# ATTITUDE, SUBJECTIVE NORMS, PERCEIVED BEHAVIORAL CONTROL, AND INTENTION OF EGYPTIAN NURSES TOWARDS PREVENTION OF DEEP VEIN THROMBOSIS AMONG CRITICALLY ILL PATIENTS IN INTENSIVE CARE UNITS

Dissertation submitted to Kent State University College of Nursing in partial fulfillment of the requirements for the degree of Doctor of Philosophy

by

Mona Ibrahim Hebeshy

PhD(c), MSN, BSN

May 2018

Dissertation written by Mona Hebeshy BSN, Suez Canal University, 2006 MSN, Suez Canal University, 2011 Ph.D., Kent State University, 2018

	Submitted to
	, Member, Doctoral Dissertation Committee
Barbara Broome	
	, Chair, Doctoral Dissertation Committee
Dana Hansen	
	, Member, Doctoral Dissertation Committee
Carolyn Murrock	
	, Member, Doctoral Dissertation Committee
Donna Bernert	
	, Member, Doctoral Dissertation Committee
Somaya Abou Abdou	
	Accepted by
	, Director, Joint Ph.D. in Nursing Program
Patricia Vermeersch	
	, Associate Dean for Graduate Programs
Wendy Umberger	

# Dedication

I would like to dedicate this dissertation to my father and my aunt, Ibrahim and Amal, who were very proud of my graduate studies but passed away before being able to see the final product. I miss them every day but know that they always encouraged me to be more than I believed I could be.

## ACKNOWLEDGEMENTS

I would like to express sincere appreciation to thank my committee chair, Dr. Barbara Broome and my amazing committee members Dana Hansen, Dr. Carolyn Murrock, Dr. Donna Bernert, and Dr. Somaya Abou Abdou for their collaboration, and support through this dissertation. Without their continuous encourage and support, I would have never completed this dissertation. I really appreciated all their comments, suggestions, and guidance through the process of developing my ideas and writing the chapters of dissertation.

I am indebted to my academic advisor Dr. Dana Hansen, for her continuous guidance, help and endless support along the PhD way. I would like to thank the panel of experts for providing their valuable insights and critical review of the content validity of the study instrument. I am especially grateful to Dr. John Updegraff, Dr. Kele Ding, Dr. Kristina Knight, Dr. Somaya Abou Abdou, and Dr. Jennifer Taber.

I would like to thank the Egyptian Cultural and Education Bureau, Washington, DC, and Suez Canal University that supported me during this governmental scholarship.

Finally, Special thanks to my family. I'm really grateful to have my husband, Ahmed, you supported me more than any one. I am blessed that you have been by my side through this scientific journey. My dear kids, Fatma, Rodyna, and Youssef, thank you for being the source of happiness in my life. I would like to thank my mom, my sister, my mother in-law, and my brothers, for all their love and support.

ii

# **Table of Contents**

1. CHAPTER I: INTRODUCTION	1
1.1 Background	
1.1.2. Prevalence of DVT	3
1.1.3. Fiscal Implications of DVT.	4
1.1.4. Critically Ill Patients.	4
1.1.5. The Role of the ICU Nurse.	5
1.1.6. Prevention.	6
1.2. Purpose	9
1.3. Theoretical Framework	10
1.4. Significance of the Study	
1.5. Research Questions	17
1.6. Summary	
2. CHAPTER II. LITERATURE REVIEW	19
2.1. Prevalence of Deep Vein Thrombosis and Pulmonary Embolism	19
2.2. Deep Vein Thrombosis	
2.3. Pathophysiology of DVT	
2.4. Risk Factors of DVT	
2.4.1. General Acquired Risk Factors	
2.4.2. Genetic Risk Factors	
2.4.3. Acquired ICU risk factors	
2.5. Signs and Symptoms of DVT	
2.6. Complications of DVT	30
2.7. Critical Care Patients and Risks for Developing DVT	
2.8. DVT Prevention Interventions in Critically Ill Patients	
2.9. Nurses Role in Preventing DVT	35
2.10. Theory of Planned Behavior	37
2.10.1. Utility of Theory of Planned Behavior	40
2.11. Factors Predicting Nurses' Behavioral Intention	

2.11.1. Psychometric properties of developed TPB instruments	46
2.12. Summary of Literature Review	49
3. CHAPTER III. METHODS	51
3.1. Research design	51
3.2. Setting	52
3.3. Measures	53
3.3.1. Development of the items and content validity of the instrument	53
3.3.1.1. Constructing an instrument items using guidelines on constructing questionna based on the TPB.	iire 53
3.3.1.2. Recommended guidelines for development of a TPB measurement tool	53
3.3.1.3. The Intention to Use DVT preventive Measures Questionnaire	55
3.3.2. Judgment /Quantification of The Intention to Use DVT preventive Measures Questionnaire.	56
3.3.2.1. Content validity	57
3.3.3. Questionnaire Translation Process	57
3.3.4. Pilot testing and structure of the Intention to Use DVT Preventive Measures Questionnaire.	59
3.3.5. Psychometric Evaluation and Predictors of Nurses' Intention	60
3.3.5.1. Participants/Sample	60
3.3.5.2. Sample size estimation	60
3.4. Data Collection	61
3.4.1. Institutional Review Board and Ethical Considerations	62
3.5. Validity	64
3.5.1. Confirmatory factor analysis	64
3.5.2. Construct Validity	65
3.5.3. Concurrent criterion-related validity	65
3.6. Reliability	66
3.7. Data Management and Analysis	67
3.8. Summary	68
4. Chapter IV: RESULTS	69
4.1. Phase I Results	69
4.1.1. Questionnaire Development Results	69
4.1.2. Content Validity of the Questionnaire Results	70

4.1.3. Pilot Testing of the Questionnaire Results
4.2. Phase II Results
4.2.1. Data Management
4.3. Psychometric Properties (Construct Validity and Reliability)
4.4. Construct Validity
4.4.1. Factor Analysis
4.4.2. Convergent Validity
4.4.3. Discriminant validity
4.4.4. Criterion-related validity
4.4.5. Internal consistency
4.5. Testing Statistical Assumptions of Multivariate Analysis
4.6. Prediction of Nurse Intention
4.6.1. Analysis of research questions
4.7. Summary of the Findings from Open-Ended Questions
4.6. Chapter Summary
5. CHAPTER V DISSCUSSION
5.1. Discussion of the Results
5.1.1. Psychometric Properties of the Instrument
5.1.2. Predictors of intention to use DVT preventive measures
5.2. Strengths of The Study
5.3. Limitations of The Study 106
5.4. Implications for Nursing and Future Research
5.6. Conclusion
6. <b>References</b>

# APPENDICES

Appendix A: Nurses' Intention to use DVT Preventive Measures Survey Question	nnaire111
Appendix B: Arabic Version of Nurses' Intention to use DVT Preventive Measur	res Survey
Questionnaire	117
Appendix C: Experts Information Letter	122
Appendix D: Participants Information Letter	127
Appendix E: The Ethical Approval from Suez Canal University	129
Appendix F: Support letter	
Appendix G: Study Flyer	131

# LIST OF TABLES

Table 3.1: Items used to assess Theory of Planned Behavior constructs	8
Table 4.1: Demographic Characteristics of the Study Participants	4
Table 4.2: The Correlation Matrix of the TPB items	5
Table 4.3: Items Extracted and Factor Loadings for the nurses' intention	7
Table 4.4: Items in Each Factor and Factor Loadings for the nurses' intention	7
Table 4. 5: Convergent Validity and Composite Reliability of the TPB Constructs	)
Table 4. 6: Discriminant Validity80	)
Table 4.7: Correlations of TPB Subscales with GSE Scale	1
Table 4.8: Reliability as Internal Consistency of TPB Sub-Scales	1
Table 4.9: Descriptive Statistics for the TPB Scale	2
Table 4.10: Intercorrelations for TPB Constructs	1
Table 4. 11: Regression Analysis Summary for TPB Variables Predicting Behavioral      Intention	4
Table 4.12: Coefficient for Final Model	5
Table 4.13:    Multiple Regressions of Attitude, Subjective norms, and Perceived Behavioral Control in Predicting Nurses' Intention	6
Table 4.14:    Attitudinal Beliefs on the Advantages & Disadvantages of Using DVT Preventiv      Measures in the ICU	e 3
Table 4.15: Perceived Behavioral Control Beliefs on the Enablers & Barriers of Using DVT      Preventive Measures in the ICU	0

# LIST OF FIGURES

Figure 1: Model of Theory of Planned Behavior	13
Figure 2: Model of the Study	14
Figure 3: The Study Results	.86

NURSING

# ATTITUDE, SUBJECTIVE NORMS, PERCEIVED BEHAVIORAL CONTROL, AND INTENTION OF EGYPTIAN NURSES TOWARDS PREVENTION OF DEEP VEIN THROMBOSIS AMONG CRITICALLY ILL PATIENTS IN INTENSIVE CARE UNITS

Director of Dissertation: Barbara Broome

#### Abstract

**Background:** Prevention of DVT is an effective method in reducing morbidity and mortality among critically patients in the intensive care units. Previous research has found nurses who lack motivation or have little support for practice change contributed to unsuccessful behavioral changes, suggesting that nurses' attitudes and beliefs strongly predict behavioral outcomes. The Theory of Planned Behavior (TPB) was used to investigate attitudes and behavioral relationships and to understand persons' behavioral intentions in relation to their performance. Furthermore, the TPB has not been used as a theory-based approach to predict nurses' intention to use DVT preventive measures in the ICU.

**Objective:** The purposes of this study were 1) to develop a reliable and valid questionnaire to assess the constructs of the TPB in relation to nurses' intention to use DVT preventive measures and 2) determine whether *attitude, subjective norms and perceived behavior control* predict the ICU nurses' intention to use DVT preventive measures.

**Methods:** A cross-sectional study was conducted on 78 ICU nurse of Suez Canal University Hospital in Egypt. Data was collected via online survey questionnaire based on the TPB constructs. The development of the intention to use DVT preventive measures

ix

questionnaire included several steps. First, the instrument was constructed using the TBP construction guidelines, next the panel of experts provided critical feedback to the development of the questionnaire. After which, the questionnaire was piloted with eight ICU nurses.

**Results:** Convergent and discriminant validity supported the construct validity of the instrument. Cronbach's alpha was >.82 for the TPB scale. Correlation coefficient r = -.115 (p < .001), which did not support the association between intention to use DVT preventive measures and the GSE scales for criterion validity. The results revealed that subjective norms and perceived behavioral control were significant predictors of nurses' intention to use DVT preventive measures in the Egyptian ICU nurses' intention.

**Conclusion:** Subjective norms and perceived behavioral control is a powerful determinant of nurses' intention to use DVT preventive measures in the ICU. The findings support previous studies and the TPB in predicting nurses' intention. This study adds to our understanding of the variables predicting nurses' intention. Hence, the current study can serve as a practical basis for planning and implementing DVT prevention programs and/or articulating or revising the Egyptian hospital policies. Future research can build on the current study by seeking to replicate the findings reported here and expanding the list of demographics variables investigated. Also, to reexamine the scale in other cohorts of nurses.

## **CHAPTER I**

Chapter 1 presents a review of the background, the prevalence of deep vein thrombosis (DVT), and the role of Intensive Care Unit (ICU) nurses in preventing DVT. In addition, a description of the purpose of this dissertation study is discussed. Further, this chapter presents the theoretical framework, theoretical definitions, and the theoretical and study models. The research questions and operational definitions of the study's variables are explained. Finally, this chapter addresses the significance of this study to nursing.

## **INTRODUCTION**

Imperative concerns in the delivery of health care services are quality of care and patient safety, especially during hospitalization. Leading healthcare organizations have called for immediate improvements in care delivery to ensure high quality outcomes, that would prevent harm to patients and reduce unnecessary health care costs. The Egyptian Vascular Society (EVS), The Egyptian Venous Forum(EVF), the Agency for Healthcare Research and Quality (AHRQ), Centers for Medicare and Medicaid Services (CMS), The Joint Commission (TGC), Healthy People 2020, and Centers for Disease Control and Prevention (CDC) have all set goals and expectations for the prevention of preventable, harmful events, such as hospital acquired thromboembolic events (Deep Vein Thrombosis [DVT] & Pulmonary Embolism [PE]), falls, hospital acquired infections, and wrong site-surgeries.

Deep Vein Thrombosis is recognized as a common complication in critically illhospitalized patients (Guyatt et al., 2012; Boonyawat & Crowther, 2015). DVT is a

blood clot that forms in one of the deep veins in the body, most often occurring in the deep veins of the leg, but it also can form in the veins of arms, the mesenteric and cerebral veins (Hanes, 2013; Kucher, 2011; Emanuele, 2008).

**Consequences of DVT.** The consequence of a DVT is a PE that occurs when a DVT clot breaks free from the vessel wall and travels to the lungs where it impedes blood flow and oxygenation (American Heart Association [AHA], 2017). PE is estimated to occur in up to 50% of DVT cases and has a mortality rate of up to 30% (CDC, 2016). This results in poor outcomes and varying rates of harm, including death (Tufano et al., 2011).

The post-thrombotic syndrome is another consequence that evolves into longterm complications; it affects up to one-third of individuals with DVT and causes chronic pain, chronic inflammation, cellulitis, and ulceration of the affected limb; in severe cases, it can require amputation (Anthony, 2013; Streiff, et al., 2014). Unfortunately, up to 30% of patients who survive the first occurrence of a DVT/PE develop another DVT within 10 years (CDC, 2016).

Critically ill patients are at high risk for developing DVT for many reasons such as extended periods of immobilization, mechanical ventilation, and vascular injury or surgery (Streiff et al., 2014). Unsuspected DVT/PE can be present in critically ill patients, causing episodes of hemodynamic instability, hypoxia, and/ or difficulty weaning from mechanical ventilation (McLeod & Geerts, 2011; Pastores, 2009). Intensive Care Unit (ICU) nurses have a fundamental role in assessing and applying DVT preventive measures in vulnerable populations, such as critically ill patients.

## Background

DVT is caused by altering physiologic mechanisms likely to occur with decreased mobility, surgery and traumatic injury. These mechanisms include stasis, endothelial damage, and increased coagulation in the blood vessels (Virchow's Triad) (Restrepo, Jameson & Carroll, 2015). The patient's health history, severity of illness, and surgical intervention puts the patient at risk for thrombus formation. The risks are influenced by patient age (i.e., aged older than 40), history of previous thromboembolism, major surgery, multiple trauma, pelvis or hip fractures, obesity, immobility, indwelling central venous catheter, heart disease, lung disease, malignancy, hormonal therapy and inflammatory bowel disease (AHA, 2017; Makic, 2014). Signs and symptoms of DVT depend on the location of the thrombosis. For example, DVTs can present with swelling, pain/tenderness, erythema in the affected limb, and warmth to touch in the affected area (Makic, 2014).

## **Prevalence of DVT**

Worldwide, DVT and PE are major leading causes of preventable hospital death (Jha et al., 2013; Spencer et al, 2008). DVT and PE affects approximately 900,000 people (1 to 2 per 1,000) in the U.S., resulting in more than 100,000 related deaths annually (CDC, 2016). In 2010, the incidence was 5 million cases of DVT (1 to 2 per 1,000) in Egypt, 10% of these resulted in pulmonary embolism and 10% died due to incorrect diagnosis (Aboul-Eniein, 2010). DVT incidence rates vary from 6.6% to 27.3% in critically ill Egyptian patients (Abdel-Aziz; Elfawwal, & Goubran, 2012; El-Rashedy, 2008); while DVT incidence rates in critically ill patients in the U.S vary

between 0.4% –31%. As a result, the prevalence of reported DVT varies significantly among critically ill patients based on baseline characteristics of patients, prophylactic intervention, methods of DVT screening, and thrombosis location (Barrera, Ker, Cirocchi, Farinella, & Uribe, 2013; Cook et al., 2005) and the underlying disease causing the critical illness. For example, in the general ICU population, the incidence of DVT is between 3.5% and 33% (Miri, Goharani, & Sistanizad, 2017; Cook et al., 2005) whereas in trauma patients, it can reach up 63% (Bendinelli & Balogh, 2008).

Fiscal Implications of DVT. According to the Agency for Healthcare Research and Quality (AHRQ) (2015), DVT and PE are considered a major public health issue in the United States (U.S.) Estimates suggest that 60,000-100,000 Americans die of DVT/PE and 10 to 30% of people with DVT die within one month of diagnosis, Additionally, about 33% will have a recurrence within 10 years (CDC, 2016). DVT can increase hospital length of stay from two to five days and result in excess costs of about \$7,500 per person. Furthermore, PE increases a length of hospital stay by more than five days, resulting in intensive care unit admission, and incurring additional costs of more than \$20,000 per treated individual (AHRQ, 2015; Mahan et al., 2011; Raskob, Silverstein, Bratzler, Heit, & White, 2010). In addition, DVT and PE follow-up costs at three months, six months, and a year in the U.S. are about \$5, 000, \$10,000, and \$33,000 respectively; in Europe, the three and six-month figures are about €1,800 and €3,200 (Ruppert, et al., 2011). The true DVT and PE follow-up costs in Egypt remain unknown.

**Critically Ill Patients.** Critically ill patients are at high risk for developing DVT because they combine both general risk factors and specific intensive care unit (ICU) risk

factors, such as premorbid medical and surgical conditions, invasive tests and treatments, prolonged immobility (often exacerbated by sedation or paralysis), vascular injury from indwelling central venous catheters, sepsis, lower extremities or pelvic fractures, and acute and chronic renal insufficiency (Minet et al., 2015). In addition, critical illness activates the coagulation cascade that may mediate the increased likelihood of DVT (Cohen, 2011). Moreover, the prevalence of DVT and PE is underestimated in the ICU, as it is often clinically silent, especially in sedated and mechanically ventilated patients. ICU-acquired thromboembolic events are difficult to diagnose as they can mimic several other diseases (Minet et al., 2105). *Thus, DVT remains an important area of healthcare research.* 

The Role of the ICU Nurse. The ICU is a specialized area of a hospital where patients with serious illnesses or injuries receive special medical and nursing care. ICU nurses are highly knowledgeable and skilled health care professionals who work in interprofessional teams to provide optimum patient care (Pande, Kolekar, & Vidyapeeth, 2013). The role of critical care nurses in detecting and preventing DVT is important because observation and risk assessment of patients can result in early and prompt diagnosis and treatment with a subsequent decrease in life-threatening complications. In addition, the diagnosis of DVT is generally challenging in ICU patients as their clinical status, such as intubation, sedation, and altered mental states make it difficult to distinguish clinical symptoms of DVT (Abbas, 2017).

The rapid progression and high mortality rate of DVT increases urgency for consistent and effective assessments by ICU nurses that can in turn affect early diagnosis

and treatment. Accordingly, ICU nurses need to increase effectiveness of assessments, apply timely preventive measures, and comply with DVT prevention protocol. Additionally, ICU nurses must share feedback frequently to the whole health care team, provide educational and psychological support to patients, and implement a collaborative inter-professional thromboprophylaxis plan for all patients (Anthony, 2016; Duff, Walker & Omari, 2011; Li, Walker, McInnes, & Duff, 2010; Tooher, et al., 2010).

**Prevention.** Prevention of DVT is more important and cost effective than treatment because once a DVT develops; it is cured at considerable expense. Since the diagnosis is difficult and the treatment is not always effective, the prevention of DVT is essential. Prevention of DVT is feasible, practical and is the most effective method in reducing morbidity and mortality. Prevention decreases length of hospital stay, improves quality of life, and decreases rehabilitation time as well as economic burden (Ho, 2010). Successful prevention of DVT in critically ill patients requires that nurses assess for DVT risk within 24 hours of admission, assess for signs and symptoms frequently, and initiate DVT preventive care (Antony, 2016; Tooher, et.al, 2010). Thus, identifying nurses' perceived knowledge of DVT, their assessment practices, their self-efficacy in conducting DVT prevention care, and their perceived barriers to applying DVT preventive measures are effective measures to intervene early to prevent DVT. *As such, the trajectory of this line of research is to develop an intervention that includes educating nurses on the best practices of DVT prevention.* 

Previous studies have investigated nurses' knowledge and practice of DVT risk assessment, intention to use DVT risk assessment tools, self-efficacy on DVT prevention

care, and perceived barriers in performing nursing practices in ICU and acute care settings in Western countries. In a study performed by Lee et al. (2014), registered nurses (RNs) were surveyed to identify RNs' perceived knowledge of venous thrombosis, assessment practices, self-efficacy in conducting venous thrombosis prevention care, and their perceived barriers to performing venous thrombosis risk assessment. The results indicated most RNs had limited confidence in their own abilities to conduct a thorough DVT risk assessment. In addition, the nurses acknowledged that the most common perceived barrier in performing risk assessment was lack of knowledge and lack of time.

McFarland et al. (2014) also conducted a qualitative research study to explore the perceived practice of thromboprophylaxis, and the knowledge and experience of venous thrombosis prevention among nurses. The researchers observed that several barriers hindered respondents' ability to prevent venous thrombosis in acute care settings, including a diminished nurse sense of responsibility to carry out a DVT risk assessment, lack of DVT knowledge and lack of a standardized tool or protocol to use (McFarland, Murray, Harrison et al., 2014).

Exter et al. (2013) and Hudson (2012) reported that nurses do not feel confident in three critical areas of DVT prevention, 1) explaining the risks, signs and preventive treatment to patients; 2) variability in knowledge of risk assessment and appropriate prophylaxis strategies; and 3) lack of belief and acceptance that the DVT prophylaxis is appropriate in all clinical situations.

In Middle Eastern countries, few studies exist that investigated nurses' knowledge, attitude, and practice related to DVT prevention. Hussein and Hassan (2016)

surveyed 60 nurses about their attitudes, knowledge, and beliefs with respect to DVT prevention. *The researchers found nurses who had received training had increased positive attitudes toward preventing DVT and felt more confident about their abilities to recognize the symptoms of DVT in ICU and CCU patients*. El Meanawi and El Hefnawy (2016) reported lack of nurse compliance, lack of time, knowledge deficits, and inadequate DVT assessment as the most important barriers for health care professionals in implementing DVT management in surgical and orthopedics Saudi Arabian patients.

According to Conner and Armitage (1998), highly motivated individuals think deliberately and plan their behavior based on their attitudes and beliefs. Nurses lacking motivation or having little support for evidence-based practice changes are often unsuccessful in implementing behavioral changes, suggesting that nurses' attitudes and beliefs strongly predict behavioral outcomes (Underwood, 2002).

There are no known studies regarding Egyptian ICU nurses' beliefs and attitude toward DVT prevention and applying its preventive measures. In addition, no instrument exists to measure beliefs, attitude, and knowledge regarding DVT preventative measure. In order to produce a positive practice change, it is important to study nurses' intention regarding DVT and its prevention to assess whether these beliefs are predictive of their behavior. Thus, evaluating nurses' intention to prevent DVT in ICU patients requires development of a reliable instrument based on the context and culture of the target group. When a new instrument is designed, measurement and report of its validity and reliability have a fundamental importance in the research; therefore, the new instrument could be a

valuable tool to determine nurses' intention to use DVT preventive measures in Egyptian ICUs.

# Purpose

The present study had two aims. The first aim was to develop a questionnaire measuring Egyptian ICU nurses' intention to use DVT preventive measures. Additionally, the questionnaire was developed based on the constructs of the TPB and the process of questionnaire development as delineated by Ajzen (2006) and Francis et al. (2004). Reliability and validity were evaluated in various aspects of the study. First, five experts of the TPB provided extensive feedback on the questionnaire and the questionnaire was adjusted according to the expertise, which provided content validity. Construct validity included convergent and discriminant validity, and reliability were established through factor analysis and internal consistency, respectively. Moreover, the newly developed instrument was correlated to the General Self Efficacy Scale to evaluate criterion related validity. The second aim, using the evidence and theory based, researcher-developed questionnaire, was to determine correlations among the variables using a predictive correlational, cross-sectional research design. Specifically, we sought to examine whether *attitude*, *subjective norms*, and *perceived behavior control* can predict Egyptian staff ICU nurses' *intention* to prevent DVT among critically ill patients in intensive care units.

