TREATING PATIENTS WITH VENTILATOR-ASSOCIATED PNEUMONIA (VAP): THE CHALLENGES OF IMPLMENTING NURSING BUNDLES OF CARE.

Honors Thesis

Presented in Partial Fulfillment of the Requirements
for the Degree of Bachelor of Science in Nursing

In the Maguire Meservey College of Health and Human Services
at Salem State University

By
Emilee Guzman

Dr. Nancy Ebersole
Faculty Advisor
School of Nursing

***

Commonwealth Honors Program
Salem State University
2022

Abstract

A ventilator is any device used to support, assist, or control respiration. Ventilator Associated Pneumonia (VAP) can result from long term mechanical ventilation and causes a major life-threatening infection that has a high prevalence in patients in the Intensive Care Unit (ICU) within our hospitals today. Despite having life-saving benefits, mechanical ventilation puts patients at a high risk of developing VAP; this increases the length of hospital stay, increases the cost of treatment, and decreases patient quality of life. Therefore, hospitals have implemented standardized preventative care interventions or "bundles" for mechanically ventilated patients in attempts to reduce the overall VAP prevalence, and infection rate.

A systemic literature review was performed using the CINAHL Plus database to investigate the challenges posed to nurses when implementing VAP care bundle interventions in ICU patients. Major themes are (a) VAP bundles significantly reduce days on a ventilator and days in the ICU, (b) What is in the care bundle matters, (c) Nursing compliance is related to education and years of experience, (d) Barriers to nursing adherence is related to the use of bundles, (e) Institutional barriers that affect nursing adherence to the use of bundles. The registered nurse is in a key position to mitigate the risk of VAP. Hospitals must provide standardized nursing policies that emerge from interpersonal communication with bedside nurses to enforce Evidence Based Practices. In the future, to provide optimal care for mechanically ventilated patients, hospitals must take action to create changes to overcome institutional barriers which impact patient care.

Key words: Ventilator Associated Pneumonia, nursing care bundles, challenges

Table of Contents

Acknowledgements

To begin, I would like to express my complete gratitude to my thesis advisor Nancy Ebersole. I would not have been anywhere near as successful without Nancy's kindness, continuous support, and positive, laid-back outlook. I appreciate your guidance and intellect more than I can express. I hope one day to be as great of a thesis writer as you are. Secondly, I would like to thank Scott Nowka for being such a gem, and a constant mentor in my time in the Commonwealth Honors Program. Scott, you were truly a light to work with and the successful completion of this project would not have been possible without the two of you.

I would also like to thank my family and friends for their love and understanding throughout this vibrant time of my life. It has been a very hectic few years of college due to COVID and an array of other things, for that I thank you for being so loving and supportive of me.

Many patients admitted to the intensive care unit (ICU) require the support of a mechanical ventilator. Mechanical Ventilation provides additional breathing support for patients who cannot maintain adequate oxygenation on their own; this may be due to trauma, ineffective airway clearance, aspiration and more. Although mechanical ventilation provides many lifesaving benefits to patients by helping them to maintain effective airway clearance, homeostasis, and protect their airway, there is an increased risk of acquiring VAP. Mechanical ventilation increases the risk of Pneumonia 6-to-21-times, and there is a high prevalence of hospital acquired infections (HAIs) in the ICU (Mahmudin, 2020). VAP is a HAI that is preventable and is common in patients who are under long term mechanical ventilation for more than 48 hours. VAP is suspected when a patient receiving ventilation has evidence of a new or progressive pulmonary infiltration along with fever, leukocytosis, and purulent tracheobronchial secretions (Sedwick, 2012). This preventable disease is associated with decreased quality of life, increased length of hospital stays and increased treatment costs.

It is essential that nurses implement effective care bundle interventions to minimize the risk of ventilator associated complications and their financial, social, and psychological burdens. There are many challenges posed to nurses when implementing care bundle interventions to achieve optimal patient outcomes and prevent VAP. Evidence-based practices (ebp) for preventing nosocomial pneumonia have been published by the Centers for Disease Control and Prevention for more than 30 years and have contributed to a reduced incidence of VAP. The cost of care for a patient with VAP is approximately $40,000 to $57,000 higher per occurrence than the cost of care of a patient treated with mechanical ventilation in whom VAP does not develop (Sedwick,

2012). Patients receiving mechanical ventilation are at significantly higher risk of acquiring VAP, therefore it is important that the challenges nurses face when implementing VAP care bundle interventions are addressed. This way, nurses can incorporate and apply effective evidence-based practices into the daily care provided to patients receiving mechanical ventilation. Essentially, this will help lower treatment costs for hospitals, decrease length of hospital stay for patients and ensure increased quality of life.

