Spring 5-12-2023

REGISTERED NURSE EDUCATION ON PREVENTION OF VENTILATOR ASSOCIATED PNEUMONIA IN AN URBAN MIDWESTERN INTENSIVE CARE UNIT

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REGISTERED NURSE EDUCATION ON PREVENTION OF VENTILATOR ASSOCIATED PNEUMONIA IN AN URBAN MIDWESTERN INTENSIVE CARE UNIT

A Scholarly Project Submitted to the Graduate School
in Partial Fulfillment of the Requirements
for the Degree of
Doctor of Nursing Practice

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April 2023

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An Abstract of the Scholarly Project by
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Ventilator associated pneumonia (VAP) is a preventable health condition causing increased hospital stays, over 35,000 deaths each year, and one of the costliest healthcare associated infections. VAP occurs when a patient develops pneumonia after being intubated and mechanically ventilated. Preventative measures are commonly in place amongst facilities, despite these measures VAPs still are occurring. Poor compliance with preventative measures have been observed in regards to oral care. Staff nurses in an intensive care unit (ICU) at a midwestern urban hospital were provided education on VAPs and preventative measures, with a focus on proper oral care. Staff nurses were given a survey before the educational intervention and seven months after to assess perceptions of importance as well as barriers to providing oral care. Data was collected from the ICU seven months before and after the educational intervention including oral care kit usage, ventilator days, and VAP occurrence. Education was found to increase compliance with oral care the month directly following the educational intervention. No significant change was found after the following months. Education did not impact VAP occurrence. Nurses had high perceived importance and confidence of performing oral care both before and after the educational intervention. Two main barriers to oral care compliance were time constraints due to patient acuity, which was significantly increased, and understaffing. These barriers to proper VAP preventative measures need to

be addressed as findings indicate that nurses know and perceive preventative measures to be important but do not have the time to properly implement them.

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CHAPTER I

INTRODUCTION

Ventilator associated pneumonia (VAP) is a major preventable health condition that affects thousands of patients each year. This preventable condition causes many complications and can be lethal. Although there are many different preventative methods proven by the literature to decrease the incidence of VAP, VAPs still occur frequently (Gianakis, et al., 2015). Nurses are responsible for providing care that is in alignment with the literature. Perceptions, knowledge, and compliance of nurses affect the administration of these preventative measures, therefore affecting the incidence of VAP.

Description of the Clinical Problem

Patients can be intubated for a variety of reasons including protection of the airway, increased oxygenation needs, decreased level of consciousness (LOC), pain management, surgeries, or procedures. The process of intubation involves an endotracheal tube inserted through the mouth into the trachea for the purpose of mechanical ventilation. The endotracheal tube (ETT), although necessary, can serve as a pathway for bacteria to travel from the oral cavity into the lungs (Dumbre, 2019). The ETT causes the removal of plaque to be decreased because it inhibits salivary flow and also reduces the cough reflex (Hiroko Kiyoshi-Teo & Blegen, 2015). Those factors lead

to a decrease in mucus and bacterial clearance from the respiratory system increasing the risk of bacterial buildup.

Ventilator associated pneumonia occurs in patients that are mechanically ventilated as an infection of the lung (CDC, 2020) and is one of the leading causes of hospital acquired infections (Gianakis, et al., 2015). Patients in the intensive care unit have a much higher risk, 5 to 10 times more, of acquiring nosocomial infections (Dumbre, 2019). Patients at risk for this infection are already considered to be critically ill and located in an intensive care unit. Nosocomial bacterial pneumonia is specific to VAP. VAP can occur 48 or more hours after intubation (Chacko, et al., 2017). Patients that develop VAP have increased rates of morbidity and mortality (Dumbre, 2019). VAP increases length of stay in the ICU an average of 14 days and death occurs in 33% of patients that develop this complication (Wagner, et al., 2015). These complications can be avoided because VAP is a preventable infection (Swearer, et al., 2015).

There are several preventative measures in place to help decrease the occurrence of VAPs in critical care settings. Some preventative measures include elevating the head of the bed 30 – 45 degrees, providing oral care, implementing sedation vacations, administering prophylactic antibiotics, and following care bundles (Chacko, et al., 2017). Other measures may also include gastrointestinal decompression/prophylaxis, daily weaning, and deep vein thrombosis prevention (Gianakis, et al., 2015). Although evidenced based clinical practice guidelines are available from which institutions can adopt care bundles, preventative measures continue to vary between institutions. VAP bundles include several prevention methods, as mentioned above, organized as structured, timely, nursing interventions. VAP bundles have been found to decrease

ventilator days and decrease length of stay in ICUs (Parisi, et al., 2016). This information is important because it was found that the greatest risk factor for acquiring VAP was the length of time spent on the ventilator (Chacko, et al., 2015). In utilizing VAP bundles, interventions made can help to decrease several factors that contribute to the development of ventilator associated pneumonia.

The nursing intervention of oral care is a main component of preventing ventilator associated pneumonia. Research has shown that there is a significant decrease in respiratory tract infections from the use of standard and frequent oral care (Chacko, et al., 2017). Decreasing the incidence of VAP relies on nurses properly implementing prevention measures and nursing interventions (Swearer, et al., 2015). Proper oral care, and other prevention methods, are highly dependent on the nurse's education, technique, and compliance. Therefore, instruction and understanding of these methods are very important.

At the facility where this student was employed, decreased nursing compliance with care bundles for VAP had been observed. Oral care is one of the major factors involved in VAP care bundles in this specific institution. Oral care kits are provided for every ventilated patient. These oral care kits come in a box with twelve individual packages, so oral care can be provided every two hours. This means that there are enough oral care packages to be used in two twelve-hour shifts. These kits are put together to provide an easy way to keep track of and deliver oral care to mechanically ventilated patients. This student observed several individualized oral care packages leftover after the completion of a shift. Unless the patient was not on the unit for the whole shift, the oral care kit should be completely used by the end of the shift- indicating oral care was

optimally provided every two hours, per institutional policy. Observing the influx of leftover oral care packages from these kits indicates a decreased compliance with providing this VAP preventative measure.

Preventative measures are important to have in place for ventilator associated pneumonia. Many preventative measures are carried out by nursing staff and compliance with these preventative measures are extremely important. Decreased adherence to these protocols may lead to an increase in VAP rates, which in turn leads to an increase in morbidity and mortality. Knowledge and education of preventative measures to nurses is a high priority in helping to decrease VAP rates. A study done in 2019 (Dumbre) assessed knowledge and compliance of critical care nurses with ventilator associated pneumonia preventative methods. The conclusion of this study showed the correlation of knowledge and compliance of nurses to be highly significant (Dumbre, 2019). Since knowledge has been shown to increase compliance, it is reasonable to assume that there is a need for increased education.

Problem Statement

Ventilator associated pneumonia can be a deadly complication in patients within intensive care units. Preventative measures are commonly in place in facilities as suggested by the literature. Poor compliance with preventative measures has been observed. Despite preventative measures in place patients are still developing this deadly complication.

Significance

Ventilator acquired pneumonia is a common hospital acquired infection and the leading cause of device associated morbidity and mortality (Parisi, et al., 2016). In the United States for every 1000 hospital discharges there are six VAP cases (Garcia de Mello & Machado de Lima, 2014). There are 35,967 deaths each year as a result of ventilator associated pneumonia (Boev & Yinglin, 2015). Ventilator associated pneumonia increases costs, length of stay, morbidity, and mortality (Gianakis, et al., 2015). Mortality rates of ventilated acquired pneumonia range from 20% to 60% (Garcia de Mello & Machado de Lima, 2014). An average of 14 days is added to the length of stay in the ICU for patients who develop this complication (Wagner, et al., 2015). Fifty percent of antibiotics used in the ICU are due to ventilator acquired pneumonia (Parisi, et al., 2016). Ventilator associated pneumonia is the second most costly healthcare associated infection (Swearer, et al., 2015). Costs related to VAPs amount to more than 1.2 million dollars per year (Glanakis, et al., 2015). $40,000 per incidence of VAP is estimated for treatment of a patient who develops this complication (Swearer, et al., 2015).

The nursing staff has a major impact on patient care. Most preventative measures in place for VAPs are implemented by nurses. Thorough patient care and compliance with implemented preventative measures is key to the success of these measures. With proper implementation of preventative measures for VAPs and high compliance nurses can impact VAP rates positively by improving patient outcomes though the decrease of VAP rates, length of stay, and decreasing costs.

Specific Aims and Purpose

The purpose of this project was to decrease rates of ventilator associated pneumonia in adult patients who are mechanically ventilated in the Trauma Surgical intensive care unit in an Urban Midwestern hospital by providing an educational offering to nursing staff on ventilator associated pneumonia, associated preventative measures, with a focus on proper oral care.

Theoretical Framework

The Health Belief Model was used as the framework for this DNP Scholarly Project. The Health Belief Model is a theory that focuses on preventative measures and states that an individual's perception of illness and its factors will guide what actions they take (Current Nursing, 2012). Major assumptions in this theory include perceived susceptibility, severity, benefits, costs, motivation, and modifying factors. These assumptions are defined by Current Nursing (2012) as the following:

> "Perceived Susceptibility: refers to a person's perception that a health problem is personally relevant or that a diagnosis of illness is accurate.
>
> Perceived severity: even when one recognizes personal susceptibility, action will not occur unless the individual perceives the severity to be high enough to have serious organic or social complications.
>
> Perceived benefits: refers to the patient's belief that a given treatment will cure the illness or help to prevent it.

Perceived Costs: refers to the complexity, duration, and accessibility of the treatment.

Motivation: includes the desire to comply with a treatment and the belief that people should do what.

Modifying factors: include personality variables, patient satisfaction, and socio-demographic factors."

The main goal of this scholarly project was to decrease VAP rates by increasing nurse's knowledge and understanding about oral care for ventilated patients. This nursing theory was applied specifically to the nurses rather than patients. Nurse's perceptions influence the care they provide and how they prioritize tasks. Perceived susceptibility relates to the nurse's perceptions of which patients are at risk of developing VAP and which patients need preventative measures. Perceived severity relates to nursing in that if they do not understand the severity of VAP and related complications, preventative measures may not be followed strictly or prioritized in patient care. The same is true for perceived benefits. If the nurse is provided with education and perceives extensive benefits of decreased VAPs from preventative measures, those measures may be prioritized and completed efficiently. Perceived costs would be minimal to the organization due to the simplicity of providing the educational information. Perceived costs would be none to the patients, as this project is enforcing already practiced interventions. Motivation of the nurse should be to prevent ventilator associated pneumonia, and with this motivation promote the use of preventative measures.

