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# An Educational Intervention for Perioperative Nurses on Venous Thromboembolism Prophylaxis

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
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the review committee have been made.

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Walden University
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Abstract

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## Abstract

Research has demonstrated that enhancing a nurse's knowledge and awareness may result in positive patient, provider, and organizational outcomes. In a local organization, there had been a 25% increase of postoperative venous thromboembolisms (VTEs) within the last 12 months. The purpose of this doctor of nursing practice (DNP) project was to determine whether an educational intervention focused on VTE and the standards of care for VTE prevention increased knowledge and awareness among perioperative nurses working in the local organization. Benner's novice to expert theory and King's goal attainment theory provided the framework for the DNP project. Thirty-eight nurses were invited and 23 perioperative nurses participated in the educational intervention for a 61% response rate. The mean pretest score for knowledge was 92.70 ($SD$ = 5.61) with a range of scores between 83 and 100, and the mean posttest score was 97.26 ($SD$ = 4.23) with a range of 91 to 100. Results of a Wilcoxon signed rank test indicated a statistically significant difference in pretest and posttest knowledge scores ($z$ = -3.06, $p$ < 0.01). This project may contribute to social change by increasing nurses' ability to translate knowledge into practice to improve patient and organizational outcomes.

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# Dedication

This doctoral project is dedicated to perioperative nurses. It is my hope that this nursing education project will enhance their professional education and improve their care for surgical patients in preventing postoperative venous thrombosis embolism. Further, I dedicate this doctoral project to all patients who have experienced venous thrombosis embolism postoperative complications due to the lack of education in the perioperative nursing profession. As a perioperative nurse, I believe that it is the provider's responsibility to provide the best care possible. I comprehended the importance of venous thrombosis embolism prophylaxis once I became a leader and was involved in quality outcomes. Frontline nurses must take ownership and bring awareness to their patient's quality of care, and this comes from education.

# Acknowledgments

I want to thank my Heavenly Father for giving me the strength to keep pressing forward with my professional goals. The assistance provided by my Doctor of Nursing Practice committee chairperson, Dr. Marilyn Stankiewicz Losty, and committee member, Stacy Lourie, was greatly appreciated. Dr. Losty, you have always made me feel sure of myself and that this would be a fun and exciting adventure. Thank you for always being available and encouraging with your kind and gentle words. Most of all, it is without a doubt that I was blessed with the best committee chairperson.

Next, I would like to acknowledge my husband, Roger Evans Sr., for always being in my corner and supporting my drive for excellence in my career. I promise, this is it! To my mom, Patsy McGhee, who wears the proud mother badge, thank you for believing in me. I love you more than words would ever show. My children, Roger, Rakevia, and Anjelica, for always asking about my paper and progress in school. The McGhee, Kilpatrick, Evans, and Carter families for their encouragement. To my dear friend, Dr. Vickey Ford, thank you for all the motivation and inspiration throughout our journey.

Throughout this process, I extend my special thanks to Dr. Rodney Martin and Dr. Shariff Abdou-Salaam, my preceptors and mentors. Thank you for supporting me and ensuring our surgical patients receive quality care. Big special thanks to Dr. Dishmon for all the support toward the end of this journey. Lastly, thank you for your understanding and never-ending support to my Eureka Truevine Baptist Church, Moolah Court 22, and Q-Leap Health family.

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Section 1: Nature of the Project

## Introduction

Venous thromboembolism (VTE), more commonly known as a blood clot, is a condition in which a gel-like cluster of blood forms in a vein and blocks blood from flowing (Centers for Disease Control and Prevention [CDC], 2020). There are two types of VTE: deep vein thrombosis (DVT) in which a blot clot forms in a deep vein, and pulmonary embolism in which a DVT clot breaks free and travels to the lungs (AHA, 2022). VTE is the third leading vascular diagnosis following a myocardial infarction or stroke and affects approximately 900,000 Americans each year (CDC, 2020).

VTE is a severe hospital-acquired preventable complication that is the third most common cause of hospital deaths postoperatively (Nicholson et al., 2020). It is estimated that 60,000 to 100,000 people die of VTE each year, and among those who have VTE, one third to one half of individuals will have long-term complications such as swelling, pain, discoloration, and scaling in the affected limb (CDC, 2020). Moreover, 10%–30% of individuals diagnosed with VTE will die within 1 month of diagnosis (CDC, 2020). Along with the diagnosis of VTE, there are many complications of VTE, which include prothrombic syndrome and chronic thromboembolic pulmonary hypertension.

Surgical patients have a more significant risk for developing VTE compared to other patient populations (CDC, 2020). Further, VTE is the second most common cause of increased length of stay and the third most common cause of excess mortality in this population with medical costs estimated to total $5 to $10 billion per year (Geerts et al, 2008). Per patient, acute treatment for VTE ranges between $12,000 and $15,000 per

patient (Grosse et al., 2016), and with a readmission rate of 18% for VTE patients within 30 days of discharge, an additional expense of $10,000 per patient is incurred. Moreover, patients who survive VTE develop recurrent VTE within 5 years after discontinuation of anticoagulation treatments, increasing the cost for VTE inpatient and outpatient to $82,110 (Grosse et al., 2016). Given these data, VTE is a cause for concern among providers and health care organizations.

The American Society of Hematology (ASH) created guidelines for providers and practitioners based on surgical procedures, admission status, and the patient's risk of VTE and bleeding to prevent VTEs among the surgical patient population (D. R. Anderson et al., 2019). It is imperative for the nursing profession to understand and implement these approved guidelines for VTE interventions for all surgical patients. One plausible strategy to ensure that nurses are aware of this important issue is through education focused on VTE and its risk factors, assessing patients for VTE, and the most current VTE guidelines to prevent VTE in this vulnerable patient population.

As part of Walden University's (2020) mission, students are empowered to make a difference in their personal, professional, and global communities. Education is one avenue in which social change may occur because education is a strategy for social adaptation. The current staff education project has the potential to promote positive social change by educating nurses on an important topic with the hope that the knowledge will be translated into practice and result in positive patient, provider, and organizational outcomes.