# **Theoretical Framework**

# **Theory of Planned Behavior (TPB)**

A theory provides an explanation about how and why variables are related. With this, confidence in understanding the relationship between variables is strengthened by a theoretical framework that provides a model for organizing the research questions or hypotheses and data collection (Creswell, 2012). In this study, the theoretical framework is centered on intention. This is based on Ajzen's (1991) Theory of Planned Behavior (TPB), an extension of the 1975 Theory of Reasoned Action (TRA). The TPB postulates that intention forms from a combination of attitude toward the behavior, subjective norm, and perceived behavioral control. An intention must be present, prior to behavior performance (Ajzen, 1991).

According to the TPB, an individual's intention can be predicted by three determinants, namely attitude toward the behavior, beliefs about the motivation to comply with other expectations (subjective norms), and beliefs about the perceived level of control over factors that can either facilitate or hinder behavior performance (perceived behavioral control) (Figure.1). These determinants provide a comprehensive method of predicting intention and can be measured utilizing the questionnaire based on the TBP (Ajzen, 1991).

According to Ajzen (2005), *attitude toward a behavior* is the degree of a person's positive or negative appraisal of performing a certain behavior (Ajzen, 2005). It is considered a personal factor in the TPB (Ajzen, 2005). Attitude toward a behavior is determined by a) the "behavioral beliefs," defined as the subjective judgment that a

particular action will lead to a certain outcome(s), and b) the strength of those behavioral beliefs (Ajzen, 2005). For example, a nurse might believe that using DVT preventive measures (the behavior) reduces DVT rates (outcomes). Attitude toward a behavior can be measured directly by using a group of semantic differential items that reflect the person's evaluation of performing a behavior (Ajzen, 2005). For instance, the nurse should report whether using DVT preventive measures is considered *necessary* or *unnecessary, beneficial* or *beneficial*, and *evidence based*, or *non-evidence based*. This type of instrumental items presents in all questionnaires that are developed based on TPB, including the questionnaire developed for this study.

Subjective norm is defined as the degree of social influence on a person to perform or not to perform a behavior (Ajzen, 2005). Subjective norm is determined by "normative beliefs," defined as the person's perception of how much colleagues approve or disapprove of engaging in a behavior (Ajzen, 2005). Normative beliefs, therefore, include the person's perception of ICU staff members engaging (or not engaging) in the behavior (Ajzen, 2005). Subjective norm is also determined by the person's motivation to comply with the colleague's expectations toward engaging in a certain behavior (Ajzen, 2005). As stated above, subjective norm is measured using a group of semantic differential items that estimate the amount of social pressure to engage or not to engage in a behavior (Ajzen, 2005). In one example from the questionnaire, a nurse reports the level of agreement/ disagreement in reacting to the statement, "*My professional colleagues, whose opinions I respect, would approve my using of DVT preventive measures among critically ill patients in the ICU*"

*Perceived behavioral control* (PBC) refers to the level of confidence individuals have about their ability to perform the behavior based on how they perceive the hindrances or facilitators (Ajzen, 1991; Ajzen, Brown, & Carvajal, 2004). The PBC determinant considers two main areas, namely perceptions of having adequate control and management of resources (e.g. knowledge, or practice) that facilitate successful performance of the behavior (controllability), as well as the perceived level of ease or difficulty associated with doing the behavior (self-efficacy) (Smith, 2015). For instance, with respect to providing DVT care, if staff nurses believe they have enough knowledge, ability, skill, support from administrators, consultants, and budget for implementation, then they would likely perceive high control over DVT care in the ICU and, consequently, patient outcomes improve.

*Intention* is defined as a person's readiness to engage in a certain behavior (Ajzen, 2005). It is positioned in this theory as the immediate antecedent of the behavior (Ajzen, 1991; Ajzen, 2005). According to the TPB, the three concepts (attitude toward a behavior, subjective norm, and perceived behavioral control) are considered predictors of intention (Ajzen, 2005). Finally, behavior is defined as the actual response of a person to a certain situation; it is determined by the person's intention to perform that behavior and the perceived behavioral control (Ajzen, 1991; Ajzen, 2005). Figure 1 illustrates the relationships among all concepts of the theory of planned behavior (Ajzen, 1991).



Figure 1: Model of theory of planned behavior (Ajzen, 1991)

The author of the TPB has developed a guide for researchers to adapt an instrument that measures the concepts of the TPB. Therefore, the TPB guided the development of the instrument measuring nurses' intention to prevent DVT among critically ill patients, which was critiqued by a panel of five experts. In addition, this theory guides this study to provide useful insights into predictors that influence nurses' intention to prevent DVT in the ICU. This theory was tested to show whether the three factors (attitude toward behavior, subjective norm, and perceived behavioral control) predict intention to use DVT preventive measures. According to the TPB, we can assume that if a nurse perceives using DVT preventive measures in a positive manner (attitude toward the behavior), believes that his/her colleagues approve of the practice of DVT prevention (subjective norm), and the nurse perceives to have control and ability to use DVT preventive measures (perceived behavioral control), then the nurse's intention to use DVT preventive measures was high. **Study Model** The study model represents the second aim of the study and is directly related to the relationships between the theoretical concepts and variables: attitude, subjective norms, and perceived behavior control and is based on the evidence from the literature for each construct. The second aim of the study was to determine the predictors of nurses' intention to prevent DVT among critically ill patients based on TPB (Figure.

2).



Figure 2: The Study Model

# **Self-efficacy theory**

*Self-efficacy* has been defined as the confidence one feels when performing a particular behavior, including confidence in overcoming the barriers to achieve that behavior (Bandura, 1986). It is people's judgment of their capabilities to execute course of action required to deal with a situation (Bandura, 1986). According to Bandura, an individual's perception of self-efficacy consists of two components: efficacy expectations and outcome expectations. An efficacy expectation is the belief that a person can

successfully perform the required behavior to achieve an outcome, whereas an outcome expectation is a person's estimate that the behavior will lead to a specific outcome. For an individual to successfully perform a behavior, both components of self-efficacy must be present.

Although efficacy expectations and outcome expectations, are two different constructs, they are also related. Bandura (1986), argues that "the types of outcomes people anticipate depend on their judgments of how well they will be able to perform in a given situation" (Bandura, 1986, p. 392). In this study, we proposed that there is an essential linkage between the outcomes of the one action (e.g., DVT prevention knowledge) and the action (e.g., using DVT preventive measures). Therefore, nurses who were fully confident in their ability to use DVT preventive measures anticipated that their action would result in the prevention of DVT among critically ill patients in the ICU. This suggest that motivating nurses to use DVT preventive measures are likely to be more successful by influencing their self-efficacy levels and intentions.

Several studies support the positive links between self-efficacy and intention (Jonas et al., 2016; Tolma, Reininger, Evans, &Ureda, 2006; Terry & O'Leary, 1995). The present study evaluated the criterion validity of the developed instrument utilizing the General Self Efficacy (GSE) scale because of the close connection to the TPB. We anticipated that there would be a strong correlation between the two theories.

## Significance of the Study

The need to develop an instrument to assess nurses' intention to prevent DVT arose from the observation, in the context of a review of the scientific literature that

instruments geared toward DVT prevention are lacking. Therefore, one purpose of this study was to develop an instrument measuring nurses' intention to prevent DVT and evaluate its psychometric properties. The content validity of the instrument was evaluated by expert review, construct validity including convergent and discriminant validity were evaluated by factor analysis, while the developed questionnaire was correlated to the General Self -Efficacy (GSE) scale to determine criterion related validity, and finally, the internal consistency used to evaluate reliability and validity of the new questionnaire. This study makes substantive and methodological contributions to our knowledge about nurses' intentions to prevent DVT.

We sought to identify and predict several barriers to preventing DVT including diminished sense of responsibility to carry out a DVT risk assessment and a lack of a standardized tool or protocol to use for DVT prevention (McFarland, Murray, Harrison et al., 2014). Additionally, nurses' frequently lack confidence in explaining the risks, and educating patients about the signs and preventive treatments (Exter et al, 2013). In addition, the lack of nurse compliance, lack of time, knowledge deficits, and inadequate DVT assessment are the most important barriers for nurses in implementing DVT preventive care (Lee et al., 2013; Pakhide et al., 2013; El Meanawi & El Hefnawy, 2016). There is sparse research that has utilized the TPB as a theory-based approach to predict intention to prevent DVT and the application of DVT preventive measures.

Early detection and prevention is essential to reduce the immediate and long-term complications of DVT. This is the first study to examine if nurses' attitude, subjective norms, and perceived behavior control predict their intention to use DVT preventive

measures among critically ill patients in an intensive care unit in Egypt. This study is, thus, a critical first step in closing the gap in scientific knowledge in DVT prevention in Egypt and creating effective future interventions to change practice. Completing this study filled the gap in the literature regarding the study phenomenon.

Bringing awareness of the widespread effect of poor DVT prevention can help in decision making and changing organizational policy and hospital culture. The study results would contribute to nursing practice by bringing awareness of the issues surrounding DVT prevention guiding nurses and other healthcare professionals in ICU's in non-Western countries. Ultimately, this line of research, through future interventions, aims to enhance patient quality of life, reduce hospital length of stay, decrease readmission rate of DVT, and the likelihood of a DVT or its complications, as well as decrease medical costs.

### **Research Questions**

The present study answered the following questions:

- 1. What is the criterion related validity of the nurses' intention to prevent DVT scale?
- 2. What is the internal consistency of the nurses' intention to prevent DVT scale?
- 3. What are the correlations between nurses' attitudes, subjective norms, and perceived behavioral controls?
- 4. Do attitudes, subjective norms, and perceived behavioral controls predict ICU nurses' intentions to prevent DVT among critically ill patients in an Egyptian ICU?

5. Of these predictors (attitudes, subjective norms, perceived behavioral controls), which variables have the most relevant influence on intention ICU nurses' intentions to prevent DVT among critically ill patients in ICU?

# Summary

As articulated in the Introduction, this study is important because it closes a gap in the existing body of knowledge about ICU nurses' beliefs and intention, by using a theory-based framework that can be replicated in futures studies. Chapter I also provide the operational and empirical indicators of the study variables. The last section of Chapter I: Introduction provides an outline of the research questions and hypothesis.

## **CHAPTER II**

# LITERATURE REVIEW

In this chapter, the literature pertinent to the major concepts of interest is reviewed. It begins with a brief description of DVT, its definition, pathophysiology, risk factors, signs and symptoms, complications, and prevention intervention in order to facilitate an understanding of the impact of DVT in hospitalized ICU patients. This is followed by risks of DVT among critically ill patients and nurses' role in preventing DVT. Next, findings supporting the utility of the theory of planned behavior and factors predicting nurses' behavioral intention in different circumstances were presented. Finally, a conclusion of the literature review was presented.

#### **Prevalence of Deep Vein Thrombosis and Pulmonary Embolism**

DVT and pulmonary embolism (PE) are a major public health problem among Americans (Agency of Healthcare Research and Quality, 2016) as well as Egyptians. The statistics reported are in terms of incidence, which is the risk of contracting a DVT. In Egypt in 2010, the incidence of DVT was 5 million cases (1 to 2 per 1,000); 10% of these resulted in pulmonary embolism and 10% died due to misdiagnosis (Aboul-Eniein, 2010). DVT incidence rates vary from 6.6% to 27.3% in critically ill Egyptian patients (Abdel-Aziz, Elfawwal, Goubran, 2012; El-Rashedy, 2008); while DVT incidence rates in critically ill patients in U.S vary between 0.4% –31%. As a result, the prevalence, which is how widespread DVT is, varies significantly among critically ill patients based on baseline characteristics of patients, prophylactic intervention, methods of DVT screening, thrombosis location (Barrera, Ker, Cirocchi, Farinella, & Uribe, 2013; Cook et al. 2005), and the underlying disease causing the critical illness. For example, in the general ICU population, the incidence of DVT is between 3.5% and 33% (Miri, Goharani & Sistanizad, 2017; Cook et al. 2005) whereas in trauma patients, it can reach up to 63% (Bendinelli & Balogh, 2008).

### **Deep Vein Thrombosis**

DVT is a blood clot that forms in one of the deep veins in the body, most often occurring in the deep veins of the leg, but it also forms in the veins of arms as well as in the mesenteric and cerebral veins (Hanes, 2013; Kucher, 2011; & Emanuele, 2008). According to Hanes (2013), a blood clot is a clump of blood cells that forms into a solid mass over time. Deep vein thrombosis occurs when a blood clot forms in a large vein (cuisine et al., 2011). Once formed, a DVT can either remain fixed in the lumen of the vein or become detached to form an embolism that can travel to the pulmonary arteries with fatal consequences (Sander, 2013). Due to this, the prevention of DVTs is paramount

## Pathophysiology of DVT

The pathophysiology of vein thrombosis involves three interrelated factors, commonly referred to as "Virchow's triad," comprised of damage to the vessel wall (endothelial damage), slowing down of the blood flow (stasis), and increase in blood coagulability (hypercoagulability) (Islam, 2017). Thrombus formation starts in the valve pockets of the veins of the calf and extends proximally (Kesieme et al., 2011). The valve pockets of the veins are vulnerable to hemoglobin desaturation and hypoxia when blood flow ceases, as blood is trapped in a secondary vortex (Bovill & Van der Vliet, 2011).

The hypoxia caused by blood stasis leads to stimulation of the endothelium resulting in a proinflammatory and prethrombotic state (Von Brühl et al., 2012). The activated endothelial cells release Weibel-Palade bodies that contain Von Willebrand factor (vWF) and membrane-bound P-selectin, that leads to the binding of leukocytes, endothelial tissue factor (TF) positive microparticles, and platelets (Lopez & Chen, 2009; von Bruhl, et al., 2012). The leukocytes, especially the monocytes, can synthesize and release tissue factor when stimulated (Mackman, et al, 2007; von Bruhl, et al., 2012). Tissue factor from leukocytes and micro particle binds to coagulation factor VII and results in activation of the coagulation cascade and initiation of thrombosis (Lopez and Chen, 2009).

Blood stasis leads to accumulation of prothrombotic substances, such as thrombin that might overcome the local anticoagulant regulators and could induce thrombosis (Esmon, 2009; Mackman, 2012). Other factors occasionally contribute to thrombosis. Alterations of blood composition as inherited thrombophilia and acquired factors causing a hypercoagulable state make subjects more susceptible to DVT (Reitsma, et al., 2012).

Endothelial injury is a dominant influence in the formation of thrombi and attributed to several factors, including the physical loss of endothelial, atherosclerotic plaques, or vasculitis. This damage exposes the extracellular matrix, leading to platelet adhesion, release of tissue factor, and the depression of anticoagulants; endothelial dysfunction differs, however, in that the cells remain intact with a perturbation in the balance of pro and anticoagulant effectors causing the thrombosis. This imbalance can
arise from factors such as hypertension, hypercholesterolemia, radiation, or products absorbed from cigarette smoke (Kumar, et al., 2007).

# **Risk Factors of DVT**

DVT results from the interplay of general acquired and genetic risk factors in addition to ICU acquired DVT risk factors. Acquired risk factors include age, pregnancy, puerperium, surgery, immobilization, cancer, chemotherapy, hormone therapy, previous DVT, heavy smoking, obesity, air travel, and the lupus anticoagulant (CDC, 2017). Genetic risk factors include gender, ethnicity, blood group, and many genetic abnormalities affecting the control of hemostasis that lead to excess thrombin generation or decreased fibrinolysis. Acquired ICU risk factors include sepsis, respiratory/ heart failure, sedation, mechanical ventilation, central venous catheterization, and end stage renal failure (Minet et al., 2015).

### **General Acquired Risk Factors**

Age. Being over the age of 40 years is the strongest risk factor for DVT (CDC, 2016). This could be due to aging-related increased fibrosis and thickening in the valve leaflet and vein wall and decreased compliance of the vein wall (Langevelde, et al., 2010). Changes in compliance in the vein wall affect venous blood flow, and thickened, stiff leaflets disrupt the normal flow of blood during the valvular cycle (Bovill & van der Vliet, 2011).

<u>**Pregnancy and the puerperium.</u>** The risk of antenatal DVT is four- to five times higher in pregnant women than in non-pregnant women of the same age (Springel, 2016). Venous thromboembolism can occur at any stage of pregnancy, but the</u>

puerperium is the time of highest risk, with estimates of relative risk of approximately 20-fold (Greer & Thomson, 2013).

**Hormone therapy.** Use of estrogen-containing hormone replacement therapy or oral contraceptives in women also presents an increased risk because exposure to estrogen increases the risk of clot formation. Contraception or hormone replacement therapy that uses both estrogen and progesterone produce DVTS at the rate of two to eight times that of the general population (Huerta, et al, 2007; Vickers, et al., 2007; Canonico, et al., 2008; Jacobsen, et al, 2008; USDHHD, 2008). One clinical controlled study, with a follow-up period of seven years, conducted in a cohort of women using oral hormone therapy, the risk of DVT among women taking estrogen was twice as high (OR = 2.08 [1.02-4.27]) as among women receiving estradiol (Smith et al, 2014).

Surgeries. All surgical procedures, including abdominal, pelvic, thoracic, or orthopedic surgical procedures such as total knee, hip replacement, and hip fracture are associated with high risk of DVT (Whiting et al., 2016). The nature of orthopedic disorders and diseases, such as trauma or arthroplasties, particularly of the hip and knee, create a higher risk for the occurrence of venous thromboembolism. The positioning of the limb during surgery, localized postoperative edema, and limitations in mobility immediately after surgery all play a role in venous stasis and the consequent reduction of blood flow (Leme & Sguizzatto, 2012). In addition, general anesthesia and duration of immobility, including duration of surgery, both increase risk of DVT (Kim et al, 2015).

**<u>Cancer.</u>** Malignancy is one of the most common acquired risk factors for DVT, and patients with active malignancy have a fourfold to sevenfold higher incidence of

symptomatic DVT than the general population (Khorana et al., 2103). The increased risk of DVT in patients with cancer appears to be because of the effect of malignancy on each component of the Virchow triad, namely, venous stasis, blood components imbalance, and vessel wall damage. Each factor ultimately contributes to the alteration of normal blood flow, thereby increasing thrombus formation (Brown, 2012).

Evidence suggests the absolute risk depends on the tumor type, initial cancer stage, biological aggressiveness of cancer, and rate of metastatic spread (Brose & Lee, 2008; Zaher & Abdelaal, 2012). The presence of tumor cells induces a hypercoagulable state and creates stasis by compression and invasion of vessels (Rickles, 2006). In addition, tumor cells can promote the release of tissue factor (TF) from the affected organs during expansion and the metastatic processes. Importantly, cancer cells themselves could release tissue factor-rich micro particles. These micro particles adhere to (and be incorporated into) monocytes and other cells, particularly those activated by hypoxia, and thus promote fibrin formation (Khorana, 2009; Prandoni, Falanga, & Piccioli, 2005).

<u>Chemotherapy.</u> Chemotherapy is one of the most important treatment-related factors in the etiology of cancer-associated DVT as cancer alone is associated with a fourfold risk of thrombosis, while chemotherapy increases the risk by six-fold (Fekri, Zadi & Fatehi, 2014; Haddad& Greeno, 2006). Several different mechanisms have been reported to explain the prothrombotic states induced by chemotherapy. These include (a) damage to the vascular endothelium, (b) reduction of endogenous, physiological, anticoagulant factors, (c) increase of levels of procoagulants, (d) induction of tumor and

endothelial level apoptosis and cytokine release that, in turn, lead to increased expression and hence activity of TF, (e) induction of platelet activation, and (f) direct induction of expression of monocyte macrophages TF (Zaher & Abdelaal, 2012).

**Previous DVT.** The risk of recurrence after a first episode of VTE is 5% to 7% per year, and it is more than 50 times higher than in patients without previous VTE (Fahrni et al., 2015). A potential mechanism by which the residual thrombus increases the risk of recurrence is impaired venous outflow, resulting in blood stasis and clot formation. Nevertheless, because some patients have recurrent thrombosis in the initially unaffected leg and others have isolated pulmonary embolism, other mechanisms must be involved. Residual thrombosis is perhaps a marker for a more generalized procoagulant diathesis. Elevated plasma D-dimer levels after withdrawal of oral anticoagulation (a marker of hypercoagulability) are an independent risk factor for recurrent venous thrombosis (Alikhan, et al, 2004; Huerta, et al, 2007; Palareti, et al., 2007).

**Obesity.** Obese people are at an increased risk for DVT compared with individuals who are of normal weight (Yang et al., 2012). Kabrhel et al. (2009) and Severinsen et al. (2009) reported increased body mass index (BMI) >30 Kg/m2 was associated with a rising risk of DVT. An elevated BMI can increase levels of coagulation factor VIII and IX possibly contributing to the increased risk of thrombosis. A mechanical exertion also exists that can lead to impairment of the valve system in the deep veins of the lower limbs, with ensuing venous stasis, which is a risk factor for thrombus formation (Huerta, et al, 2007; Ageno, et al., 2008; Martinelli, et al., 2010). A prospective cohort study of 87,226 women in the Nurses' Health Study (NHS) showed

the relative risk of unprovoked PE that was not associated with prior surgery, trauma, or cancer raised by about 8% per 1 kg/m<sup>2</sup> increase in BMI and approached a nearly six-fold greater risk among individuals with a BMI  $\ge$  35 kg/m<sup>2</sup> (p < 0.001) (Kabrhel et al., 2009).

Acute or chronic chest infection. Acute exacerbation of chronic obstructive pulmonary disease (COPD), adult respiratory distress syndrome, moderate to severe community-acquired or nosocomial pneumonia, lung cancer, interstitial lung disease, or pulmonary hypertension, respiratory failure, particularly if mechanical ventilation is used (longer than 3 days), are associated with increased risk of DVT (Huerta, et al, 2007 and Rawat, et al., 2008). This is related to the hypercoagulable state secondary to the inflammatory state due to infection (Kouismi, Laine, Bourkadi &Iraqi, 2012).

<u>Cardiovascular conditions.</u> Myocardial infarction (MI), ischemic and nonischemic cardiomyopathy, congestive heart failure (CHF) secondary to valvular disease, stroke, and chronic idiopathic dilated cardiomyopathy can increase the risk of DVT (Huerta, et al., 2007; Sander,2013; Cock, et al., 2008). Features that include increasing age, prolonged immobility, and cardiac or respiratory failure in patients with MI probably account for the well-documented association of DVT with cardiovascular diseases (Caprini et al., 2017).

Inflammatory bowel disease. Acute inflammatory bowel disease (IBD) was associated with a two to three times risk of DVT or PE when compared with general population (Yuhara et al., 2014; Murthy & Nguyen, 2011). The main risks for DVT in IBD patients include dehydration, hyperhomocysteinaemia, and active disease with an "inflammatory burden" (Papa et al., 2014, p. 3174). In addition, in IBD patients, several

mechanisms triggered by active inflammation are involved in moving the coagulative balance towards a prothrombotic state, including: (1) increased plasmatic levels and decreased levels of natural anticoagulants; (2) reduced fibrinolytic activity; (3) endothelial abnormalities that are mainly represented by the downregulation of the anticoagulant thrombomodulin and endothelial protein C receptor, that in turn affects the conversion of protein C into its activated form; and (4) abnormalities of platelets, such as thrombocytosis and increased activation and aggregation (Danese et al., 2007).