Project Questions

Questions for this project included:

- What is the incidence of VAP in a Midwestern ICU during the seven months prior to an educational offering over VAP preventative measures?
- What is the incidence of VAP in a Midwestern ICU during the seven months after an educational offering over VAP preventative measures?
- What is the rate of oral care kit usage per ventilator patient care day in a Urban Midwestern ICU for a seven month period prior to a staff oral care educational intervention?
- What is the rate of oral care kit usage per ventilator patient care day in an Urban Midwestern ICU for a seven month period after a staff oral care educational intervention?
- Does an oral care educational intervention result in an increase in oral care kit usage per ventilator patient care day in an Urban Midwestern ICU?
- Is there a change in perceived importance of oral care in nursing staff who are employed in an Urban Midwestern ICU after the educational offering?

Definition of Key Terms/Variables

- Ventilator Associated Pneumonia (VAP)- “pneumonia that develops 48 hours or longer after mechanical ventilation is given by means of an endotracheal tube or

tracheostomy" and "results from the invasion of the lower respiratory tract and lung parenchyma by microorganisms" (Amanullah, 2015, p. 1).

- VAP Preventative Measures- measures as defined by literature to decrease incidence of VAP including but not limited to oral care, head of bed elevation, turning patients, and sedation vacations.

- Mechanically Ventilated- "artificial respiration of the lungs using a mechanical ventilator to support the delivery of oxygen to the lungs when breathing has ceased, is failing, or is inadequate" (Merriam-Webster, 2020).

- Oral Care- care provided by nursing staff that cleanses the oral cavity using institutional provided cleansing solutions and suctioning of secretions.

- Oral Care Kits- a kit containing twelve individual oral care packages, the number needed for each day.

- Oral Care Package- individualized package containing a toothbrush, suction catheter, sponge, and chlorhexidine solution or a package containing a suction swab, swab, hydrogen peroxide solution, and oral moisturizer.

- Nursing staff- Registered nurses that work in the ICU providing care each shift to mechanically ventilated patients.

Logic Model

The following Logic Model was established to aid the development of this scholarly project. The logic model includes inputs, activities, outputs, and outcomes.

Outcomes include short term, intermediate, and long-term goals of this scholarly project. Assumptions of the author and contextual factors are also included in this logic model.

Inputs included are educational tools used to provide the educational offering. Research and statistical information are also included as inputs for this scholarly project. This included information on number of oral care kits that were provided over a specific time frame in the specific ICU utilized for this scholarly project. Activities of this scholarly project included the provided educational offering to nursing staff members of this ICU. Education provided covered VAP significance specific to that ICU, occurrence, and importance of preventative measures. Other education provided will include correct frequencies and measures used to prevent VAP. A proper demonstration of oral care will be provided. Outputs for this scholarly project included nursing prioritization of the current institution's VAP bundle, increased confidence in performing proper oral care, and increased awareness of VAP significance.

Short term outcomes are related to understanding the education provided. Nursing staff in the ICU were expected to understand the importance of VAP preventative measures and significance of VAPs related to their specific ICU. Prioritization of VAP prevention was made. Nursing staff were expected to have increased confidence in providing proper oral care after viewing the demonstration of proper oral care techniques. Intermediate outcomes include changes in nursing practice with regard to VAP prevention bundles. Oral care techniques could be improved leading to more attention to detail in the administration of oral care. Oral care compliance would increase and be provided per protocol every two hours. Long term outcomes are reliant on short and

intermediate outcomes. Long term outcomes include a decrease in VAP rates for the specific ICU and a decrease in the number of unused oral care packages per number of patient ventilator days.

Assumptions included that nursing staff will listen, comprehend, and apply education provided to their current practice. Contextual factors that may impede the scholarly project include inadequate staffing for the ICU resulting in inability of nurses to provide thorough care to patients. Another factor is that when patients are not on the nursing division due to a procedure, test, or other reasons will result in leftover oral care packages due to not being under care of the ICU nurse.

Figure 1

Logic Model

Inputs	Activities	Outputs	Outcomes		
			Short	Intermediate	Long
Educational Tools	Educate nursing staff on VAPs and corresponding preventative measures	Nursing staff is educated on VAP prevention techniques and recommended frequency.	Prioritizing VAP bundle in daily patient care	Increased attention to detail in oral care administration	Decrease in VAP rates and decreased number of unused oral care packages used per number of patient ventilator days.
Research	Educate nursing staff on correct preventative measure techniques and frequency	Nursing staff is educated on VAP incidence and significance in their place of work.	Increase in nursing staff awareness of VAP significance and occurrence in place of work.	Increased compliance in performance of oral care every two hours	
Statistical Analysis	Demonstrate proper oral care techniques	Staff is able to provide adequate oral care.	Increased confidence in performing proper oral care.	Increased compliance of VAP bundles.	

Assumptions:	Education will be provided to all nursing staff and information will be utilized in future care practices.	Contextual Factors:	Decrease in adequate staffing can decrease ability of staff to provide thorough patient care. Patients who are off the unit will not have consistent VAP bundles implemented during that time.

Summary

Ventilator associated pneumonia is a deadly complication that occurs in critically ill patients who are mechanically ventilated. There are many preventative measures that have been proven to aid in the decreased incidence of VAP. Of these preventative measures one of them includes proper and frequent oral care. Increasing VAP preventative measures is an important factor to help decrease VAP rates in patients in the ICU. Nursing staff are responsible for the administration of some of these preventative

measures. Increased knowledge has been shown to increase compliance of VAP preventative measures. An educational offering was provided to nursing staff in the ICU on VAP significance, incidence, and preventative measures. This educational offering was hypothesized to lead to increased nursing compliance of the current institutions VAP bundle and ultimately lead to a decrease in VAP rates.

CHAPTER II

EVIDENCE/INTEGRATED REVIEW OF THE LITERATURE

A review of the literature regarding ventilator associated pneumonia and associated oral care and nursing interventions was completed. The purpose of this literature review is to investigate oral care, nursing compliance with regards to VAP rates and prevention, and practice guidelines. The following search criteria was used:

- Ventilator associated pneumonia
- Oral Care
- Nursing staff
- Adult patients
- Nursing compliance
- VAP prevention
- Practice guidelines

The databases that were used in this review of literature included PubMed, CINAHL, and UpToDate. Relevant literature was based on scholarly, peer reviewed articles from the past ten years were chosen, as literature from the past five years was limited. References from the selected literature were also reviewed and included in the selection for this extensive review. The selected literature was then analyzed, and information was

combined to form the following categories: risk factors, nursing perceptions, nursing knowledge, educational impact, and practice guidelines.

Risk Factors

Research studies conducted in intensive care units have found several risk factors for development of ventilator associated pneumonia. They include decreased cuff pressures, enteral feedings, patients who are kept in a supine position, reintubation, increased number of ventilator days, central circuit contamination, and several medical factors (Parisi, 2016). No significant correlation was found between age, antibiotic days, and length of ICU stay in a year long study done in South India (Chacko, et al., 2017). Entrance point for pathogens are found principally in subglottic secretions and cuff leaks (Parisi, 2016) indicating nursing care in collaboration with respiratory care is needed for prevention of these pathogens. Risk of VAP increases with delayed oral care after intubation. Patients who developed VAP had an increased time between intubation and oral care with an average time of 8.5 hours versus 6.6 hours in patients who did not (Swearer, et al., 2015). Swearer, et al showed that implementing oral care within 2 hours of admission to the ICU or intubation resulted in a reduction of VAP rates (2015).

Intensive care units were found to have differing rates of VAPs occurring. "National VAP rates are highest in trauma ICUs (15%), followed by surgical ICUs (13%), CCUs (9.2%), and medical ICUs (7.8%)." (Feider, Mitchell, & Bridges, 2010, p. 179). Research was also done in a level 1 trauma center's ICU studying VAP rates and risk factors between brain injury patients and nonbrain injury patients. In nonbrain injury patients the number of ventilator days was the strongest predictor of VAP (Gianakis, et al., 2015).

Another study has found that with each day of intubation VAP risk increased by 1.3 times (Chacko, et al., 2017). Patients with brain injury had increased VAP rates compared to those without brain injury along with increased rates of emergent or field intubation and decreased age of patients (Gianakis, et al., 2015). With decreased age having no significant correlation in the yearlong study from South India (Chacko, et al., 2017) other risk factors of VAP may also include number of ventilator days, and emergent and field intubations.

Nursing Perceptions

Nurses' perceptions in the realm of healthcare may influence the way they provide care to patients. Their opinions of priority and importance may alter the care provided. The literature provides and discusses two ways nurses' perceptions can impact patient care.

Provider Collaboration

Research has been done regarding the perception of nurses and the correlating compliance with VAP bundles. Perceptions of nurses regarding nurse-provider collaboration was researched in comparison with VAP rates (Boev & Yinglin, 2015). This longitudinal study found that with increased collaboration between nurses and providers, there was a significant decrease in VAP rates (Boev & Yinglin, 2015). Measurement of collaboration between nurses and providers was measured by nurse's perception of what was favorable and their perception of a favorable collaboration led to decreased VAP rates. Compliance has shown to be increased with nurses' perceptions of a positive relationship with providers.

Oral Care

Chacko et al found when researching oral care in regard to VAP prevention, that as nurses were educated on oral care they gained confidence in performance and attributes of those nurse were positive, with this, measured compliance rates were good (2017). The American Journal of Critical Care published research that found decreased compliance with oral care was associated with nurse perceptions about oral care. Several perceptions that may impact adherence to current oral care guidelines include oral care viewed as an unpleasant and difficult task, disagreement with guidelines, disbelief in effectiveness of the current policies, concern for patients discomfort, as well as lack of resources (Hiroko Kiyoshi-Teo & Blegen, 2015).