## Problem Statement

Research has demonstrated that surgical patients are at highest risk for VTE, and practice guidelines to address VTE and VTE prevention exist (CDC, 2020). Despite current information regarding VTE, nurses' knowledge and awareness of VTE is insufficient and often not implemented (Nicholson et al., 2020). By educating and enhancing nursing practice with regard to VTE and VTE practice guidelines, these interventions may mitigate the incidence of VTE rates among this vulnerable population (Ma et al., 2018). Nurses are vital participants as frontline health care providers. Educating perioperative nurses about VTE, the causes of VTE, and preventive strategies of VTE is one plausible strategy to mitigate the challenges of VTE. The purpose of this doctor of nursing practice (DNP) project was to determine whether an educational intervention focused on VTE and the standards of care for VTE prevention increased knowledge and awareness among perioperative nurses working in a local organization.

## Purpose Statement

As demonstrated by the literature, surgical patients are at greatest risk of developing a preventable VTE postoperatively (CDC, 2020). At the project hospital, there had been a 25% increase of postoperative VTEs within the last 12 months (Premier, 2022). Research has demonstrated that by enhancing a nurse's knowledge and practice, the patient's quality of care in preventing VTE may be improved (Yohannes et al., 2022). The gap in practice was the lack of knowledge and awareness of VTE, risk factors for VTE, and the most current VTE guidelines to reduce and prevent VTE in this vulnerable patient population. The purpose of this DNP project was to determine whether an

educational intervention focused on VTE and the standards of care for VTE prevention increased knowledge and awareness among perioperative nurses working in a local organization. The practice-focused question for this project was the following: Did an educational intervention focused on VTE and the standards of care for VTE prevention increase knowledge and awareness in perioperative nurses? I hoped that the increased education and awareness would be translated into practice and promote positive patient, provider, and organizational outcomes.

## Nature of the Doctoral Project

In 2018, ASH and McMaster University created comprehensive guidelines to assist providers in clinically managing those patients at risk for VTE. The Agency for Healthcare Research and Quality monitors Patient Safety Indicator 12 (PSI-12) metrics for reportable perioperative VTEs (Bhakta et al., 2022). These guidelines, along with the current literature, were used as credible sources of evidence for the current project.

Following Walden University Institutional Review Board (IRB) approval, I worked with my preceptor to identify three to five stakeholders to be part of the DNP stakeholder team and collaborated with them to gain support and further insight into the organization's identified problem. I conducted a thorough review of the literature to understand the current state of the science regarding VTE, risks of VTE, and preventive strategies to address VTE. With the stakeholders' input and the current literature, I developed an educational intervention to address the project question. Along with the educational program, I created a pretest and posttest to evaluate the educational intervention.

Once the materials were developed, the identified stakeholders reviewed them and established the Individual-Content Validity Index (I-CVI) and Scale-Content Validity Index (S-CVI) of the educational program, pretest, and posttest (Polit & Beck, 2006). Once content validity was established, perioperative nurses currently working in the operating room and post-anesthesia care unit were invited to attend an educational intervention. Prior to the educational intervention, the nurses were asked to complete a pretest, and following the educational intervention the nurses were asked to complete a posttest. Pretest scores were compared with posttest scores using a unique identifier to determine whether there was an increase in knowledge and awareness of VTE, risks of VTE, and preventive strategies to address VTE. I expected that a difference in pretest and posttest scores would be found, indicating an increase in knowledge and awareness of this important topic.

## Significance

A list of potential stakeholders for this project was created and reviewed by the DNP mentor for availability and willingness to serve on the DNP project team. Given that successful implementation of a change requires input and buy-in from all possible stakeholders and leadership support from all aspects of the organization, stakeholders included the perioperative nurses, the nurse manager of the operating room and post-anesthesia care unit, chief of surgery, chief nursing officer, chief medicine officer, surgeons, and a pharmacy representative. These individuals brought their area of expertise and contributed to the doctoral project by partnering with me and my DNP mentor. This educational intervention aligned with Walden University's (2020) goals for

positive social change. I hoped that the educational intervention would translate into practice and would result in positive patient, nurse, and organizational outcomes.

## Summary

Empowering nurses through education is essential for efficient communication, leadership, problem solving, and critical thinking skills regarding VTE prevention. For nurses' ongoing education, it is necessary to include knowledge regarding VTE and the standard of care for VTE patients to promote positive patient outcomes. I hoped that once the nurses were educated, they would be prepared to translate the knowledge into practice and implement the recommended preventive treatment (Green & Bernhofer, 2018). Section 2 focuses on the background and context of the project.

Section 2: Background and Context

## Introduction

Through education, nurses are empowered to design and implement interventions that improve patients' overall outcomes (American Association of Colleges of Nursing, 2006). However, nurses must first believe that a change starts by advocating for the patients towards high-quality care (Ellenbecker et al., 2017). The purpose of this DNP project was to determine whether an educational intervention focused on VTE and the standards of care for VTE prevention increased knowledge and awareness among perioperative nurses working in a local organization. The practice-focused question for this project was the following: Did an educational intervention focused on VTE and the standards of care for VTE prevention increase knowledge and awareness in perioperative nurses?

## Concepts, Models, and Theories

Nursing theories, concepts, and models are used in nursing to help nurses understand patients, their specific needs, and care delivery. According to Younas and Quennell (2019), nurses should continue to acclimate and use nursing theories to build knowledge and skills because nursing is an ongoing learning process. Nurses should set goals to learn new information for the delivery of quality care to their patients, and nurse educators and nurse leaders should have a complete understanding of how to deliver the educational intervention to nursing adult learners. Therefore, I used Benner's novice to expert theory and King's goal attainment theory to support my DNP project.