Background

A ventilator is any device used to support, assist, or control respiration through the application of positive pressure to the airway when delivered via an artificial airway-specifically an oral/nasal endotracheal or tracheostomy tube (Sedwick, 2012). A patient may require mechanical ventilation due to a respiratory failure such as: hyperventilation, increased intracranial pressure, or brain herniation (Parisi, 2016). The use of endotracheal tubes is associated with increased injury to the mucosa in which reduces ciliary function and damages upper airway defense; therefore, the accumulation of subglottic secretions and increasing in gastric pH will lead to gastric colonization of pathogenic organisms (Yazici, 2018). These infectious secretions are then aspirated into the lungs, resulting in a VAP (Yazici, 2018). Despite having lifesaving benefits, a mechanical ventilator can increase the occurrence of VAP (Mahmudin, 2020). VAP is a HAI occurring in patients under the care of ventilators for more than 48 hours (Mahmudin, 2020). VAP is suspected when a patient receiving mechanical ventilation has evidence of a new or progressive pulmonary infiltration along with fever, leukocytosis, and purulent tracheobronchial

secretions (Mahmudin, 2020). For VAP to develop, microorganisms must gain access to the normally sterile, lower part of the respiratory tract (Sedwick, 2012). Pneumonia is considered ventilator associated if the patient was intubated and receiving mechanical ventilation at the time of or within 48 hours before the onset of infection (Sedwick & Mahmudin, 2020).

To combat this preventable and deadly infection, hospitals have been implementing nursing bundles of care. A VAP care bundle is a structured series of preventative ebp's for patients with mechanical ventilators to improve patient outcomes, and patient health (Mahmudin et al., 2020). As it is implemented altogether, nurse care bundles will give significant results in decreasing VAP rates compared to the individual application of the care interventions (Mahmudin, 2020). VAP bundle interventions include head of the bed elevation, oral hygiene, assessment of sedation, peptic ulcer prophylaxis, cuff pressure control, endotracheal tube suctioning and emptying of condensate in tubing etc. (Sedwick, 2012). The implementation of cost-effective interventions to minimize the risk of ventilator associated complications, such as HAI's and their associated financial burden, is essential to ensure the continued delivery of quality and safe healthcare (Sedwick, 2012). The goal of nursing care bundles is to reduce the health risks of a ventilator using these VAP care bundle interventions, along with decreasing ICU stay, decreasing time spent on a mechanical ventilator and preventing HAIs such as VAP. Several investigators examined the efficacy of the Institute of Healthcare and Improvement bundled practices and found that bundled practices were effective in reducing the rate of VAP (Sedwick, 2012).

The registered nurse is in a key position to mitigate the risk of HAIs such as VAP due to their constant presence at the bedside and their key role in providing direct patient care (Ladbrook, 2019). Nurses are key implementers of care bundle interventions which help to minimize the risk of HAI's and their associated risk of developing secondary complications. Implementation of care bundle interventions are essential to ensure the continued delivery of quality, safe and preventative healthcare for mechanically ventilated patients (Ladbrook, 2019). Patients at risk for VAP present a unique challenge to critical care nurses. To prevent VAP, nurses must develop strategies to incorporate ebp into the daily care provided to patients receiving mechanical ventilation (Sedwick, 2012). Prevention of VAP needs to be a priority in national health organizations to reduce treatment costs, reduce length of hospital stays and improve patient quality of life (Parisi, 2016). Hospital authorities across the world should regularly plan and send their ICU nurses for updates in knowledge and skills to refine their competency and provide them with the educational tools to provide essential preventative care (Shanaz, 2018). Mortality rates are 46% in patients with VAP and 32% in those without VAP; the cost of care for a patient with VAP is approximately $40,000 to $57,000 higher per occurrence than the cost of care of a patient treated with mechanical ventilation in whom VAP does not develop (Sedwick, 2012). Nursing adherence to care bundles based one ebp's can prevent VAP, ultimately decreasing the mortality rate of patients from VAP and saving more lives (Dumbre, 2019). The association between knowledge and compliance of nursing staff to VAP rates is significant (Dumbre, 2019). Nurses need to have an awareness of the complications associated with a patient's problem, as well as knowledge on the prevention strategies to decrease patient risk of secondary complications such as

VAP. Skilled and knowledgeable nurses are extremely important in making the appropriate decisions in patient care, and thus will minimize poor outcomes in the recovery of mechanically ventilated patients (Shanaz, 2018).