A large descriptive cross sectional study surveying nurses from the AACN database discovered several perceptions of nurses regarding oral care in intensive care units (Feider, Mitchell, & Bridges, 2010). Nurses who perceived oral care as high priority in ventilated patients were totaled at 47% and 48% of nurses reported not having enough time for oral care (Feider, Mitchell, & Bridges, 2010). In this same surveyed group only 50% reported providing oral care every two hours (Feider, Mitchell, & Bridges, 2010). This data suggests a correlation between the decreased perceived importance of oral care and the decreased compliance with oral care. The literature discusses transitioning perceptions of oral care from a comfort care means to an intervention preventing VAP in critical patients (Feider, Mitchell, & Bridges, 2010). This shift in perception may increase the perceived significance of oral care in nurses with appropriate education.

Nursing Knowledge

The knowledge and perceptions nurses have about ventilator associated pneumonia guide the actions they take in preventative measures for VAPs. Several nurses were surveyed in a general ICU regarding their knowledge of VAP prevention interventions (Wagner, et al., 2015). Preventative care was grouped into four categories including head of bed elevation, oral hygiene, endotracheal suction, and tracheostomy care; out of these categories oral hygiene had the lowest combined score of 73% (Wagner, et al., 2015). Another study looked at ICU nursing knowledge of preventative care including oral care with chlorohexidine, sedation vacations, elevating the head of the bed, and subglottic suctioning endotracheal tubes (Dumbre, 2019). Results of this research has shown that 56.7% of nurses had “excellent knowledge” of VAP preventative care and 43.3% has “good knowledge” of this care (Dumbre, 2019). With only a little over half of nurses having excellent knowledge of VAP preventative measures, there is a need for increased education among them. Of the nurses surveyed only 10% had excellent compliance with the ventilator care bundle, and there was a significant association between knowledge and compliance (Dumbre, 2019). Nursing knowledge of current institutional VAP rates is also subpar with one study showing only 20% of nurses knew their current ICU VAP rates (Feider, Mitchell, & Bridges, 2010). “Educating bedside nurses on VAP, and providing the proper tools to help their workflow, is an integral part in decreasing VAP incidence" (Swearer, et al., 2015, p. 1). Nursing knowledge of VAP care bundles, oral care, and facilities VAP rates and guidelines is shown to have large areas for improvement in the studies done. Limitations to these

studies include a limited sample size, with the largest sample size being 60 participants. The need for increased education of nurses is shown through the research.

Educational Impact

Educational techniques differ in effectiveness. “Educating bedside nurses on VAP, and providing the proper tools to help their workflow, is an integral part in decreasing VAP incidence" (Swearer, et al., 2015, p. 1). Interventions including leaflets, lectures, VAP bundles, and posters have increased VAP bundle adherence significantly, decreased VAP incidence significantly from 23.4% to 15.4%, along with a decreased ICU stay with the average decreasing from 36 to 27 days after the provided interventions were implemented (Parisi, 2016). Institutional guidelines and bulletins were found less effective in increasing nursing adherence, awareness, and priority level of VAP bundles (Hiroko Kiyoshi-Teo & Biegen, 2015). Out of informational bulletins, nursing policies, institutional guidelines and order sets, nursing policies were found to have the lowest adherence, priority, agreement, and self-efficacy (Hiroko Kiyoshi-Teo & Biegen, 2015). Daily rounding, in services, handouts, and bulletin boards combined with education provided to nursing technicians of stocking oral care kits and labeling suction canisters, resulted in VAP rates decreasing 62% after 3 months and 60% at 6 months as well as an increase in documentation compliance (Swearer, et al., 2015).

Nurses prepared with higher education may have increased adherence to VAP preventative measures. BSN prepared nurses reported increased use of oral suctioning and swabs before endotracheal tube suctioning, as well as significantly increased suctioning after oral care (Feider, Mitchell, & Bridges, 2010). Critical Care Registered Nurses (CCRNs) had significantly longer toothbrushing duration (Feider, Mitchell, &

Bridges, 2010). The data may suggest a higher education leading to increased administration of oral care in ventilated patients.

Practice Guidelines

Practice guidelines for VAP prevention have been published by four organizations: UpToDate, Cochrane Library, American Association of Critical Care Nurses (AACN), and the Society for Healthcare Epidemiology of America (SHEA). The recommendations for practice are discussed below.

Suctioning Practices

One preventative practice in avoidance of VAP is to decrease accumulation of secretions above the endotracheal cuff (Klompas, et al., 2014). Practice guidelines from UpToDate (2021) recommend suctioning of subglottic secretions to decrease the risk of aspiration and VAP. It is recommended to use endotracheal tubes that include suctioning of subglottic secretions for patients expected to be intubated over 48 or 72 hours (UpToDate, 2021). It is also recommended by SHEA to use endotracheal tubes with subglottic secretion drainage ports for those requiring intubation for longer periods of time although, it is not recommended to exchange endotracheal tubes for one with subglottic secretion drainage (Klompas, et al., 2014).

The American Association of Critical-Care Nurses (AACN) do not have any guidelines currently on suctioning of secretions in ventilated patients. The use of saline instillation into the endotracheal tube before suctioning has a low quality of evidence (Klompas, et al., 2014). The American Association for Respiratory Care (AARC) (2010) does not recommend the regular use of saline instillation before suctioning. Closed versus

open suctioning systems have been found to have no impact on VAP rates (Klompas, et al., 2014). Actions taken to decrease secretions in the ventilated patient are recommended to decrease the rate of VAP.

Oral Care

Oral care is a major part of VAP bundles used in intensive care units. The American Association of Critical Care Nurses (2017) recommend oral hygiene programs for patients in critical care settings. SHEA recommends the use of "selective decontaminations of the oropharynx to decrease the microbial burden of the aerodigestive tract" (Klompas, et al., 2014, p. 6). UpToDate (2021) reports that decontamination of the oropharynx can prevent colonization in the respiratory tract and decrease VAP occurrence. It is not recommended for selective decontamination of the digestive tract in North America due to promotion of antimicrobial resistance (UpToDate, 2021).

Oral hygiene with toothbrush, sponge, mouthwash, or other tools help clean and prevent disease in the mouth, which may decrease VAP (Zhao T., et al., 2020). The AACN (2017) lists the following as expected nursing practice:

- Bushing the teeth, gums, and tongue with a soft toothbrush at least twice a day
- Every 2-4 hours use oral moisturizer on the lips and oral mucosa
- Using oral chlorhexidine gluconate rinse in intubated patients twice a day

It is also recommended by SHEA to provide oral care regularly with chlorhexidine and oral care with toothbrushing (Klompas, et al., 2014). Although data shows these measures may lower VAP rates, it is undetermined whether they will impact mortality,

length of stay, or mechanical ventilation duration (Klompas, et al., 2014). UpToDate (2021) neither recommends nor denounces regular chlorhexidine use, they state this use as "controversial" as some studies have shown an increase in mortality. The Cochrane Library concluded that chlorhexidine along with toothbrushing may prevent VAP development but may have little effect on decreasing length of stay or mortality (Zhao T., et al., 2020). Regular oral care is recommended to prevent VAP in ventilated patients, although use of chlorhexidine is still being studied at this time, so no clear guidelines are in place.

Patient Positioning

Elevating the head of bed in ventilated patients is used in many VAP care bundles. Due to its ease of ability, nominal risk, with no cost associated, it is recommended by SHEA to elevate the head of bed to 30-45 degrees (Klompas, et al., 2014). UpToDate (2021) also recommends elevating the head of bed 30-45 degrees to prevent aspiration and concurrent pneumonia development. Further studies are needed to confirm the decreased risk of VAPs with head of bed elevation, but at this time it is recommended for practice.

Sedation

It is recommended with high evidence of data to limit sedation if possible, in ventilated patients to prevent VAP (Klompas, et al., 2014). SHEA recommends daily sedation vacations, daily assessment of extubation readiness, and spontaneous breathing trials with high quality of evidence to decrease the risk of VAPs in ventilated patients (Klompas, et al., 2014). UpToDate (2021) also recommends minimizing sedation.

Ventilator Care

Avoiding intubation remains the highest preventative factor for VAP. When applicable it is recommended with high quality of evidence to use noninvasive positive pressure ventilation, provided the risk versus benefits are weighed and potential delaying of intubation would not cause harm (Klompas, et al., 2014). SHEA recommends maintenance of ventilator circuits for VAP prevention, including changing the circuit if visibly soiled and following approved guidelines for sterilization and disinfection of equipment (Klompas, et al., 2014).

Not Recommended

The following items are not generally recommended for VAP prevention by SHEA (Klompas, et al., 2014):

- Changing ventilator circuits on a fixed schedule
- Silver coated endotracheal tubes
- Kinetic beds
- Prone positioning
- Stress ulcer prophylaxis
- Early tracheostomy
- Monitoring residual gastric volumes
- Early parenteral nutrition

Summary

The review of literature shows various risk factors for VAP. Major risk factors include accumulation of subglottic secretions, delayed oral care after intubation, length of ventilated days, and cuff leaks. Nurses' perception with regards to provider collaboration and oral care to ventilated patients has affected VAP rates. It has been shown that further education is needed to increase nursing knowledge of VAP and preventative measures. The literature has shown promising results to the reduction of VAPs, but further research is needed to better understand and allow for further reduction of VAPs.

Practice guidelines for prevention of VAPs were reviewed from UpToDate, Cochrane Library, American Association of Critical Care Nurses, and the Society for Healthcare Epidemiology of America. Decreasing the amount of oral and subglottic secretions through suctioning is indicated as a major preventative measure. Administration of oral care by nursing staff is expected, with no clear recommendations on chlorhexidine usage. Limiting sedation, ventilator care, and elevating the head of bed are also recommended to decrease VAP rates. Along with implementation of current practice guidelines, evidence from current and future research will aid in the reduction of ventilator associated pneumonia.

CHAPTER III

METHODOLOGY

Project Design

This project was designed for quality improvement in the ICU setting. A quantitative design was utilized to measure the compliance of oral care administration in ventilated patients, clinical VAP incidence, and surveillance VAP incidence pre and post educational intervention. Data was compared for seven months before the intervention and seven months after. A survey done pre and post educational intervention was utilized to measure nurse's perception of oral care. The survey provided measured attitudes towards oral care and perceived barriers pre and post educational intervention. The educational intervention provided training, specific ICU data, and policy guidelines.