**Benner's Novice to Expert**

Benner's novice to expert theory has five stages that a learner progresses through before accomplishing the expert level: (a) novice, (b) advanced beginner, (c) competent, (e) proficient, and (f) expert. I assumed that the nurses attending the intervention would be from all levels of Benner's theory. However, given that the progression from novice to expert is not a linear process, I assumed that the individuals may or may not have had expertise on the intervention topic, and therefore had the potential to move along the continuum regardless of their starting point (see Quinn, 2020). By approaching the topic from a novice starting point, the learner can move throughout this process as new knowledge and skills are presented and reviewed (Ozdemir, 2019). I hoped that the educational intervention would provide the perioperative nurses with a broader understanding VTE and its standards of care for surgical patients by bringing knowledge and awareness of the five stages of learning (see Quinn, 2020).

**King's Goal Attainment**

King's goal attainment theory is centered around four key factors: (a) the nurse–patient relationship, (b) mutual understanding, (c) the patient's goals, and (d) the nurse's knowledge level to establish goals. The goal of the goal attainment theory is effective communication between the patient and the nurse; therefore, the nurse must have a relationship with the patient as well as the knowledge of the topic to communicate with and educate the patient on VTE and VTE prophylaxis (Adib-Hajbaghery & Tahmouresi, 2018). However, one of the main reasons VTE is not administered to patients is the patient's resistance or refusal (Lau et al., 2017). By understanding and listening to the

patient, the nurse will be able to overcome this resistance and create a patient's plan of care that is patient centric. Applying the goal attainment theory to this project supported the nurse–patient relationship and the nurse's knowledge to educate and address the patient's misconception of therapy.

## Relevance to Nursing Practice

A literature review was conducted through the Walden University online databases: Medline Complete, CINAHL Complete, and Cochrane Library. The review search was limited to 5 years or less. The search terms used included *VTE*, *venous thromboembolism*, *DVT*, *deep venous thrombus*, *PE*, *pulmonary embolism*, *VTE prophylaxis, blood clots*, *post-operative, education*, *surgery*, and *prevention*. Sixty-one articles were identified, and after I eliminated duplicates and unrelated content, 42 were relevant. After a review of abstracts, 33 articles were identified. From these 33 articles, the following themes were identified: VTE standards of care, VTE and complications, populations at risk for VTE, the need for nursing education, and the importance of engagement.

### VTE Standards of Care

In 2018, ASH endorsed the need for a standard of care for VTE prevention. As a result, ASH created a series of guidelines on screening, prevention, and treatment for VTE to reduce the risk of VTE, treat VTE among hospitalized patients, and promote positive patient outcomes. The guidelines recommended high-risk surgical patients receive the appropriate VTE prophylaxis according to the type of surgery and

comorbidities. One of the 10 guidelines developed was the prevention of VTE in surgical patients (ASH, 2018).

According to Rafiq et al. (2017), surgical patients are at a high risk of developing VTE, yet only 58.5% of surgical patients at risk for VTE receive the appropriate prophylaxis treatment. Further, Qin et al. (2020) posited that there are various ways nurses can prevent VTE in postoperative patients. First, nurses have the responsibility to educate the patients regarding VTE and its prevention strategies. However, for nurses to educate patients, they need to be proficient on the topic (Quinn, 2020). Therefore, educating nurses on VTE standards of care is imperative for positive patient outcomes. Rafiq et al. concluded that patients whom nurses educated on a topic are more likely to comply with the providers' orders.

Second, Qin et al. (2020) hypothesized that nurses should be able to assess the patient's risk for bleeding and the possibility of receiving pharmacological therapy. According to Chindamo and Marques (2021), despite the evidence supporting the use of thromboprophylaxis for surgical patients, prescribed pharmacological therapy is suboptimal. A worldwide constitute for improperly ordering pharmacological VTE prophylaxis is the fear of hemorrhaging. Nurses must be empowered through education to understand bleeding risk for appropriate administration of thromboprophylaxis. Bleeding risks assessment is necessary during the educational phase of educating the nurses; nurses must understand modifiable risk factors for bleeding. Nursing education regarding adequate thromboprophylaxis decreases hospital expenditures, eliminates fear of bleeding, and increases the quality outcome of the patient (Qin et al., 2020).

Last, nurses should be able to assess the need for and the proper operation of the VTE mechanical devices. Strategies and standards of care can be implemented to prevent and treat VTE. Although the use of mechanical VTE prophylaxis has no bleeding risk, the mechanical device can be uncomfortable and damage the skin if improperly applied to the lower extremities, causing additional harm to the patient (Ajmal et., 2021). Nurses should assess for contraindications before applying mechanical VTE devices on a patient with impaired skin integrity. Also, nurses must have a sufficient knowledge base for application of the device.

**VTE and Its Complications**

VTE is a preventable health concern contributing to most DVTs and pulmonary embolisms in patients; therefore, immediate diagnosis and treatment are required to prevent complications. Post-thrombotic syndrome (PTS) is a potentially debilitating condition that develops in 20%–50% of DVT patients even when appropriate therapy is implemented (Kahn, 2016). Typical PTS symptoms include leg pain, limb swelling, and sensations of leg heaviness. Symptoms of PTS usually occur within 3 to 6 months after a DVT but can occur up to 2 years following a DVT (Kahn, 2016).

Although the indicators of PTS are not understood, 20%–50% of asymptomatic patients who recovered from VTE develop PTS (Makedonov et al., 2020; Winter et al., 2017). The diagnosis for PTS is confirmed 3–6 months after the acute DVT is resolved. Chronic pain and heaviness sensation in lower extremities with cramping, itching, and tingling are symptoms of PTS, whereas swelling, lower peripheral discoloration, and severe skin ulceration are signs of PTS (Engeseth et al., 2021). Anticoagulants, low-

molecular-weight heparins, anti-inflammatory medications, and physical activities are types of treatment for PTS. The goal of treatment is the prevention of complications after DVT disease.

Another complication of VTE is chronic thromboembolic pulmonary hypertension (CTEPH), which is a rare and potentially fatal form of elevated blood pressure in the lungs (Robbins et al., 2017). Signs and symptoms of CTEPH are shortness of breath, lethargy, chest pain, and edema in lower extremities. Clinicians must be knowledgeable of the patient's presentation of symptoms to identify and treat the disease. Improper or delayed treatment of CTEPH may result in progressive pulmonary vascular obstruction, right heart failure, and death (Robbins et al., 2017). Because of the misdiagnosis and rare form of this disease, patients with CTEPH often have inadequate quality of life. Therefore, it is recommended that patients with CTEPH be identified and referred for surgical intervention (Robbins et al., 2017).

