Citation	Quality Grade	Question	Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction and Analysis	Key Findings	Usefulness/ Recommendation/ Implications
		patients at risk of NVAP and how do these patients specifically respond to oral hygiene programs? When is the optimum time to initiate OCIs; that is, are programs which commence at the time of admission effective, or should oral hygiene programs begin earlier, and if so, how much earlier? Are the pathogens		confidence intervals Exclusion: Studies that did not provide NVAP data Those that used 'hospital-acquired pneumonia' but did not differentiate NVAP from VAP Studies not published in English	and exclusion criteria, diagnosis of NVAP, intervention (type, dose and frequency of oral care), control (type, dose and frequency of oral care), outcome measures involving incidence of NVAP secondary endpoints, and funding source.	toothbrushing increased x1each day	

Citation	Quality Grade	Question	Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction and Analysis	Key Findings	Usefulness/ Recommendation/ Implications
		observed in NVAP found in the oral biofilm, where are the primary depots of pathogens and which OCIs best target those depots?					
Kaneoka, A., et al. (2015).	Level I Grade B	What is the effectiveness of oral care on the incidence of pneumonia in non-ventilated patients	Medline, Embase, CENTRAL, CINAHL, Web of Science, LILACS, ICHUSCHI, and CiNii Trial registries and manual search	Inclusion: Published or unpublished RCTs Primary studies Examined the incidence of pneumonia or mortality Adults (18 years or older) in hospitals or long-term care facilities Chemical oral disinfection and/or	Extraction: Study characteristics: country, duration of follow up Participants: sample size, inclusion/exclusion criteria, methods of diagnosing pneumonia Intervention: type, dose, and frequency of oral care	The Cochran-Mantel-Haenszel fixed effect analysis showed a significant overall effect of oral care interventions in reducing the risk for developing pneumonia as compared with a control condition (RR, 0.61; 95% CI, 0.40–0.91; *P*=.02), with no statistical heterogeneity (χ^2=0.53;	Their finding supports the benefit of oral care in pneumonia prevention in the nonventilated patient population Strengths of the review include the preregistered protocol, duplicate screening, data extraction, and risk of bias assessment. This systematic review and meta-analyses of RCTs showed oral care potentially reduced the risk

Citation	Quality Grade	Question	Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction and Analysis	Key Findings	Usefulness/ Recommendation/ Implications
				mechanical cleaning Reported sufficient data to calculate the RR for pneumonia or mortality Exclusion: Patients with mechanical ventilation	Control: type, dose, and frequency of placebo or oral care Outcome measure: incidence of pneumonia or number of deaths due to pneumonia 2 reviewers assessed the risk of bias based on sequence of generation, allocation concealment, blinding, selective outcome reporting, and completeness of outcome data	df=3; *P*=.91; I^2=0%). Pooled RR for fatal pneumonia was significant (RR,0.41; 95% CI, 0.23–0.71; P=.002) with no statistical heterogeneity (χ2=0.94; df=1; P=.33; I2=0%), suggesting that mechanical oral care significantly reduced the risk for fatal pneumonia in elderly nursing home residents	of pneumonia in nonventilated patients.

Legend: CHX, chlorhexidine; NVAP, non-ventilated aspiration pneumonia; OCI, oral care interventions; RR, relative risk

Appendix C

Nursing Staff Oral Care Survey

1. On which inpatient unit do you primarily work? _____

2. What is your role?

□ Registered Nurse (RN)
□ Licensed Practical Nurse
□ Nursing Assistant (NA)
□ Healthcare Tech (HCT)
□ Other _____

3. How often in a shift do you typically provide oral care to non-ventilated patients? (Check only one)

□ Not at all
□ Every 2-4 hours
□ Every 5-8 hours
□ Every 9-12 hours
□ Other _____

4. How often in a shift do you document providing oral care to non-ventilated patients? (Check only one)

□ Not at all
□ Every 2-4 hours
□ Every 5-8 hours
□ Every 9-12 hours
□ Other _____

1. What is the typical **duration** you brush a non-ventilated patient's teeth with a: (For each tool, please check only one duration)?