Sample/Target Population

Sample Access/Target Population. The target population for this project included registered nurses. All registered nurses providing direct patient care and employed by the Trauma Surgical ICU in a Midwestern hospital were eligible to participate in the study. Participants were employed in the Trauma Surgical ICU at any time between educational intervention to seven months after.

Sample/Target Population Recruitment. The sample was recruited through employees of the 16 bed Trauma Surgical ICU in the urban Midwestern hospital. Staff registered nurses were invited to participate in this study by email. Participation was voluntary with no compensation provided.

Inclusion & Exclusion Criteria. Inclusion criteria for this study included registered nurses over the age of eighteen, employed by the Trauma Surgical ICU at an urban midwestern hospital, providing direct patient care, during the time of January 1, 2022 to September 30, 2022. Participant's completion of provided education and survey was voluntary. Exclusion criteria included licensed practical nurses, nurse technicians, certified nurse aids, medical doctors, doctors of osteopathy, clinical nurse specialists, and registered nurses who provided direct patient care but were not specifically employed by Trauma Surgical ICU.

Protection of Human Subjects. Participants were protected throughout the initiation and completion of this project. The principal investigator completed CITI training prior to the beginning of the project. Approval from the Institutional Review Board (IRB) at Pittsburg State University was obtained, along with approval from the Irene Ransom Bradley School of Nursing IRB Committee. Ascension Via Christi Hospitals Wichita, Inc. Institutional Review Board provided IRB oversight at the research site. Participants in this study were protected from identification when completing education by keeping a head count of those in attendance with no sign in utilized. All surveys collected were provided on paper format with no name or identification included. The primary researcher was the only individual who viewed the surveys. All data from surveys

were combined into electronic format to prevent identification from handwriting. Paper surveys were then be placed in a manilla envelope and stored in a locked drawer in the Project Advisors office, at Pittsburg State University, for three years. The unit manager was not in attendance of educational sessions providing protection from identification of individuals in attendance. Data provided by the unit manager on VAP incidence only included the number of VAPs in the specified time frame, along with number of oral care kits used per month. No patient identifiers were provided with this information. There was minimal anticipated risk involved with those in participation. All participation was voluntary.

Procedure

IRB approval was obtained before initiation of project. Permission was granted by the unit manager to initiate the project and provide the educational intervention. The researcher worked with the unit manager to ensure the educational intervention was provided at several different times, giving all the opportunity to participate. Registered nurses employed in the intensive care unit were participants. All participation was voluntary. The educational intervention was completed in person in the ICUs staff meeting room. Previous data on the ICU's VAP rates and occurrences was provided by the unit manager. A survey assessing attitudes and barriers towards oral care was provided to participants before the intervention. Education provided included preventative measures for VAPs, instruction of proper oral care techniques, and data on VAP rates and significance (*Appendix B*). The same survey was distributed seven months after the educational intervention; and included an additional question asking if the

educational intervention had no change, increased, or decreased commitment in providing oral care.

Hand-outs were provided to all participants during the educational intervention for their convenience. The handouts were a paper copy of the PowerPoint utilized for the educational intervention. Educational posters were laminated and hung in each patient room above the patient bed in the area designated by the ICUs manager. Posters included a summary of correct steps for oral care administration created from the educational presentation (*Appendix C*). The educational posters distributed in patient rooms were viewable by all hospital staff, patients, and family members.

After the educational intervention was complete, data was collected for seven months. This data included the number of ventilator days per month, number of oral care kits provided per month, and VAP incidence. All data collected was from the seven months before and seven months after the educational intervention. The Urban Midwestern hospital's definition of VAP was used and provided by the unit manager. Number of ventilator days was compared to the number of oral care kits, that data indicated staff nursing compliance with oral care. Data was then compared pre and post intervention to assess incidence of VAP and oral care kit compliance.

Registered Nurses that met all inclusion criteria and were employed by the Trauma Surgical ICU in the urban midwestern hospital during the time frame of this study was given an opportunity to participate. Individuals who met criteria were asked if they would like to participate by this researcher with the survey given at that time if agreeable. The presentation of the educational intervention was provided again for those individuals. The post survey was distributed to all participants at the same time, seven

months from the original educational intervention. Surveys were compared in a group format from the pre-educational intervention to seven months post the original educational intervention.

Treatment of Data/Outcomes/Evaluation Plan

Evaluation Measures Linked to Objectives. The logic model demonstrates how evaluation measures were linked to objectives. This project used an educational intervention on the prevention of VAPs and importance of oral care. It also utilized a survey aiding in identifying nurses' attitudes and barriers towards oral care in the ICU. Data on VAP incidence rates along with ventilator days and number of oral care kits used were collected. The data was already collected and utilized by the facility. The unit manager provided this data to the researcher. Comparing this data, pre and post educational intervention revealed nursing compliance with oral care administration. It also allowed for comparison of nurses' attitudes and perceived barriers pre and post intervention. Allowing seven months post educational intervention gave adequate amount of time to reach short, intermediate, and long-term outcomes. Short term outcomes included increasing awareness of VAPs, prioritizing oral care, and increasing confidence of oral care administration. Intermediate goals included increased attention or detailed oral care, increased compliance of oral care performance, and increase compliance of institutions VAP bundles. Long term outcomes included decreasing VAP incidence along with decreasing the number of unused oral care packages used per number of ventilator patient days.

Outcomes/Evidence-based Measures are Appropriated for Objectives. The outcomes defined for this project were appropriate for objectives. The time frame allotted gave adequate time for implementation and data collection. The educational intervention utilized a PowerPoint for simple teaching and handouts were provided. Data collection of VAPs, patient ventilator days, and oral care kits were appropriate for quantitative analysis. The survey done pre and post intervention was appropriate to identify attitudes and perceived barriers from participants as a group.

Tools/Instruments Described and Linked to Measures and Objectives. One instrument was utilized in this study. The survey provided to participants was administered pre and seven months post educational intervention. The survey included ten questions that are rated on a scale of one to ten; one being never, five being sometimes, and 10 being always. The questions related to participants attitudes and compliance with the institution's oral care policy. One question, obtaining data regarding perceived barriers, was select all that apply. The survey was given out in person on paper and returned to this researcher. The survey given seven months post original educational intervention included an additional question inquiring if commitment of providing oral care was increased, stayed the same, or decreased after the educational intervention. Data on number of oral care kits, ventilator days, and VAP incidence was already collected and utilized by the facility. This data was provided to the researcher by email from the unit manager. Data provided only included aggregate numbers for each category with no patient information or identifying factors included.

Methods of Analysis for each Measure. The data was analyzed using a t-test. A confidence interval of 95% and a p value of 0.05 was used to determine significance. The t-test compared VAP incidence and oral care compliance by number of ventilator days in relation to oral care kits used. The t-test also compared survey responses regarding attitudes of oral care. Survey questions regarding attitudes were on a Likert Scale with a rating of one to ten. The perceived barriers were not compared the same way. One *select all that apply* question regarding barriers was analyzed through comparison of answers reported in the survey pre and post educational intervention (Appendix A).

Plan for Sustainability

If the educational intervention leads to decreased VAP incidence and increased compliance of oral care administration, it could be implemented throughout the hospital. The educational intervention could be offered in each unit yearly, to keep nurses up to date on current guidelines regarding prevention of VAPs and oral care administration. The quality improvement team at the hospital, or a similar education team, would be needed to keep education up to date and administer the education yearly. Unit managers would be needed to track and provide their staff data on unit specific VAP incidence in addition to the educational material. Implementation of this educational intervention throughout the hospital would allow for possible decrease in VAP incidence along with increased nursing knowledge and compliance of preventative measures.

CHAPTER IV

EVALUATION OF RESULTS

The aim of this study was to determine if an educational intervention regarding VAPs and their preventative measures with a focus on oral care would change incidence of VAPs, staff nurses' perceptions of VAPs, or oral care compliance.

Description of Sample/Population

The participants of this study were staff nurses employed in an Urban Midwestern ICU. There were thirty-one participants who attended the educational intervention and completed the pre-study survey. There were twenty staff nurses who completed the post-study survey. No demographics were collected in this study.

Analyses of Project Questions

Incidence of Ventilator Associated Pneumonia

Incidence of VAP rates were measured per the facilities specific guidelines. Ventilator-Associated Condition (VAC), Infection-related Ventilator-Associated Complication (IVAC), and Possible VAP (PVAP) rates were obtained from the facility as shown in Table 1 below. IVAC incidence pre and post educational intervention were 5 and 1 respectively. VAC incidence pre and post educational intervention were 8 and 13

respectively. PVAP incidence pre and post educational intervention were 0 and 1 respectively. There was no statistically significant change in any types of VAP rates before or after the educational intervention.

Table 1: *Facility's Clinical Data of Reported VAPs*

Reported Types of VAPs:	*7 Months Before Educational Intervention*	*7 Months After Educational Intervention*	*P Value*
IVAC	5	1	0.086
VAC	8	13	0.127
PVAP	0	1	0.178

Oral Care Kit Usage per Ventilator Day

The number of oral care kits supplied to the ICU per month were reported and then divided by the number of ventilator days the ICU had for that month. This data was collected to help document rates of oral care compliance. Table 2, pictured below, shows the collected data. There was a significant increase in usage of oral care kits the month directly following the educational intervention; oral care kit usage per ventilator day increased from 1.383 to 2.389, having statistical significance with a *p value* of 0.049. All months following the educational intervention had higher rates of oral care compliance than the seven months prior to education but as you can see in Table 2 below. However, rates decreased with each ongoing month following education. There was no statistical significance in months 2 through 7 as all *p values* were greater than 0.05. Oral care kit usage per ventilator day was significantly increased the month directly following education but was not significantly changed in the seven months following education.