**Population at Risk for VTE**

VTE predominantly affects surgical and medical patients in the acute care hospital setting (Collins et al., 2010). It was traditionally thought that VTE was the result of one of three underlying factors: "vascular endothelial damage, stasis of blood flow, and hypercoagulability of blood" (F. A. Anderson & Spencer, 2003, p. 10). However, research has demonstrated that VTE patients tend to have numerous acquired risk factors including age, obesity, prolonged immobility, multiple trauma, and chronic heart failure that may contribute to VTE (F. A. Anderson & Spencer, 2003). Moreover, there are external factors such as major surgery, multiple trauma, hip fractures, or low extremity

paralysis that may contribute to VTE and may encourage providers to consider VTE prophylaxis for these types of patients (Konstantinides et al., 2019; Waheed et al., 2021). Although most patients are diagnosed with VTEs in the emergency department prior to surgery, 80% of VTE patients have one or more risk factors. Therefore, identifying and promoting proper treatment of VTE among these patients at risk is essential to prevent VTE (McLendon et al., 2022).

**Importance of Education**

Research has demonstrated a connection between education, patient safety, quality outcomes, the patient experience, and patient–nurse engagement (Brooks Carthon et al., 2019). However, Shoghi et al, (2019) posited that there is often a significant gap between nurse–patient engagement and care delivery at the bedside due to a lack of knowledge of a specific disease or care process. As a result, nurse leaders must understand the importance of education among nurses and how education may influence care delivery at the bedside (Dempsey & Assi, 2018).

This can be easily applied to educating nurses regarding VTE and standards of care for VTE. As recommended by the guidelines, all surgical patients should have a VTE risk assessment as part of their hospital admission and receive the appropriate VTE prevention and treatment according to their level of risk and existing comorbidities (Collins et al., 2010). However, for this to occur, nurses must be educated on VTE and standards of care for VTE to care for these patients. Collins et al. (2010) posited that nurses with expert knowledge have a prominent role in influencing and implementing change in health care delivery and practice.

In addition, nurses should be educated with expert knowledge regarding VTE to collaborate with other health professionals regarding this important disease. Horntvedt et al. (2018) posited that collaborating is about working effectively as a team to achieve an optimum outcome through the implementation of the best clinical practices and a holistic model of care whereby the nurses ensure that patients are protected from avoidable adverse events. Through education of nurses about VTE and the standards of care for VTE, the knowledge may be translated into practice, which may result in the adoption of preventive and treatment metrics that may reduce the incidence of VTE and improve patient and organizational outcomes. Improving the quality and safety of patients is a major health care goal for nursing. Therefore, educating nurses on this important topic may prevent patient harm caused by VTE (Dempsey & Assi, 2018).

## Local Background and Context

The project's setting was a nonprofit, faith-based community hospital in the southeastern United States. The hospital has served a low socioeconomic community for many generations, made up of 99% African Americans living below the federal poverty line. The hospital provides emergent, orthopedic, general, women, and cardiac care services. The Joint Commission, the Centers for Medicare and Medicaid Services, the Agency for Healthcare Research and Quality, and the American College of Surgeons have mandated reportable VTE outcomes with the mission of decreasing VTE.

In 2021, the project organization had seven PSI-12 VTEs, experienced by the patients (see Lau et al., 2018). Two of the seven VTEs were pulmonary embolisms, and five of the VTEs were DVT. All patients survived their disease; however, the long-term

complications of the VTE were unknown. The organizational leadership determined that this was a cause for concern, which became the topic of my DNP project. The purpose of the DNP project was to determine whether an educational intervention focused on VTE and the standards of care for VTE prevention increased knowledge and awareness among perioperative nurses working in the local organization. The practice-focused question for this project was the following: Did an educational intervention focused on VTE and the standards of care for VTE prevention increase knowledge and awareness in perioperative nurses? The approval of the educational content was a collaborative process with the preceptor, the perioperative nurse educator, and the administration team. The project was conducted in this setting by bringing knowledge and awareness to the nurses through education regarding VTE prophylaxis for the surgical population at risk for VTE.

## Role of the DNP Student

As a perioperative nurse for 19 years and a nurse leader for 3 years at the project site, I understood VTE and the risks of VTE among surgical patients were paramount for quality patient care. In 2021, the project site had seven PSI-12 VTEs. Given my role in the organization, it was my responsibility to ensure that all surgical patients receive the appropriate VTE prophylaxis care in the perioperative stages. To achieve this goal, I recognized that education does not stop once a nurse completes his or her last class or clinical rotation. In a constantly changing health care environment, education is paramount because knowledge and skills are essential qualities of a nurse (Quinn, 2020). By educating nurses on this important topic, I hoped that the knowledge would be

translated into practice, thereby improving patient outcomes and promoting social change.

My project was supported by the American Association of Colleges of Nursing DNP Essentials. Specifically, this project addressed Essential II: Organizational and Systems Leadership for Quality Improvement and System Thinking; Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes; and Essential VII: Clinical Prevention and Population Health for Improving the Nation's Health (American Association of Colleges of Nursing, 2006). According to Lau et al. (2017), missing pharmacologic VTE prophylaxis contributes to VTE in hospitalized patients. Patient refusal is the typical documentation by nurses for VTE prophylaxis non-administration.

Educating nurses and providing evidence-based practice theories regarding the necessity for prescribed VTE prophylaxis would empower the nurses to educate the patients. In addition, educating the patients would decrease the knowledge gap involving VTE administration (Haut et al., 2018). Educating and engaging nurses are critical components for therapeutic intervention for quality improvement of patient outcomes for VTE prevention.