Metabolic syndrome. There is increasing evidence for an association between thrombosis and the metabolic syndrome. Such evidence includes glucose intolerance (ranging from type II diabetes mellitus to impaired glucose intolerance or impaired fasting glycaemia), insulin resistance, abdominal obesity, atherogenic dyslipidemia, and arterial hypertension (Franchini, et al., 2008). Metabolic syndrome affects the thrombogenicity of circulating blood. Apart from its effect, it is accompanied by important changes in the hemostatic system that could favor the development of thrombosis. The changes include hyperactivity of platelets, hypercoagulability increase platelet and fibrin deposits, hypofibrinolysis, and endothelial dysfunction. This can lead to increase the risk for both arterial and venous thrombosis (Alessi &Vague, 2008).

# **Genetic Risk Factors**

Inherited or acquired thrombophilia. The genetic risk factors known to be associated with inherited thrombophilia include the gain-of-function variants factor V Leiden and prothrombin mutation (G20210A) and the loss-of-function variants in the coagulation inhibitors antithrombin, protein C, and protein S (Pomero et al., 2014; CDC,

2016). In addition, high levels of coagulation factors VIII, IX, and XI as well as prolongation of clot lysis time, which is a measure of fibrinolysis, are associated with increased risk of DVT.

Sickle cell disease (SCD). DVT commonly occurs in patients with SCD. The etiology of increased risk of DVT in SCD patients is multifactorial and is related to both acquired factors and SCD-specific factors. Acquired risk factors, such as central venous catheters, frequent hospitalization, and orthopedic surgeries for avascular necrosis occasionally lead to increased incidence of DVT in the SCD population (Naik, Streiff & Lanzkron, 2013). In addition, SCD itself appears to be a hypercoagulable state, and many SCD-specific factors such as changes in antiphospholipid antibodies and protein S and C levels (thrombophilic defects), genotype, and splenectomy could modify the risk of DVT (Naik, Streiff & Lanzkron, 2011; Rahimi & Parsian, 2011).

Gender. Several investigators have studied the effect of gender. North American studies have shown that males (after age 50) have slightly higher incidence of asymptomatic DVT (RR 1.2-1.4). Males are known to have higher risk for recurrent DVT. Nonetheless, females in the childbearing age, (i.e., young females,) are at risk for DVT due to hypercoagulable state associated with pregnancy and puerperium or use of hormones as contraception or part of treatment for other associated disease such as carcinoma breast cancer (Varma, 2016; Naess et al., 2007).

# **Acquired ICU risk factors**

Indwelling central venous catheters (CVS). CVCs are associated with an increased risk of DVT (Caprini et al., 2017), especially when inserted in femoral veins, a

catheter-related thrombosis occurrence rate ranges from 5% for symptomatic events to an overall rate of 14% to 18% (Kamphuisen & Lee, 2013). The incidence of thrombosis is estimated to be 2% to 6% when symptomatic and 11% to 19% when asymptomatic with subclavian catheter (Grant et al., 2012) and 33% with internal jugular catheter (Kujur et al., 2102).

<u>Vasopressor administration</u>. This was found to be an independent risk factor for DVT (hazard ratio 2.8, 95 % confidence interval 1.1 to 7.2) (Cook et al., 2005), certainly explained by reduced absorption of subcutaneous heparin linked to the vasoconstriction of peripheral blood vessels. This mechanism could explain the lower anti-Xa factor activity after thromboprophylaxis with low molecular weight heparin (LMWH) in critically ill patients on vasopressors.

The risk factors for DVT are varied and complex. As a result, critically ill patients face both the VTE risk factors (acquired and inherited) identified in the general population and those specific to ICU. An understanding of those risk factors is paramount importance for thrombosis prevention in this patient population.

# Signs and Symptoms of DVT

Signs and symptoms of deep vein thrombosis are often absent and diffuse (Feied & Handler, 2007). The symptoms caused by DVT depend on the location and extent of the clot. If the clot is small, or if it is limited to the small veins in the calf, there could be no symptoms at all. If the clot is extensive, involving the thigh veins and/or the large veins in the pelvis, the symptoms can be extreme. The most common symptoms a person experiences when he or she has a DVT are pain, swelling, tenderness, discoloration or

redness, skin that is warm to the touch, and visible surface veins (Sander, 2013). Other symptoms of DVT include unexplained fever due to the accumulation of tissue metabolites at the site of thrombus, and increased leg circumference (Joanna Briggs Institute, 2008).

#### **Complications of DVT**

PE the most serious complication of DVT occurs in up to 50% of cases and has a mortality rate up to 30% (CDC, 2016). PE occurs if a fragment of the clot breaks loose, travels through the heart, and migrates to the lungs, obstructing the pulmonary artery. Symptoms of PE include chest pain; sudden cough, rapid breathing, and shortness of breath, rapid heart rate, low blood pressure, lightheadedness, and a feeling of apprehension and in rare cases, the clot may be pumped to the brain, causing cerebral venous thrombosis and stroke (Emanuele, 2008).

Another complication is Post-Thrombotic Syndrome (PTS), which is defined as a chronic condition characterized by recanalization, a complex process of fibrinolysis, thrombus organization, and neovascularization (proliferation of blood vessels) occurs. This process can result in valve destruction, damaged valves, insufficient closure, and/or occlusion of the veins, which in turn results in venous hypertension. PTS affects up to one-third of persons with DVT, and causes chronic pain, chronic inflammation, cellulitis, and ulceration of the affected limb, where, in severe cases, amputation of the affected limb is required (Fanikos, 2008; Anthony, 2013). Additionally, recurrence of DVT, renal vein thrombosis, right side heart failure, and paradoxical embolism can cause heart attack and stroke (Park, 2012).

### **Critical Care Patients and Risks for Developing DVT**

Critically ill patients are at high risk for developing DVT because they combine both general risk factors and specific intensive care unit (ICU) risk factors. These risk factors include premorbid medical and surgical conditions, invasive tests and treatments, prolonged immobility (often exacerbated by sedation or paralysis), vascular injury from indwelling central venous catheters, sepsis, lower extremities or pelvic fractures, and acute and chronic renal insufficiency (Minet et al., 2015). In addition, critical illness activates the coagulation cascade that can mediate the increased likelihood of DVT (Cohen, 2011). Furthermore, the prevalence of DVT and PE is underestimated in the ICU, as it is often clinically silent, especially in sedated and mechanically ventilated patients. ICU-acquired thromboembolic events are difficult to diagnose, as they may mimic many other diseases (Minet et al., 2105). Therefore, DVT is still considered an important area of healthcare research. The ICU is a specialized area of a hospital where patients' serious illnesses or injuries receive special medical and nursing care. ICU nurses are highly knowledgeable and skilled health care professionals who work in interprofessional teams to provide optimum patient care (Pande, Kolekar, & Vidyapeeth, 2013).

# **DVT Prevention Interventions in Critically Ill Patients**

Treatments and evidence-based interventions for preventing DVT in critically ill patients aim to decrease the risk of DVT and PE, to decrease rates of mortality and morbidity (Adriance & Murphy, 2013). The 9<sup>th</sup> edition of the American College of Chest Physicians (ACCP) clinical practice guidelines for prevention and treatment of venous

thrombosis provide updated recommendations for various subgroups of patients that emphasizes the evaluation of patient risk for DVT and use appropriate thromboprophylaxis according to patient's condition (Guytta et al., 2012). The American Association of Critical Care Nurses [AACCN, 2016] published a practice alert in 2016 outlining evidence that should be applied by nursing in daily practice in the care of critically ill patients to prevent venous thrombosis. Evidence-based prevention interventions are categorized as mechanical and chemical (pharmacologic) prophylaxis.

### **Mechanical Prophylaxis**

Mechanical devices for thromboprophylaxis are characterized as either static or dynamic (Guyatt et al., 2012). Static devices include graduated compression stockings (GCS) and placement of an inferior vena cava (IVC) filter, which is an invasive procedure. Dynamic methods include intermittent pneumatic compression devices (IPC), sequential compression devices (SCD), and arteriovenous foot pumps. Mechanical compression devices work by creating intermittent sequential pressures on the legs to promote venous blood flow that reduces venous stasis and activates the fibrinolytic pathway (Cowell et al., 2010). Since up to 80% of ICU patient experience one or more episodes of minor or major bleeding, mechanical thromboprophylaxis is often an attractive option to limit potential adverse effects (Gould et al., 2012; Guyatt et al., 2012; Mcloads & Greets, 2011; Ho & Tan, 2013; Ibrahim et al., 2015).

Current guidelines recommend mechanical prophylaxis for patients in whom pharmacological prophylaxis is contraindicated or in combination with pharmacologic thromboprophylaxis in certain sub-populations at higher venous thrombosis risk (Guyatt et al., 2012). A recent study examined the association of mechanical thromboprophylaxis with IPC or GCS with the risk of DVT and hospital mortality among critically ill patients. The researchers found the use of IPC was associated with a significantly lower DVT incidence compared with no mechanical thromboprophylaxis (Arabi et al., 2013).

Ibrahim et al. (2015) found the incidence of DVTs was higher (8.8%) among critically ill trauma patients who did not receive DVT prophylaxis as compared to those who used SCDs (2.9%). Similar findings were discovered among patients with hip and pelvic fractures. The incidence of DVTs for patients who did not receive DVT prophylaxis was higher (11.3%) compared to those who used SCDs (4%) (Ibrahim et al., 2015). These significant findings demonstrate that SCDs are effective in reducing DVTs when compared to no DVT prophylaxis.

In a meta-analysis, Ho and Tan (2013) evaluated the effectiveness of IPCs in reducing DVTs, and if combining IPCs with pharmacologic prophylactic agents would further reduce DVT risk. The researchers found that IPCs appeared to have the same efficacy as pharmacologic prophylaxis in reducing the incidence of PE (RR, 1.19; 95% CI. 0.62-2.29; P=0.59) and DVT (RR, 0.93; 95% CI, 0.69-1.26, P=0.66). IPCs were associated with reducing the risk of bleeding. Additionally, combining pharmacologic prophylaxis and IPCs further reduced the risk of DVT (RR, 0.54; 95%CI, 0.32-0.91; P=0.02), but not PE (RR, 0.62; 95% CI; 0.32-3.02) compared to IPC alone. Therefore, it is recommended that high-risk patients, especially those with multiple risk factors, receive combined DVT therapy to prevent venous stasis and hypercoagulability (Ho &Tan, 2013).

# **Pharmacologic Prophylaxis**

Options for pharmacologic thromboprophylaxis include unfractionated heparin (UFH), low molecular weight heparins (LMWH) (i.e., enoxaparin, and dalteparin), and pentasaccharides (i.e., fondaparinux). Although there are few studies evaluating pharmacologic prophylaxis for critically ill patients, current guidelines recommend the use of either LMWH or UFH over no prophylaxis (Guyatt et al. 2012).

Prophylaxis with an anticoagulant is recommended in patients who have an elevated DVT and PE risk that includes the critically ill provided they are not at a high bleeding risk (Adriance & Murphy, 2013). The use of anticoagulants in patients with an active gastroduodenal ulcer, bleeding history in the three months prior to hospital admission, or platelet count less than 50,000 K/uL can increase the risk of hemorrhage (Bates et al., 2012; Gould et al., 2012). In observational studies of intensive care unit (ICU) patients receiving low-molecular-weight heparin (LMWH), the frequency of DVT at any site ranged from 5.1% to 15.5% and bleeding complications from 7.2% to 23.1%, respectively (Ribic et al., 2013). A meta-analysis by Alhazzani et al., (2013) incorporated the randomized control trials (RCTs) comparing heparin (UFH or LMWH) thromboprophylaxis strategies with each other or no prophylaxis in medical-surgical critically ill patients several outcomes, more specifically DVT, PE, major bleeding, HIT, and mortality. The researchers reported Heparin (UFH and LMWH) compared to placebo reduces the rate of DVT and PE (risk ratio [RR], 0.52 [95% confidence interval (CI), 0.28, 0.97]; P = 0.04; I2 = 0%, but not symptomatic DVT (RR, 0.86 [95% CI, 0.59, [1.25]; P = 0.43). Major bleeding and mortality rates were similar, as compared to

placebo patients who had similar bleeding rates, mortality, and symptomatic DVT (Alhazzani et al., 2013).

# Nurses Role in Preventing DVT

# **Patient's Assessment**

Nurses are key players in the prevention of DVT and its complications. Nurses are with patients at the time of admission and take care of patients throughout their hospital stay. They are in the ideal position to assess patient risk factors early and implement DVT prophylaxis. Admission assessments are an opportune time to evaluate patient risk factors, such as mobility, age, previous history of DVT, and medical conditions that increase the risk of developing DVT in hospital patients. Patient risk assessment should be ongoing throughout hospitalization, especially when patient condition changes. A worsening of patient condition warrants a re-evaluation of risk factors, just as a significant improvement in condition can signal the need to reconsider previous risk factor assessment (Kehl-Pruett, 2006).

The nurse should complete an assessment devoting special attention to the presence of any risk factors for DVT upon admission, and at any time when patient's condition changes. If the patient exhibits any risk factors, the nurse should use the established risk assessment protocol to determine the level of risk. When the risk level has been determined, the nurse should work cooperatively with the physician and other health care providers to determine the proper DVT prophylaxis method. Upon determination of the appropriate method, the nurse caring for the patient is responsible for administering the DVT prophylaxis (Burlingame, 2009).

# **Assessing and Monitoring Anticoagulants**

Anticoagulation drugs can be lifesaving. Nurses must carefully assess, closely monitor, and comprehensively educate the patient receiving anticoagulation drugs to ensure the full benefit of anticoagulation therapy and to minimize potential harm. In adult patients', nurse-driven heparin nomograms for IV heparin administration manage anticoagulation needs. Nurses should obtain baseline labs; calculate and administer the initial bolus dose; order and evaluate anticoagulation labs; and titrate heparin to therapeutic goal based on clinical algorithm and patient presentation (Moore, et al., 2011).

#### **Early Ambulation**

Early ambulation is an essential intervention to reduce VTE risk. Efforts to improve early mobility of critically ill postoperative patients improve the patient's respiratory status and cardiovascular performance, and it reduces muscle deconditioning and development of DVT (Vollman, 2010). Early progressive mobility of the critically ill patient should occur as soon as possible to maximize the benefits of patient movement. One common misunderstanding is that when the patient begins ambulation, thromboprophylaxis can be held or discontinued. For moderate to high-risk patients, chemical and mechanical thromboprophylaxis in addition to ambulation is most effective when it extends beyond discharge from acute hospitalization (Li et al., 2010; Vollman, 2010; Tufano et al., 2011).

### **Theory of Planned Behavior**

Ajzen (2006) expanded an earlier Theory of Reasoned Action to explain the influences of individual behavior intention. The Theory of Reasoned Action (TRA) was limited in only predicting voluntary behaviors (Sheeran, Trafimow, & Armitage, 2003). The construct of perceived behavioral control was added to address this limitation. The TPB proposes that health care professionals' behavior is directly influenced by intention to perform the behavior and indirectly by three factors, namely, attitudes toward the behavior, subjective norms, and perceived behavioral control (Ajzen, 1991). As a result, to predict whether a person intends to do something, we need to know whether they are in favor of doing it (*attitude*), how much they feel social pressure to do it (*subjective norm*), and their perceived level of control over factors that can facilitate or hinder their performance of the behavior (*perceived behavioral control*) (Ajzen, 2006a; Francis et al., 2004a). The dependent variable, *behavior intention* (BI), is predicted by the variables attitude (ATT), subjective norm (SN), and perceived behavioral control (PBC).

Further investigation of the construct PBC has determined it can directly influence behavior, bypassing behavior intention (Ajzen, 1991; Ajzen, 2006b; Gagne & Godin, 2007). The control factors of the PBC construct can be either internal or external factors. Some authors argue the construct is in fact two distinct constructs or sub constructs (Ajzen, 2002): *self-efficacy*, also referred to as perceived difficulty; and *controllability*, also called perceived control (Ajzen, 2002; Leach, Hennessy, & Fishbein, 2001; Sparks et al., 1997; Trafimow, Finlay, Sheeran, & Conner, 2002). While some authors report these two constructs to replace the existing PBC in the TPB (Trafimow et

al., 2002), Ajzen (2002) proposes a hierarchical model, where *self-efficacy*, and *controllability* are separate sub-constructs that form the higher construct of PBC. Ajzen (2002) believes these sub-constructs reflect beliefs about both internal and external factors, despite numerous others reporting that *self-efficacy* reflects internal factors and *controllability* reflects external factors (Sparks et al., 1997; Terry & O'Leary, 1995). There have been differences in the effects of self-efficacy and controllability sub-constructs of PBC reported in the literature; still, self-efficacy has emerged as a significant positive predictor of behavior intention (Knowles, 2015).

Despite self-efficacy being defined as part of the perceived behavioral control construct from the TPB, it has been identified in other theories. The concept of selfefficacy originates from the Self- Efficacy Theory (SET), which came from Social Cognitive Theory (SCT) that proposed by Bandura in 1977. The theory of self-efficacy explains that psychological procedures can predict changes in behavior under such circumstances (Bandura, 1977). According to Bandura (1986), Self-efficacy refers to the confidence one feels about performing a behavior, including confidence in overcoming the barriers to achieve that behavior. Bandura (1982) affirms that self-efficacy is a major predictor of behavior and whether that behavior would persist in adverse times. Selfefficacy theory has been applied to a very diverse range of human behaviors, demonstrating that a sense of self-efficacy can make a difference to how people think, feel and act (Schwarzer and Fuchs, 1995).

Several studies had empirically established a strong link between intention and self-efficacy (Jonas et al., 2016; Tolma, Reininger, Evans, &Ureda, 2006; Terry &

O'Leary, 1995; White, Terry, & Hogg, 1994). In a meta-analysis conducted by Armitage and Conner (2001), the researchers reported that self-efficacy was frequently emerged as the most significant predictor of both intention and behavior. As both SET and TPB contributes to explaining various relationships between beliefs, attitudes, intentions, and behavior, Therefore, we expected there to be a strong, positive correlation between the self-efficacy theory and the theory of planned behavior. Hence, the GSE scale was chosen to validate the newly developed questionnaire.

General Self Efficacy Scale (GSE). Self-efficacy is usually understood as being domain-specific. However, some researchers have conceptualized a general sense of self-efficacy that refers to a broad and stable sense of personal competence to deal effectively with different demanding situations (Schwarzer & Jerusalem, 1995: Sherer et al. 1982). The General Self-Efficacy (GSE) Scale, developed by Jerusalem and Schwarzer in 1979, to assess the general sense of perceived self-efficacy. The GSE is a 10-point scale answered on a 4- point response format, not at all true (1), hardly true (2), moderately true (3), and exactly true (4). Scores ranged from 10-40 with higher scores representing higher self-efficacy (Schwarzer & Jerusalem, 1995). The GSE has been translated into several languages (Scholz, Gutiérrez-Doña, Sud & Schwarzer, 2002). In different studies the scale showed internal consistencies between alpha = .75 and .94(Luszczynska, Scholz & Schwarzer, 2005; Scholz, Gutiérrez-Doña, Sud & Schwarzer, 2002). The retest-reliability was found to be between .47 and .75 for time periods ranging from 6 months to two years (Scholz, Gutiérrez-Doña, Sud & Schwarzer, 2002).

Previous studies found that the correlations among the GSE and social cognitive constructs (intention, implementation intentions, outcomes of expectations, and self-regulation) are high and support the validity of the scale (Luszczynska, Scholz & Schwarzer, 2005). A meta-analysis was conducted by Scholz and Schwarzer (2005), to examine the relations between general self-efficacy and social cognitive variables (intention, implementation intentions, outcome expectancies, and self-regulation), behavior-specific self-efficacy, health behaviors, well-being, and coping strategies among 1.933 respondents in 3 countries: Germany, Poland, and South Korea. The researchers reported that the GSE appears to be a universal construct that yields meaningful relations with other psychological constructs. As GSE is a universal construct, which implies that it describes a basic belief that is inherent in all individuals. We assume that there were correlations between GSE beliefs and intention to perform a behavior

#### **Utility of Theory of Planned Behavior**

The TPB has been the theoretical basis for numerous studies reported in the literature investigating health-related behavior (Francis et al., 2004a). Recently, the TPB has been the theoretical basis of studies investigating health care professionals' behavior and the determinants of their behavior intentions for nurses, doctors, pharmacists, and allied health professionals (Godin et al., 2008). Studies of nurses using the TPB include investigations of their intentions to administer opioids for pain relief (Edwards et al., 2001), use clinical practice guidelines (Kortteisto et al., 2010), and integrate evidence into practice (Côté, Gagnon, Houme, Abdeljelil, & Gagnon, 2012). Studies using the TPB have investigated nurses' adherence to hand hygiene recommendations

(Eiamsitrakoon et al., 2013) and improving compliance with healthcare associated infection (HAI) practice guidelines to reduce the acquisition of HAIs (Bruce, 2013). The findings supported the ability of the theory to identify factors that contribute to nurses' practice.

The TPB has been reported as the theoretical basis for investigating and changing clinician behavior within the intensive care environment, although use of questionnaires based on the TPB specifically within ICU was not reported. In a study of the factors influencing nurses' behavior intention to perform hemodynamic assessment using a pulmonary artery catheter by Pinto, Colombo, and Gallani (2006), the TPB helped to conceptualize results of staff interviews. Hatler and colleagues (2006) used the TPB during the introduction and monitoring phases of their project aimed at improving practices with a Ventilator Associated Pneumonia (VAP) bundle. They developed strategies that addressed the TPB constructs; clinicians were provided with a summary of practice for preventing VAP, which increased their control over and ability to perform the desired behaviors, and the new behaviors enforced the "norm" by use of recognition, rewards, and opinion leaders.

In a study investigating intensive care nurses' knowledge, attitudes, and perceived barriers to pressure ulcer prevention, Strand and Lindgren (2010) discussed their results in relation to the TPB constructs, but their survey did not measure the constructs. Although these three studies in intensive care report using the TPB as a framework for further understanding, none report specifics around measuring the TPB constructs or the use of questionnaire tools based on the TPB. There were no previous studies using the

TPB as a theoretical basis to investigate nurses DVT prevention practices in general, or within intensive care, reported in the literature.

#### **Factors Predicting Nurses' Behavioral Intention**

A literature review identified factors, as proposed in the framework that affect nurses' intention and behavior related to nursing practice. A literature search was conducted from 2004 to 2017. Sixteen studies were located, and all studies examined factors derived from the TPB and predicting nurses' behavioral intention to perform specific behavior based on TPB construct. The studies examined nurses' behavioral intentions towards different nursing practices; using health literacy strategies in patient education (Sharifirad et al., 2015); predicted safety behaviors of nurses (Javadi et al., 2013); volunteering to care for SARS patients in Taiwan (Nai-Ying Ko et al., 2004); giving lifestyle support (McKenzie, 2014); and providing labor support (Sauls, 2007). Additionally, some studies reported medication administration errors (Hung et al., 2016), using music therapy as an intervention (Loke, 2013) and providing blood pressure monitoring (Nelson, 2014); Furthermore, other studies identified performing routine HIV screening (Sutherland, 2015) and hemodynamic assessment using a pulmonary artery catheter (Pinto et al., 2006). In addition, some studies examined the prevention of ventilator associated pneumonia in NICU (Bokheim, 2011); implementing an evidencebased protocol for bowel management practices in ICU (Knowles, 2015) and providing artificial nutrition and hydration for terminal cancer patients in Taiwan (Ke, Chiu, Lo & Hu, 2008). Finally, other studies focused on understanding the psychosocial determinants of the nurse's intention to follow recommendations related to a preventive

clinical practice (Gagnon et al., 2015); mobilization of ventilated patients in ICU (Holdsworth et al., 2015); and preventing pressure ulcers in ICUs (Strand & Lindgren, 2010).