Table 2: *Comparison in Oral Care Kit Usage/Ventilator Day*

Time Frame:	*Oral Care Kit Usage per Ventilator Day*	*p value*
7 Months Before Educational Intervention	1.383	n/a
1 Month After Educational Intervention	2.389	0.049
2 Months After Educational Intervention	2.024	0.071
3 Months After Educational Intervention	1.770	0.071
4 Months After Educational Intervention	1.660	0.196
5 Months After Educational Intervention	1.522	0.325
6 Months After Educational Intervention	1.429	0.436
7 Months After Educational Intervention	1.412	0.456

Perceptions of Oral Care in VAP Prevention

The pre and post survey questions were averaged and compared as shown in Table 3 below. Survey questions utilized a Likert Scale of 0 to 10 with 0 being "Never" and 10 being "Always". There was high perceived importance or oral care and reported compliance with oral care, both pre and post surveys with averages of over 8 out of 10 on the Likert Scale. There was no statistically significant difference in perceived importance of oral care or reported compliance with oral care.

The post survey included the question regarding how the educational intervention affected the staff nurse's commitment to providing oral care, shown at the bottom of Table 3. The Likert Scale was utilized for this question as well with 0 being "Decreased" and 10 being "Increased". The average reported was 9.28 out of 10 on the Likert Scale.

This indicates that the educational intervention did increase staff nurses' commitment to providing oral care to ventilated patients.

Table 3: *Pre and Post Education Survey Results*

Question:	*Pre-Education Average*	*Post-Education Average*	*% Change*	*p value*
I feel as if I do not have enough time to complete oral care as recommended by my facility due to patient acuity	3.58	4.60	28.47%	0.091
I feel as if I do not have enough time to complete oral care as recommended by my facility due to understaffing	4.06	5.10	25.48%	0.084
I see oral care as an important aspect of care in ventilated patients	9.87	9.85	-0.21%	0.436
I see oral care as a priority in ventilated patients	9.52	9.50	-0.17%	0.476
I provide oral care every two hours, per policy, in ventilated patients	9.00	9.15	1.67%	0.308
I am confident in my skill to provide oral care	9.55	9.80	2.64%	0.093
I suction the oropharynx with the directional tip catheter every six hours, per policy	9.13	8.75	-4.15%	0.184
I prioritize oral care in ventilated patients	9.04	8.89	-1.56%	0.345
I believe that oral care is an important aspect of preventing pneumonia in ventilated patients	9.75	9.74	-0.13%	0.471
When providing oral care, I suction the mouth and endotracheal tube every two hours	8.89	9.21	3.57%	0.201
Regarding the past 5 ventilated patients you cared for how often did you provide meticulous oral care every 2 hours per policy?	9.00	8.58	-4.68%	0.090
After the educational presentation my commitment to provide oral care is:	n/a	9.28	n/a	n/a

Barriers Present to Oral Care Administration

The survey given to staff nurses included a section where there was an option to select barriers to providing oral care as a VAP preventative measure in patients. This data was collected, totaled, and divided by the number of pre and post surveys to obtain a percentage of staff that viewed the item as a barrier. The barrier most reported was time constraints due to understaffing with 70% of staff reporting this on the post survey and 58% reporting this on the pre survey. There was an increase, although not statistically significant, *p value* 0.343, in nurses who reported time constraints due to understaffing. The second most reported barrier was time constraints due to patient acuity. Before the educational intervention 32% of nurses reported that they did not have enough time to complete oral care due to patient acuity, 65% of nurses reported this post educational intervention. There was a statistically significant increase, *p value* 0.023, in nurses who reported time constraints due to patient acuity. The next most reported barrier was patient refused/patient condition. This was reported pre and post survey in 23% and 15% respectively. Only 3% and 5% pre and post survey reported they did not think oral care was a priority. No nurses reported that they did not think oral care was important nor did they report it was not necessary to administer every two hours.

Table 4: *Staff Reported Barriers to Oral Care*

Barriers:	*Pre-Education Staff Reported Percentage*	*Post-Education Staff Reported Percentage*	*p value*
I do not have enough time due to patient acuity	32%	65%	0.023
I do not have enough time due to understaffing	58%	70%	0.343
I do not think oral care is important	0%	0%	n/a
I do not think oral care is a priority	3%	5%	0.406
Patient refused/Patient Condition	23%	15%	0.206
I do not believe oral care is necessary every two hours	0%	0%	n/a

Summary

This study's purpose was to see if an educational intervention regarding VAPs and their preventative measures would help to decrease VAP rates, increase perceived importance of VAP preventative measures, and increase oral care compliance. The educational intervention supplied to staff nurses did increase oral care compliance in the month directly following education. It did not impact clinical VAP incidence or nurses perception of importance of VAP preventative measures. Additional findings indicated that a majority of staff nurses did not feel as though they had the appropriate time, due to patient acuity or understaffing, to complete oral care administration.

CHAPTER V

DISCUSSION

Relationship of Outcomes to Research

The aim of this study was to determine if an educational intervention regarding ventilator associated pneumonia (VAP) and its preventative measures would lead to a decreased incidence in VAP rates, increased oral care compliance, or changed perception of staff nurses. Quantitative measures were used to determine if there were any changes in VAP rates or oral care compliance. Qualitative measures were collected by a pre and post survey to determine staff nurses' perceptions of oral care as well as perceived barriers to oral care. This data was then analyzed to answer research questions.

Incidence of Ventilator Associated Pneumonia

Previous studies have shown that educational interventions had helped to decrease VAP incidence and ICU stay (Parisi, 2016). Another study had found that after three months of daily rounding, in services, handouts, and provided education to nurses and nurse technicians VAP rates were decreased significantly as well as a noted increase in documentation of oral care compliance (Swearer, et al., 2015). The results of this study did not indicate similar findings. VAP rates in this study were not significantly increased or decreased after an educational intervention was performed. This study did not include

daily rounding or education to nurses technicians, as the previous study had. It is possible that the combined effort of those items rather than just one educational intervention provided to staff nurses helped lead to a decrease in VAP rates.

Oral Care Kit Usage per Ventilator Day

Previous research has found that there is a need for increased education to nurses about VAPs and corresponding preventative measures. One research study found that only about half of nurses had excellent knowledge of VAP preventative care (Dumbre, 2019). This study also found a significant associated between increased knowledge of ventilator care bundles and nursing compliance (Dumbre, 2019). Another study indicated that education of oral care increased nurses' confidence and measured compliance rates were good (Chacko, et al., 2017). Findings from this study indicated that the educational intervention did significantly increase oral care compliance the month following the intervention, which aligns with previous research. Rates of oral care compliance the following six months were higher than before the educational intervention, but not statistically significant. This may indicate education has an initial positive impact on nurses' compliance with oral care that dissipates over time.

Perceptions of Oral Care in VAP Prevention

Research done in 2017 (Chacko, et al.) found that after education was provided to nurses regarding oral care their attitudes were positive. This study has found that attitudes about oral care were positive both before and after education. There was not a change in perceived importance of oral care, as nurses already perceived oral care as an important tool in preventing VAP rates. This indicates that the educational intervention enhanced

the already perceived importance of oral care administration. In this study nurses did report that the educational intervention increased their commitment to providing oral care per policy. Another research study found that 47% of nurses found oral care as a high priority and 48% of nurses reported not having enough time to perform this measure (Feider, Mitchell, & Bridges, 2010). Time constraints were also found to be a major barrier in this study with over half the nurses reporting not having enough time to administer proper oral care.

Observations

This study did not find education to decrease VAP rates as hypothesized but did find that education had an initial significant increased compliance of oral care administration. An important finding of this study was that nurses had high perceived importance of oral care as a VAP preventative measure but did not feel as if they had adequate time to complete this. Perceived importance was high both pre and post education but perceived barriers, due to not having enough time, were also high pre and post education. Although oral care compliance was found to be higher, this does not mean that it was properly administered. There was no measure of time spent on oral care, nor if oral care steps were done per guidelines. Although more oral care kits were used, administration could have been rushed due to the reported time constraints, thus leading to an inadequate or incomplete providence of oral care. Education is not able to increase time or resources needed for nurses to complete preventive measures. This indicates that since these barriers, adequate staffing and nurse to patient ratios, were not addressed oral care was not able to be properly administered by nurses, thus VAP rates were not decreased.

Evaluation of Theoretical Framework

The Health Belief Model was utilized for this project. This is a theory focusing on preventative measures and perceptions guiding actions taken by individuals (Current Nursing, 2012). There are six major assumptions in this theory including: perceived susceptibility, severity, benefits, costs, motivation, and modifying factors. The educational intervention used highlighted areas of ventilator associated pneumonia and its severity, costs, and modifying factors. The education also highlighted benefits to providing oral care per guidelines. The major assumption of this theory was that if nurses had high perceived importance of VAP's the actions they take to prevent VAPs would be prioritized. In this project, nurses were found to already have high perceived importance of oral care as a VAP preventative measure, thus there was no significant change in actions of these nurses following the educational intervention.

Evaluation of Logic Model

The logic model introduced in Chapter I included inputs, activities, outputs, outcomes, assumptions, and contextual factors. All inputs and activities were completed per the logic model. Outputs included that nursing staff would be educated and able to provide adequate oral care. Short term outcomes included increasing confidence of performing oral care and increased awareness of VAP significance. The post survey indicated that these short-term outcomes were indeed met, with nurses reporting they had a high commitment to providing oral care after listening to the educational intervention. Intermediate outcomes included increased attention to detail in oral care administration, increased compliance in performance of oral care every two hours, and increased

compliance of VAP bundles. There was an initial increase in oral care compliance after the educational intervention. Increased attention to detail and compliance with complete VAP bundles were unable to be measured by this study. Long term outcomes listed included a decrease in VAP rates along with an increase in oral care compliance, which were not met in the by the conclusion of this study. Contextual factors in this logic model included that a decrease in adequate staffing can affect administration of oral care and patients off the unit are not able to be provided proper preventive care. Contextual factors were supported by this study with over half of the nurses' reporting barriers of time constraints due to understaffing and patient acuity. This contextual factor may have influenced outcomes of this logic model.

Limitations

There are limitations in this scholarly project. One limitation is that in the duration of this study there were several changes in nursing staff. Travel and float nurses provided care on the unit and were not included in the educational intervention as they were not employed by the ICU. Some staff nurses changed employment during the duration of this study. New nurse orientees started their position after the initial educational intervention and although education was offered, it was not always completed. There was a smaller sample size of nurses that completed the post survey then pre survey, this may be due to the turnover of nurses in the unit at that time.