Placement of an endotracheal tube impedes the body's natural defense against infection by negating effective cough reflexes and mucocillary clearance of secretions (Sedwick et al., 2012). Therefore, placement of an endotracheal tube potentially increases the risk of VAP 6-to-20 fold in patients treated with mechanical ventilation (Sedwick & Mahmudin, 2012). Critically ill patients are at risk of microorganisms getting into the sterile part of the respiratory tract because of their depressed level of consciousness and impaired gag reflex (Sedwick & Mahmudin, 2012). VAP poses major risk of death for patients who are mechanically ventilated and therefore it is vital nurses actively prevent VAP to avoid an array of other comorbidities from developing such as: deep vein thrombosis (DVT's), gastric ulcers, pressure wounds and more (Sedwick, 2012). The purpose of this literature review is to identify the challenges posed to nurses when implementing VAP care bundles. The population is nurses providing care to patients on ventilators. The intervention is the implementation of bundles of care to reduce complications and length of stay. The comparison is how nurses are adhering to the bundles and the outcome is whether complications and lengths of stay have been reduced.

Methods

A systematic review of literature was conducted to determine the challenges of implementing nursing bundles of care to treat ventilator associated pneumonia (VAP).

The researched articles were within the years of 2016-2022 to identify the most prominent, recent findings. Inclusion criteria compromised of articles written in the English language, peer-reviewed and in full text. The database utilized was CINHAL Plus with Full Text. A Boolean search was conducted using the following terms: ventilator associated pneumonia, VAP, pneumonia, VAP Pneumonia, bundles of care, and nursing care bundle interventions.

See Figure 1.