Many health care settings were included in those studies. The settings varied from pediatric and pediatric intensive care units [PICU] (Gagnon et al., 2015) to regional hospitals (Sharifirad et al., 2015; Javadi et al., 2013; Nai-Ying Ko et al., 2004; McKenzie, 2014; Hung et al., 2016). Other settings include acute care, rehabilitation and long-term care units (Loke et al., 2013). Hospital departments included internal medicine (Nelson, 2014), gastroenterology, general surgery units (Ke, Chiu, Lo & Hu, 2008). Finally, other settings included labor and delivery units (Sauls, 2007); community settings (Sutherland, 2015); neonatal intensive care units [NICU] (Gagnon et al., 2015; Bokheim, 2011); and the ICU (Gagnon et al., 2015; Holdsworth et al., 2015; Knowles et al., 2015; Pinto et al., 2006; Strand & Lindgren, 2010; Ke, Chiu, Lo, & Hu, 2008).

Most studies involved cross sectional, survey-type designs. Eleven of the studies used large samples of 140 participants and up (Hung et al., 2016; Gagnon et al., 2015; Sharifirad et al., 2015; Sutherland, 2015; Nelson, 2014; Loke, 2013; Côté et al., 2012; Bokheim, 2011; Strand & Lindgren, 2010; Ke, Chiu, Lo, & Hu, 2008; Nai-Ying Ko et al., 2004). The use of large sample sizes increases the statistical power of the studies, which in turn increases the credibility of the findings. Different samples with different characteristics were included in these studies. In respect to gender, most studies (15 studies) covered both female and male subjects. Three studies included adult nurses with a great variation in subjects' age; the average of age of the participants was 30 years

(Gagnon et al., 2015; Ke, Chiu, Lo, & Hu, 2008; Nai-Ying Ko et al., 2004). Participants with different nationalities and cultures were included; there were Taiwanese (Hung et al., 2016; Ke, Chiu, Lo, & Hu, 2008; Nai-Ying Ko et al., 2004), Canadian (Gagnon et al., 2015; Loke, 2013; Côté et al., 2012), Iranian (Javadi et al., 2013; Sharifirad et al., 2015), Americans (Sutherland, 2015; Nelson, 2014; Bokheim, 2011; Sauls, 2007), Australian (Knowles, 2015), Brazilian (Pinto et al., 2006), and Swedish participants (Strand & Lindgren, 2010). The subjects were ICU, CCU nurses, acute, rehabilitation, long-term care, and internal medicine staff nurses. The variability in age, gender, cultural backgrounds, and nationality improve generalizability of findings over these variables and the applicability of the TPB.

The sample size ranged from 23 (Pinto et al., 2006) to 750 nurses (Nai-Ying Ko et al., 2004). There was considerable variability in the response rates for the surveys ranging from 30% (Sutherland, 2015) to 100% (Ke et al., 2008). Results of 14 (87.5 %) studies indicated that attitude was a significant predictor of nurses' intention to perform a given behavior, that is, engage in the new, evidence-based practice (Hung et al., 2016; Sharifirad et al., 2015; Gagnon et al., 2015; Javadi et al., 2013; Bokheim, 2011; Sauls, 2007; Nai-Ying Ko et al., 2004; McKenzie, 2014; Hung et al., 2016; Loke, 2013; Sutherland, 2015; Strand & Lindgren, 2010; Pinto et al., 2006).

The magnitude of the relationship between attitude and intention was small ( $\beta$  = 0.09; Sharifirad et al., 2015) to large ( $\beta$  = 0.431; Loke, 2013), indicating nurses with positive attitudes towards the behavior were likely to perform it. Four studies found subjective norm was significantly associated with nurses' intention to perform a given

behavior (Hung et al., 2016; Gagnon et al., 2015; Nelson, 2014; Javadi et al., 2013). The association of a small to moderate magnitude ( $\beta = 0.014$  to 0.55) implied that if nurses perceive that persons who they consider important (i.e., colleagues, patients, and other health care professionals) support a behavior then they perform it. Perceived behavioral control was positively and moderately related to nurses' intention (Sauls, 2007; Nai-Ying Ko et al., 2004; Gagnon et al., 2015; Nelson, 2014; Sharifirad et al., 2015). This relationship indicated nurses who perceived minimal barriers and increase in available resources enhanced their positive intention to implement nursing practice.

In addition, findings of research showed variation in results related to background factors such as age, gender, ethnicity, years of experience, and exposure to information could indirectly impact intention. Some studies showed that nurses' behavioral intention was significantly associated with knowledge (Loke, 2013), age (Loke, 2013; Sharifirad et al., 2015), moral norms (Loke, 2013), experience (i.e. the number of years working as a nurse) (Loke, 2013; Javadi et al., 2013; Sharifirad et al., 2015), area of practice (Loke, 2013; Javadi et al., 2013; Sharifirad et al., 2015), area of practice (Loke, 2013; Javadi et al., 2013), and professional norms (Javadi et al., 2013). Other studies showed that knowledge was not a predictor of intention related to monitoring blood pressure accurately (Nelson, 2014; Ko et al., 2004;). Regarding years of experience, Nai-Ying Ko et al. (2004) reported nurses who are novice, younger, and possess less professional experience had a more positive intention to care for SARS patients. In other words, nurses' behavioral intention to care for SARS patients was not significantly associated with age and years of experience. Also, Hung et al. (2016) reported no significant association between nurses' attitudes toward medication administration errors

(MAE) reporting and expert and non-expert nurse status, indicating an equivalent attitude of MAE reporting among expert and non-expert nurses. Although level of education is certainly necessary for safe nursing practice, the results showed nurses' education and gender did not contribute significantly to nurses' intention to use music therapy (Loke, 2013).

**Psychometric properties of developed TPB instruments**. Several studies have been conducted validating the psychometric properties of instruments developed according to the TPB guidelines for a variety of patient populations. Javadi et al., 2013 designed a TPB questionnaire to measure patients' safety behaviors of nurses in medical surgical and intensive care unit. The content validity of the questionnaire was evaluated by expert nurses in field (hospitals) and academic members. Internal consistency of questionnaire was assessed by Cronbach's alpha coefficient was 0.87.

Gagnon et al. (2015) developed a questionnaire based on Ajzen's TPB and distributed it to ICU, NICU, PICU, and pediatric nurses. Face validity of the questionnaire was confirmed with a panel of five expert nurses. Confirmatory factor analysis and computed Cronbach alpha were used to assess the validity and reliability of items. Cronbach alpha values were acceptable for all theoretical constructs (= 0.70).

Nelson et al., (2014) reported licensed practical nurses (LPNs) and medical assistants (MAs) of family practice and internal medicine departments had completed a questionnaire on TBP variables. Similar to the proposed study, the blood pressure monitoring behavior questionnaire was developed based on the manual '*Constructing Questionnaires Based on The Theory of Planned Behavior*' (Francis et al. 2004). The

instrument was pilot tested by five LPNs and Mas, nurses reported the instrument was easy to understand and completed in less than five minutes. Internal consistency, reliability (Cronbach's alpha) and predictive validity were measured but authors not reported the value of Cronbach's alpha.

Sharifirad et al. (2015), developed a *nurses' intention regarding the use of health literacy strategies in patient education'* questionnaire based on TPB. Face validity was confirmed by expert panel and content validity were assessed by calculating content validity ratio (CVR). The CVR value for the whole instrument was 0.85 indicating good content validity of the questionnaire. Regarding reliability, Cronbach's alpha was used to assess the internal consistency. Thirty participants completed the questionnaire and Cronbach's alpha was 0.74 for the attitude scale, 0.78 for subjective norms, 0.68 for perceived behavioral control, and 0.81 for behavioral intention. These results are in line with other researcher's results. For example, like the other studies that used a researcherdeveloped instrument utilizing the process set forth by Ajzen, the Cronbach's alpha is consistently reported at good internal consistency.

Loke et al. (2014) adapted *Use of Music Therapy Questionnaire* (UMTQ). The UMTQ was a measure adapted based on instructions in a manual written by Francis et al. (2004). The UMTQ pilot tested for readability and comprehension on acute care, rehabilitation, and long-term care nurses. Content validity were assessed by calculating content validity ratio (CVR), the CVR was 0.80. In addition, the Cronbach alpha coefficient was examined to evaluate the internal consistency of the items comprising

each subscale. Cronbach's alpha was > 0.85 for the behavioral intention scale, > 0.80 for attitude scale, > 0.80 for subjective norms, and 0.85 for perceived behavioral control.

Ke et al. (2010), designed a questionnaire to understand knowledge, attitudes, and behavioral intentions of clinical nurses providing artificial nutrition and hydration (ANH) for terminal cancer patients. Nurses from the gastroenterology, general surgery, and intensive care units had completed the questionnaire. To evaluate psychometric properties of the questionnaire, the content validity was assessed by four physicians and two nurses, all of whom were experienced in the care of the terminally ill. Content validity index was calculated and yielded a value of 0.93. The Cronbach alpha for the overall questionnaire was (0.73).

Nai-Ying Ko et al. (2004) developed a questionnaire to measure the constructs in the TPB '*nurses*' *intention to provide care to SARS patients*', following Ajzen's guidelines for constructing a TPB questionnaire. The questionnaire piloted with 30 staff nurses to determine the clarity of the questions, the effectiveness of instruction, the completeness of response sets, and the time required to complete the questionnaire. Six experts in the field of infectious disease, experienced SARS care nurses, nursing experts, and nosocomial infection control nurses, reviewed the questionnaire for content validity. Based on the pilot study and expert opinions, some changes were made to the questionnaire to increase the clarity of the items. Reliability of the questionnaire not reported.

The above studies used developed instruments (questionnaire survey) measuring the TPB constructs. The developed questionnaire surveys were reported to have good

validity and reliability (Gagnon et al., 2015; Sharifirad et al., 2015; Nelson, 2014; Javadi et al., 2013; Loke, 2013; Ke et al., 2008; Nai-Ying Ko et al., 2004). It is noticed that, the validity and reliability remained consistent despite the population being studied. This because the researchers follow Ajzen's methodological recommendations on how to construct a TPB questionnaire using composite measures of attitudes, subjective norms, perceived behavioral control, and intention.

Despite this, two methodological issues were noted: 1) the use of non-random sampling techniques could have introduced sample bias and therefore limited the generalizability of the findings (Burns & Grove, 2001); and 2) the small (< 65) sample sizes in several studies could have reduced the power to detect significant relationships among the concepts (Burns & Grove, 2001). Francis et al. (2004) recommend a minimum sample size of 80 for studies testing the propositions of the TPB with multiple regression analysis.

Overall, results of the studies showed attitude, subjective norm, and perceived behavioral control were significant predictors of nurses' behavior; the importance and the degree to which each of these factors determines behavior has varied across studies. The variability can be attributed to differences in research methods (i.e. small sample sizes, use of non-validated measures) as well as in the type of behavior investigated and clinical settings.

# **Summary of Literature Review**

In reviewing the literature, a gap in knowledge remains in that no discovered study examined predictors of nurses' intentions or behavior related to applying DVT

preventive measures in ICU. Further, a methodological gap exists since there is no known instrument that measure nurses' intention to prevent DVT. As such, this study contributes to the growing knowledge of beliefs and attitude that influence nurses' intention and behavior related to preventing DVT and extended to the application of its preventive measures. This study laid the foundation for future initiatives that promote the use of critical, evidence-based nursing interventions in day-to-day practice.

# **CHAPTER III**

# **METHODS**

This chapter describes the methodology used to evaluate psychometric properties of the developed questionnaire, and to determine the predictors of nurses' intention regarding DVT prevention among critically ill patients in Egypt utilizing the Theory of Planned Behavior (TPB) as a framework.

# **Research design**

This non-experimental study sought to develop, pilot, and test psychometric properties of a new instrument for measuring ICU nurses' intention to prevent DVT. The other aim of this study utilizes a predictive correlational, cross-sectional research design. A correlational design allows for prediction of variance of one or more variables (Grajales, 2013). This design was appropriate for the study to determine the relationships among the independent variable (intention), and dependent variables (attitude, subjective norms, and perceived behavioral control). The constructs for this research have been chosen from the theoretical framework of the TPB found in the literature, and they are influenced by research relating to nurses' intention. For this study, this design provides valid evidence to answer the research questions about nurses' intention related to use of DVT preventive measures among critically ill patients in Egyptian ICUs. Moreover, the design helps in determining the strength and direction of a relationship between the study variables, which in turn enhances the understanding of nurses' intention. Although causal conclusions cannot be drawn using a cross sectional correlational design, it allows researchers to analyze the relationship among large numbers of variables (Polit, 2011).

Data collection on the selected variables occurred at a single point in time to determine the correlation among the dependent variable (intention), and predictor variables (attitude, subjective norms, and perceived behavioral control). Also, no conditions were manipulated or altered in the current study, and only the correlations and predication of the variables were examined.

In this study, the questionnaire was used to collect data from the participants. Questionnaires collected quantitative information about issues in a population, such as obtaining information about certain behavior, opinions, intentions, and attitudes, as well as the prevalence, distribution, and interrelations of variables and other relevant characteristics of the participants (Knapp 1998; Tashakkori & Creswell, 2008). According to Fricker (2008), survey technique allows large populations to be assessed with relative ease and flexibility. Nonetheless, surveys need extensive planning, time, and effort, and sometimes a discrepancy exists as to recall accuracy; further, the validity of a survey depends on the response rate (Jones, Baxter & Khanduja, 2013).

# Setting

Nurses were recruited from Suez Canal University Teaching Hospital (SCUH) in, Ismailia, Egypt. This hospital is the only tertiary care facility in the Suez Canal and Sinai area. This hospital provides service for a variety of socioeconomic levels of Egyptians, and it is estimated to service more than five million patients annually. Among 1,633 registered nurses working at SCUH, 120 nurses comprise the ICUs nursing team that provides comprehensive care for patients who require monitoring or treatment due to acute, chronic, and serious illnesses or injuries.

#### Measures

# Development of the items and content validity of the instrument

Development of the intention to use DVT preventive measures instrument included several steps. First, the instrument was constructed using the TBP construction guidelines, next the panel of experts provided critical feedback that assisted in the development of the instrument. After this, the instrument was piloted with eight ICU nurses.

#### Constructing an instrument items using guidelines based on the TPB

The application of the TPB in any new context requires a tool to measure the concepts related to the behavior of interest and its correlations and, like any other measurement tool, it should demonstrate evidence of psychometric properties, such as validity and reliability (Cornélio, et al., 2009 and Padilha et al., 2004). *No previous studies were identified that investigated nursing or medical clinicians' attitudes, beliefs, and behavior intentions for DVT prevention*. In this study, items that measure the TPB constructs of behavior intention (BI), attitude (ATT), subjective norms (SN), and perceived behavioral beliefs (PBC) were constructed based on the literature review of the TPB (Ajzen 2002), as well as guided by Francis and colleagues' (2004) manual on constructing a questionnaire based on the TPB.

**Recommended guidelines for development of a TPB measurement tool.** The constructs of attitudes, subjective norms, and perceived behavioral control can be measured directly (i.e., by asking whether their attitude towards behavior is favorable or unfavorable) or indirectly (i.e., by asking specific beliefs about behavior to infer whether

the attitude is favorable or unfavorable (Ajzen, 1991, 2002; Conner, Rodgers, and Murray, 2007; Francis et al, 2004). Francis and colleagues (2004) recommended the TPB questionnaires use the direct measurement method: If the goal of the research is simply to do an analysis to predict variance in behavioral intentions, it would be sufficient to measure intentions (three generalized intention items) and the three predictor variables using direct measures (three items x three variables = nine). This resulted in a 12-item questionnaire. *In this study, only direct measurements of the TPB constructs was measured to answer the research questions.* 

Direct measures are general measures of determinants of nurses' attitudes, subjective norms, and perceived behavioral control about their behavior. Direct measures are overall questions with standardized wording across behaviors that directly ask about respondents' perceptions of the construct (Ajzen 2006). For example, questioning nurses about their attitudes toward utilizing DVT preventive measures behavior would involve asking, is it evidence-based practice or not evidenced-based practice?

Direct measures were developed by following the guidelines outlined by Ajzen (2006) and Francis et al. (2004). To increase within subject variability, the items of questionnaire survey appeared in form of a 7-point Likert scale for bipolar adjectives (i.e., pairs of opposites), which are evaluative (e.g., strongly disagree to strongly agree) recommended by the most recent literature using the TPB (Francis et al. 2004; Ajzen 2006). The format of this scale is based on the semantic differential concept, founded on the 7-point scale to be optimal for use in TPB studies (Ajzen 2006). Francis et al. (2004) recommended each construct should be measured using a minimum of three items. In

addition to the demographic questions, this resulted in a minimum of 12 items for intentions and direct measures of the predictor variables.

**The Intention to Use DVT preventive Measures instrument.** In this study, the instrument included 15 items that reflected each of the key TPB constructs: three items for the dependent variable generalized *behavioral intention* (BI); four items for the predictor variable *attitude* (ATT); four items for predictor variable *subjective norm* (SN); and four items for the predictor variable *perceived behavioral control* (PBC) (Table .3.1).

We constructed an instrument with a subset of items selected from the larger recommended instrument. Such construction took place because the aim of the instrument is to measure behavioral intention, not to identify specific beliefs that contribute to predictor variables or to assess the influence of predictor variables in order to design an intervention to modify predictors (Francis et al., 2004).

Attitude Toward the Behavior. When measuring nurses' attitudes toward the behavior, Ajzen (2006) suggests starting with a relatively simple set of semantic differential scales based on time-tested published lists of adjectives. Here, as prescribed by Ajzen (2006) and Francis et al. (2004), direct measurement of attitude developed using instrumental items (whether the behavior achieves something, e.g., worthwhile – non-worthwhile). These bipolar adjectives followed a single stem statement, "*In my opinion, using DVT prevention measures among critically ill patients is*…." This method of using established measures helps to ensure reliability.

**Subjective Norm.** The subjective norm (SN) construct is the perceived social pressure to engage or not to engage in a behavior (Ajzen, 2006). Direct measurement of

subjective norm used questions referring to the opinions of important people in general. As in past studies (Ajzen, 2006; Francis et al., 2004), direct measures of subjective norms included injunctive statements. Injunctive norms refer to people's beliefs about what others think "ought to be done" (Ajzen, 1988), for example "*My professional colleagues, whose opinions I respect, think that I should apply DVT preventive measures*".

**Perceived Behavioral Control (PBC).** According to Ajzen (2006), PBC refers to people's perceptions of their ability to perform a given behavior. PBC reflects the confidence people have that they are able to perform the target behavior while, utilizing DVT preventive measures. PBC was measured by assessing the person's self-efficacy and his or her beliefs about the controllability of the factors enabling to apply DVT preventive measures (Ajzen, 2006). Self-efficacy was assessed by asking participants about the difficulty of utilizing DVT preventive measures, and their level of confidence about the difficulty of utilizing DVT preventive measures. Controllability in the PBC construct was measured by asking participants about the level of control they feel they have over performing the behavior, and if factors beyond their control determined whether the nurses use DVT preventive measures.

# Judgment /Quantification of The Intention to Use DVT preventive Measures instrument.

The first indicators on psychometric soundness and validity of the intention to use the DVT preventive measures questionnaire were established by evaluating content, construct validity and concurrent criterion-related validity.

**Content validity.** Content validity examines the degree to which a tool has an adequate number of sample items that measure a given construct (Polit & Beck, 2008). By ensuring that content validity is achieved, researchers can be certain that the questions asked in the survey adequately represent the constructs. Reviewers rated the survey questions on a scale of one to four based on content, clarity, and relevancy. Questions that do not rate higher than a three by the experts were revised or removed from the survey (Rubio, Berg-Weger, Tebb, Lee & Rauch, 2003).

Five field experts in content and survey development were chosen at Suez Canal University, Kent State University, and through the study's supervisors. These experts were chosen based on their experience with TPB research, survey tools, and knowledge in DVT prevention. The experts were contacted by email to ask if they would be willing to review the survey tool. The content validity was evaluated using an item level content validity index (I-CVI) and the overall scale content validity (S-CVI/Ave) (Polit, Beck, & Owen, 2007). The results of content validity will be discussed in detail in Chapter IV.

# **The Instrument Translation Process**

The new questionnaire was developed in the English language and then translated into the Arabic language for the study. The back-translation technique was employed because it allows comparison of the original source language with the back-translation (Duffy, 2006). According to Beaton, Bombardier, Guillemin, and Ferraz (2002),
Construct	Label	Questions	Response scale
Behavior Intention (BI)	BI1	I intend to use X	Strongly disagree (1) to Strongly
	BI2 BI3	I expect to use X I am planning to use X	
Attitude (ATT)	Att1	For me, using DVT preventive measures among critically ill patients in the ICU is:	Unbeneficial/ beneficial (1) to (7)
	Att2		Not Evidence based/ Evidenced based (1) to (7)
	Att3		Unnecessary practice/ necessary practice (1) to (7)
	Att4		Not worthwhile/ worthwhile (1) to (7)
Subjective norm (SN)	SN1	I feel under social pressure, from my professional colleagues, to use X	Strongly disagree (1) to Strongly agree (7)
	SN2	People who are important to me professionally, want me to use X	Strongly disagree (1) to Strongly agree (7)
	SN3	My professional colleagues, whose opinions I respect, would approve X	Strongly disagree (1) to Strongly agree (7)
	SN4	In our unit, it is expected from me that I should use X	Strongly disagree (1) to Strongly agree (7)
PBC – Controllability	PBCC1	The decision to use X is beyond my control	Strongly disagree (1) to Strongly agree (7)
(PBCC)	PBCC2	There are factors outside of my control that prevent me from using X	Strongly disagree (1) to Strongly agree (7)
PBC – Self efficacy	PBCE1	I am confident that I could use X when a critically ill patient requires it.	Strongly disagree (1) to Strongly
(PBCE)	PBCE2	In my opinion, using X is:	Difficult/ Easy (1) to (7)

## Table 3.1 Items used to assess Theory of Planned Behavior constructs

Table designed after Puffer & Rashidian (2004). Substitute X with use DVT preventive measures.

translation should involve at least two independent forward translations by bilingual translators who can then compare their versions to identify discrepancies indicative of ambiguous wording within the original survey or other problems.

For this study, two independent translators completed the translation and backtranslation process. Both bilingual experts were fluent in both Arabic and English languages. One translator translated the questionnaire from English to Arabic. The other translator re-translated the Arabic version back to English. The native English expert compared the back-translated tool (English) with the original tool in English to determine errors or discrepancy in meanings. The final Arabic version of the intention to use DVT preventive measures questionnaire was used to collect the data.

# Pilot testing and structure of the Intention to Use DVT Preventive Measures Instrument.

Pilot studies are used in two different ways in research. One aim of a pilot study is feasibility and typically is conducted on a "small scale or trial, done in preparation for a major study" (Polit, Beck, & Hangler, 2001, p.467). The second use of a pilot tests a research instrument or research procedure (Bark, 1994). Generally, the goals of pilot studies focus on testing methods and feasibility in addition to descriptive results that justify a larger, full- scale study (Arain et al., 2010; Hertzog, 2008; Thabane et al., 2010).

As a result, this researcher conducted a pilot study with a sample of eight Egyptian ICU nurses to evaluate the comprehensibility and feasibility of the survey instrument. In addition, we determined the required time to complete the questionnaire. Additional revisions were made based on participant feedback. This certified that the questions were precise and that the variables reliably generated data that are accurate for the descriptive study.

## Psychometric Evaluation and Predictors of Nurses' Intention Participants/Sample

The study participants were recruited from the ICU of Suez Canal University Teaching Hospital in, Ismailia, Egypt. A convenience, nonprobability sample included staff nurses who met the inclusion criteria and volunteered to participate in this study. Participants recruitment took place via flyers posted in the ICU by a nurse administrator of the ICU. Interested participants contacted the researcher, as the email address was posted on the flyers and/ or they provided their email addresses to the ICU nurse administrator. The inclusion criteria consisted of: (a) registered nurses (RNs) who provide clinical care for critically ill patients in the ICU; (b) who work full-time or parttime and have (c) worked more than one year in the ICU. Exclusion criteria included (a) head nurses, nurse's aides, and other staff who do not provide clinical care for adult critically ill patients, and (b) nurses who participated in a similar study or attended any previous specialized courses in DVT prevention.