This study was done on a 16 bed ICU with 31 nurses completing the educational intervention. A larger scale study including more than one specific ICU and more nurses may provide more accurate results. The study done compared seven months pre and post

survey, as time constraints allowed. A longer study comparing one year could provide more accurate results as you can compare month to month data as patient population in the ICU does change season to season.

Oral care compliance was measured by the amount of oral care kits distributed to the specific ICU per month. More accurate representation of oral care kit usage would be to count the number of oral care kits leftover in each ventilated patients room after a shift. This was unable to be collected due to limited resources but could provide a more accurate measure of oral care compliance.

Implications for Future Research

This project could be carried out in any ICU to determine if education impacts VAP rates and oral care compliance differently in various ICU settings. As major barriers included time constraints, a comparison of VAP rates and staffing ratios could be done to see if there is a correlation between them. The comparison of monthly VAP rates to average monthly staffing ratios would help to show this correlation. A deeper dive into specific patients who developed VAPs and the previous nurse to patient ratio of that specific patient leading up to the development of VAP would lead to a more conclusive association between understaffing and VAP incidence. Other factors that may improve future research on this topic could include nurses education level and years of experience. Including monthly reminders about the importance of oral care during the study may also help in keeping the education in the forefront of the nurses' minds. Chart reviews of patients who did develop VAPs could be included in future studies to identify oral care

compliance and rates of oral, directional tip, and direct ventilator suctioning. All of these factors could help improve future research.

Implications for Practice/Health Policy/Education

This study found an initial increase in nursing compliance with oral care administration after an educational intervention. Continuing to provide nurses with education on VAPs and their preventative measures will aid in an increased knowledge and continued perceived importance of performing these measures. The findings from this study indicated that nurses already had knowledge and perceived importance of ventilator associated pneumonia and preventative measures, so the next step would be to address barriers to providing that care. As nurses perceive time as a major barrier to administering oral care, adequate staffing is necessary.

Conclusion

The purpose of this scholarly project was to see if an educational intervention over ventilator associated pneumonia and associated preventative measures would decrease VAP incidence, increase oral care compliance, or change nurses' perceptions on oral care administration. This study found that VAP incidence was not affected by the educational intervention. An initial increase in oral care compliance was found after the educational intervention. Nurses' had high perceived importance of oral care pre and post educational intervention. Significant findings of this study included lack of time as a reported barrier to providing proper oral care. Findings indicated that staff nurses have the knowledge and high perceived importance of oral care as a VAP preventative measure, but do not have adequate time to administer, thus education was not sufficient

to decrease VAP incidence nor significantly increase compliance with oral care long term.

References

AACN. (2017). Oral care for acutely and critically ill patients. Critical Care Nurse, 37(3), e19–e21. https://doi-org.library.pittstate.edu/10.4037/ccn2017179

Amanullah, S. (2015). Ventilator-associated pneumonia: Overview of nosocomial pneumonias, epidemiology of VAP, clinical presentation of VAP. https://emedicine.medscape.com/article/304836-overview

American Association for Respiratory Care. (2010). AARC clinical practice guidelines. endotracheal suctioning of mechanically ventilated patients with artificial airways. *Respiratory care*, *55*(6), 758–764.

Boev, C., & Yinglin Xia. (2015). Nurse-physician collaboration and hospital-acquired infections in critical care. *Critical Care Nurse*, *35*(2), 66–72. https://doi-org.library.pittstate.edu/10.4037/ccn2015809

CDC. (2020). Ventilator-associated pneumonia (VAP). *Centers for Disease Control and Prevention*. https://www.cdc.gov/hai/vap/vap.html

Chacko, R., Rajan, A., Lionel, P., Thilagavathi, M., Yadav, B., & Premkumar, J. (2017). Oral decontamination techniques and ventilator-associated pneumonia. *British Journal of Nursing*, 26(11), 594–599. https://doi-org.library.pittstate.edu/10.12968/bjon.2017.26.11.594

Current Nursing. (2012). *Health Belief Model*. http://currentnursing.com/nursing_theory/health_belief_model.html

Dumbre, D. U. (2019). A study to assess the knowledge and compliance of critical care nurses regarding ventilator care bundle in prevention of ventilator associated pneumonia. *Medico-Legal Update*, *19*(1), 176–178. https://doi-org.library.pittstate.edu/10.5958/0974-1283.2019.00035.5

Feider LL, Mitchell P, & Bridges E. (2010). Oral care practices for orally intubated critically ill adults. *American Journal of Critical Care*, *19*(2), 175–183. https://doi-org.library.pittstate.edu/10.4037/ajcc2010816

Garcia de Mello, L. R., & Machado de Lima, D. V. (2014). Prevention of ventilator-associated pneumonia: a case control study. *Online Brazilian Journal of Nursing*, 13, 419-421.

Gianakis, A., McNett, M., Belle, J., Moran, C., & Grimm, D. (2015). Risk factors for ventilator-associated pneumonia. *Journal of Trauma Nursing*, *22*(3), 125–131. https://doi-org.library.pittstate.edu/10.1097/JTN.0000000000000121

Hiroko Kiyoshi-Teo, & Blegen, M. (2015). Influence of institutional guidelines on oral hygiene practices in intensive care units. *American Journal of Critical Care*, *24*(4), 309–317. https://doi-org.library.pittstate.edu/10.4037/ajcc2015920

Klompas, M., Branson, R., Yokoe, D. S., Berenholtz, S. M., Eichenwald, E. C., Greene, L. R., Howell, M.D., Lee, G., Magill, S.S., Maragakis, L. L., Priebe, G. P., Speck, K., & Society for Healthcare Epidemiology of America (SHEA). (2014). Strategies to prevent ventilator-associated pneumonia in acute care hospitals: 2014 update. *Infection Control and Hospital Epidemiology*, 35(8), 915-936. https://doi.org/10.1017/S0899823X00193894

Merriam-Webster. (2020). https://www.merriam-webster.com/dictionary/mechanical%20ventilation

Parisi, M. (2016). Use of ventilator bundle and staff education to decrease ventilator-associated pneumonia in intensive care patients. *Critical Care Nurse*, *36*(5), e1–e7. https://doi-org.library.pittstate.edu/10.4037/ccn2016520

Swearer, J. N., Hammer, C. L., Matthews, S. M., Meunier, J. L., Medler, K. L., Kamer, G. S., Fiedler, D. M., Johnston, C. L., Schmitt, K. R., & Sawyer, A. J. (2015). Designing technology to decrease pneumonia in intubated trauma patients. *Journal of Trauma Nursing*, *22*(5), 282–289. https://doi-org.library.pittstate.edu/10.1097/JTN.0000000000000155

Wagner, B. V., Alves, E. F., Brey, C., Waldrigues, M. C., & Caveião, C. (2015). Knowledge of nurses about the intervention for the prevention of pneumonia associated with mechanical ventilation. *Journal of Nursing UFPE / Revista de Enfermagem UFPE*, *9*(5), 7902–7909. https://doi-org.library.pittstate.edu/10.5205/reuol.6121-57155-1-ED.0905201521

UpToDate. (2021). Risk factors and prevention of hospital-acquired and ventilator-associated pneumonia in adults. https://www-uptodate-com.library.pittstate.edu/contents/risk-factors-and-prevention-of-hospital-acquired-and-ventilator-associated-pneumonia-in-adults?search=ventilator%20acquired%20pneumonia&source=search_result&selectedTitle=3~133&usage_type=default&display_rank=3

Zhao T, Wu X, Zhang Q, Li C, Worthington HV, Hua F. (2020). Oral hygiene care for critically ill patients to prevent ventilator-associated pneumonia. Cochrane Database of Systematic Reviews 2020, Issue 12. Art. No.: CD008367. DOI: 10.1002/14651858.CD008367.pub4.

APPENDIX

Appendix A

Pre and Post Survey

Please rate the following items on a score of 1 to 10. With 1 meaning never, 5 meaning sometimes, and 10 meaning always.

I feel as if I do not have enough time to complete oral care as recommended by my facility due to patient acuity.

1 2 3 4 5 6 7 8 9 10
Never Sometimes Always

I feel as if I do not have enough time to complete oral care as recommended by my facility due to understaffing.

1 2 3 4 5 6 7 8 9 10
Never Sometimes Always

I see oral care as an important aspect of care in ventilated patients.

1 2 3 4 5 6 7 8 9 10
Never Sometimes Always

I see oral care as a priority in ventilated patients.

1 2 3 4 5 6 7 8 9 10
Never Sometimes Always

I provide oral care every two hours, per policy, in ventilated patients.

1 2 3 4 5 6 7 8 9 10
Never Sometimes Always

I suction the oropharynx with the directional tip catheter every six hours, per policy.

1 2 3 4 5 6 7 8 9 10
Never Sometimes Always

I prioritize oral care in ventilated patients.

1 2 3 4 5 6 7 8 9 10
Never Sometimes Always

I believe that oral care is an important aspect of preventing pneumonia in ventilated patients.

1	2	3	4	5	6	7	8	9	10
Never				Sometimes					Always

When providing oral care, I suction the mouth and endotracheal tube every two hours.

1	2	3	4	5	6	7	8	9	10
Never				Sometimes					Always

Regarding the past 5 ventilated patients you cared for, how often did you provide meticulous oral care every 2 hours per policy?

1	2	3	4	5	6	7	8	9	10
Never				Sometimes					Always

What barriers do you have to providing oral care every two hours in patients? *Select all that apply*

1. I do not have enough time due to patient acuity
2. I do not have enough time due to understaffing
3. I do not think oral care is important
4. I do not think oral care is a priority
5. Patient refused/Patient condition
6. I do not believe oral care if necessary every two hours
7. Other: (*please list any other barrier to providing oral care every two hours*)

   _____
   _____
   _____
   _____

Included Only in Post Survey:

After the educational presentation my commitment to provide oral care is:

1	2	3	4	5	6	7	8	9	10
Decreased				Same					Increased

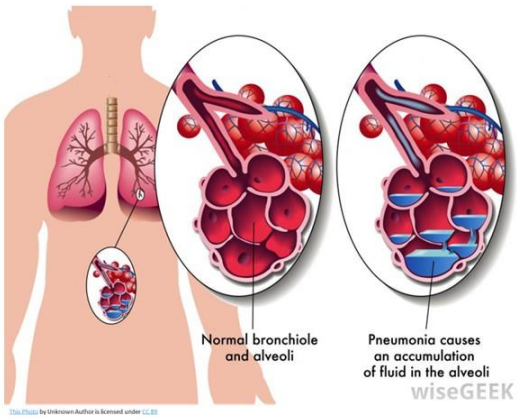
Appendix B

Educational PowerPoint

Ventilator Associated Pneumonia – How can we prevent it?