## Role of the Project Team

The project team consisted of several members. First, a senior leadership team was created consisting of the director of pharmacy, chief of surgeon, and chief nursing officer. This team was responsible for approving the project. A second team was created consisting of the director of quality, clinical directors of perioperative units, and nurse

educators. This team was responsible for reviewing the educational intervention, the pretest, and the posttest, and providing insight to these tools. Once the tools were finalized, these stakeholders reviewed and established the content validity for the educational intervention, pretest, and posttest using the I-CVI and S-CVI (Polit & Beck, 2006). The team used Microsoft Teams to share their expertise and correspond. The timeline for feedback was scheduled for 1 week after the first meeting.

## Summary

Nurses have many responsibilities in patient care, and their practice depends on their education and experience. The literature supported the use of best practices among surgical patients at risk of VTE, and nurses needed to be educated on those best practices with the hope that the education would translate into practice to promote positive patient, provider, and organizational outcomes. Section 3 addresses the development and delivery of the collection and analysis of the evidence for the VTE prophylaxis educational intervention for perioperative nurses.

Section 3: Collection and Analysis of Evidence

## Introduction

Surgical patients have more significant risk for developing VTE. VTE rates have increased over the years, warranting immediate intervention in preventing VTE in this population (Ma et al., 2018). The current project's setting was a nonprofit, faith-based community hospital in the southeastern United States that serves a low socioeconomic community. The organization provides emergent, orthopedic, general, women, and cardiac care services. In 2021, this organization had seven PSI-12 VTE. PSI-12s are reportable adverse VTE events experienced by patients (Lau et al., 2018). Therefore, an educational intervention was warranted in educating nurses for the safety of all surgical patients.

## Practice-Focused Question

The gap in practice indicated the need for increased knowledge and awareness of VTE and the standards of care in VTE prophylaxis among surgical patients at the local organization. Through effective education, nurses can practice at the highest levels of their profession. In addition, educated nurses can implement orders, educate patients, and collaborate with prescribers regarding missing VTE prophylaxis orders (Ma et al., 2018). The purpose of this DNP project was to determine whether an educational intervention focused on VTE and the standards of care for VTE prevention increased knowledge and awareness among perioperative nurses working in a local organization. The practice-focused question for this project was the following: Did an educational intervention

focused on VTE and the standards of care for VTE prevention increase knowledge and awareness in perioperative nurses?

## Definitions of Terms

The following operational keywords are defined as used throughout this DNP project:

*Perioperative nurses*: Registered nurses who work closely with surgeons, anesthesiologists, nurse anesthetists, surgical technologists, and physician assistants. Perioperative nurses work in the preoperative, intraoperative, and postoperative stages of a patient's care.

*Venous thromboembolism (VTE)*: A DVT and a pulmonary embolism are the two complications of a VTE (Nicholson et al., 2020).

## Sources of Evidence

A literature review was conducted through the Walden University online databases: Medline Complete, CINAHL Complete, and Cochrane Library. The review search was limited to 5 years or less. The search terms used included *VTE, venous thromboembolism, DVT, deep venous thrombus, PE, pulmonary embolism, VTE prophylaxis*", *blood clots, post-operative, education, surgery,* and *prevention*. Sixty-one articles were identified, and after I eliminated duplicates and unrelated content, 42 were relevant. After a review of abstracts, 33 articles were identified.

For the DNP project, the need for an educational program on VTE and the standards of care for VTE in surgical patients was warranted in the organization. Various evidence resources with practice guidelines were available regarding VTE, standards of

care for VTE, and prevention of VTE. Although systematically reviewed evidence existed, knowledge and awareness of VTE was limited among perioperative nurses despite the supportive clinical evidence (see Bartlett et al., 2020) due to lack of education among nurses in the operating room and post-anesthesia care unit. The purpose of this DNP project was to determine whether an educational intervention focused on VTE and the standards of care for VTE prevention increased knowledge and awareness among perioperative nurses working in a local organization.

## Evidence Generated for the Doctoral Project

The literature review and organizational practices were aligned with the goal of decreasing VTEs in surgical patients. The stakeholders included members of the administration team including the chief nursing officer, chief medical officer, chief of surgery, clinical director of surgery, director of pharmacy, and director of quality and risk management. The approach for the project was an educational program for the perioperative nurses on VTE prophylaxis. The program focused on VTE prophylaxis during the preoperative, intraoperative, and postoperative stages of the patient's surgery. The purpose of the evidence-based practice project was to determine whether an evidence-based education intervention focused on standards of care for VTE prevention resulted in increased knowledge and awareness among perioperative nurses.

### Participants

The organization has eight operating room nurses, eight preoperative and postoperative nurses, and 16 labor and delivery nurses. All 32 perioperative nurses at the local organization were invited to participate in the educational intervention. The

education intervention notice was disseminated via email, text messages, and postings in the break room. The perioperative nurse educator was a lead participant for the project.

**Procedures**

Following Walden IRB approval, I worked with the stakeholder team to gain support and further insight into the organization's identified problem. From the discussion with the stakeholders, I conducted a thorough review of the literature to understand the science's current state. With my stakeholders' input and the current literature, I created an educational intervention PowerPoint presentation to address my project question. Along with the PowerPoint presentation, I created a pretest and posttest. Once these materials were completed, the stakeholders reviewed and established the educational program's content validity, pretest, and posttest using the I-CVI and S-CVI (see Polit & Beck, 2006). The I-CVI is used widely in nursing. It addresses the content validity of individual items with the S-CVI representing the content validity of the overall scale (Polit & Beck, 2006).

Once content validity was established, I created announcements for the educational intervention. The targeted participants for the educational intervention were perioperative nurses currently employed at the local organization. Flyers for the educational intervention were posted in common areas, and an email invitation with attached flyer was shared with the potential participants describing the educational intervention and inviting them to participate in one of the educational interventions. The educational intervention was offered on multiple days and times to encourage participation. Participation in the intervention was voluntary, and the participants did not

receive any compensation. A participant could have withdrawn from the intervention at any time if they were uncomfortable attending.