#### **Sample Size Estimation**

Both factor analysis and multiple regression analyses were used in this study. Factor analysis is used to determine whether the study variables, as measured, are empirically distinguishable from one another and whether the items of each measurement scale align with the factor that they are intended to represent (Williams, Onsman, & Brown, 2010; Ullman, 2007), while, multiple regression examines the relationship

between a single outcome measure and several predictors or predictor variables (Jaccard et al., 2006). In this study, factor analysis was used to evaluate the construct validity of the study questionnaire. Further, multiple regression was used to determine the relationships between attitude, subjective norms, perceived behavioral control (predictor variables), and intention (outcome variable).

The general goal for both analyses are the same: to take individual variables and create optimally weighted linear composites. While the mathematics and procedures differ in the details, the essence and the pitfalls are the same (Osborne & Costello, 2004). Seeing this, calculation of the sample size estimation in this study took place based on the consideration of the subject to item ratio with a minimum acceptable ratio of 5:1 (Gorsuch, 1983; Hatcher, 1994; Polit and Beck, 2008). As such, the total number of respondents was relied on the total number of questions in the tool (n = 75). There is no need to adjust sample size for attrition since this is a cross-sectional study (one-time point of data collection).

#### **Data Collection**

A quantitative cross-sectional questionnaire was used to gather data in this study. The survey method was chosen because this method provides the researcher with an accurate way to appraise data about the sample, make inferences about attributes of the population, and generalize research findings (Creswell, 2014). Advantages of the survey method according to Fricker (2008) include "lower cost, less effort to administer, better response rates and greater accuracy" (p. 196). Here, the questionnaire was administered using Qualtrics online software. Qualtrics is an online survey tool that allows one to

build surveys, distribute surveys, and analyze responses from one convenient online location.

#### **Institutional Review Board and Ethical Considerations**

Institutional review board (IRB) approval to conduct research on human subjects was obtained from the Institutional Review Board (IRB) at Suez Canal University, in Ismailia, Egypt as well as the Institutional Review Board (IRB) at Kent State University. To initiate the study, the researcher contacted the director of the nursing departments and ICU nurse administrator by sending an official letter via email to obtain permission to allow nurses to take part in this study and to obtain an email list of volunteer participants. The initial contact with the nursing administrators provided background information about the purpose and significance of the study while seeking support and obtaining the e-mail list of ICU nurses to mail out the Qualtrics survey. In addition, a copy of the study flyer was sent to the ICU administrators to be posted on the advertising board of all participated units to inform nurses about the study.

Upon obtaining the email list of ICU nurses was obtained, the researcher uploaded the email addresses to Qualtrics. Then, Qualtrics was sent to the ICU nurses, which included an invitation to participate in the online survey. After one week, a follow up questionnaire with a reminder about the study was sent, and after two weeks, if there was still no participation, a second set of reminder emails were sent with the questionnaire. Nurses opened the email, read its content, and decided whether to complete the survey. If nurses decided to complete the survey, they clicked on a link provided in the middle of the invitation email, which took them to the survey

questionnaire on the Qualtrics website. The initial screen included two conditional questions regarding exclusion criteria. The first question was, "Do you attend any DVT prevention training programs or participated in similar study? The second question was, "Do you provide direct care for critically ill patients?" If, the participants answered, "Yes" to one of the questions, they received a message that he/she was not eligible to participate in the study, after which the survey was ended. Participants who answered "No" to both exclusion criteria questions were taken to the informed consent page. For participants who agreed to the conditions of the study, Qualtrics allowed them to complete the other sections of the survey. Demographic data was collected in the first section of the survey to allow for a description of the sample. Demographics include age, gender, years of experience working in the ICU, and education level. Theory of planned behavior questions were presented in the second and third sections of the survey. Upon completing the survey, participants submitted their responses online through the survey platform. An email of thanks was sent to each nurse who participated in the study. The data was stored in the Qualtrics database. Participants had 30 days to complete and submit their surveys for the data to be included in analysis; however, we had 78 responses within twenty-one days. The data from Qualtrics was downloaded into both an Excel spreadsheet and a SPSS format for statistical analysis. In addition, data was stored in files on the researcher's password protected computer and backed up on flash drives and other storage devices for analysis.

**Rights and privacy.** Ethical considerations are vital to all areas of research, especially when working with human beings, including nursing research because they

represent values, relationships, and rights, and such considerations build both professionalism and accountability. This study respected participants' rights and privacy in several ways 1) The researcher was available via email to answer questions about the study and the consent form; 2) The participants signed the informed consent prior to the study; and 3) The participants had the opportunity to withdraw from the study at any time without harm or repercussions. There are four ethical principles in nursing research, namely, beneficence, respect, justice, and informed consent (Cherry & Jacob 2005). In both phases of this study, the researcher upheld these principles. Minimal risk existed because no intervention was being performed and the study requires only the participant to answer questions on a survey. The human dignity of all participants was respected, and the researcher assured the subjects that their participation, or non-participation, would not affect them in any way.

Maintaining confidentiality and anonymity. The results of all aspects of the study do not contain any personal identifying information. In the case of all aspects of the study, participants are not required to identify themselves on the questionnaires. Regarding issues of confidentiality and anonymity, only the researcher and her research supervisory team have access to the raw data, which remain confidential (Polit & Beck 2004). The data was kept on a separate encrypted jump drive and stored in password-protected files on the computer at the researcher's home.

#### Validity

**Confirmatory factor analysis.** Confirmatory factor analysis established whether the TPB items conformed to the theory constructs. Data was entered into SPSS 24 (IBM,

Chicago, IL, U.S.A.). Factorability of items was evaluated by Bartlett's test of sphericity to test relationships among variables, and Kaiser-Meyer-Olkin was used as a measure of sampling adequacy to test whether partial correlations among variable are small. Then, factor analysis using principal component analysis and varimax rotation was performed for the behavior to confirm the predictor variables attitude, subjective norm, and perceived behavioral control (15 items).

**Construct Validity.** Validity of the questionnaire was assessed by estimating construct validity, which means that the extent to which an instrument measures what it is supposed to measure (Waltz et al, 2010). Construct validity was evaluated by examining their convergent and discriminant validity. If the multiple items of the same construct are correlated, and the average variance extracted (AVE) exceeds 0.50, it is support for the convergent validity of the instrument (Heir, Hult, Ringle, & Sarstedt, 2014). Regarding discriminant validity, it was assessed by compare the square root of the AVE with the correlation of latent constructs. The construct should better explain the variance of its own indicator rather than the variance of other constructs. Therefore, the square root of each construct's average variance extracted (AVE) should have a greater value than the correlations with other constructs; this was supported the construct validity of the instrument (Heir et al., 2014, Waltz et al, 2010). Consequently, factor analysis was conducted to assess the dimensionality of an instrument and its consistency with the theory constructs and its dimensions (Waltz et al, 2010).

**Concurrent criterion-related validity.** Another method to address validity is concurrent criterion-related validity. Validity is confirmed when scores on a scale

strongly correlate to a related criterion or scale at the same point in time (DeVon et al., 2007). In this study, the General Self-Efficacy Scale (GSE) was chosen to demonstrate criterion-related validity (Schwarzer & Jerusalem, 1995). The GSE is a 10-point scale answered on a 4-point response format, not at all true (1), hardly true (2), moderately true (3), and exactly true (4). The total scores ranged from 10-40 with higher scores representing higher self-efficacy. Construct validity of the GSE has been documented in numerous studies on hundreds of samples worldwide (Scholz, Doña, Sud, & Schwarzer, 2002; Luszczynska, Scholz & Schwarzer, 2005). The GSE is the most frequently used and thoroughly validated scale to assess general self-effacing in the world. Typical internal consistencies of the GSE range from  $\alpha = 0.75$  to  $\alpha = 0.91$ (Schwarzer & Jerusalem, 1995)

#### Reliability

Reliability can be defined as the consistency in which an instrument measures the targeted variable (Boynton & Greenhalgh, 2004; Polit & Beck, 2008; Zumbo & Rupp, 2004). By ensuring reliability, the consistency of the items on the survey tool is optimized. Internal consistency reliability is defined as a critical quality of a good measure and indicates that the items in a scale or subscale are related to each other (Fink et al., 2010; Nunnally, 1994). In other words, internal consistency measures how well the items correlate with the constructs. Internal consistency reliability is achieved by measuring for Cronbach's alpha on scaled questions where appropriate; a value of at least  $\alpha = 0.70$  is desired to ensure internal consistency (Polit & Beck, 2008; Nunnally, 1994).

Internal reliability was assessed for the TBP items grouped, first on constructs as suggested by factor analysis results and second, on constructs as determined by the TPB.

#### **Data Management and Analysis**

**Data Entry.** Prior to data collection, a codebook was developed for all the demographic data and the variables. Data was entered into the Statistical Package for the Social Sciences IBM SPSS Statistics Base 24 for Windows in two files. Double data entry occurred, necessitating the creation of two data files and comparison for inconsistencies to protect the validity of this study as well as to decrease the potential for random and systematic errors.

**Data Management.** The analysis plan began by preliminary data screening to assess the data for missing values and outliers. Missing values were assessed using frequency distribution, as recommended by Tabachnick and Fidell (2007). Box plots and Mahalanobis and Cook's distances were used to identify univariate and multivariate outliers, respectively. Removing both types of outliers can reduce the probability of Type I and Type II errors, and improve accuracy of estimates (Osborne, 2001).

**Testing Statistical Assumptions.** The multiple regression test assumptions, including (a) normality, (b) no influential cases, (c) linearity, (d) homoscedasticity, and (e) no multicollinearity, were examined. Firstly, normality was assessed by using frequencies and histograms for highly skewed and kurtotic distributions. Second, linearity was checked by inspecting bivariate scatterplots and the partial regression plot where standardized residuals are plotted against predicted values. Residual plots show the standardized residuals versus the predicted values, and they prove useful in detecting

violations in linearity (Stevens, 2009). Third, homoscedasticity checked by visual examination of the standardized residuals plot. Ideally, residuals are randomly scattered around zero (the horizontal line), which provides even distribution (Osborne & Waters, 2002). Finally, assumption of multicollinearity was examined by tolerance testing and the variance inflation factor (VIF) (Keith, 2006 & Shieh, 2010). If tolerance is less than or equal to 0.1 and if VIF is equal to or more than 10, this is a sign of multicollinearity (Polit, 2010).

**Statistical analysis.** Statistical analysis was conducted using SPSS software (version 24). Descriptive statistics was used to describe the sample. The sample and variables were described by measures of central tendency and dispersion appropriate to the level of measurement. For instance, means and standard deviations were calculated for demographic variables on interval level (e.g., age). Frequency was calculated for categorical variables such as gender, level of education, and years of experience.

#### Summary

In this chapter, the researcher presented a description of the research design, setting, study population, instrumentation, data collection, and data analysis. A thorough outline of the operational definitions for each variable has been included. The statistical technique for data analysis undertaken for this study was also described.

#### **Chapter IV**

#### RESULTS

This cross-sectional predictive correlational study endeavored to: 1) develop a reliable and valid questionnaire to assess the constructs of the TPB in relation to nurses' intention to use DVT preventive measures; and 2) determine whether attitude, subjective norms, and perceived behavior control predict the Egyptian ICU nurses' intention to use DVT preventive measures among critically ill patients in intensive care units. The findings appear in this chapter and include descriptive data of the participants, description of the study instrument, content and construct validity, reliability of the instrument, preliminary data analysis, tests of statistical assumptions, and analysis of research questions. In addition, this chapter includes the responses of participants to four open-ended questions regarding the barriers, the enabling factors, and any other issues of using DVT preventive measures in the ICU.

#### **Phase I Results**

#### **Questionnaire Development**

The development of the questionnaire items was informed by the procedures described by Ajzen and Fishbein (1980), Ajzen (2006), and Francis et al. (2004). The questionnaire contained three parts. The first covered demographic variables, including age, gender, level of education and years of experience working in ICU. The second part included 15 questions to quantify the direct measures of the TPB components. These questions measured nurses' intentions to use DVT preventive measures (dependent variable) as well as their attitudes toward the use of DVT preventive measures, subjective

norms, and PBC (predictor variables variables). The third part consisted of four openended questions that assessed advantages/disadvantages as well as factors and barriers that influence nurses' intention to use DVT preventive measures in the ICU.

### **Content Validity of the Questionnaire**

In the second stage after selecting five content experts, the results were such that three were experts in instrument development and two were DVT research experts. An expert panel was created to make quantitative and qualitative judgments on the questionnaire items. The panel members were requested to judge on the content validity index and instrument comprehensiveness. The initial contact with the members of the expert panel was via email or via telephone. Upon securing their agreement, the information letter and the survey tool were sent via e-mail to the contact e-mail addresses. The study objectives, scoring method, and required instructions on responding were discussed. Theoretical definitions of the construct underlying study, along with a list of the items on the questionnaire that would be used to measure each concept were also discussed. The panel members then determined content validity and instrument modification by scoring the relevancy and clarity of instrument items on a scale from 1 to 4. According to Waltz, Strickland, and Lenz (2010), each item was rated on a 4-point ordinal scale (1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, 4 = highly relevant).

Content validity of the nurses' intention to use DVT preventive measures questionnaire was evaluated using an item level content validity index (I-CVI) and the overall scale content validity (S-CVI/Ave), which is the average of the I-CVI (Polit,

Beck, & Owen, 2007). In order to compute the I-CVI, the proportion of agreement among panel members on the relevancy and clarity of 15 items was calculated. To obtain content validity index for each item, the number of those judging the item as relevant (rated either 3 or 4) was divided by the number of content experts (N=5). In the current study, the I-CVIs of 10 of the 15 items were 1.0. The other five items had an I-CVI of 0.80. The averages the item-level CVIs (S-CVI/Ave) approach was used to compute the scale-level index of an instrument (S-CVI). In the average approach, the sum of I-CVIs is divided by the total number of items (Polit, Beck, & Owen, 2007). Here, the overall content validity index of the instrument using the averaging approach S-CVI/Ave was 0.93. Polit, Beck, and Owen (2007) recommend that I-CVIs of 0.78 or higher and an S-CVI/Ave of 0.90 or higher are considered to have excellent content validity.

#### **Pilot Testing of the Questionnaire**

Nurses' intention to use DVT preventive measures questionnaire pilot tested prior to beginning the main study in order to assess the comprehension and relevance of the questionnaire content. A convenience sample of eight registered nurses took part in the pilot test. The ages of the participants ranged from 22 to 26 years with the mean of 22.5 ( $\pm$ .626). All participants were male. The majority of respondents were Diploma's Prepared (87.5%); only one had a technical institute's degree in nursing. Participants had been working in ICUs as nurses for an average of four years ( $\pm$ .267). The participants were asked to answer the five questions as recommended by Francis et al (2004). All participants reported that the items comprising the nurses' intention to use DVT preventive measures was easy to understand and complete. The average completion time

of the questionnaires was 15 minutes. Comments raised by the participants who participated in the pilot testing provided valuable insight in revising the questionnaire. Minor revisions were made based on the feedback from participants, making certain that the questions were precise and that the variables reliably generate data that are accurate for the study.

#### **Phase II Results**

#### **Data Management**

**Data entry and coding.** Data were entered to statistical social package SPSS 24. According to the standard questionnaire guidelines of Ajzen and Fishbein (1980), it is recommended that responses to items be obtained on a TPB scale, rating from -3 to +3 (Ajzen 2006; Francis et al. 2004). Following Ajzen's (1991) recommendations, behavioral intention, attitude, subjective norms, and perceived behavioral control items were re-coded in the SPSS software analysis on the scale -3 to +3; thus, the higher numbers reflect high intention to use DVT preventive measures, and centered mean scores were calculated for all the TPB subscales. As a scaling difference appeared between the items in the TPB survey (7-point scales) and the items in the GSE (4-point scales), a simple proportional transformation was applied. The proportional transformation for 7-point scales (TPB scale) was to subtract 4 (-> range is between -3 and +3), then divide the difference by 3. For 4-point scales (GSE scale), the formula consisted of subtracting 2.5 (-> range is between -1.5 and +1.5), then dividing the difference by 1.5 so that each scale had a range of -1 to 1. **Data Screening.** All data entry was screened to check for any possible errors including the coding process, missing values, and scale for all variables by the researcher. No data entry errors were identified for each variable in the current study.

**Missing Data.** The data was screened for the missing values using the FREQUENCIES option in SPSS. There were no missing values identified for any variable in the current study.

**Outliers.** Regression showed Cook's D values of less than 1.0 (.001- .691), indicating no influential cases on the prediction line. The Mahalanobis Distance was 15.616. The critical value of  $\chi 2$  at p < .001 and df = 3 was 16.266. Cases with a cook's distance of 1 and more and MD's probability of .001 and less were considered as outliers (Tabachnick & Fidell, 2007). Similarly, there were no outliers in the multivariate independent variable.

#### **Psychometric Properties (Construct Validity and Reliability)**

**Descriptive statistics.** The questionnaire was completed by n = 78 nurses. Their response rate was 91.7%. Participants' age ranged from 20 to 50 years with a mean of 27.83 (± 6.26). Most nurses (64.7%) were between 20-29 years of age, the minority were older than 50 years of age (1.5%), 26.4% of the nurses were between 30-39 years of age, and 7.4% of nurses were between 40-49 years of age. The nurses were predominantly female (*59%*, n = 46). The majority of nurses were technical institute prepared (53.3%, n= 41). They had an average of 6.2 years of experience working in the ICU (range =24, *SD* 5.32).

Characteris	stics	Ν	%
Age			
-	20-29	54	64.7
	30-39	18	26.4
	40-49	5	7.4
	50+	1	1.5
Gender			
	Male	32	41
	Female	46	59
Education			
	Diploma	37	48.7
	Technical institute	41	53.3
Years of			
experience	1-4	39	50
working in	5-9	22	28.2
ICU	10-14	7	9
	15 +	10	12.8

**Table 3.1**. Demographic Characteristics of the Study Participants (N=78).

## **Construct Validity**

**Factor Analysis.** The minimum amount of data for factor analysis was satisfied, with a final sample size of 78, and with over 5 cases per variable. Initially, the factorability of the 15 TPB items was examined. Several well-recognized criteria for the factorability of a correlation were used. Firstly, all 15 items had correlations of 0.3 with a minimum of one other item, suggesting reasonable factorability. Secondly, the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.71, which is above the recommended value of .6, and Bartlett's test of sphericity was significant ( $\chi^2$  (91) = 410.16, p < .05). The diagonals of the anti-image correlation matrix were all over .3, supporting the

inclusion of each item in the factor analysis. Finally, the communalities were all above 0.5. Given these overall indicators, factor analysis was conducted with all 15 items.

The results of the principal components analysis PCA were reported in Table .3.2 and Table 3.3. With a cutoff of 0.4 for inclusion of a variable, four factors were extracted. The items were rotated using a Varimax (orthogonal) rotation (Table .3.4). The four factors were extracted, explaining 65.5% of the variance. Varimax rotation provided the best-defined factor structure. All items had primary loadings over 0.6 and only one item had a cross-loading above 0.6. Factor loadings of 0.5 and greater were considered good (Nunnally & Bernstein, 1994).

For the 15-items nurses' intention to use DVT preventive measures, four items loaded on Factor 1, which accounted for 30.5 % of the variance. Factor 1 items were mostly behavioral intention. Four items loaded on Factor 2 and accounted for 15.3 % of the variance. These items were correlated with attitude to use DVT preventive measures. For Factor 3, four items loaded, accounting for 11.7% of the variance, and were mostly perceived behavioral control. Three items were loaded on Factor 4 and accounted for 8% of the variance. These items were subjective norms. Additionally, *in our unit, it is expected from me that I should*, was categorized as measuring SN; however, in the factor analysis, it loaded onto the BI factor instead. It was thus also dropped from the SN subscale. The final TPB scale included four subscales with 14 items on a 7-point Likert-type scale as strongly disagree = 1 and strongly agree = 7.

						Corre	lation N	<b>Matrix</b> <sup>a</sup>								
		BI1	BI2	BI3	ATT1	ATT2	ATT3	ATT4	SN1	SN2	SN3	SN4	PBCC1	PBCC2	PBSE1	PBSE2
Correlation	BI1	1.000	.593	.612	.148	.149	.152	.162	.181	.385	.301	.482	.236	.242	.367	.189
	BI2	.593	1.000	.487	.142	.063	.085	.001	.216	.277	.308	.551	.372	.230	.371	.091
	BI3	.612	.487	1.000	.114	.071	.150	.267	.140	.375	.406	.468	.254	.291	.306	.139
	ATT1	.148	.142	.114	1.000	.530	.707	.378	.195	.103	.165	.196	.177	.141	.105	060
	ATT2	.149	.063	.071	.530	1.000	.574	.529	.064	.223	.020	.123	.147	.139	.148	.066
	ATT3	.152	.085	.150	.707	.574	1.000	.459	.162	.059	.122	.117	.100	.124	.070	.004
	ATT4	.162	.001	.267	.378	.529	.459	1.000	.206	.161	.234	.118	.089	.226	.121	.082
	SN1	.181	.216	.140	.195	.064	.162	.206	1.000	.460	.448	.263	.165	.170	.178	.129
	SN2	.385	.277	.375	.103	.223	.059	.161	.460	1.000	.608	.419	.181	.170	.230	.071
	SN3	.301	.308	.406	.165	.020	.122	.234	.448	.608	1.000	.433	.294	.092	.121	.019
	SN4	.482	.551	.468	.196	.123	.117	.118	.263	.419	.433	1.000	.468	.259	.310	.103
	PBCC1	.236	.372	.254	.177	.147	.100	.089	.165	.181	.294	.468	1.000	.358	.643	.384
	PBCC2	.242	.230	.291	.141	.139	.124	.226	.170	.170	.092	.259	.358	1.000	.465	.449
	PBSE1	.367	.371	.306	.105	.148	.070	.121	.178	.230	.121	.310	.643	.465	1.000	.531
	PBSE2	.189	.091	.139	060	.066	.004	.082	.129	.071	.019	.103	.384	.449	.531	1.000
Sig. (1-tailed)	BI1		.000	.000	.097	.096	.091	.078	.056	.000	.004	.000	.019	.016	.000	.049
	BI2	.000		.000	.108	.293	.229	.496	.028	.007	.003	.000	.000	.022	.000	.215
	BI3	.000	.000		.161	.267	.095	.009	.110	.000	.000	.000	.012	.005	.003	.113
	ATT1	.097	.108	.161		.000	.000	.000	.044	.184	.074	.043	.060	.108	.179	.302
	ATT2	.096	.293	.267	.000		.000	.000	.288	.025	.430	.142	.099	.112	.098	.284
	ATT3	.091	.229	.095	.000	.000		.000	.078	.303	.143	.153	.192	.140	.271	.485
	ATT4	.078	.496	.009	.000	.000	.000		.035	.080	.019	.151	.219	.023	.146	.239
	SN1	.056	.028	.110	.044	.288	.078	.035		.000	.000	.010	.074	.068	.059	.129
	SN2	.000	.007	.000	.184	.025	.303	.080	.000		.000	.000	.057	.069	.021	.268
	SN3	.004	.003	.000	.074	.430	.143	.019	.000	.000		.000	.005	.212	.147	.436
	SN4	.000	.000	.000	.043	.142	.153	.151	.010	.000	.000		.000	.011	.003	.185
	PBCC1	.019	.000	.012	.060	.099	.192	.219	.074	.057	.005	.000		.001	.000	.000
	PBCC2	.016	.022	.005	.108	.112	.140	.023	.068	.069	.212	.011	.001		.000	.000
	PBSE1	.000	.000	.003	.179	.098	.271	.146	.059	.021	.147	.003	.000	.000		.000
	PBSE2	.049	.215	.113	.302	.284	.485	.239	.129	.268	.436	.185	.000	.000	.000	

 Table 3.2. Correlation Matrix of the TPB items.

a. Determinant = .002

Items		Com	ponent	
Items	1	2	3	4
BI1	.682			
BI2	.641			418
BI3	.666			
ATT1	.429	.700		
ATT2		.695		
ATT3		.760		
ATT4	.428	.579		
SN1	.472			.595
SN2	.601			
SN3	.584		516	
SN4	.700			
PBCC1	.612			
PBCC2	.519		.481	
PBSE1	.619		.526	
PBSE2			.641	

**Table 3.3.** *Items Extraction in Each Factor and Factor Loadings for the nurses' intention before rotation* (N=78).

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Table 3.4. Items in Each Factor	and Factor Loadings	for the nurses	<i>intention</i> (N=78).
---------------------------------	---------------------	----------------	--------------------------

%Variance	Item	Item Subscale		Fact	or	
explained			1	2	3	4
30.499	1	I intended to use	.824			
15.326	2	I expect to use DVT preventive measures	.793			
11.725	3	I am planning to use	.773			
8.046	4	Unbeneficial/ beneficial		.816		
6.181	5	Not evidence-based practice / Evidence based practice		.811		
4.626	6	Unnecessary/necessary		.865		

4.327	7	Non-worthwhile/worthwhile		.689	
3.774	8	I feel under social pressure			.785
3.377	9	People who are important to me			.774
2.960	10	My professional colleagues			.799
2.419	11	In our unit, it is expected	.688		
2.084	12	The decision to use		.6	93
1.756	13	There are factors outside of my control		.6	91
1.714	14	I am confident that I could use		.8	311
1.187	15	In my opinion, using DVT preventive measure is difficult/easy		.8	518

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

**Convergent Validity.** Fornell and Larcker (1981) proposed three measures to assess for convergent validity of the measurement items: (1) factor loadings; (2) Composite Reliability (CR); and (3) the Average Variance Extracted (AVE). Table 3.5. showed that all item loadings exceeded the recommended value of 0.6 (Chin, 1988). Composite reliability values, which represent the degree to which the construct indicators indicate the latent construct, exceeded the recommended value of 0.7 (Hair et al., 2006); while AVE, which reflects the overall amount of variance that is attributed to the construct in relation to the amount of variance attributable to measurement error, exceeded the recommended value of 0.5 (Hair et al., 2006). Attitude, behavioral intention, subjective norms, and perceived behavioral control had the highest factor loadings, respectively.