	15 secs or less	30 secs	60 secs	90 secs	120 secs	Other	Do not know	Do not use
Manual toothbrush								
foam toothettes								
Other:								

6. In your practice, what patient oral care products do you use? (Check all that apply)

□ Manual toothbrush
□ Toothpaste
□ Foam swabs/ foam toothettes
□ Suction toothbrush

□ Hydrogen peroxide
□ Glycerin lemon swabs
□ Moisturizers
□ Saliva Substitute
□ Mouthwash
□ Alcohol free mouthwash
□ Blistex
□ Tap water
□ Ice water
□ Ceytlpyridium chloride
□ Chlorohexidine
□ Nystatin swish and swallow
□ Lidocaine/ magic mouthwash
□ Water rinse after steroid inhaler
□ I do not use oral care products
□ Other _____

7.Given all the tasks to complete for a patient, please rate your priority level of oral care. (Check only one)
□ No priority
□ Low priority
□ Moderate priority
□ High priority
□ Highest priority

8. On average, I have adequate time to provide oral care to non-ventilated patients at least _____ (Check only one)
□ Every 2-4 hours
□ Every 6-8 hours
□ Every 9-12 hours
□ I do not provide oral care
□ Other_____

9. What are the barriers you face in performing oral care for non-ventilated patients?
□ Lack of Time
□ Lack of Resources/Supplies
□ Not a Priority of Care
□ Lack of Knowledge
□ Fear of ETT Dislodgement
□ Combative patient
□ Enteral Tube Placement
□ Swallow Precautions
□ ICP Monitoring
□ Other_____

10. Do you provide oral care to patients with a feeding tube?
□ Yes □ No

11. Do you feel you have adequate education and knowledge to provide oral care to non-ventilated patients?
□ Yes □ No If no, what type of education do you need? _____

12. Please rate your agreement with the following statement: "I would be receptive to providing regular oral care (twice daily) to non-ventilator patients who require assistance."
□ Agree
□ Somewhat agree
□ Neutral
□ Somewhat disagree
□ Disagree

13. Do you know how many cases of non-ventilator hospital acquired pneumonia (NV-HAP) occur per month at your facility?
□ Yes □ No

Note: Adapted from "Diffusion of Excellence, VA National Oral Care Implementation Toolkit: Preventing Non-ventilator Associated Hospital Acquired Pneumonia by Engaging Nurses to Complete Inpatient Oral Care (Internal VHA publication 2017, last revised October 2020)" by S. Munro, A. Haile-Mariam, C. Greenwell, H. Peabody, S. Demirci, J. Adams, D. Edgemon,

Appendix D

Oral Hygiene Protocol

Purpose: Brushing the teeth 2-3 times in a 24-hour period will help reduce the patient's risk of developing hospital acquired pneumonia and other health problems. Dental plaque and oral biofilm that contain bacteria (germs) is removed by tooth brushing and denture cleaning.

Frequency: Every 12 hours

Health Care Staff are responsible for:

- Preventing hospital acquired infections such as pneumonia by providing oral care

Equipment

- Gloves
- Cup and basin
- Towel
- Toothbrush, American Dental Association (ADA) approved or other high-quality product*
- ADA approved fluoride toothpaste*
- Petroleum-free lip balm (optional)
- Alcohol free mouthwash* (optional)
- Mouth moisturizer (as needed)
- Dental floss or interdental cleaners (optional)
- Suction toothbrush, canister, tubing, and sterile water as needed

Procedure

1. Approach the patient at eye level, smile and establish rapport. Ask the patient for permission to assist with tooth brushing.
2. Perform hand hygiene, then collect and arrange the appropriate supplies within easy reach (e.g., on covered table or rolling cart).
3. Mouth care is best provided in a quiet environment with the patient standing or sitting in front of the bathroom sink which serves as a cue regarding the purpose of the intervention.
4. For those who cannot walk to the bathroom, position the patient in a chair or raise the bed to a comfortable working height. Raise the head of the bed to a semi-recumbent position and lower the side rail closest to you. A side-lying position may be used. Cover the patient's chest with a towel.
5. Perform hand hygiene and apply personal protective equipment (PPE).