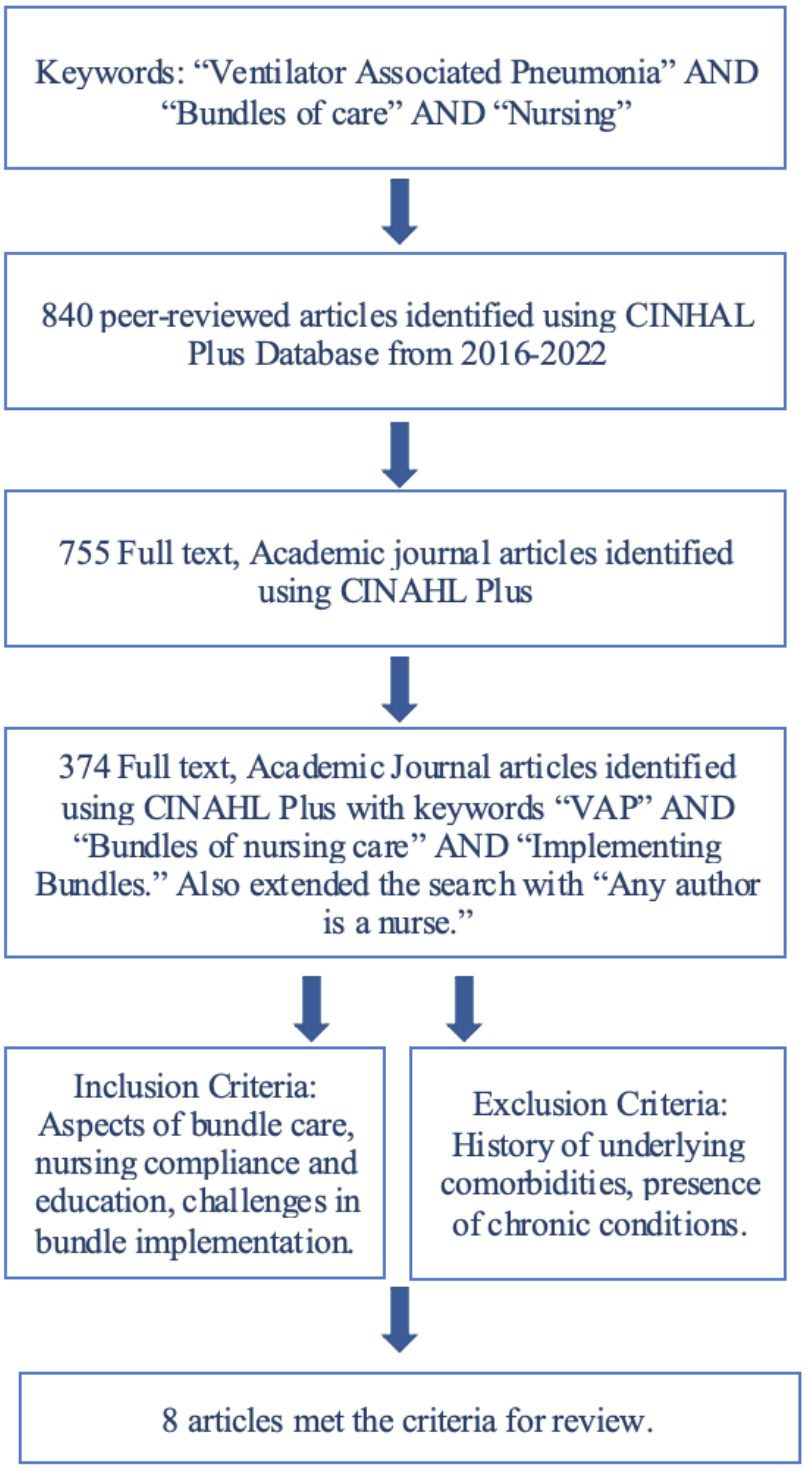

Figure 1 Journal Article Identification: Treating patients with Ventilator-Associated Pneumonia (VAP):

The Challenges of Implementing Nursing Bundles of Care

Results

Nine studies met the criteria of identifying the challenges nurses face when implementing VAP bundles of care. Within the nine articles, five major themes were identified (a) VAP bundles significantly reduce days on a ventilator and days in the ICU; (b) what is in the bundle matters; (c) nursing compliance is related to education and years of experience; (d) barriers to nursing adherence is related to the use of bundles; and (e) institutional barriers that affect nursing adherence to the use of bundles.

VAP bundles significantly reduce days on a ventilator and days in the ICU.

Researchers have found evidence that patient length of stay in the hospital decreases when implementation of VAP nursing bundles of care occurred on an ICU (Sedwick, 2012). The length of time patients spent under the assistance of mechanical ventilation reduced by 5 days from 26-21 days, and patients' length of stay in the ICU decreased 9 days, from 36 to 27 days upon implementation (Sedwick, 2012). Within the first year of implementing VAP bundles in an ICU, the number of days patients spent on a ventilator overall decreased by 5% (Sedwick, 2012). It is clearly shown that VAP care bundles significantly reduce the number of days patients spend under the assistance of mechanical ventilation when bedside ICU nurses adhere and implement the proper care bundles. Upon nursing implementation of VAP bundle interventions, the overall incidence rate of VAP reduced by 8, from 23.4 to 15.4 (Sedwick, 2012). These positive outcomes of decreased number of days under the assistance of a ventilator, decreased length of ICU stay, and decreased incidence rate are directly correlated to the implementation of care bundle interventions by bedside ICU nurses (Sedwick, 2012). VAP bundles reduce the number of days patients spend in the ICU, which is again

directly correlated to nursing implementation of care bundles. Reducing HAI rates promotes positive patient outcomes, prevents secondary complications, and overall reduces the length of hospital stay.

VAP bundles of care have been proven to be the most effective at preventing VAP in mechanically ventilated patients in the ICU (Dumbre et.al., 2019) Many hospitals have implemented care bundle intervention policies for bedside nursing staff in attempts to treat and prevent VAP in ventilated patients. Evidence based guidelines for preventing nosocomial pneumonia have been published by the CDC and prevention for more than 30 years and have contributed to a reduced incidence of VAP (Parisi, 2016). Researchers in several studies have reported a reduced VAP rate with the implementation of the VAP bundle and the use of similar care bundles (Parisi, 2016). Therefore, upon implementation of VAP bundle interventions in an ICU, it has been shown this will significantly reduce the number of days patients spend on a ventilator, and the number of days spent in an ICU.