Construct	Items	Factor loading	<sup>a</sup> Average Variance	CR (>.70) *
		(>.60)	Extracted (> .50) *	
BI				
	BI1	.824		
	BI2	.793	0.63	.75
	BI3	.773		
ATT				
	ATT1	.816		
	ATT2	.811	0.63	<b>Q</b> 1
	ATT3	.865	0.03	.01
	ATT4	.689		
SN				
	SN1	.785		
	SN2	.774	0.61	.73
	SN3	.799		
BPC				
	PBC1	.693		
	PBC2	.691	0.56	.74
	PBC3	.811		
	PBC4	.818		

**Table 3.5.** Convergent Validity and Composite Reliability of the TPB Constructs.

\* Indicates an acceptable level of validity and reliability, <sup>a</sup>AVE: Average Variance Extracted. This is computed by adding the squared factor loadings divided by number of factors of the underlying construct. CR: composite reliability. This is computed by sum of squared factor loadings / (sum of squared factor loadings + sum of error variance).

**Discriminant validity.** Discriminant validity refers to "*the extent to which the measures are not a reflection of some other variables*" (Ramayah, Yeap, & Igatius, 2013; p. 142). The discriminant validity was assessed using Fornel and Larcker's (1982) criteria by comparing the square root of each average variance extracted (AVE) in the diagonal with the correlation coefficients (off-diagonal) for each construct in the relevant rows and columns. The latent construct should explain better the variance of its own indicator rather than the variance of other latent constructs. With this, the square root of each construct's AVE should have a greater value than the correlations with other latent

constructs. Overall, the discriminant validity was established between the constructs (attitude, subjective norms, PBC, and behavioral intention). In Table 3.6, the diagonal elements in the correlation matrix have been replaced by the square roots of the average variance extracted. Discriminant validity appears satisfactory at the construct level in the case of all constructs.

**Table 3. 6.** The square root of the average variance extracted (AVE) and correlationsbetween constructs (off-diagonal).

Construct	BI	ATT	SN	PBC
BI	(0.78)			
ATT	.186	(0.79)		
SN	$.410^{**}$	.217	(0.77)	
PBC	.385**	.159	$.235^{*}$	(0.75)

*Note.* \*p < .05. \*\*p < .01.

**Criterion-related validity.** For criterion-related validity, the TPB subscales were not significantly related to the GSES (r = -.115, p < .01). For the three subscales of nurses' intention to prevent DVT, attitude demonstrated a negative but non-significant relationship with the GSES (r = .158, p < .01); subjective norms showed a positive but non-significant relationship with the GSES (r = .048, p < .01); and perceived behavioral control had a non-significant relationship with the GSES (r = .048, p < .01); Thus, the GSE did not correlate with intention and TBP subscales (Table 3.7).

Construct	BI	ATT	SN	PBC
BI				
ATT	.186			
SN	.410**	.217		
PBC	.385**	.159	$.235^{*}$	
GSE	115	158	.048	089

**Table 3.7.** Correlations of TPB Subscales with GSE Scale.

*Note.* \*p < .05. \*\*p < .01.

**Internal consistency.** Four subscales of TBP were examined for internal consistency using as Cronbach's alphas. Francis et al. (2004) consider an alpha coefficient value greater than 0.60 as generally acceptable in statistical analysis. In this study, Cronbach's alpha was 0.82 for questionnaire as a whole, 0.79 for the behavioral intention scale, 0.81 for attitude scale, > 0.74 for subjective norms, and 0.77 for perceived behavioral control (Table 3.8).

Scales	Number of items	Cronbach's Alpha (α)
Attitude	4	.81
Subjective norms	3	.74
PBC	4	.77
Intention	3	.79

**Table 3.8.** Reliability as Internal Consistency of TPB Sub-Scales.

## **Testing Statistical Assumptions of Multivariate Analysis**

**Normality**. Normality was examined for each study variable (BI, ATT, SN, and PBC) by checking their normality with frequencies and histograms. The skewness values ranged between -3 and +3 and the kurtosis ranged between -8 and +8 as recommended by

Kline (2005). Therefore, all study variables had sufficient variance. The Shapiro-Wilk test of normality was not significant (S-W = 0.987, df = 78, P = .590), suggesting that the unstandardized residuals were normally distributed.

**Multicollinearity.** There is no evidence of multicollinearity between predictors. The tolerance coefficients for values fell between .874 and .937(> .1) and variance inflation factor (VIF) values came down between 1.067and 1.144 (<10).

**Homoscedasticity.** The homoscedasticity was tested using graphics from regression and simple scatterplots of Studentized Deleted Residuals versus Standardized Predicted Scores. The results showed that the residuals were randomly scattered around the zero line. This result suggests no evidence of non-constant error.

#### **Prediction of Nurse Intention**

Composite centered scores were created for each of the TPB subscales, based on the mean of the items that had their primary loadings on each factor. Higher scores indicated high intention to use DVT preventive measures. Descriptive statistics appear in Table 3.9. *Mean* scores for predictors were 1.64 for attitude, 1.45 for subjective norms, 1.44 for perceived behavioral control, and 1.54 for behavioral intention.

**Table 3.9.** *Descriptive statistics for the TPB Scale* (N = 78).

Predictors	No. of items	M (SD)	
Attitude	4	1.64 (.85)	
Subjective norms	3	1.45 (1.03)	
PBC	4	1.44 (1.10)	
Behavioral intention	3	1.54 (1.10)	

#### Analysis of research questions

**Research question 1.** *What are the correlations between nurses' attitudes, subjective norms, and perceived behavioral controls?* 

A standard multiple regression analysis was conducted to estimate the total effect of ICU nurses' attitudes, subjective norms, and perceived behavioral control on their intention to use DVT preventive measures among critically ill patients in ICU. Pearson correlation coefficients were calculated to determine the bivariate correlation between the TPB constructs. The Pearson correlation coefficients of the theoretical constructs appear in Table 3.10. All variables correlated significantly with subjective norms. There were weak to moderate correlations between each of the predictor variables and intention. Intention was most strongly correlated with subjective norms and perceived behavior control (r = 0.410, p < 0.01; r = 0.385, p < 0.01), and was most weakly correlated with attitude (r = 0.186, p < 0.05). Attitude was moderately correlated to subjective norms (r= 0.217, p < 0.05) and was most weakly associated with perceived behavior control (r =0.159, p < 0.05). Perceived behavior control was most correlated to subjective norms (r = 0.235, p < 0.05). As subjective norms and perceived behavioral control toward using DVT preventive measures increased, the ICU nurses' intentions to use DVT preventive measures among critically ill patients in the ICU increased.

Predictors	BI	ATT	SN	PBC
BI				
ATT	.186			
SN	.410**	.217		
PBC	.385**	.159	.235*	

**Table 3.10.** Intercorrelations for TPB Variables Phase II (N = 78).

*Note.* \**p* < .05. \*\* *p* < .01.

**Research question 2.** Do attitudes, subjective norms, and perceived behavioral controls predict ICU nurses' intentions to prevent DVT among critically ill patients in an Egyptian ICU?

To examine Research Question 2, a multiple linear regression was conducted to assess if attitudes, subjective norms, and perceived behavioral controls predict ICU nurses' intentions to use DVT preventive measures among critically ill patients. Regression results indicated the overall model significantly predicts nurses' behavioral intention. The regression model accounted for 26.1% of the variance in behavioral intention score ( $R^2$  = .261,  $R^2_{adj}$  = .231, F (3, 74) = 8.696, p < .001). Tables 3.11 and 3.12 detail the full regression. Based on the results of the regression model showed that the ability of TPB constructs to predicted nurses' intention to use DVT preventive measures in the ICU.

**Table 3.11.** Regression Analysis Summary for TPB Variables Predicting BehavioralIntention.

R	<b>R</b> <sup>2</sup>	R <sup>2</sup> adj	$\varDelta R^2$	<b>F</b> chg	df1	df2	р
.511a	.261	.231	.261	8.696	3	74	.000

a. Predictors: (Constant), PBC, ATT, SN

b. Dependent Variable: BI

#### Table 3.12. ANOVA Summary.

Model	Sum of	df	df Mean		Sig.
	Squares		Square		
Regression	24.392	3	8.131	8.696	.000 <sup>b</sup>
Residual	69.188	74	.935		
Total	93.580	77			

a. Predictors: (Constant), Perceived behavioral control, Attitude towards prevention of DVT, Social norms about prevention of DVT

b. Dependent Variable: Behavioral intention to treat DVT in critically ill patients

**Research question 3.** *Of these predictors (attitudes, subjective norms, perceived behavioral controls), which variables have the most relevant influence on intention ICU nurses' intentions to prevent DVT among critically ill patients in ICU?* 

**Predictors of intention.** Each of the three predictors warranted further examination. Results of the multiple linear regressions are presented in Table 3.13. In this model, subjective norm was a significant predictor of nurses' intention ( $\beta$  = .325, p = .003), suggesting that the nurses' intention increased by .32 unit for every one unit increase in nurses' subjective norms. Perceived behavioral control was also a significant predictor of nurses' intention ( $\beta$  = .298, p = .005), suggesting that the nurses' intention increase in perceived behavioral control. Attitude was not found to be significant predictors of nurses' intention to use DVT preventive measures in the ICU. The overall regression model was significant (F (3, 74) = 8.696, p < .001). Social norms ( $\beta$  = .325, t (1) = 3.107, p = .003) and perceived behavioral control ( $\beta$  = .298, t (1) = 2.876, p = .005) were significant predictors of behavioral intention, but attitude towards prevention was not ( $\beta$  = .068, t (1) = 0.658, p = .513).

$$BI = 4.495 + 0.087_{Att} + 0.313_{SN} + 0.298_{PBC}$$

The size and direction of the relationships indicated that the strong intention to use DVT preventive measures among critically ill patients in the ICU occurred among the ICU nurses who had high positive social support towards and high perceived behavioral control over the use of DVT preventive measures in the ICU (See Figure 3).

**Table 3.13.** Multiple Regressions of Attitude, Subjective norms, and Perceived

Behavioral Control in Predicting Nurses' Intention.

Predictor variables –	Unstandardized coefficients		Standa coeffi	ordized cients	Sig.	
	В	SE B	β	t		
ATT	.087	.133	.068	.658	.513	
SN	.313	.101	.325	3.107	.003	
PBC	.298	.104	.298	2.876	.005	



*Note.* Numbers above the line are be ta coefficients, and/or correlations, \*p < .05. \*\*p < .01.

Figure 3: The Study Results.

#### **Summary of the Findings from Open-Ended Questions**

Content analysis was employed to analyze the responses from the open-ended questions regarding the advantages, disadvantages, enabling factors, and barriers of using DVT preventive measures in the ICUs. The majority of nurses responded to these questions.

**Open-ended question 1.** What do you believe are the advantages of using DVT preventive measures in the ICU?

Fifty-one nurses (65.6%) reported that the most frequently reported advantages of using DVT preventive measures among critically ill patients included reduce risks of pulmonary embolism (n = 10, 19%), decrease length of ICU stay (n = 23, 45%), decrease rates of morbidity and mortality ( n = 17, 33%), cardiovascular benefits (reducing muscle wasting and improve blood flow) (n = 12, 23.5%), and decrease medical costs (n = 8, 15.6%).

**Open-ended question 2.** What do you believe are the disadvantages of using DVT preventive measures in the ICU?

Fifty-one nurses (65.6%) answered open-ended question 2. The most frequently reported perceived disadvantages were the possibility of bleeding (n = 32,62.6%), time consuming (n = 42, 82.3%), increased staff workload (n = 24, 47%), need more time (n = 37,72.5%), and potential for physiological instability or harm to the patients (n = 17, 32.6%). The attitudinal beliefs on the advantages and disadvantages of using DVT preventive measures in the ICU appear in Table 3.14.

**Beliefs** No % - Reduce risks of pulmonary 10 19 embolism. - Decrease length of ICU stay. 23 45 - Decrease rates of morbidity and 17 33 **Advantages** mortality. - Cardiovascular benefits. 12 23.5 - Decrease medical costs. 8 15.6 - Possibility of bleeding. 32 62.6 - Time consuming. 42 82.3 - Increased staff workload 24 47 Disadvantages - Need more time 37 72.5 - Potential for physiological 17 32.6 instability or harm to the patients.

**Table 3.14.** Attitudinal beliefs on the advantages & disadvantages of using DVT

preventive measures in the ICU (N=51).

**Open-ended question 3.** *What factors or circumstances would enable you to use DVT preventive measures in the ICU?* 

**Availability of equipment.** Forty-three nurses (55%) reported that having available equipment such as compression devices or elastic compression stockings would enhance their abilities to use DVT preventive measures in the ICU among critically ill patients.

**Collaboration among ICU team.** Twenty nurses (25.6%) believed that the collaboration among the ICU team including nurses, physicians, physical therapists and pharmacists also served as a factor that would support the use of DVT preventive measures in the ICU.

**Continuing training for nurses.** Many nurses mentioned the significance of knowledge and skills of staff nurses regarding DVT prevention as important factors that would enable nurses to use DVT preventive measures in the ICU. Twenty-five nurses (32%) reported that the ICU nurses should be trained in DVT preventive measures. Also, thirteen nurses (16.6%) indicated that conducting training programs, workshops, and seminars would be helpful regarding DVT prevention.

**Open-ended question 4.** What factors or circumstances would make it difficult or impossible for you to using DVT preventive measures in the ICU?

Lack of knowledge, skill, and experience regarding using DVT preventive measures. The researcher asked questions regarding factors or circumstances that would make it difficult. The majority of nurses replied that they lacked the knowledge, skills, and experience to use DVT preventive measures for critically ill patients in the ICU.

**Instability of condition of patients.** Twenty-five ICU nurses (32%) thought that the critical illnesses of the patients in the ICU were barriers. Twelve nurses (15.3%) reported that their belief that the conditions of patients are too serious was considered a major barrier to providing pharmacological prophylaxis in the ICU such as patients with subarachnoid hemorrhage, lower extremities surgeries, or fractures. Additionally, several life support devices are attached to patients as well as, when some patients had lower extremities fractures or surgeries.

**Staff shortage.** Twenty-one staff nurses (26.9%) specified that their workload and staff shortages coupled with emergencies and stressful aspects of working in the ICU created barriers. Of these nurses, twelve reported that the routine workload of the staff

nurses keeps them fully occupied, as do the patients' instability conditions. Thirteen nurses (16.6%) were concerned about the ratio of nurses to patients. The nurses reported that the nurse-to-patient ratio was not fair, but that if there was an equitable ratio of nurse to patients, they would have enough time to provide DVT preventive measures to critically ill patients. Fourteen nurses (17.9%) were concerned about the availability of other staff that can help during using DVT preventive measures.

Lack of equipment and resources. All nurses stated that using DVT preventive measures required equipment such as compression devices, elastic compression stockings, and other equipment. They thought that the lack of compression devices might be the barrier. The perceived behavioral control beliefs on the enablers and barriers of using DVT preventive measures in the ICU appear in Table 3.15.

**Table 3.15.** Perceived behavioral control beliefs on the Enablers & Barriers of using

DVT preventive measure	s in	the	ICU	(N =	: 78).
------------------------	------	-----	-----	------	--------

	Beliefs	No	%
	- Availability of equipment	43	55
Enablers	- Collaboration among ICU team	20	25.6
	- Continuing training for nurses.	25	32
Barriers	<ul> <li>Lack of knowledge, skill, and experience.</li> <li>Instability of condition of patients</li> <li>Staff shortage</li> </ul>	45 25	57.5 32
	- Lack of equipment and	21	26.9
	resources	78	100

#### **Chapter Summary**

This chapter presented the quantitative and qualitative results obtained by using the TPB cross-sectional survey and the results of the open-ended questions. The target population consisted of ICU nurses who worked at Suez Canal University Hospitals. Descriptive statistics were used to describe the sample characteristics such as age, gender, years of experience, and level of education. Moreover, the instrument was evaluated for validity and reliability. Content validity was evaluated by a review of the instrument by a panel of content experts. Construct validity was established by evaluating convergent and discriminant validity through factor analysis. The questionnaire reliability was assessed using Cronbach's alpha coefficient of the TPB variables, indicating satisfactory values of reliability at 0.82.

This study contains several significant outcomes. First, a reliable questionnaire was developed to predict nurses' intentions to use DVT preventive measures. Second, the constructs of the TPB (i.e., subjective norms and PBC) did explain the model, and the TPB model explained 26.1% of variance in the intentions. The results also revealed that subjective norm and PBC significantly relate to nurses' intention, whereas attitude was not a significance predictor for nurses' intention. The ICU nurses who had high positive social influence and high perceived behavioral control over the use DVT preventive measures expressed a strong intention to use DVT preventive measures among critically ill patients in the ICU. The next chapter presents the discussion of these results, focusing on the interpretation of inconsistencies in the findings of this study when compared to similar studies.

#### **CHAPTER V**

#### DISCUSSION

The purposes of this study were to (1) design a research questionnaire based on the theory of planned behavior (TPB) to measure nurses' intention to use DVT preventive measures to collect data to test the questionnaire for psychometric properties; and (2) determine whether attitude, subjective norms, and perceived behavioral control predict Egyptian ICU nurses' intention to prevent DVT among critically ill patients.

This chapter begins with a review of the major findings that are reported as a result of this study, followed by a discussion of the findings of psychometric properties of the questionnaire. After that, the findings regarding the predictors of nurses' intention to use DVT preventive measures are discussed. The strengths and limitations of the research are also presented. Finally, this chapter concludes with a discussion of the implications of the study findings for nursing practice, as well as recommendations for future research.

#### **Psychometric Properties of the Instrument**

The expert opinions of five professionals familiar with the theory of planned behavior and knowledge in DVT prevention and questionnaire development resulted in content validity of the nurses' intention to use the DVT preventive measures questionnaire.

**Content validity.** The determination of content validity was evaluated using the methods proposed by Polit, Beck, and Owen (2007) based on two calculations: The Item Level Content Validity Index (I-CVI) and the Scale Level Content Validity Index (S-

CVI). In the current study, findings showed that the I-CVIs of 10 of the 15 items were 1.0. The other five items had an I-CVI of .80. As to the S-CVI, the score was .93, which demonstrates a strong estimate of content validity. These results accord with earlier findings suggesting that acceptable scores for the items, I-CVI  $\geq$  .78, and S-CVI > .80 were considered as high scores for validity of content (Lynn, 1986; Polit et al., 2007).

**Construct Validity.** Construct validity was assessed by confirmatory factor analysis (CFA) based on the TPB theoretical model. CFA supported a four-factor structure. The results revealed that of the three items loaded on Factor 1, all three consisted of behavioral intention (*I intend to use DVT measures in the ICU, I am planning to,* and *I expected to use*). The four items loaded on Factor 2 seemed to represent nurses' attitudes toward using DVT preventive measures (*Unbeneficial / beneficial, Not evidence-based practice / Evidence based practice, Unnecessary / necessary,* and *Non-worthwhile / worthwhile*).

The four items loaded on Factor 3 seemed to represent perceived behavioral control to use DVT preventive measures (*The decision to use; I am confident that I could use; in my opinion and using DVT preventive measure is difficult/easy*). Finally, the three items loaded on Factor 4 represented subjective norms (*I feel under social pressure; People who are important to me;* and *My professional colleagues*). Tabachnick and Fidell (2001) considered 0.32 as a good standard for the minimum loading of an item, which equates to approximately 10% overlapping variance with the other items in that factor. A "cross loading" item is an item that loads at 0.32 or higher on two or more factors. Here, item number 11 (SN4) (*In our unit, it is expected from me that I should use*
*DVT preventive measures*) was loaded on the behavioral intention subscale instead of subjective norms subscale, therefore it was dropped from the analysis, as there were several adequate to strong loaders (0.50 or better) on each factor (Costello & Osborne, 2005).

**Convergent Validity.** In this current study, convergent validity was assessed by factor loadings, composite reliability, and the average variance extracted. The results indicated a high level of correlation of multiple indicators of the same construct that support the convergent validity of the instrument. Attitude toward using DVT preventive measures emerged as the most positive evaluation of the behavior by nurses. This was demonstrated by the items with the highest factor loading validity within the attitude construct. The items with the highest factor validity within behavioral intention construct indicated that ICU nurses' readiness to use DVT preventive measures among critically ill patients. Subjective norms included perceived pressure from colleagues and other ICU staff. The items with the highest factor validity within the behavioral intention construct indicated ICU nurses' readiness to use DVT preventive measures when working with critically ill patients. Subjective norms included perceived pressure from colleagues and other ICU staff. The items with the highest factor validity within this construct indicated that most nurses perceived their behavior in line with that of colleagues. Similarly, the items with the highest factor validity within PBC construct indicated that nurses had enough level of confidence about their abilities to use DVT preventive measures based on how they perceive the hindrances or facilitators. These findings were similar to a study conducted in England by Russo et al. (2012), in which the researchers assess the

convergent validity of the questionnaire with the TPB using factor analysis. The results showed higher coefficient correlations between the TPB construct and corresponding items, which indicate higher factor validity.

**Discriminant validity**. The results showed that the square root of AVE of each construct is larger than the correlation estimates of the constructs. This specifies that all the constructs are distinctly different from one another, implying that each construct is unique and captures phenomena not represented by other constructs in the analysis. This was in line with the previous studies by Sierra (2107) as well as Teo and Lee (2010), who reported that each TPB construct correlated more strongly with its indicators than with the other constructs, which support the discriminant validity between constructs.