6. Pre-rinse soft toothbrush with clean tap water. For patients requiring assistance, brush all the teeth beginning with the chewing surfaces using short strokes. Move slowly from one side of the mouth to the other side brushing all the upper and lower teeth. Gently brush front and back surfaces of all teeth in small circular strokes, including the gum line where plaque builds up easily.
7. In patients without a risk of aspiration, after the first step of dry brushing with tap water, apply a pea-sized amount of fluoride toothpaste to brush. Take care to brush all surfaces of the teeth.
8. Gently brush the soft tissues (tongue, roof of mouth, places where teeth are missing).
9. Assist the patient when rinsing with water and spitting or provide suction if needed.
10. Wipe the patient's mouth and apply petroleum-free lip balm to the lips.
11. Appropriately discard soiled linens and trash.
12. Store patient's personal oral care items.
13. Clean and disinfect the area as appropriate.
14. Return the bed and side rails to their original position.
15. Remove PPE and perform hand hygiene.
16. Report any problems or concerns.
17. Document care provided in the patient's record.

Denture Cleaning

Frequency: Variable, depending upon the condition of the dentures. Any visible signs of tartar on the dentures are an indication for the need of cleaning it. Dentures should be removed at night so the mouth can rest.

Equipment

- Gloves
- 9"x12" clear plastic bag
- Denture brush
- Liquid denture cleaner (or denture cleaning tablets)

Procedure

1. Approach the patient at eye level, smile and establish rapport. Ask the patient for permission to assist with tooth brushing.
2. Perform hand hygiene, then collect and arrange the appropriate supplies within easy reach (e.g., on covered table or rolling cart).
3. Mouth care is best provided in a quiet environment with the patient standing or sitting in front of the bathroom sink which serves as a cue regarding the purpose of the intervention.
4. For those who cannot walk to the bathroom, position the patient in a chair or raise the bed to a comfortable working height. Raise the head of the bed to a semi-recumbent position

and lower the side rail closest to you. A side-lying position may be used. Cover the patient's chest with a towel
5. Perform hand hygiene and apply personal protective equipment (PPE).
6. Pre-rinse soft toothbrush with clean tap water. For patients requiring assistance, brush all the teeth beginning with the chewing surfaces using short strokes. Gently brush front and back surfaces of all teeth in small circular strokes, including the gum line where plaque builds up easily.
7. In patients without a risk of aspiration, after the first step of dry brushing with tap water, apply a pea-sized amount of fluoride toothpaste to brush. Take care to brush all surfaces of the teeth.
8. Gently brush the soft tissues (tongue, roof of mouth, places where teeth are missing).
9. Assist the patient when rinsing with water and spitting or provide suction if needed.
10. Wipe the patient's mouth and apply petroleum-free lip balm to the lips.
11. Appropriately discard soiled linens and trash.
12. Store patient's personal oral care items.
13. Clean and disinfect the area as appropriate.
14. Return the bed and side rails to their original position.
15. Remove PPE and perform hand hygiene.
16. Report any problems or concerns.
17. Document care provided in the patient's record.

Denture Cleaning

Frequency: Variable, depending upon the condition of the dentures. Any visible signs of tartar on the dentures are an indication for the need of cleaning it. Dentures should be removed at night so the mouth can rest.

Equipment

- Gloves
- 9"x12" clear plastic bag
- Denture brush
- Liquid denture cleaner (or denture cleaning tablets)
-

Procedure – With gloved hands

1. Approach the patient at eye level, smile and establish rapport. Ask the patient for permission to assist with denture removal and cleaning.
2. Place dentures/partials in a 9x12" clear plastic bag.
3. Pour denture cleaner in the bag until the dentures are covered with solution.
4. Zip the bag shut and gently shake the bag to ensure all the denture surfaces are clean.