What is in the bundle matters.

It is shown by research that the nursing interventions that make up a VAP bundle matters for nursing compliance and positive patient outcomes. It has been proven that high nursing compliance with all bundle elements results in a decreased incidence of VAP, hence decreased length of stay in the ICU and time spent on a ventilator (Mahmudin, 2020). Bedside ICU nurses utilize guidelines that dictate the preventative care provided for mechanically ventilated patients to prevent VAP. In attempts to reduce the incidence of VAP, nurses must be compliant with at least five bundle elements (Mahmudin, 2020). Since nurses are the primary implementors of

preventative care bundles, if there are any existing discrepancies between nurses and guideline makers, this will impact VAP infection rates and nursing compliance (Dumbre et al., 2019). This decreased nursing compliance is not the result of education or experience; however, it is the result of discrepancy between priority nursing care and preventative guidelines; hence, this must be addressed to decrease institutional variation and increase interdisciplinary communication between hospitals and nurses. Nurses need to have a say in what is contained in a care bundle to ensure that not only are these care bundles a reflection of provided bedside care, but their impact on patient populations is noted.

There are three to six components of the VAP nursing care bundle that have been found to occur the most often: oral hygiene, positioning of patient, cuff pressure, sedation assessment, deep vein thrombosis prophylaxis and peptic ulcer prophylaxis (Jannson et.al., 2018) The least common VAP nursing bundle interventions used in practice is: peptic ulcer prophylaxis, the use of recommended respiratory equipment, avoidance of gastric distension, kinetic bed therapy, suctioning according to protocols and the management of sedation and analgesia (Jansson, et al., 2018). Research shows that this discrepancy between nurses and guideline makers has an impact on which bundle interventions are implemented, and which are not implemented by bedside nursing staff. It is important to consider what goes into a care bundle because most nurses have been trained under specific hospital guidelines and this variation in nursing training impacts whether a bundle intervention is implemented by nursing or not. Further, there are barriers that nurses face when implementing these bundles and as stated above one of

them is education and another is variation in training; hence, what is in the care bundle matters because this dictates implementation and impacts VAP prevalence rates.

Nursing compliance is related to education and years of experience.

Nursing compliance or willingness to perform care bundle interventions at the bedside is based on the knowledge obtained through either workplace training and guidelines, or experience in the nursing field. Researchers have found that in relation to the knowledge of VAP bundles reported by a group of ICU nurses, 56.7% of ICU nurses had excellent knowledge of VAP bundle care interventions, and 43.4% of ICU nurses had good knowledge of VAP bundle care interventions (Dumbre, 2019). It is shown that there is a positive correlation between nursing education and experience with implementation of VAP care bundles; hence why most ICU nurses who are seasoned medical professionals have “excellent knowledge” versus “good knowledge” (Dumbre, 2019). Experience in the nursing field is based on exposure to levels of acuity and situations, but also is impacted by the shift nurse's work. Research has shown that 52% of nurses working night shift had excellent knowledge of VAP bundles; this may be due to the lack support and resources night nurses have, hence they are more accountable for patients since night shift nurses are one of the few at the bedside during the night shift (Dumbre, 2019).

Nurses gain workplace experience as they become more seasoned in the field and obtain knowledge to determine which bundle interventions may be more effective for each patient; hence, this creates a discrepancy amongst seasoned ICU nurses and policy makers that impacts nursing compliance because of their personal nursing knowledge and experience. There comes a point in a nurse's career where they feel comfortable and

confident in their skills, where they will obtain their own method of providing patient care and perhaps disregard guidelines; hence the gap between "good and excellent" nursing knowledge (Dumbre, 2019). Some nurses will follow policies and guidelines strictly, and others will provide nursing care based on seasoned knowledge and experience. This, however, does not mean that nurses who follow guidelines strictly are more knowledgeable or seasoned, but this means that they are adequately trained in these guidelines. Research shows that ICU nurses use VAP bundles consistent with level of education but not ICU training or years of work experience; hence, you could train an ICU nurse to implement certain care bundle interventions, but this does not guarantee implementation at the bedside (Shanaz, 2018).