Before the educational intervention, the participants completed a pretest. First, the participants were asked to create a unique identifier to match the pretest to the posttest. The pretest included three to five demographic questions to describe the sample and 10 true/false questions focused on VTE and the standard of care for VTE. Additionally, the pretest contained two Likert-style questions asking the participant to rate their awareness of the mechanical prophylaxis of DVT and their awareness of the pharmacological prophylaxis of DVT using a scale of 1 to 7 with 1 = *no awareness* and 7 = *full awareness*. Following the educational intervention, the posttest was given. The posttest contained the same 10 questions regarding mechanical and pharmacological prophylaxis of DVT, and two questions focused on awareness.

Using each participant's unique identifier, I matched each pretest to its posttest to determine whether there was a difference in scores between the pretest and posttest, which served as a proxy for increased knowledge. Similarly, pretest awareness scores were matched to posttest awareness scores to determine whether there was a difference in scores, which served as a proxy for increased awareness. No identifying information was collected, and all data were reported in the aggregate. Descriptive statistics were used to describe the sample, and inferential statistics were used to determine whether there was a difference in pretest and posttest scores regarding knowledge and awareness.

**Protection**

Throughout the planning and implementation of this DNP project, I followed all established ethical guidelines according to Walden University and the practicum location. The project was voluntary, no identified data were collected, and all data were reported in the aggregate. This project was a minimal-risk educational project focused on perioperative nurses at the local organization. The project protected the human subjects involved. IRB approval was obtained before the project's inception. At any time, the participants were free to leave the intervention without question or penalty. All questionnaires were identified by a unique identifier known only to the participant, and after completion all questionnaires were kept in a locked drawer in a locked office.

## Analysis and Synthesis

Each pretest was matched to its posttest using the participant's unique identifier. Pretests and posttests were reviewed, and the total number of questions answered correctly created a pretest score and a posttest score. Demographic data along with the pretest and posttest scores were entered into an Excel spreadsheet and uploaded into Statistical Package for the Social Sciences (SPSS) for analysis. Descriptive statistics were used to describe the sample, and inferential statistics were used to determine whether there was a significant difference in pretest and posttest scores regarding knowledge and awareness. All statistical data were reported in the aggregate.

## Summary

Section 3 presented the (a) problem statement, (b) practice-focused question, (c) sources of evidence, and (d) planned analysis and synthesis for the project. The DNP

practice-focused question was the following: Did an evidence-based education intervention focused on standards of care for VTE prevention increase knowledge and awareness in perioperative nurses? The definition of patient safety and optimal health outcome is delivering health care services with intervention without harm to the patient. My DNP project was necessary for all surgical patients because education and knowledge of VTE prevention contribute to optimal health outcomes.

# Section 4: Findings and Recommendations

## Introduction

Research has demonstrated that surgical patients are at highest risk for VTE, and practice guidelines to address VTE and VTE prevention exist (CDC, 2020). Despite current information regarding VTE, nurses' knowledge and awareness of VTE is insufficient and often implemented (Nicholson et al., 2020). Educating and enhancing nursing practice regarding VTE and VTE practice guidelines may mitigate the incidence of VTE among this vulnerable population (Ma et al., 2018) and result in positive patient and organizational outcomes.

In 2021, the project organization had seven PSI-12 VTEs, which are measured, reportable adverse VTE events experienced by patients (see Lau et al., 2018). Two of the seven VTEs were pulmonary embolisms, and five of the VTE were DVT. All patients survived their disease; however, the long-term complications of the VTE were unknown. The organizational leadership determined that this was a cause for concern, which became the topic of my DNP project. The purpose of the DNP project was to determine whether an educational intervention focused on VTE and the standards of care for VTE prevention increased knowledge and awareness among perioperative nurses working in a local organization. The practice-focused question for this project was the following: Did an educational intervention focused on VTE and the standards of care for VTE prevention increase knowledge and awareness in perioperative nurses? The approval of the educational content was a collaborative process with the preceptor, the perioperative nurse educator, and the administration team.

## Findings and Implications

Following the creation of the educational intervention, pretest, and posttest, the DNP project stakeholder team established the I-CVI and S-CVI for each component. Using the I-CVI and S-CVI universal agreement approach (Polit & Beck, 2006), the team rated each component (educational intervention content, pretest, and posttest) using a 4-point scale of 1 to 4, with 1 = *content not relevant* and 4 = *content highly relevant,* and calculated the I-CVI and S-CVI. The I-CVI and S-CVI universal agreement were rated at 1.00 for the educational intervention, pretest, and posttest, exceeding the standard acceptable content validity rating of 0.90 for both item-level and scale-level content validity (see Polit & Beck, 2006).

Following the establishment of content validity, the educational intervention was scheduled and held on site. The intervention took place over 2 days to facilitate attendance. Notification regarding the educational intervention was disseminated via emails, flyers, and postings. Thirty-eight nurses were invited, and 23 nurses participated in the project, capturing 61% of the target population. The participants were asked to complete a pretest prior to the educational intervention. The pretest consisted of creating a unique identifier used to match the pretest to the posttest, five demographic questions, and 10 true/false questions regarding VTE and the standards of care for VTE prevention. After the pretest was completed, the participants were asked to place them in an envelope to maintain anonymity. Once all pretests were collected, the educational intervention was conducted. Following the educational intervention, the participants completed the posttest using their unique identifier. The posttest consisted of the same 10 true/false questions as

the pretest. After each participant completed the posttest, they were asked to place the posttest in an envelope and were free to leave.

**DNP Findings**

A total of 23 individuals participated in the educational intervention. Ninety-six percent (*n* = 22) were women with a mean age 49.8 years (*SD* = 12.07) and a range of 24 to 72 years. From an educational perspective, 56.5% of the participants (*n* = 13) had a bachelor's degree, 30% (*n* = 7) had a master's degree, 9% (*n* = 2) had an associate's degree, and 4.5% (*n* = 1) had a doctoral degree. On average, the participants had 20 years (*SD* = 11.41) of nursing experience with a range of 2 to 40 years and had been in their current position for an average of 6.49 years (*SD* = 7.60) with a range of 0.25 to 38 years (Table 1). The mean pretest score for knowledge was 92.70 (*SD* = 5.61) with a range of scores between 83 and 100. As part of the pretest, participants were also asked to assess their awareness of the importance of preventing VTE in surgical patients using a Likert scale of 1 to 7 with 1 = *no awareness at all* and 7 = *fully aware*. The mean pretest score for awareness of the importance of preventing VTE in surgical patients was 6.70 (*SD* = 0.47) with a range of 6 to 7. Also, the participants were asked to assess their awareness of strategies to address VTE prevention using the same Likert scale of 1 to 7 with 1 = *no awareness at all* and 7 = *fully aware*. The mean pretest score for awareness of strategies to address VTE prevention was 6.48 (*SD* = 0.73) with a range of 4 to 7.