5. Line the sink with a towel to protect the dentures if they are dropped. Place the filled bag in the sink and soak for approximately 2 minutes.
6. Remove the dentures from bag, discard the cleaner down the sink, and throw the bag in the garbage can.
7. Under warm running water, gently brush all surfaces of the denture/partials. Remove all plaque and biofilm using a denture brush.
8. Rinse denture brush thoroughly so it may be reused.
9. Return dentures/partials to the patient. Place the used towel in the hamper.
10. Remove PPE and perform hand hygiene.

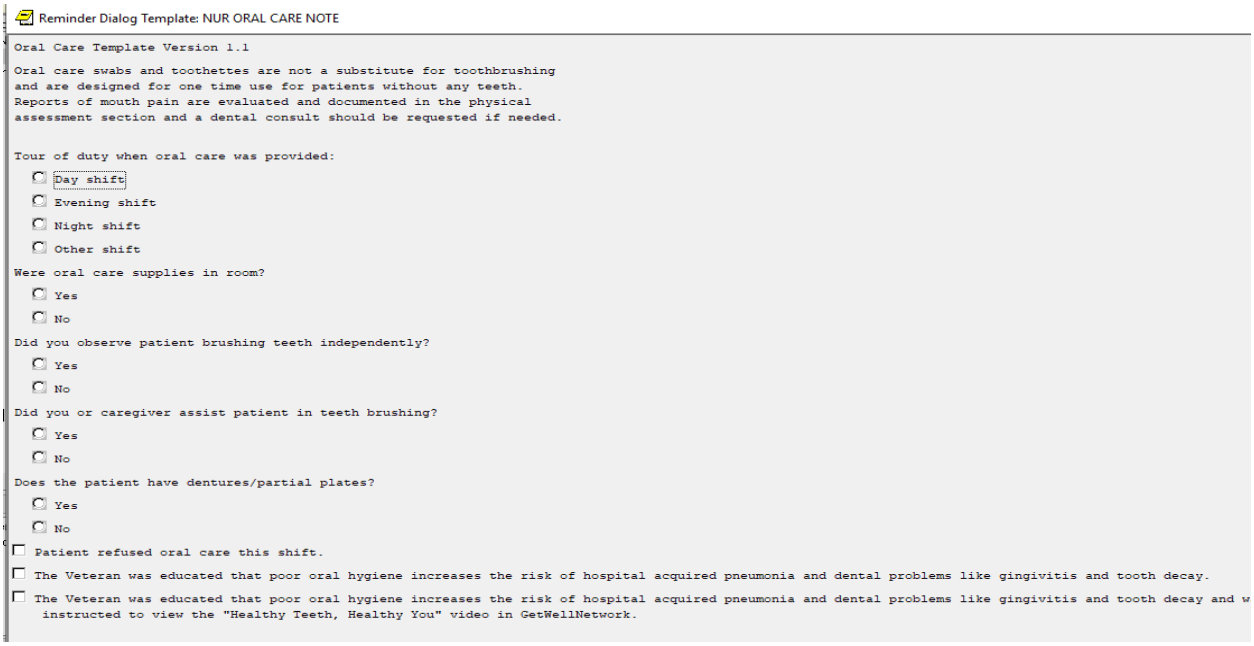
Things to remember:

- Discard the denture cleaning solution and bag after each use.
- Do not dilute the denture cleaning solution as it is ready for use, as is.
- Use denture cleaning solution with adequate ventilation.
- Denture cleaning tablets may be used instead of solution. Follow the manufacturer's instructions for use.
- If there is extensive tartar build up on the dentures that you cannot remove, contact the dental clinic for their assistance.
- Label and store oral care supplies in the cleanest, driest part of the patient's room.