In relation to this, nurses face an array of barriers when implementing VAP bundles that impact seasoned nursing knowledge and experience. Nurses are less likely to perform bundles of care interventions, that nurses are aware help to prevent VAP, if there is a lack of reliable resources, timing, education etc., and therefore will impact nursing compliance (Shanaz, 2018). Interdisciplinary communication is necessary to ensure that nursing knowledge and experience is respected because it is shown that nursing compliance is directly correlated. Nurses have the experience to attest to certain care bundles within specific patient populations; some patients on mechanical ventilators may come into the ICU with already secondary comorbidities that put them at an increased risk of acquiring VAP, versus others that do not. This is when nursing judgement, nursing knowledge and nursing experience are the most important tools that determine patient life or death. Therefore, experienced, and knowledgeable nurses will deem fit certain care

bundle interventions for specific patient populations and implement them on as an "needed basis," (Jansson, 2018).

Barriers to nursing adherence is related to the use of bundles.

The VAP care bundle provides a structured approach to nursing care, meaning there is a necessity for policies and procedures that support using Evidence Based Practice to improve bedside nursing practice and implementation (Ladbrook, 2019). The barriers to the use of certain care bundles are directly related to the use of the bundles, meaning experienced and knowledgeable nurses adhere to only specific VAP bundle interventions (Ladbrook, 2019). The first barrier is that nurses need to be provided with a standardized methodology identifying the care bundle, the time it must be done and instructions on how to perform this care (Ladbrook, 2019). It is not the nurse's duty to remember this care, but the hospital's duty to provide nurses with some sort of adequate reminder and help upon implementation (Ladbrook, 2019). A structured approach to nursing care is essential and the only way nurses will feel obligated to provide this care is if there is a clear, concise, time manageable care bundle policy. This won't necessarily hold them accountable for providing the care, but they will hold themselves to the standard of providing this care since the policy coincides with the patients' needs, as well as the nurse's judgement of the situation. One method that may be used to prompt nurses is in the electronic health record (EHR) which would be helpful- however excessive reminders will prompt alarm fatigue (Ladbrook, 2019).

The second barrier to nursing adherence to bundles is that nursing implementation is inconsistent due to nurses addressing immediate patient life or death care needs (Ladbrook, 2019). Preventative care is not always the main priority when providing patient centered care due to high acuity taking priority over preventive care; patient life takes priority over preventing secondary complications since if the patients immediate

acute care needs are not addressed, they will not survive to develop secondary complications such as VAP (Ladbrook, 2019). The use of bundles in the situation of patient life and death is not the priority, the patient's life takes priority. In relation, during this treatment time of high acuity, patients who are more stabilized are periodically decreased in sedation and weaned off the vent to assess respiratory status and the need for the vent. This process is called the "Sedation and Weaning Process" (Ladbrook, 2019). This varies by prescriber, therefore there are no clear standards or consistency that exists when this process is being completed on high acuity, mechanically ventilated patients (Ladbrook, 2019).

This variation in policy impacts nursing care, posing as a barrier for nurses since they are the immediate implementers of these care bundles and assess the patient throughout the duration of the "Sedation and Weaning Process" (Ladbrook, 2019). Therefore, there is a need for an interdisciplinary approach which will equip nurses with adequate knowledge, resources, and training in bundles to improve nursing adherence and prevent this deadly infection (Ladbrook, 2019).

Institutional barriers that affect nursing adherence to the use of bundles.

There are institutional barriers that affect nursing adherence to bundles. Factors such as: lack of guidelines, high treatment costs and role ambiguities between nurse's role and policies determining interventions contribute to institutional barriers (Jannson, 2018). As stated, preventative care is not always the nurse's main priority and acute care takes priority, therefore implementation of preventative care bundles is inconsistent (Ladbrook et. al., 2019). Nursing compliance is based upon effective implementation of nursing policy, and therefore research shows a more targeted approach to implementation

of care bundles is needed to increase nursing adherence and compliance (Ladbrook et. al., 2019). Being told what to do on a document is not enough for nurses, perhaps the EHR is where we need prompting since it is easily accessible at the bedside, and an area of improvement nurses can partake in (Ladbrook, 2019).

The lack of clear, concise guidelines serves as an institutional barrier nurses face when implementing VAP care bundles. Interdisciplinary approaches are needed to ensure that nurses are aware of policies, and so effective communication between nurses and policy makers exist. A lack of clear and concise guidelines turns nurses away from considering the policy, hence there is a need for nursing judgement in the creation of these care bundle policies to increase nursing adherence to the use of bundles of VAP.