JODI WEBER

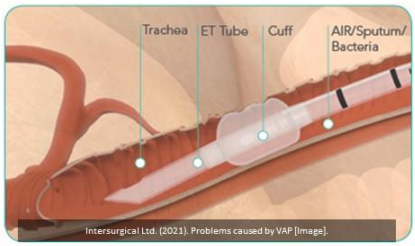
PITTSBURG STATE UNIVERSITY



What is VAP?

- Ventilator associated pneumonia
- Preventable health condition
- ETT serves as a pathway for bacteria to travel into the lungs from the oral cavity (Dumbre, 2019)
- ETT inhibits salivary flow and reduces cough reflex leading to decreased plaque removal and bacterial buildup (Hiroko Kiyoshi-Teo & Blegen, 2015).

Significance



Intersurgical Ltd. (2021). Problems caused by VAP [Image].

Increases length of stay by 14 days (Wagner, et al., 2015).

Mortality rates 20-60% (Mello & Machado, 2014).

- Death in 33% of pts who develop VAP (Wagner, et al., 2015).
- 35,000 + deaths each year as a result of VAP (Boev & Yinglin, 2015).

50% of abx used in the ICU setting are r/t VAPs (Parisi, et al., 2016).

2nd most costly healthcare associated infection (Swearer, et al., 2015).

- 1.2 millions dollars per year (Gianakis, et al., 2015).
- $40.000 per incidence (Swearer, et al., 2015).

Significance- Unit Specific

- Trauma Surgical ICU VAP rates
- National VAP rates
- Current VAP rates in TSICU for 2021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VAP Bundles

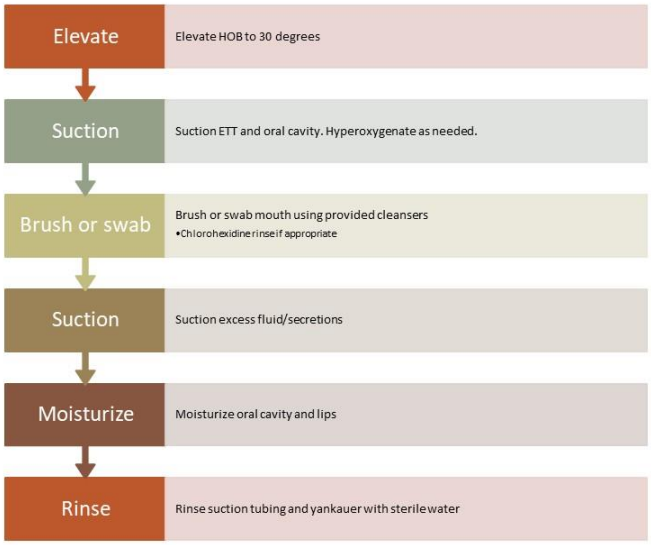
Shown by literature to reduce incidence of VAP

Facility adapted

Hospital Care Bundle Currently Includes: (Ascension Health, 2013).

- Perform hand hygiene
- DVT prophylaxis
- Head of bed (HOB) elevated greater than 30 degrees
- Daily assessment of readiness to wean (including the consideration of sedation vacation in adult patients and daily sedation titration in pediatric patients)
- Perform routine oral care
- Address the duration of ventilation
- Reduction in colonization of the digestive tract
- Reduction in closed ventilatory system contamination risk

Oral Care Basic Steps

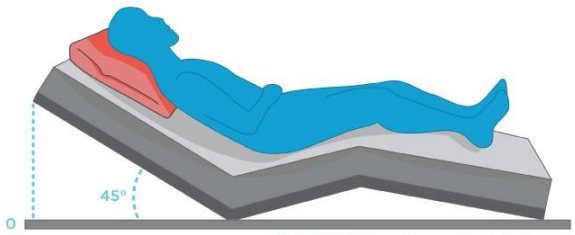


Elevate HOB

HOB 30-45 degrees

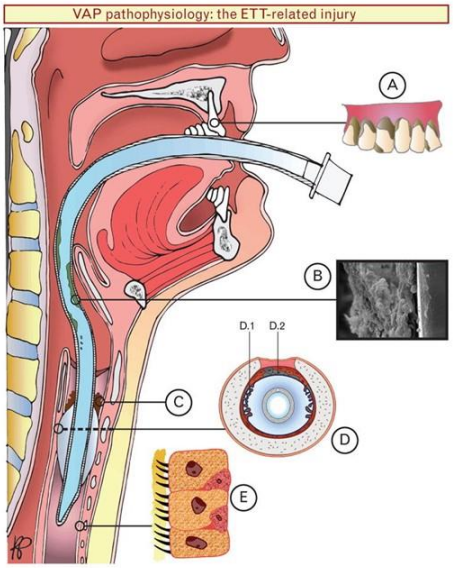
Prevents aspiration and pneumonia development (UptoDate, 2021) (SHEA, 2021)

Helps to decrease extra fluids from cleaning/secretions to travel down along ETT



Semi-Fowler's: Head of the bed raised 30-45 degrees

Permobil. (2020). Standard Fowler's 45-60 degrees. [Image].



Berra. (2016). Microbiome, biofilms, and pneumonia in the ICU. [Image].

Suction

Suction oral cavity (and oropharynx if indicated)

Prevents pushing present secretions further into oral cavity while brushing or swabbing teeth

Hyperoxygenate as needed

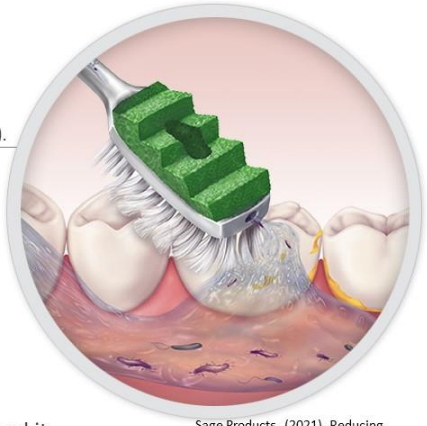
Subglottic Suctioning recommended by UptoDate and SHEA (2021).

Brush Teeth/Swab Mouth

(Vollman, Sole & Quinn, 2017).

Chlorohexidine Brush
- Brushing removes dental plaques where bacteria colonizes
- Twice daily

Hydrogen Peroxide Swab
- Foam swabs help stimulate mucosal tissue
- Cleanse q2hrs



Sage Products. (2021). Reducing VAP/HAP risk factors [Image].

Be sure to brush/swab teeth, tongue, gums, and ETT

If bite block is in place, do your best to swab/brush in and around it

"If oral care if omitted for an extended period, previous benefits are lost" (Vollman, Sole & Quinn, 2017, p. 38).

Chlorohexidine Rinse

- ✓Chlorohexidine rinse provided BID with cleanser and toothbrush
- ✓Soak provided swab in chlorohexidine rinse and scrub in circular motions around teeth, gums, and tongue (London Health Sciences Centre, 2017).
- ✓This creates a film that sticks and stays on the teeth and surface and provide antibacterial protection against gram + organisms. (Vollman, Sole & Quinn, 2017).
- ✓Suction remaining chlorohexidine but don't rinse after use (London Health Sciences Centre, 2017).
- ✓Frequent use can discolor teeth (Vollman, Sole & Quinn, 2017).
- ✓Never use on dentures (London Health Sciences Centre, 2017).

HealthWarehouse.com. (2021). Product ID: *CHLORGLUC12. [Image].

Medthusiast. (2021). Everyday I'm suctioning sticker. [Image].

Suction

SUCTION AFTER BRUSHING/SWABBING TO REMOVE ANY EXCESS CLEANER

Oral Moisturizer (Vollman, Sole & Quinn, 2017).

Saliva is protective as it clears out bacteria in the mouth

Ventilated pts have mouth dryness which decreases saliva and can cause mucositis where areas are susceptible for bacterial growth

Moisturizer acts as saliva

- Moistens tissues
- Decreases risk of mucositis

MedicalProductsSupply. (2020). Moisturizing Oral Gel MDS096803H. [Image].

Rinse Suction Tubing (Vollman, Sole & Quinn, 2017).

Bacteria can colonize in suction tubing
- Will then travel up tubing into yanker and will deposit into pts mouth

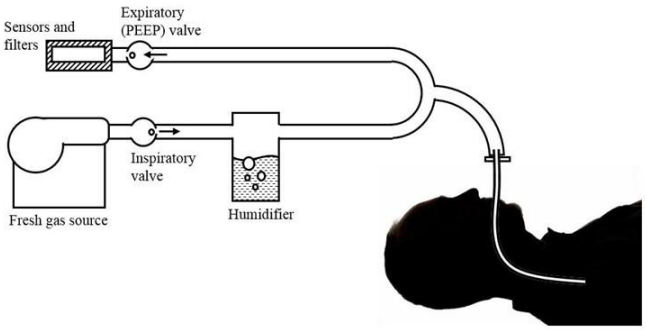
Rinse with sterile or distilled water after suctioning

Prevents colonization of bacteria

Save Rite Medical, LLC. (2021). Argyle Yankauer Suction Tube Regular Capacity Bulbous Tip. [Image].

McKesson. (2021). McKesson Respiratory Therapy Solution Sodium Chloride, Preservative Free 0.9% Solution Unit Dose Vial 15 mL. [Image].

Ventilator Care



Alex Yartsev. (2021). The circuit of the typical ICU ventilator. [Image].