**Criterion related validity.** The nurses' behavioral intention and subscales were not significantly correlated with the validation measures of GSE. Still, the correlations were weak, ranging from r = -.158 to .048. It is not surprising that the strength of the correlations was weak as it applies to the TPB subscales. This is similar to the findings of a meta-analysis study conducted by Luszczynska, Scholz, and Schwarzer (2005). There, the researchers examined relations between general self-efficacy and social cognitive variables (intention, implementation intentions) in three countries, Germany, Poland, and South Korea. The researchers reported that the correlations between GSE and socialcognitive variables, such as intentions, remained significant and in the low range. But the amount of variance shared between these variables was low in most cases. These studies resulted in evidence that supported associations between perceived self-efficacy and the variables under study confirming the validity of the psychometric scale. In addition,

other researchers explained that the GSE construct was not a true use of SE theory as defined by Bandura (1997). For example, the key two constructs of SE theory are self-efficacy expectancy and outcome expectancy. Person's belief in his or her self-confidence to carry out a specific, behavior refers to an expectation of self-efficacy (Bandura, 1977). As a result, SE as proposed by Bandura was a situation-specific concept, and which is concerned with judgment of personal capabilities in unique situations, while general self-efficacy assesses a broad and stable sense of personal competence to deal effectively with a variety of stressful situations (Schwarzer & Luszczynska, 1995).

In this study, non-significant results could be explained by the generality of the self-efficacy construct used in the present study. Stronger relations emerged for GSE and other general constructs, such as self-regulation, than for GSE and behavior-specific constructs, such as intention. Moreover, previous studies focused on intention and domain specific self-efficacy (Ghahremani, Niknami, & Nazari, 2012; Wang & Zhang, 2016). A possible explanation for such non-significant results was the present study sought to determine the variance in behavioral intention accounted by a combination of predictor variables (attitude, subjective norms, and perceived behavioral control) not to identify specific beliefs that contribute to a situation or predictor variables (attitude, subjective norms). This could explain why the GSE scale did not strongly correlate with the TPB scale.

**Reliability.** Findings of this study remained consistent with previous research that reported similar reliability. In the study conducted in Italy, Bertani et al. (2016)

reported the reliability values of nurses' intention to perform peripherally inserted central catheter (PICC) was good, attitude = 0.79; subjective norms = 0.72; perceived and behavioral control = 0.85). Moreover, the reliability of this study was better compared to previous studies. For example, Beduze (2012) reported the reliability of nurses' intention to perform anxiety assessment subscales were 0.67 for attitude; 0.37 for subjective norms; .28 for perceived behavioral control; and 0.70 for intention. In the study that measured nurses' intention to support and use music therapy in NICU, however, Muensa (2102) reported the reliability for attitude = 0.77; subjective norms = 0.63; perceived behavioral control = 0.61; and intention = 0.66. Further, the reliability scores for our questionnaire as a whole ( $\alpha = 0.81$ ) were better compared to Gagon's study of measuring ICU nurses' intention to follow recommendations on the use of filter needles ( $\alpha = 0.70$ ) (Gagon et al., 2015). Because of this, the TPB subscales in this study were evaluated according to several criteria, most notably by the degree of validity and reliability. Our questionnaire established strong reliability and internal consistency using coefficient ( $\alpha$ ). The internal consistency suggests that the items function together in order to consistently measure the ICU Egyptian nurses' intention to use DVT preventive measures. Overall, the psychometric evaluation of the questionnaire confirmed that a TPB-based questionnaire provides a sound basis for nurses' intention to use DVT preventive measures.

# Predictors of intention to use DVT preventive measures

The literature suggests that the TPB provides the most effective framework for predicting intentions and behaviors in both general and culturally-diverse populations

(Ajzen, 2006; Akbar, Anderson, & Gallegos, 2015). The present study was designed to examine the TPB variables to predict utilization of DVT preventive measures intention among ICU nurses. Using Ajzen' well- defined methodology (2006), the researcher developed a reliable and valid questionnaire. Data analysis with correlational analysis and multiple regressions were employed to interpret the predictor variables' influence on the intention to use DVT preventive measures.

Pearson's correlation coefficient was used to assess the relationships between attitude, subjective norms, PBC, and the behavioral intention variable. Although subjective norms and PBC were significantly correlated with behavioral intentions in this study, the attitude did not significantly correlate with behavioral intentions (r = 0.186, p > 0.01). Subjective norms and PBC yielded significantly positive relationships (r = 0.410, p < 0.05) and (r = 0.235, p < 0.05) respectively. As with previous studies that utilized the TPB in general applications (Armitage & Conner 2001; Godin & Kok 1996; Godin et al. 2008) and in nurses' clinical practices (Javadi et al., 2013; Nelson et al., 2014), subjective norms and PBC significantly and positively associated with behavioral intention.

The TPB provided strong evidence of attitude, subjective norms, and PBC in prediction of ICU nurses' intention to use DVT preventive measures among critically ill patients. Subjective norms, attitude, and perceived behavioral control accounted for nearly one-fourth of the variance in intentions. These results support other TPB studies by accounting for 12% to 61.6% of variance in intentions in general application (McKinney, Modeste, Lee, & Gleason, 2015; Malek, Umberger, Makrides, & ShaoJia,

2017; White, Starfelt, Young, Hawkes, Leske, & Hamilton, 2015) and accounting for 10% to 44.5% in nurses' clinical practice (Piras, 2016; Appleby, 2016; Sharifirad et al., 2015; Hung et al., 2016).

### Nurses' attitudes towards using DVT preventive measures

The findings of this study established subjective norms and PBC as the main determinants explaining nurses' intention to use DVT preventive measures among critically ill patients in the ICU. These results indicated that nurses who perceive a higher social influence from persons whom they consider important (i.e., colleagues) to support using preventive measures and who have over control toward the behavior have a higher intention to use DVT preventive measures.

Surprisingly and not in line with previous research, (Hung et al., 2016; Sharifirad et al., 2015; Gagnon et al., 2015; Javadi et al., 2013; Bokheim, 2011; Sauls, 2007; Nai-Ying Ko et al., 2004; Hung et al., 2016; Loke, 2013; Sutherland, 2015; Strand & Lindgren, 2010; Pinto et al., 2006), attitude was not a significant predictor of the Egyptian ICU nurses' intention to use DVT preventive measures. Additionally, it was the strongest determinant of behavioral intention in other publications. See, for example, Chio and Kim's study (2015) on a nurses' intention to implement smoking cessation interventions in Korea and Loke's (2013) study on intention to use music therapy for the management of anxiety and pain among nurse working with patients in acute, rehabilitation, and long-term care settings. While Lavoie, et al., (2016), Cassista et al., (2014), Javadi et al. (2013), and Nelson et al. (2014) studies did not support attitude as a significant determinant of intention.

The incongruity between the findings of the current study and previous studies regarding the association between attitude and intention could be attributable to three things, namely possible response bias, differences in population, and no previous experience to the behavior. First, for instance, participants' responses to the attitude scale might contaminated by social desirability bias and hence failed to reflect person's true attitudes (e.g., Waltz et al., 2010). Second, the low contribution of attitude suggests that attitude is the individual's overall evaluation of an object, concept, or behavior (Ajzen 2001). Thus, individuals consistently differ in the amount of weight they place on attitude and normative considerations, which allows attitude to vary across a population (i.e., Egyptian ICU nurses). Further, nurses reported positive overall attitudes towards using DVT preventive measures; however, many negative attitudes were identified throughout open-ended questions. Explanations for these behaviors can be gleaned from nurses who reported the risks and complications of DVT preventive measures and the undesirability of these risks. These negative attitudes could persuade nurses not to use DVT preventive measures and/or those who do use these measures could also aspire to reduce rather than prevent DVT. Additionally, the qualitative information of the study indicated that Egyptian ICU nurses hold a positive attitude toward DVT prevention. This meant that the variability of attitude was not great, and therefore, its explanatory power was weak. Third, because the majority of ICU nurses had fewer than five years working in the ICU, it can be assumed that as a consequence, they had little experience about this particular behavior. This can further explain why the strength of this predictor variable

appeared so low. Seeing this, it can be argued that if the nurses had experience with DVT prevention, the contribution of attitude might have been higher.

### Nurses' subjective norms towards using DVT preventive measures

Although several studies have argued that subjective norms are the weakest predictor of behavioral intention (e.g., Jie et al., 2009; Puffer & Rashidian 2004; Sharifirad et al. 2015), other studies confirm that subjective norms are significant and strong indicators of behavioral intention (e.g., Sauls 2007; Javadi et al., 2013; Nelson, 2014; Gagnon et al., 2015; Hung et al., 2016;). The findings of this study showed subjective norm as the most significant predictor of intention to use DVT preventive measures ( $\beta = .336$ , p = .002). These findings remained consistent with previous research, which found subjective norm as a significant predictor of the behavior in question. For example, Hung et al. (2016) found that significance in others' attitude, such as the nurse manager and co-workers, influence nurses' attitude toward medication administration error reporting. Kortteisto et al. (2010) reported the subjective norm as the strongest factor, revealing that the professionals' perception of social pressure toward the use of clinical guidelines produced positive intention to use them. Moreover, Javadi et al. (2013) provided that normative beliefs had the greatest influence on nurses' intention to implement patient safety behaviors.

Javadi and colleagues (2013) explain that subjective norms are a cultural factor, and that individuals usually maintain social relationships that are congruent with outstanding individuals in their work areas. Additionally, approval and disapproval voiced by important others might play a significant role in the formation of nurses'

behavioral intentions for complying with the required behavior (Ajzen 1991; Francis et al. 2004). In this current study, the nature of ICU work involves extensive contact with other healthcare professionals, which can explain the relative importance of subjective norms in predicting ICU nurses' behavioral intentions. Additionally, Egyptian ICU nurses could simply value guidance more in the form of what they believe their significance others think they should do when considering a behavior.

# Nurses' perceived behavioral control towards using DVT preventive measures

In this study, the multiple regression analysis showed that PBC perceived behavioral control was the second strongest predictor that accounted for the variance in intention and predicted ICU nurses' intention to use DVT preventive measures. This remains consistent with those of the prior studies by Nai-Ying Ko et al. (2004), Sauls (2007), Loke (2011), Nelson (2014), Gagnon et al. (2015), Sharifirad et al. (2015), Cassista et al. (2014), Javadi et al. (2013), and White et al. (2015) in showing that PBC was often the strongest predictor of behavioral intention. Contrary to the current study, Abamecha and colleagues (2013) and Ghahremani et al. (2012) found attitudes and subjective norms significantly related to high levels of behavioral intention, whereas PBC does not.

The findings of the open-ended questions showed that the ICU nurses endorsed a number of beliefs, which concur with previous studies (Holdsworth et al., 2015; Muensa, 2012). For example, the attitudinal beliefs pertaining to the advantages of using DVT preventive measures reflected concerns about the reduced risks of pulmonary embolism, decreased length of ICU stay, decreased rates of morbidity and mortality, and improved

cardiovascular benefits. The attitudinal beliefs about the disadvantages of using DVT preventive measures are largely supported within the literature. A recent multi-center survey among experienced health professionals in North America examined some common disadvantages of using DVT preventive measures (i.e., administering pharmacological prophylaxis in the critical care population). These included bleeding risk, planned interventional procedures or surgery, and concern over bioaccumulation in renal failure (Cook et al., 2014). These results showed that nurses have different types of positive and negative attitudinal beliefs about performing behavior. In similar studies of performing behavior beliefs, several researchers (e.g., Holdsworth et al., 2015; Knowles, 2015; Volino - 2014) found that the most important behavioral beliefs of the advantages and disadvantages of carrying out the behavior related to psychological factors and were similar to the findings identified in this study.

According to control beliefs (support factors) in this study, the collaboration among ICU team members was the most frequently reported factor, followed by high levels of knowledge and skills that would facilitate the utilization of DVT preventive measures in the ICU. These findings are consistent with other studies (Puffer & Rashidian 2004; Appleby, Roskell, & Daly, 2016).

Nurses believed that barriers preventing the use of DVT preventive measures in the ICU are the risks for some patients and instability of patients' conditions. This was supported by Achaibar & Waldmann (2015), who reported that severe physiological upset and bleeding risk remains challenging in applying DVT prophylaxis to ICU patients. In addition, the ICU population includes patients with complex medical

comorbidities, post-operative general surgical patients, poly-trauma, and neuro-intensive care as well as bariatric patients coupled with risk factors acquired during their ICU stays. With this, applying DVT prophylaxis measures among those populations must be considered carefully. Also, nurses believed that other factors such as lack of ICU nurses' knowledge, skills, and training, lack of time, nurses shortage, workload, and in availability of equipment prevent them from using DVT preventive measures (Ko et al., 2011; McFarland et al., 2014;

In sum, the results of this study emerged as mixed regarding consistency with prior studies. Consistent with most of the results in the literature, nurses indicated subjective norms and PBC as significant predictors of intention in the current study. On the contrary, no significant associations appeared between attitude and intention, which conflicts with the TPB. This resultant incongruence can be explained in that the magnitude of each construct on intention varied as the behavioral beliefs can vary from priority population to another, conceptualization of behavioral outcomes varies across population for the same behavior; additionally, differences in methodology used to develop the survey did not use an elicitation phase to elicited nurses' salient beliefs. Overall, the results of this study indicated that TPB was a sound and useful model in explanation of intention to use DVT preventive measures, especially in an international setting. Moreover, ICU nurses had high positive social influence and high perceived ability, and control over the use DVT preventive measures expressed a strong intention to use DVT preventive measures among critically ill patients in the ICU. Further, the study

provided empirical support for the distinction between the TPB construct and the SE construct.

### Strengths of the Study

This study had several important outcomes. First, the strength of the study was primarily related to the research methodology. The instrument used to measure the outcome variable was reliable and valid. Internal consistency reliability was established with strong values (> .80) of the Cronbach's alpha coefficient for the different subscales measuring the study variables. In addition, factor analysis confirmed the convergent and discriminant validity of the instrument.

Second, this study explored the relationships between ICU nurses' attitudes, subjective norms, perceived behavioral control, and intention toward using DVT preventive measures in the ICU. In addition, through the open-ended questions, we discovered perceptions of barriers and enabling factors of using DVT prevention measures. The information provided by this study will be used to guide the development of future educational programs to improve knowledge and quality of nursing care for critically ill patients in an ICU, and to provide the basis for the replication of the study in other settings in Egypt.

Thirdly, this is the first study in Egypt that uses the theory of planned behavior to provide a framework in nursing research. This framework assisted in the development of the questionnaire and the interpretation of the findings related to the intentions of ICU nurses to use DVT preventive measures. Finally, the questionnaire used included openended questions regarding barriers that might prevent or impede the use of DVT

preventive measures in the ICU and enabling factors that would support using DVT preventive measures in the ICU. These responses may be useful in refining those subscale items for a future study.

### . Limitations of the Study

This study bears several limitations. First, the use of a convenience sampling method limited the representativeness and, ultimately, the generalizability of the findings. Nurses were recruited from the ICUs of Suez Canal University Hospitals. Seeing this, generalizing the findings to another population who has different characteristics likely yields different results. Random sampling methods would increase the probability of representativeness of study sample (e.g., more subjects from different departments), which should improve the generalizability of findings.

Another limitation is that the sample size was relatively small, and this could have affected the significance and strength of relationships. A larger sample size is thus required in future studies to account for further testing of the questionnaire.

Another limitation relates to the use of General Self Efficacy Scale (GSE), which is not consistent with Bandura's Self Efficacy Theory. Further examination of nurses' SE on conducting DVT prevention care would support the linkage between self-efficacy and intention.

A final limitation concerns the nature of correlational cross-sectional design and lack of experimental data, which prevents causal relationships among variables. It remains unknown whether nurses' intention was caused by attitude, subjective norms, or PBC and how exactly these constructs cause change. Thus, conducting future

longitudinal research is recommended to determine whether the study predictor variables, including the TPB constructs, and other background factors predict nurses' intention.

### **Implications for Nursing and Future Research**

Beyond these limitations, the current study highlights several practical utilities for healthcare professionals. The present findings lend further support for TPB in predicting nurses' intention. Subjective norms and perceived behavioral control were significant predictors of the ICU nurses' intentions. Attitude was not a significant predictor of ICU nurses' intentions. The present study asserts that nurse's subjective norms and perceived behavioral control are key influences in forming interventions to improve utilization of DVT preventive measures among critically ill patients in ICUs. In practical terms, this advances the notion that interventions based on the enhancement of self-efficacy and subjective norms toward DVT prevention can lead to a related increase in utilization of DVT preventive measures behavior and thus, could have the potential to minimize or even reduce the negative consequences of DVT on critically ill patients. Additionally, subjective norm in this study served as the most significant predictor of ICU nurses' intention; therefore, implementation of educational programs should target other healthcare providers (e.g., physicians) as they impact ICU nurses' subjective norms.

Based on the findings from the qualitative information (open-ended questions) found in this study, the main barriers to using DVT preventive measures in the ICU had implications for policy at the levels of the nursing and the intensive care units. The ICU nurses reported lack of knowledge, skill, and experience regarding use of DVT preventive measures, complained about a nurse shortage, instability of patients'

conditions, their workloads, and inequitable nurse-to-patient ratio. The ratio of nurses to patients in this ICU was 1:1 during the day shift, but less than this ratio during the evening and night shifts. Although ICU nurses in this study mentioned staff shortage and workload as barriers to use of DVT preventive measures, their general comments indicated their intentions to improve their practice for better care of critically ill patients in the ICU. Moreover, some support factors and barriers identified in this study directly differed from each other. For example, some nurses perceived availability of equipment as an enabler as well as a barrier. It could be more important to address factors rated as both barriers and enablers in implementing interventions.

The findings of this study provide valuable and meaningful evidence in addition to relevant suggestions for management and policy makers. First, adequate attention should be paid to the nursing and equipment shortages in the ICU. Secondly, hospital management should undertake strategies to improve nurses' knowledge and levels of practice. Finally, hospital management should focus on improving nurses' work environments and managing nurse staffing, both of which can provide better care not only benefiting patients but also possibly increasing nurses' work satisfaction and support for change of practice.

Making use of the results of this study, future research will focus on theory-based interventions regarding prevention of DVT based on ICU nurses' beliefs and attitudes. Further research should investigate nurses' implementation of DVT preventive measures in practice and replicate the study with a national sample of nurses working in different practice settings (i.e., long-term care settings and medical surgical). Future studies will

also investigate strategies to facilitate the application of DVT preventive measures in practice and improve nurses' awareness of them.

This study has focused on nurses' intention to use DVT preventive measures. Nevertheless, the extent to which intention relates to behavior, that is, nurses' actual use of DVT preventive measures in practice, needs to be explored further. Although Ajzen (1991) argues that intention predicts behavior, empirical evidence yields mixed results when behavioral theories are applied to specific behaviors (Carmack & Lewis-Moss, 2009). As a result, further research needs to examine the extent to which nurses' intentions predicts their actual behavior in day-to-day practice.

Future research could also focus on understanding the lack of association between attitude and intention to use DVT preventive measures. A qualitative study consisting of a focus groups of nurses could be conducted to determine nurses' beliefs and barriers of their roles in using DVT preventive measures as part of their practices. In addition, we could further explore responses to the open-ended question results that seemed significant, which underlie nurses' decisions to use or not to use DVT preventive measures in the ICU.

Additionally, ICU, nurses and patients' factors were identified as important in influencing nurses' use of DVT preventive measures (e.g., resources, patient condition, and time). These additional factors could be incorporated into the conceptual framework and then tested in a subsequent study for their effects on nurses' attitudes, subjective norms, perceived behavioral control, and intention to use DVT preventive measures.

Finally, in the current study, the demographic information of participants indicated that nurses varied in their educational level and years of experience working in the ICUs, which bears similarity to findings from prior studies (Ko et al. 2011; Sauls 2007). Nonetheless, this study did not consider socio-demographic variables when exploring nurses' behavioral intentions, attitudes, subjective norms and PBC towards use of DVT preventive measures. The relationship between nurses' intentions and their demographic characteristics needs to be explored in future research. Other studies have indicated that the inclusion of demographic characteristics provides for a stronger relationship with the behavioral intention and the behavior (Volino, 2104; Bertani et al., 2016).

### Conclusion

As indicated, the purpose of this study was to develop a valid and a reliable questionnaire based on the TBP, and to determine whether attitude, subjective norms, PBC predict nurses' intention to use DVT preventive measures in an Egyptian ICU. The major strength of this dissertation is that it has contributed to the theoretical literature on nurses' DVT prevention behavior.

The methodology used while constructing the questionnaire adds considerable strength to this study. The questionnaire design took place in strict adherence to guidelines prescribed by Ajzen and Fishbein (1980) and recommended by Francis et al. (2004) added rigor to this study. Further, pilot testing of the questionnaire maintained the reliability and validity of the results as recommended by Ajzen (1991). Additionally, this study took place using the TPB model that was well-validated by a number of similar

studies in explaining and predicting nurses' intentions toward performing different nursing practice in different clinical settings (Hung et al., 2016; Sharifirad et al., 2015; Gagnon et al., 2015; Javadi et al., 2013; Sutherland, 2015; Nelson et al. 2014).

In this study, a predictive correlational design was employed to determine the relationships between the attitude, subjective norms, and PBC in predicting nurses' intentions to use DVT preventive measures. This approach provided significant contributions when examining the psychosocial determinants that influence nurses' intentions.

Overall, this study addressed a gap by specifically examining the correlations between attitude, subjective norms, perceived behavior control, and intention in the Egyptian ICU nurses. What is more, the results of this study emerged as mixed regarding consistency with prior studies. Consistent with most of the results in the literature, nurses indicated that subjective norms served as a significant predictor of ICU nurses' intention, followed by PBC as significant predictor of intention in the current study. Even so, no significant associations appeared between attitude and intention, which conflicts with the TPB. This reveals that nurses with who perceived more social pressure from specific groups of significant others and had higher self-efficacy and controllability over factors occurred with much more likelihood. As such, developing effective intervention strategies should target the beliefs of the ICU nurses that affect their PBC as well as their normative beliefs toward DVT prevention. Future research will build on the current study by seeking to validate the findings reported here and expanding the list of demographics variables investigated.

# Appendix (A)

# Nurses' Intention to Prevent Deep Vein Thrombosis (DVT) Survey Questionnaire

# **SECTION 1 – DEMOGRAPHICS**

1. What is your gender? (Please check one box only)

Female.....

Male.....

2. What is your age?

.....years

3. How much experience have you had working in Intensive Care?

.....years

4. Educational level:

Diploma.....

5. Have you participated in any research studies, educational training or workshops related to DVT prevention.

Yes..... No.....

# **SECTION 2**

## Part I: Instructions:

The questionnaire is designed to measure your perceptions toward using preventive measures for deep vein thrombosis. You will be asked questions and then asked to rate your experience or opinion based on that question using a seven-point rating scale. You need to circle a number on the rating scale in the place that best describes your experience or opinion. For example, if you were asked to rate a statement about "The weather in Egypt" on such a scale, it would be interpreted as follows:

Bad: 1 : 2 : 3 : 4 : 5 : 6 : 7 :Good extremely quite slightly neither slightly quite extremely If you think the weather in Egypt is quite good, then you would circle the number 6, as follows:

The weather in Egypt is:

Bad: 1\_: 2\_: 3\_: 4\_: 5\_: 6): 7\_: Good

If you think the weather in Egypt is extremely bad, then you would circle the number 1, as follows:

The weather in Egypt is:



### Part II: The Theory of Planned Behavior Questionnaire:

### **Definition of DVT Preventive Measures.**

Deep vein thrombosis preventive measures are measures that should be applied by nurses in daily practice to prevent venous thrombosis. *These measures include assessing DVT risk factors, applying compression stockings, administering anti coagulants medications, early mobilization, and applying sequential compression devices.* 

For each of the following questions please circle the number that best describes your point of view. Some of questions may appear similar, but there are subtle differences in what is being asked. Your opinions and perceptions are valued and appreciated.