Researchers have proven that ebp's are known to improve the quality of care mechanically ventilated patients receive, making cost-effective and positive clinical results for patients (Jansson, 2018). Costs are a barrier that exists among hospital institutions that impact nursing adherence to the use of VAP care bundles (Jansson, 2018). As stated, prior, the cost of care for a patient with VAP is approximately $40,000 to $57,000 higher per occurrence than the cost of care of a patient treated with mechanical ventilation in whom VAP does not develop (Sedwick, 2012). This puts hospitals and healthcare institutions at an economic burden, while some also lack the necessary funding to afford necessary equipment, educational resources and staffing which impacts nursing adherence to bundle care (Sedwick, 2012). Costs pose as a barrier to nurses if they are not supported to adhere to these bundle intervention policies. Researchers have found that by combining active strategies such as reminders, decision support, rewards, regular auditing etc., these may be more cost-effective than increasing

resource capacity in attempts to encourage nurses to implement and adhere to policies (Jansson, 2018). Being told what to do on a document is not enough for nurses, there needs to be constant reminders and active education on the importance, usage, and goals of utilizing VAP care bundles in ICU settings. This is not up to the nurse to "remember" or to know but it is up to the hospital/health care institution to equip nurses with the necessary tools needed for success such as: resources, staffing, and education. This means that even if hospitals that are already under economic burdens find the necessary funds to provide nurses with equipment, it will be useless unless there is effective education and training to improve adherence.

It has been found in research that role ambiguities between the bedside nurses' role, and policies and procedures determining interventions exist, and impact nursing adherence to care bundles (Jansson, 2018). To ensure the highest standards of nursing care, nursing practice must be based on a strong body of scientific knowledge (Dumbre, 2019). Therefore, a more targeted approach is needed when implementing VAP care bundles (Jansson, 2018). It has been shown that there is a highly significant association between nursing knowledge and compliance (Dumbre). Therefore, nurses need standardized policies that result from interdisciplinary communication, so they can acquire the necessary education and resources to effectively implement nursing care bundles at the bedside (Jansson et.al., 2018).

Discussion

The literature shows that nursing implementation of VAP bundles of care is imperative to decrease the incidence rate of VAP, the number of days patients spend on a

ventilator and the time patients spend in the ICU. Nursing implementation of VAP bundles of care is significantly influenced by nursing education and experience in the ICU hospital setting. Nursing compliance with policies regarding bundles of care for VAP needs to increase to prevent these deadly, preventable HAI's from occurring. It is important that careful consideration is taken when determining what is in a VAP nursing bundle of care to decrease incidence rate of VAP to meet the goal of decreasing infection in ICU patients. In simple terms, there needs to be effective interdisciplinary communication between bedside nurses and hospital administrators that create and enforce nursing policies. In turn, this will help to propel nursing compliance with care bundles at the bedside and provide better educational resources and policies for nursing staff to follow. Nurses will be better equipped to provide preventative care and obligated to follow policies that result from nursing and hospital staff communication. The fact that there are existing variations in policies across ICU's, long term acute care facilities and hospitals means that there are discrepancies and disparities in preventative nursing care; this is not the result of a lack of nursing compliance or education, but the result of distinct differences in nursing policy and training. Discussing and improving these policies will help to increase nursing education and compliance, along with decreasing preventable infections such as VAP.

As a result of the variations that exist in the policies of preventative nursing care, it is essential that nurses are provided with a standardized approach to VAP care bundles that are ebp's. There are certain VAP care bundle interventions that bedside ICU nurses follow effectively and others that are poorly adhered to; therefore, there is a need to include some sort of reminders and prompting in the EMR of patients while remaining

vigilant to reducing alarm fatigue in nurses. This will increase nursing compliance and time management of nurses, two specific challenges nurses face when implementing nursing care bundles for mechanically ventilated patients. It is shown that by overcoming these challenges posed to nurses this will increase nursing adherence to care bundle interventions and decrease VAP infection rate. Overcoming institutional barriers and variation will propel adequate reinforcement of VAP bundle interventions for ICU nurses at the bedside. The goal is to save more lives, and have more patients survive mechanical ventilation without suffering from this secondary, preventable infection. We must bring light to these challenges nurses face when implementing VAP bundles of care to create effective, long-lasting change in preventative care policies.