Change circuits when visibly soiled (SHEA, 2021)

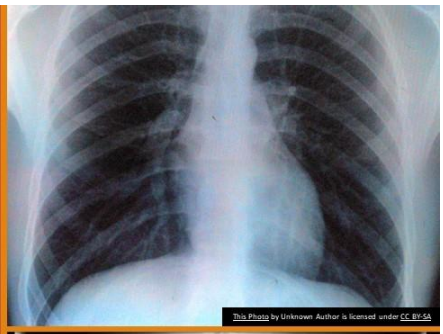
Not recommended to change circuits on a fixed schedule (Kompas, et al., 2014)

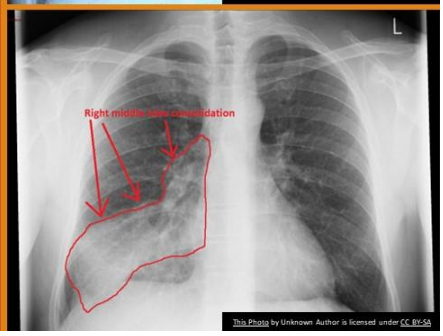
Conclusion

Oral care guidelines and VAP care bundles have had a significant impact on VAP occurrence

Following these guidelines, set by several national institutions, can prevent VAPs and saves lives

THANK YOU!





References

Ascension Health. (2013). Hospital-acquired infections (HAIs) a collection of strategies for prevention, maintenance, and improvement. *Clinical Excellence, pg 37*. https://communities.ascension.org/cm/ce/ACS/Hospital-Acquired%20Infections%20(HAIs)%20A%20Collection%20of%20Strategies%20for%20Prevention,%20Maintenance%20and%20Improvement%20Toolkit.pdf#search=vap%20bundle.

Boev, C., & Yinglin Xia. (2015). Nurse-Physician Collaboration and Hospital-Acquired Infections in Critical Care. *Critical Care Nurse*, *35*(2), 66–72. https://doi-org.library.pittstate.edu/10.4037/ccn2015809

Dumbre, D. U. (2019). A Study to Assess the Knowledge and Compliance of Critical Care Nurses Regarding Ventilator Care Bundle in Prevention of Ventilator Associated Pneumonia. *Medico-Legal Update*, *19*(1), 176–178. https://doi-org.library.pittstate.edu/10.5958/0974-1283.2019.00035.5

Gianakis, A., McNett, M., Belle, J., Moran, C., & Grimm, D. (2015). Risk Factors for Ventilator-Associated Pneumonia. *Journal of Trauma Nursing*, *22*(3), 125–131. https://doi-org.library.pittstate.edu/10.1097/JTN.0000000000000121

Hiroko Kiyoshi-Teo, & Blegen, M. (2015). Influence of Institutional Guidelines on Oral Hygiene Practices in Intensive Care Units. *American Journal of Critical Care*, *24*(4), 309–317. https://doi-org.library.pittstate.edu/10.4037/ajcc2015920

Klompas, M., Branson, R., Yokoe, D. S., Berenholtz, S. M., Eichenwald, E. C., Greene, L. R., Howell, M.D., Lee, G., Magill, S.S., Maragakis, L. L., Priebe, G. P., Speck, K., & Society for Healthcare Epidemiology of America (SHEA). (2014). Strategies to prevent ventilator-associated pneumonia in acute care hospitals: 2014 update. Infection Control and Hospital Epidemiology, 35(8), 915-936. https://doi.org/10.1017/S0899823X00193894

References

London Health Sciences Centre. (2017). *Procedure oral care intubated or trached patients*. Retrieved from https://www.lhsc.on.ca/critical-care-trauma-centre/procedure-oral-care-intubated-or-trached-patients.

Mello, Lucas & Machado, Dalmo. (2014). Prevention of ventilator-associated pneumonia: a case control study. Online Brazilian Journal of Nursing. 13. 10.5935/1676-4285.20144991.

Parisi, M. (2016). Use of Ventilator Bundle and Staff Education to Decrease Ventilator-Associated Pneumonia in Intensive Care Patients. *Critical Care Nurse*, *36*(5), e1–e7. https://doi-org.library.pittstate.edu/10.4037/ccn2016520

Swearer, J. N., Hammer, C. L., Matthews, S. M., Meunier, J. L., Medler, K. L., Kamer, G. S., Fiedler, D. M., Johnston, C. L., Schmitt, K. R., & Sawyer, A. J. (2015). Designing Technology to Decrease Pneumonia in Intubated Trauma Patients. *Journal of Trauma Nursing*, *22*(5), 282–289. https://doi-org.library.pittstate.edu/10.1097/JTN.0000000000000155

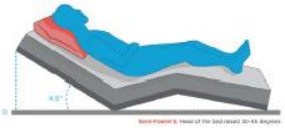
UpToDate. (2021). Risk factors and prevention of hospital-acquired and ventilator-associated pneumonia in adults. https://www-uptodate-com.library.pittstate.edu/contents/risk-factors-and-prevention-of-hospital-acquired-and-ventilator-associated-pneumonia-in-adults?search=ventilator%20acquired%20pneumonia&source=search_result&selectedTitle=3~133&usage_type=default&display_rank=3

Vollman, K., Sole, M., and Quinn, B. (2017). Endotracheal tube care and oral care practices for ventilated and non-ventilated patients. *AACN Procedure Manual for High Acuity, Progressive, and Critical Care*, 7th Edition, p. 32-39. https://www.elsevier.com/__data/assets/pdf_file/0010/270982/ch0004.pdf

Wagner, B. V., Alves, E. F., Brey, C., Waldrigues, M. C., & Caveião, C. (2015). Knowledge of Nurses about the Intervention for the Prevention of Pneumonia Associated with Mechanical Ventilation. *Journal of Nursing UFPE / Revista de Enfermagem UFPE*, *9*(5), 7902–7909. https://doi-org.library.pittstate.edu/10.5205/reuol.6121-57155-1-ED.0905201521

Appendix C

Oral Care Steps in Ventilated Patients



Elevate HOB 30°

Elevate HOB to 30 degrees

Suction ETT, mouth, oropharynx

Suction ETT, oral cavity, and oropharynx
Hyperoxygenate as needed.

Brush or Swab teeth, gums, tongue, & tube

Swab mouth w/ hydrogen peroxide q2hrs
Brush w/ chlorohexidine and

Chlorohexidine Rinse

Provide chlorohexidine rinse q12 hours
Do not use on denture, rinse after use, or use other cleaners 2 hrs after application

Suction excess fluids/secretions

Suction excess fluid/secretions

Moisturize mouth & lips

Moisturize oral cavity and lips

Rinse Yankar & suction tubing

Rinse suction tubing and yankauer with sterile water after each use
Decreases bacteria colonization

Appendix D

Information Sheet

You are invited to voluntarily participate in a research study being conducted by Jodi Weber, the principal investigator, for her DNP Scholarly Project that will measure rates of ventilator associated pneumonia and compliance of oral care administration by RNs at the AVCH-W-SF TSICU. This research is being conducted as a quality improvement initiative to decrease rates of Ventilator Acquired Pneumonia. Participation involves attending an educational session and completion of a pre- and a post- survey which will take approximately 15 minutes. No identifiers will be collected, survey responses will be anonymous, and no attempts will be made to match surveys to participants.

There is no more than minimal risk of breach of confidentiality, embarrassment, emotional or psychological stress or discomfort to nurses participating in this project. No identifying information about the subjects will be collected in the surveys. No identifying information will be used on surveys and no attempts will be made to match surveys to participants. The unit manager will not be in attendance of educational intervention. Data will only provide aggregate reports of the unit as a whole. No participants will be evaluated individually. If only one survey is completed by participant it will still be used in the study, as survey data will be compared as a unit whole and not matched pre and post intervention. If stress is induced, it will be ensured that participants are free to leave the study at any time. All participation in the study is voluntary. You may choose not to participate in this study at any time with no consequence to you. You may choose to stop participating in this study at any time with no consequence to you. There is no cost associated with participation in this study.

This study will include data eight months before and eight months after the educational intervention. RN surveys will be distributed two times, once before the education and eight months after the educational presentation. These surveys will be offered to RNs employed by TSICU though the duration of the study, there are approximately 57 RNs at this time. Surveys collected for research will be entered into excel on a password protected computer. Surveys will then be stored in a locked drawer for 3 years per policy and then destroyed. Data from this project will be analyzed and published. The report will be made available to the unit manager and you may view it through him/her.

If you have questions, concerns, or complaints, or think the research has hurt you, you can talk to the principal investigator at (316) 518-3719 or jstuhlsatz@gus.pittsate.edu.

This research has been reviewed and approved by the AVCH-W Institutional Review Board. You may talk to them at (316) 291-4774 if:

- Your questions, concerns, or complaints are not being answered by the principal investigator
- You cannot reach the principal investigator
- You want to talk to someone besides the principal investigator
- You have questions about your rights as a research subject

- You want to get information or provide input about this research

Ascension Via Christi Hospitals Wichita, Inc., does not provide free medical treatment or payment for injuries resulting from participation in biomedical or behavioral research.

Appendix E

Ascension Via Christi IRB Approval

Ascension Via Christi
Via Christi Hospitals Wichita, Inc.
Institutional Review Board

WAIVER OF DOCUMENTATION OF INFORMED CONSENT

I. Title of protocol: Registered Nurse Education on Prevention of Ventilator Associated Pneumonia in a Midwestern Intensive Care Unit

II. Principal Investigator: Jodi Weber

III. Waiver of Documentation of Informed Consent (must meet at least one of the following conditions)

[ ] The only record linking the subject and the research will be the consent document, and the principle risk would be potential harm resulting from a breach of confidentiality. Each subject will be asked whether they want documentation linking them to the research, and their wishes will govern.

[x] The research presents no more than minimal risk of harm to subjects *and* involves no procedures for which written consent is normally required outside of the research context.

[ ] The subjects or Legally Authorized Representatives (LARs) are members of a distinct cultural group or community in which signing forms is not the norm, that the research presents no more than minimal risk of harm to subjects, and provided there is an appropriate alternative mechanism for documenting that informed consent was obtained.

Investigator Comments (if any): _____

Jodi Weber
Investigator Signature

11/27/2021
Date

VCH-W IRB USE ONLY [X] Approved

THIS SIGNIFIES NOTIFICATION OF IRB APPROVAL OF THE PROJECT DESCRIBED ABOVE.

[ ] Disapproval for Waiver of Documentation of Informed Consent

This is to confirm that the following member(s) of the Institutional Review Board abstained from voting on any submissions for the above mentioned study;

N/A

IRB Chair: John L Smith Date 12 Jan 2022

RECEIVED NOV 30 2021

Pilot Form: Appendix K (Version 1/21/2019)