**Table 1**

*Project Sample Descriptive Statistics (*N = *23)*

| Category | *n* | % | Mean (*SD*) | Range |
|---|---|---|---|---|
| Gender | | | | |
| Male | 1 | 4% | | |
| Female | 22 | 96% | | |
| Education | | | | |
| Associate's degree | 2 | 9% | | |
| Bachelor's degree | 13 | 56.5% | | |
| Master's degree | 7 | 30% | | |
| Doctoral degree | 1 | 4.5% | | |
| Age | | | 49.89 (12.07) | 24–72 |
| Years in nursing | | | 20.00 (11.41) | 2–40 |
| Years in current position | | | 6.49 (7.60) | 0.25–38 |

Following the educational intervention, the participants were asked to complete a posttest that included the same 10 true/false questions and the two awareness questions as the pretest. The mean posttest score for knowledge was 97.26 (*SD* = 4.23) with a range of 91 to 100. Also, the participants were asked to assess their awareness of the importance of preventing VTE in surgical patients using a Likert scale of 1 to 7 with 1 = *no awareness at all* and 7 = *fully aware*. The mean posttest score for awareness of the importance of preventing VTE in surgical patients was 6.96 (*SD* = 0.21) with a range of 6 to 7. Also, the participants were asked to assess their awareness of strategies to address VTE prevention on the same Likert scale of 1 to 7 with 1 = *no awareness at all* and 7 = *fully aware*. The mean posttest score of the participants' awareness of strategies to address VTE prevention was 6.96 (*SD* = 0.21) with a range of 6 to 7.

Using a Wilcoxon signed rank test to analyze the data, I compared the pretest scores with the posttest scores to determine whether there was an increase in knowledge

and awareness following the educational intervention by the participants. There was a statistically significant difference in pretest and posttest knowledge scores ($z = -3.06$, $p < 0.01$), indicating an increase in knowledge among the participants. Similarly, using a Wilcoxon signed rank test to analyze the data, I found a statistically significant difference in pretest awareness scores of the importance of preventing VTE in surgical patients as compared to the posttest awareness scores ($z = -2.45$, $p < 0.05$), indicating an increase in awareness among the participants with regard to the importance of preventing VTE in surgical patients. Last, using a Wilcoxon signed rank test to analyze the data, I found a statistically significant difference in pretest awareness scores of strategies to address VTE prevention as compared to posttest awareness scores ($z = -2.89$, $p < 0.01$), indicating an increase in awareness of strategies to address VTE prevention among the participants (see Table 2).

**Table 2**

*Pretest and Posttest Scores for Knowledge and Awareness (*N *= 23)*

| Category | Pretest mean (*SD*) | Posttest mean (*SD*) | Pretest range | Posttest range |
|---|---|---|---|---|
| Knowledge* | 92.70 (5.61) | 97.26 (4.23) | 83–100 | 91–100 |
| Awareness: Importance** | 6.70 (0.47) | 6.96 (0.21) | 6–7 | 6–7 |
| Awareness: Strategies* | 6.48 (0.73) | 6.96 (0.21) | 4–7 | 6–7 |

*Note*. * Statistically significant at $p < 0.01$. ** Statistically significant at $p < 0.05$.

**Implications**

As demonstrated by the findings, the educational intervention increased the perioperative nurses' knowledge and awareness of VTE and the standards of care for VTE prevention. These findings correlate with the literature that education among nurses

can translate into practice and enhance patient, provider, and organizational outcomes (Kavanagh & Sharpnack, 2021). The use of educational interventions to enhance nurses' knowledge demonstrates the ability of education among practicing nurses as a strategy to reduce gaps in practice. The increased knowledge and awareness may then be translated into practice and result in positive patient, provider, and organizational outcomes (Kavanagh & Sharpnack, 2021).

This DNP project has three implications for nursing practice. First, it is important to understand the value of education among nurses and how education may influence care delivery at the bedside (Dempsey & Assi, 2018). When nurses and patients are educated on and aware of VTE and the standards of care for VTE prevention, the knowledge may then be translated into practice, which may result in positive patient outcomes. Research has demonstrated that by enhancing a nurse's knowledge and practice, the patient's quality of care in preventing VTE may be improved (Yohannes et al., 2022). Through effective education, nurses can practice at the highest levels of their profession.

Second, through education of nurses, nurses may become aware of their responsibility to educate the patient and the family on VTE and the standards of care for VTE prevention so that upon discharge, the patient and family are prepared to care for the patient as they transition from one care setting to another. According to Desai et al. (2021), patients who are not empowered with proper discharge instructions have a decreased compliance rate for treatment, increased risk for safety concerns, and greater chance of returning to the hospital or emergency department. Patient education is a critical component of nursing care in helping patients to meet their treatment goals

regarding postoperative VTE prophylaxis. Nurses should consider the patient's and family's literacy level to ensure that the education and instructions are understood.

Last, the results of this project demonstrate the need for regular education regarding VTE and the standards of care for VTE prevention to maintain nurses' knowledge and awareness levels. VTE management is an essential competence for nurses. Nurses are the gatekeepers between patients and providers; therefore, nurses play a pivotal role in VTE prevention and management. Continuing education can enhance nursing knowledge, which can maximize and improve patient care. The results of the project support a comprehensive VTE training program for all units through ongoing education for improved patient outcomes and positive social change.