Limitations

There are several limitations that exist throughout the systemic literature review that was conducted. The first being there was only one database utilized to acquire articles and conduct a mass literature search, CINAHL Plus with Full Text. If another database had been used, then perhaps more articles could have been found. Secondly, a portion of the data found was population specific to patients with secondary diagnosis and chronic diseases in the ICU, therefore the patient population may impact findings. Third, there was a lack of relatable research on the topic, and limited published studies, therefore the data was not coherent with the issues at hand. This may impact findings due to a lack of information from the few studies found, and the variation existing between articles found.

Conclusion

The risk of patients developing ventilator associated pneumonia is increased due to decreased nursing compliance that is significantly correlated to nursing education and experience. Ultimately it is up to nursing staff to reduce infection and prevalence rates in mechanically ventilated ICU patients due to their constant presence at the bedside. Effective communication between nursing management and bedside nurses in the ICU is the most essential strategy to enforce education. In turn, this will increase nursing compliance and decrease VAP rates. Hospitals and healthcare institutions need to provide standardized nursing policies to further enforce ebp's at the bedside, and support preventative, safe and effective nursing care. Preventative care is not always the main priority and is susceptible to nursing and physician variation. Therefore, to provide optimal care for mechanically ventilated patients and reduce VAP infection rates, hospitals must take urgent action to create effective change in nursing policies and overcome institutional barriers. In the future, to enforce effective, preventative nursing care bundles and improve patient outcomes of mechanically ventilated patients, it is vital hospitals address discrepancies that exist between medical institutions and nursing care.

References

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.

Jansson, M.M., Syrjala, H. P., Talman, K., Merilainen, M. H., & Ala-Kokko, T. I. (2018). Critical care nurses' knowledge of, adherence to, and barriers toward institution-specific ventilator bundle. *American Journal of Infection Control, 46(9),* 1051-1056

Klompas M. Ventilator-Associated Events: What They Are and What They Are Not. Respir Care. 2019 Aug;64(8):953-961. doi: 10.4187/respcare.07059. PMID: 31346070.

Ladbrook: Ladbrook, E., Bouchoucha, S. L., & Hutchinson, A. (2019). Lessons learned from a rapid implementation of a ventilator-associated pneumonia prevention bundle. *Journal of infection prevention*, *20*(6), 274-280.

Mahmudin, A. A., Chalidyanto, D., Martanto, T. W., Semedi, B. W., Yulaicha, & Solichah. (2020). Reducing incidence rate of ventilator-associated pneumonia (VAP) using prevention bundle in the ICU. *EurAsian Journal of Biosciences*, *14*(2), 3193–3199.

Muscedere, J. G., Day, A., & Heyland, D. K. (2010). Mortality, Attributable Mortality, and Clinical Events as End Points for Clinical Trials of Ventilator-Associated Pneumonia and Hospital-Acquired Pneumonia. *Clinical Infectious Diseases*, *51*, S120–S125. http://www.jstor.org/stable/20750767

Parisi: Parisi, M., Gerovasili, V., Dimopoulos, S., Kampisiouli, E., Goga, C., Perivolioti, E., ... & Nanas, S. (2016). Use of ventilator bundle and staff education to decrease ventilator-associated pneumonia in intensive care patients. *Critical Care Nurse*, *36*(5), e1-e7.

Sedwick, M. B., Lance-Smith, M., Reeder, S. J., & Nardi, J. (2012). Using evidence-based practice to prevent ventilator-associated pneumonia. *Critical care nurse*, *32*(4), 41-51.

Shahnaz, A., Bhardwaj, U., Tamang, E. K., & Dwivedi, S. (2018). A Comparative Study to Assess the Competency among Icu Nurses in Using Ventilator Associated Pneumonia Bundle to Prevent Ventilator Associated Pneumonia in Selected Government and Private Hospitals of New Delhi. *International Journal of Nursing Education*, *10*(3).

Yazici, G., & Bulut, H. (2018). Efficacy of a care bundle to prevent multiple infections in the intensive care unit: A quasi-experimental pretest-posttest design study. *Applied Nursing Research*, *39*, 4-10.