Note: Adapted from "Diffusion of Excellence, VA National Oral Care Implementation Toolkit: Preventing Non-ventilator Associated Hospital Acquired Pneumonia by Engaging Nurses to Complete Inpatient Oral Care (Internal VHA publication 2017, last revised October 2020)" by S. Munro, A. Haile-Mariam, C. Greenwell, H. Peabody, S. Demirci, J. Adams, D. Edgemon,

Appendix E

Oral Care Documentation Template



Reminder Dialog Template: NUR ORAL CARE NOTE

Oral Care Template Version 1.1

Oral care swabs and toothettes are not a substitute for toothbrushing
and are designed for one time use for patients without any teeth.
Reports of mouth pain are evaluated and documented in the physical
assessment section and a dental consult should be requested if needed.

Tour of duty when oral care was provided:
- ○ Day shift
- ○ Evening shift
- ○ Night shift
- ○ Other shift

Were oral care supplies in room?
- ○ Yes
- ○ No

Did you observe patient brushing teeth independently?
- ○ Yes
- ○ No

Did you or caregiver assist patient in teeth brushing?
- ○ Yes
- ○ No

Does the patient have dentures/partial plates?
- ○ Yes
- ○ No

☐ Patient refused oral care this shift.

☐ The Veteran was educated that poor oral hygiene increases the risk of hospital acquired pneumonia and dental problems like gingivitis and tooth decay.

☐ The Veteran was educated that poor oral hygiene increases the risk of hospital acquired pneumonia and dental problems like gingivitis and tooth decay and w
instructed to view the "Healthy Teeth, Healthy You" video in GetWellNetwork.

Note: Design model for oral care documentation with reminder alert for inclusion into local Veterans Health Administration Computerized Patient Record System (CPRS). Copyright 2021 by U.S. Veterans Health Administration.

Appendix F

Staff Training and Education

Healthy Smiles for Veterans Video	Talent Management System (TMS) Course VA37675
Oral Care Power Point Presentation	Oral Hygiene Care Share Point Database

Note: Standardized education products utilized to reinforce need for comprehensive oral hygiene.

Appendix G

Oral Care Patient Education Brochures and Flyers

Title	***Item Number***
Brush Your Teeth to Prevent Pneumonia Flyer #1 (poster 8x11)	IB 10-1354
Brush Your Teeth to Prevent Pneumonia brochure	IB 10-1358

Note: Standard products for oral health campaign. From the U.S. Veterans Administration Oral Hygiene Care Share Point Database.

Appendix H

Oral Care Audit Tracker

Date: _____

AM					PM				Comments
Room	Supplies at bedside? Y / N	Documented oral care? Y / N	Nursing staff who documented providing oral care	How was oral care done? I – Independent A – Assisted T – Total R – Refused	Supplies at bedside? Y / N	Documented oral care? Y / N	Nursing staff who documented providing oral care	How was oral care done? I – Independent A – Assisted T – Total R – Refused	State if pt. has dentures, explain situation for patient refusal, etc.

Note: Adapted from "Diffusion of Excellence, VA National Oral Care Implementation Toolkit: Preventing Non-ventilator Associated Hospital Acquired Pneumonia by Engaging Nurses to Complete Inpatient Oral Care (Internal VHA publication 2017, last revised October 2020)" by S. Munro, A. Haile-Mariam, C. Greenwell, H. Peabody, S. Demirci, J. Adams, D. Edgemon, Copyright 2017 by Veterans Health Administration. Adapted with permission of Dr. Shannon Munro.

Appendix I

International Classification of Diseases (ICD) 10 Diagnosis Codes

J15.9	Unspecified bacteria pneumonia
J18.8	Other pneumonia, unspecified organism
J18.9	Pneumonia, Unspecified Organism
J69.0	Pneumonitis, inhalation of food and vomit

Note: Example of bacterial pneumonia diagnosis codes. Copyright 2021 by World Health Organization.