## Recommendations

Given the results of this DNP project, there are three recommendations that the organization may consider. First, it is recommended that VTE and the standards of care for VTE prevention be included as part of the continuing education for all nurses so that current information may be shared with nurses as a mechanism for enhancing nursing practice. All patients are at risk for VTE; therefore, this educational intervention would benefit all nurses in the organization. Surgical patients represent only a small group of patients at risk for VTEs because hospital-acquired VTEs occur in many departments and units across the organization. By extending this educational intervention to other units and departments, this project may help close the gaps between knowledge and guidelines while improving patient care throughout the organization.

Second, this information should be included in new nurse orientation. Lack of knowledge is often the main reason VTE risk assessments are not performed, thus, by including this information in the new nurse orientation allows the information to reach the nurses so they can implement the knowledge across the organization. Further, this recommendation is grounded in Benner's theory because knowledge is one strategy to assist nurses in moving from novice to expert.

Last, this information should be shared with the education coordinator in the organization so that the information provided in this educational intervention will remain current and be shared with other departments and organizations outside the local organization. The nurse educator's role is to help nursing staff develop and maintain competencies, advance their professional nursing practice, and facilitate their achievement of academic and career goals. Through sharing of this educational intervention with the nurse educator, they may be able to share the information with other nurses and organizations that may benefit from this knowledge.

## Contribution of the Doctoral Project Team

The DNP project consisted of two DNP project teams. The primary DNP team consisted of the chief of surgery, chief nursing officer, chief medicine officer, director of surgery, and director of pharmacy. This executive team approved and supported the project. Once approval was obtained, the second DNP team was created and consisted of the director of surgery, director of quality, educators, surgeons, and pharmacists. This team provided guidance for the educational intervention project and assisted with

establishing the educational program's content validity, pretest, and posttest. Both teams were invested in the success of my DNP project.

## Strengths and Limitations of the Project

The project's major strength was the enthusiasm and zeal of the nurses who participated in the educational intervention. Additionally, the high response rate of the project (61%) added to the validity of the project. Further, the dedicated support from the organization's leadership team and stakeholders to develop and implement the project was an additional strength.

Despite these strengths, there were some limitations to the project. First, the nurses who were targeted for the project were recruited from a convenience sample of nurses working on one unit in a local organization; therefore, the results may not be generalizable to other professional nurses or nursing units. Additionally, the analysis was completed using the average pretest score and the average posttest score. Although one can conclude that the intervention may be responsible for the improvement in scores, there may be other explanations for why the posttest scores may have changed. Last, the scheduling of the educational intervention may have been challenging for some of the nurses who chose not to participate in the project. It is recommended that this project be replicated with a larger sample, perhaps across multiple hospital organizations, to validate results.

## Summary

This section provided the findings, implications, strengths, limitations, and recommendations for the DNP project. The section provided a response to the practice-

focused question and addressed the gap in practiced. Further, recommendations for project replication and additional interventions were identified. Section 5 addresses the dissemination plan and my self-assessment.

# Section 5: Dissemination Plan

## Introduction

The purpose of this DNP project was to determine whether an educational intervention focused on VTE and the standards of care for VTE prevention increased knowledge and awareness among perioperative nurses working in a local organization. The literature supported the importance of education for nurses because education provides an essential part of their clinical competence and their ability to practice to the fullest extent to maximize patient and organizational outcomes (Hooper, 1999; Mlambo et al., 2021). As demonstrated by this DNP project, staff education projects can result in increased knowledge and awareness among practicing nurses. In Section 4, I demonstrated the ability to increase perioperative nurses' knowledge and awareness of VTE and the standards of care for VTE prevention using a staff educational intervention. In Section 5, I discuss the dissemination plan for the project organization and nursing profession.

## Dissemination

As with any project, it is critical that the results of the project be disseminated to stakeholders of the organization. First, the findings of this DNP project will be shared with the DNP project team, who were instrumental in the success of this project. I hope that the next steps will be identified and implemented among these target users. Next, the project will be presented to the unit where it took place. Given that the nurses who participated in the project were anonymous, it is important that the unit receive this valuable information. Other plans for dissemination include other procedural areas in the

organization and sister organizations. Possible dissemination may be to local and national conferences and publication in a perioperative nursing journal.

## Analysis of Self

### As a Practitioner

As a perioperative nurse, I desired to search for a project that involved perioperative nurses. Many perioperative nurses never know if a surgical patient developed a postoperative VTE. The project revealed that VTE prevention starts in the operating room with the perioperative nurses. Education is the key to empowering nurses to improve surgical patient outcomes. I will continue to educate and disseminate this project about VTE prophylaxis prevention in the operating and procedural rooms to bring more awareness to the staff.

### As a Scholar

The DNP project and my academic studies have shaped me into the scholar I am today. I can think critically, reflect, assess, research, apply theory, and disseminate information. Each step of my DNP project enhanced my scholarly development. I will continue using these skills as I continue my nursing professional journey.

### As a Project Manager

Managing a project and staying on task can be challenging but rewarding as the momentum increases. The DNP project required preparation, approvals, guidelines, deadlines, consistency, and perseverance. I learned that the project manager must be organized, knowledgeable, and a team player to be successful.

## Completion of Project

Completing this doctoral project has been an amazing experience. I was challenged from the beginning of the project when choosing whether to do a project focused on VTE prophylaxis or music therapy. Although music therapy would have been a fun project, I decided to select VTE and VTE prophylaxis because this topic addressed the needs of the patients whom I served. I was also challenged in convincing the project site that perioperative nurses needed an educational intervention focused on VTE and VTE prophylaxis. However, I learned that by presenting the evidence that supported the need for the project, the organization's leaders embraced the project. Lastly, given what I learned throughout this project, I see the value of education in nursing and nursing practice. My project has brought me full circle, and I am proud of my scholarly journey at Walden University.

## Summary

Nursing education in any department is critical for positive patient, provider, and organizational outcomes. When nurses are educated, the knowledge is translated into practice. Additionally, the knowledge is translated to the patient because education empowers patients to maintain and improve their health status. This DNP project demonstrated that an educational intervention focused on VTE and the standards of care for VTE prevention can increase knowledge and awareness among nurses working in a perioperative unit. I hope that the DNP project will be the beginning of closing the gap for VTE and the standards of care for VTE prevention in the perioperative setting.

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