1. For me, using DVT preventive measures among critically ill patients in the ICU is:



2. I feel under social pressure, from my professional colleagues, to use preventive measures of DVT for critically ill patients in the ICU

**Strongly disagree**: \_\_1\_:\_2\_:\_3\_:\_4\_:\_5\_:\_6\_:\_7\_:**Strongly agree** 

 People who are important to me professionally (nurses and other health care professionals), want me to use DVT preventive measures among critically ill patients in the ICU.

**Strongly disagree**: \_\_1\_:\_2\_:\_3\_:\_4\_:\_5\_:\_6\_:\_7\_:**Strongly agree** 

 My professional colleagues, whose opinions I respect, would approve my using of DVT preventive measures among critically ill patients in the ICU.

**Strongly disagree**: \_\_1\_:\_2\_:\_3\_:\_4\_:\_5\_:\_6\_:\_7\_:**Strongly agree** 

5. In our unit, it is expected from me that I should use DVT preventive measures among critically ill patients in the ICU.

**Strongly disagree**: \_\_1\_:\_\_2\_:\_\_3\_:\_\_4\_:\_\_5\_:\_\_6\_:\_\_7\_:**Strongly agree** 

6. The decision to use DVT preventive measures among critically ill patients in the ICU is beyond my control:

**Strongly disagree**: \_\_1\_:\_2\_:\_3\_:\_4\_:\_5\_:\_6\_:\_7\_:**Strongly agree** 

7. There are factors outside of my control that prevent me from using DVT preventive measures among critically ill patients in the ICU.

**Strongly disagree**: \_\_1\_:\_2\_:\_3\_:\_4\_:\_5\_:\_6\_:\_7\_:**Strongly agree** 

**8.** I am confident that I could use DVT preventive measures when a critically ill patient requires it.

**Strongly disagree**: \_\_1\_:\_2\_:\_3\_:\_4\_:\_5\_:\_6\_:\_7\_:**Strongly agree** 

9. In my opinion, using DVT preventive measures among critically ill patients in the ICU is:

**Difficult**: \_1\_: \_2\_: \_3\_: \_4\_: \_5\_: \_6\_: \_7\_: **Easy** 

10. I intend to use DVT preventive measures among critically ill patients in the ICU.

**Strongly disagree**: \_\_1\_\_:\_2\_:\_3\_:\_4\_:\_5\_:\_6\_:\_7\_:**Strongly agree** 

11. I expect to use DVT preventive measures among critically ill patients in the ICU.

**Strongly disagree**: \_\_1\_:\_2\_:\_3\_:\_4\_:\_5\_:\_6\_:\_7\_:**Strongly** 

#### agree

12. I am planning to use DVT preventive measures among critically ill patients in the

ICU.

**Strongly disagree**: \_\_1\_:\_\_2\_:\_\_3\_:\_\_4\_:\_\_5\_:\_\_6\_:\_\_7\_:**Strongly agree** 

# **SECTION 3**

### Please provide detailed responses for the following questions.

1. What do you believe are the advantages of using DVT preventive measures in the ICU?

- 2. What do you believe are the disadvantages of using DVT preventive measures in the ICU?

.....

3. What factors or circumstances would enable you to use DVT preventive measures in the ICU?

4. What factors or circumstances would make it difficult or impossible for you to using DVT preventive measures in the ICU?

Thank you so much for your time and response!

# Appendix (B)

إستماره إستبيان عن عزم الممرضات على إستخدام الإجراءات الوقائيه لمنع جلطات الأوردة العميقة

الجزء الأول : البيانات الشخصية

1. النوع

		انثى.
		۔ ذکر
السن:	.2	-
سنوات الخبرة بالعمل بالعناية المركزة:	.3	
المؤهل الدراسي: ريض	<b>4.</b> م تمر	دبلو
، تمريض	د فنے	معه
هل شاركت في أي دراسات بحثية أو تدريبات تثقيفية أو ورش عمل تتعلق بالوقاية من جلطات الأوردة	.5	
العميقة؟		
	i	
لا	1	

الجزء الثاتى

أولا : تعليمات الإجابة على الإستبيان:

هذا الإستبيان يستخدم لقياس التصورات الخاصة بك نحو إستخدام الإجراءات الوقائية لمنع جلطات الأوردة العميقة. سوف يتطلب منك لإجابة علي الأسئلة باستخدام مقياس تقييم مكون من سبع نقاط للتقييم. فقط ضع دائره حول الرقم الذي يطابق رأيك بشكل أفضل. على سبيل المثال، إذا طلب منك تقييم العبارة " الطقس في مصر " على هذا النطاق، فسيتم تفسير مقياس التصنيف المؤلف من سبع نقاط على النحو التالي:

- جيد: <u>7 : 6 : 5 : 4 : 3 : 2 : 1</u> : سيئ جدا الي حد كبير نوعا ما لاهذا ولا ذاك نوعا ما الي حد كبير جدا
- إذا كنت تعتقد أن الطقس في مصر جيد الي حد كبير، قم بوضع دائرة حول رقم 6، على النحو التالي:



### <u>ثانيا: تعريف الاجراءات الوقائية لمنع جلطات الأوردة العميقة</u>

الإجراءات الوقائية لمنع جلطات الأوردة العميقة هي تطبيقات او مهارات تمريضية يجب علي الممرضات تطبيقها يوميا لمنع أو حدوث جلطات الأوردة العميقة بين المرضي. وتشمل هذه المهارات تقييم عوامل الخطرللإصابه بجلطات الأوردة العميقة ، لبس الجوارب الضاغطة، إعطاء الأدوية المضادة للتجلط .

# بالنسبة إلى كل سؤال من الأسئلة التالية، يرجى وضع دائرة حول الرقم الذي يصف وجهة نظرك بشكل أفضل. قد تبدو بعض الأسئلة مشابهة، ولكن هناك اختلافات طفيفة في ما هو مطلوب.

- في رأيي، إستخدام الإجراءات الوقائية لمنع جلطات الأوردة العميقة بين مرضى الحالات الحرجة في وحدة العناية المركزة هي مهاره:
   مفيده : \_\_7\_\_: \_\_6\_\_: \_\_5\_\_: \_\_6\_\_: \_\_2\_\_: \_\_1\_\_\_: غير مفيده منيده منيده منيده : \_\_7\_\_: \_\_6\_\_: \_\_5\_\_: \_\_5\_\_: \_\_1\_\_\_: غير متطوره منطوره منطوره : \_\_7\_\_: \_\_6\_\_: \_\_5\_\_: \_\_5\_\_: \_\_5\_\_: \_\_1\_\_\_: غير ضروريه منطوره منطوره : \_\_7\_\_: \_\_6\_\_: \_\_5\_\_: \_\_5\_\_: \_\_5\_\_: \_\_1\_\_\_: غير محمد منيده : \_\_7\_\_: \_\_6\_\_: \_\_6\_\_: \_\_7\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_
  - أشعر تحت الضغط الاجتماعي من زملائي بالعناية المركزه أهميه إستخدام الإجراءات الوقائية لمنع جلطات الأوردة العميقة بين مرضى الحالات الحرجة

اوافق بشده : \_ 7 \_ : \_ 6 \_ : \_ 5 \_ : \_ 6 \_ : \_ 2 \_ : \_ 2 \_ : \_ 1 \_ بلا اوافق بشده

3. الأشخاص الذين هم مهمين بالنسبة لي مهنيا، يريدون مني أن أستخدام الإجراءات الوقائية لمنع جلطات الأوردة العميقة بين مرضى الحالات الحرجة في وحدة العناية المركزة.

اوافق بشدہ : \_ 7 \_ : \_ 6 \_ : \_ 5 \_ : \_ 6 \_ : \_ 2 \_ : \_ 2 \_ : \_ 1 \_ : لا اوافق بشدہ

 يعتقد زملائي المُمرضيين، الذين أحترم آراؤهم، أنني ينبغي أن إستخدام الإجراءات الوقائية لمنع جلطات الأوردة العميقة بين مرضى الحالات الحرجة في وحدة العناية المركزة.

اوافق بشده 7\_:\_6\_:\_5\_:\_6\_:\_3\_:\_4\_:\_5\_:\_1\_: لا اوافق بشده

- 5. إنه من المتوقع مني أن أستخدام الإجراءات الوقائية لمنع جلطات الأوردة العميقة بين مرضى الحالات الحرجة في وحدة العناية المركزة.

  الحرجة في وحدة العناية المركزة.

  اوافق بشده: \_\_7\_\_: \_\_6\_\_: \_\_5\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_6\_\_: \_\_6\_\_: \_\_6\_\_: \_\_6\_\_: \_6
- 6. لدي سيطرة كاملة علي اتخاذ قرار إستخدام الإجراءات الوقائية لمنع جلطات الأوردة العميقة بين مرضى الحالات الحرجة في وحدة العناية المركزة . *الحالات الحرجة في وحدة العناية المركزة .* 
  - 7. هناك عوامل خارج سيطرتي تمنعني من إستخدام الإجراءات الوقائية لمنع جلطات الأوردة العميقة بين مرضى الحالات الحرجة في وحدة العناية المركزة. *اوافق بشده*: \_\_7 \_\_: \_\_6 \_\_: \_\_5 \_\_: \_\_4 \_\_: \_\_5 \_\_: \_\_1 \_\_: Y اوافق بشده
    - 8. أنا اثق من معرفة عما اذا كان مرضي الحالات الحرجه بحاجه الي الإجراءات الوقائية لمنع جلطات الأوردة العميقة

اوافق بشده: \_7\_\_:\_6\_\_:\_5\_\_:\_4 اوافق بشده

10. أنا أنوي إستخدام الإجراءات الوقائية لمنع جلطات الأوردة العميقة بين مرضى الحالات الحرجة في وحدة العنابة المركزة اوافق بشده: \_ 7 \_ : \_ 6 \_ : \_ 7 \_ : \_ 3 \_ : 4 \_ : 5 \_ : \_ 7 \_ : ۷ او افق بشده 11. أتوقع أن أستخدم الإجراءات الوقائية لمنع جلطات الأوردة العميقة بين مرضى الحالات الحرجة في وحدة العناية المركزة اوافق بشده: \_ 7 \_ : \_ 6 \_ : \_ 5 \_ : \_ 6 \_ : \_ 2 \_ : \_ 2 \_ : \_ 1 \_ : ۷ اوافق بشده 12. أنا اخطط لإستخدام الإجراءات الوقائية لمنع جلطات الأوردة العميقة بين مرضى الحالات الحرجة في وحدة العناية المركزة اوافق بشده: \_\_7\_\_:\_6\_\_:\_5\_\_:\_4 اوافق بشده الجزء الثالث يرجى تقديم إجابات مفصلة عن الأسئلة التالية؟ وكلما كان يمكنك شرح والتعبير عن أفكارك، سيكون ردكم أكثر فائدة. ما هي مميزات إستخدام الإجراءات الوقائية لمنع جلطات الأوردة العميقة بين مرضى الحالات. الحرجة في وحدة العناية المركزة ؟ ..... ..... ..... ما هي عيوب إستخدام الإجراءات الوقائية لمنع جلطات الأوردة العميقة بين مرضى الحالات الحرجة في وحدة العناية المركزة ؟ ..... ..... ..... ما هي العوامل التي تمكنك من إستخدام الإجراءات الوقائية لمنع جلطات الأوردة العميقة بين .3 مرضى الحالات الحرجة في وحدة العناية المركزة ؟ .....

4. ما هي العوامل التي لا تمكنك من إستخدام الاجراءات الوقائية لمنع جلطات الأوردة العميقة بين مرضى الحالات الحرجة في وحدة العنابة المركز ة.؟

شكرا جزيلا لحسن تعاونكم !!!!!

# Appendix (C)

# **Information Letter for Experts**

### **Title of Research Project:**

Attitude, subjective norms, perceived behavioral control and intention of nurses toward prevention of deep vein thrombosis among critically ill patients in intensive care units

# **Investigators:**

Mona Hebeshy, MSN, PhDc

### **Purpose of Research:**

There are two purposes of this study, the first aim is to develop and test an instrument related to nurses' intention to prevent DVT among critically ill patients. The second aim is to determine whether attitude, subjective norms and perceived behavior control can predict Egyptian staff ICU nurses' intention to prevent DVT among critically ill patients in intensive care units.

To achieve the first aim of this study, it is necessary to create a valid and reliable instrument to assess nurses' intention to prevent DVT among critically ill patients. To update, no such reliable and valid tool exists based on an international search of the literature. This tool will contribute to the credibility of subsequent studies for examining the DVT prevention on various populations.

### **Description of Research:**

This study will collect data to achieve content validity and internal consistency reliability. Content validity will be achieved through the response of 5 content and tool experts. Internal consistency will be achieved through the analysis of data collected from piloting the tool among ICU nurses.

# **Potential Harm and Benefit:**

There are no known risks identified for participation in this study. Your responses will, however, help develop a tool that can assess the needs of a population. This assessment can help future studies identify gaps in knowledge related to deep vein thrombosis prevention. By doing this, theory-based intervention can be created and offered to

nurses. These interventions would not only help nurse and healthcare providers, but it may also assist in decreasing the rates of DVTs and mortalities in ICUs.

# **Confidentiality:**

Ethics approval will be obtained from the Kent State University and Suez Canal University Research Ethics Board.

Study variables	Theoretical definitions	Operational	<b>Empirical indicators</b>
Attitude	Conceptualized as "the degree to which a person perceives the behavior based on favorable or	definition Nurses' perceptions of the outcomes/ consequences of using DVT	The attitudes items of use DVT Preventive Measures
	unfavorable evaluation or appraisal of the behavior (Ajzen, 1991; Ajzen et al., 2004).	preventive measures in ICU	Questionnaire items was scored from 1 to 7. Possible scores are from 4 to 28.
Subjective Norms	Refers to any social influence that may determine the individuals or groups to perform or not perform a given behavior (Ajzen, 1991; Ajzen, Brown, & Carvajal, 2004).	The perceived social pressure from others to support using DVT preventive measures in ICU	The subjective norms items of use DVT Preventive Measures. Questionnaire items was scored from 1 to 7. Possible scores are from 4 to 28
Perceived behavior control	The level of confidence individuals had about their ability to perform the behavior based on the ease or difficulty they perceive its performance as it relates to hindrances or facilitators (Ajzen, 1991; Ajzen, Brown & Carvajal, 2004).	Nurses level of confidence and ability to control the factors that support use of DVT preventive measures in ICU	The perceived behavior control items of use DVT Preventive Measures Questionnaire items was scored from 1 to 7. Possible scores are from 4 to 28
Intention	"Indications of how hard people are willing to try,	Nurses commitment to use DVT	The intention items of the use DVT

Theoretical and operational definitions of Study variables

of how much of an effort	preventive measures	Preventive Measures
they are planning to exert,	in ICU	Questionnaire items
to perform the behavior"		was scored from 1 to
(Ajzen, 1991p. 181).		7. Possible scores are
		from 3 to 21.

# The Following Table Will Guide the Experts for Scoring Method

- Attitude include items 1.a, 1.b, 1c, and 1.d
- Subjective norms include items 2, 3,4, and 5
- Perceived behavioral control items are 6,7,8, and 9
- Intention items are 10, 11, and 12
- Open ended questions measuring factors that affect nurses' intention to prevent DVT (13,14,15, and16).

Items	1 [ not relevant]/not clear	2 [item need some revision]	3 [relevant/clear but need minor revision]	4 [ very relevant/clear]
Attitude				
1.a. For me, using DVT				
preventive measures among				
is unbaneficial/baneficial				
1.b. For me, using DVT				
preventive measures among				
critically ill patients in ICU				
is Not evidence				
based/evidence based				
1.c. For me, using DVT				
preventive measures among				
critically ill patients in ICU				
is unnecessary/ necessary				
1.d. For me, using DVT				
preventive measures among				
critically ill patients in ICU				
is Non-worthwhile/				
worthwhile				

Subjective Norms		
2. I feel under social		
pressure, from my		
professional colleagues, I		
should use DVT preventive		
measures among critically ill		
patients in ICU	 	
3. People who are important		
to me professionally,		
(nurses, other health care		
professionals), want me to		
use DVT preventive		
measures among critically ill		
patients in ICU.		
4. My professional		
colleagues, whose opinions I		
respect, think that I should		
use DVT preventive		
measures among critically ill		
patients in ICU.		
5. In our unit, it is expected		
from me that I should use		
DVT preventive measures		
for critically ill patients in		
ICU.		
Perceived behavioral		
control		
6. I have complete control		
over using DVT preventive		
measures among critically ill		
patients in ICU.		
7. There are factors outside		
of my control that would		
prevent me from using DV1		
preventive measures among		
critically ill patients in ICU.		
8. I am confident that I could		
use DV I preventive		
measures when critically ill		
patient requires it.		
9. In my opinion, using DVT		
prevenuve measures among		
is difficult/ ease		
is: unncult/ easy		

Intention		
10. I intend to use DVT		
preventive measures among		
critically ill patients in ICU.		
11. I expect to use DVT		
preventive measures among		
critically ill patients in ICU.		
12. I have a plan to use DVT		
preventive measures among		
critically ill patients in ICU.		
13.What do you believe are		
the advantages of using		
DVT preventive measures in		
ICU?		
14. What do you believe are		
the disadvantages of use		
DVT preventive measures in		
ICU?		
15.What factors or		
circumstances would enable		
you to use DVT preventive		
measures in ICU?		
16.What factors or		
circumstances would make it		
difficult or impossible for		
you to use DVT preventive		
measures in ICU?		

# Appendix (D)

### Nurse information letter

Dear participants,

I am writing to ask for your collaboration with my Doctor of Philosophy (PhD) research project. This research study entitled "attitude, subjective norms, perceived behavioral control, perceived behavioral control and intention of Egyptian ICU nurses towards prevention of DVT among critically ill patients". The purpose of this research is to determine whether attitude, subjective norms, perceived behavioral beliefs predict nurses' intention to prevent deep vein thrombosis among critically ill patients at Suez Canal University Hospitals. This research is in partial fulfilment of the requirements for the degree of PhD in nursing from the College of Nursing, Kent State University. This project is under the supervision of Dr. Barbara Broome, Dr. Dana Hansen, Dr. Donna Bernert, Dr. Carolyn Murrock and Dr. Somaya Abou Abdou.

I would like to invite you to consider participating in a research study by completing an anonymous questionnaire. Your participation is entirely voluntary. Therefore, I hope that you will feel comfortable about giving me your honest opinions. You are being asked to participate in this study because you are a Registered Nurse, providing direct care to critically ill patients admitted to Suez Canal University Hospitals.

The study consists of completing a questionnaire. The questionnaire has several parts that have questions about yourself (e.g., your age, and education), your perception of DVT preventive measures, and questions related to factors that may influence nurses' intention to use DVT preventive measures in practice. Completing the questionnaire will take about 15-20 minutes of your time.

There are minimal risks for taking part in this research study. Some nurses may feel uncomfortable answering certain questions on the questionnaire. You may refuse to answer any question if you so desire. You will not directly benefit from taking part in this study. However, the results of this study will help inform future research about strategies to promote implementation of DVT interventions in clinical practice.

The information that is collected from you during this study will be kept confidential. Your name will not appear on the questionnaire that you complete in this study. The information that you give will be kept under lock in the research computer. The information obtained will be used for research purposes. The results will be reported as a group so that no one person will be identified. The findings of this study will be used to meet the requirements of the researcher's dissertation research. The results will be presented to meet the requirements of a doctoral degree and may be used in academic publications or conferences. Your participation in this study is voluntary. Your choice of whether or not to participate will not influence you in any way. If you decide to participate, you are free to stop your participation at any time without penalty or loss of benefits to which you are otherwise entitled. At any point in the study, you may refuse to answer any question if you so desire.

There is no cost to you in participating in this study except the time you spend completing the questionnaire.

If you have any questions about the study, please contact the researcher Mona Hebeshy, mhebeshy@kent.edu, or her thesis advisor, Dr. Dana Hansen, dhansen1@kent.edu

Your participation in this study will be highly appreciated.

Sincerely, Mona Hebeshy PhD candidate College of Nursing Kent State University Email: <u>mhebeshy@kent.edu</u>

# Appendix (E)



معاً ضد الفساد



لبنة أبلاقيات البنت العلمي

#### **Research Ethics Committee**

December 13, 2017 Mrs. Mona Ibrahim Hebeshy PhD candidate College of nursing Kent State University

Research: Attitude, Subjective norms, Perceived Behavioral Control and Intention of Nurses Toward Prevention of Deep Vein Thrombosis among Critically III Patients in Intensive Care Unit.

Members of the research ethics committee have reviewed and discussed in the details the research proposal listed above. On behalf of the committee, we pleased to inform the researcher that the research project has been approved as a chairman action.

Your research protocol has been documented under:

Project No: 27 Approved date: 12/2017

Kindly quote the project number indicated herein in all transactions and communications.

I trust your research scheme proves fruitful and beneficial to Suez Canal University.

Sincerely,

Chairman Research Ethics Committee

Dr. Inas M. Abd Allah

Inas Mohamed Mahmoud AbdAllah

			10
ويس	ه السو	الم في ا	جم
ر	تمريخ	عليدالة	-
1 . 1	* ~ 1	فلاقيات	الحنداذ

Faculty of Nursing- Accredited 19/7/2017
## Appendix (F)

## Support Letter

December 13, 2017 Mrs. Mona Ibrahim Hebeshy PhD candidate, Collage of Nursing, Kent State University

Research title: Attitude, Subjective norms, Perceived Behavioral Control and Intention of Nurses Toward Prevention of Deep Vein Thrombosis among Critically III Patients in Intensive Care Unit.

I pleased to inform you that the researcher has been approved to collect data of her research project at Intensive Care Units, at Sucz Canal University Hospitals.

Sincerely, Somal & Abou-Abduell 13/12/2014

## Appendix (G)





Participants needed for research study in (Nursing) Attitude, Subjective norms, Perceived Behavioral Control and Intention of Nurses Toward Prevention of Deep Vein Thrombosis among Critically III Patients in Intensive Care Units

You are invited to participate in a research study about attitude, subjective norms, perceived behavioral beliefs predict nurses' intention to prevent deep vein thrombosis among critically ill patients at Suez Canal University Hospitals. I am asking if you would like to take about 15 minutes to complete a survey for this research study. Participation is completely voluntary, and your answers will be anonymous.

If you interested to participate in the study, please contact Mona Hebeshy at (<u>mhebeshy@kent.edu</u>) or Dr. Somaya Abou Abdou (<u>somaya 67@yahoo.ca</u>).

Your participation in this study will be highly appreciated.



## References

- Abdel-Aziz, A., & Elfawwal, M. A. (2015). Incidence of deep venous thrombosis in stroke patients in medical intensive care unit Zagazig University Hospitals, Egypt. Zagazig University Medical Journal, 20(1),88-96.
- Achaibar, K., & Waldmann, C. (2015). Prevention of venous thromboembolism in the critically ill patient. *Journal of the Intensive Care Society*, *16*(3), 199–201.
- Agency for Healthcare Research and Quality (AHRQ) (2015). Preventing Hospital-Associated Venous Thromboembolism: A Guide for Effective Quality Improvement. Retrieved from

https://www.ahrq.gov/sites/default/files/publications/files/vteguide.pdf

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Precision Processes*; 50:179–211.
- Ajzen, I. (2002). Perceived behavioral control, self-efficacy, locus of control and the Theory of Planned Behavior. *Journal of Applied Social Psychology*, 32(4), 665-683.
- Ajzen, I., Brown, T. C., & Carvajal, F. (2004). Explaining the discrepancy between intentions and actions: The case of hypothetical bias in contingent valuation. *Personality and Social Psychology Bulletin, 30* (9), 1108-1121.
- Ajzen, I. (2005). *Attitudes, personality, and behavior*. Berkshire, England: McGraw-Hill International.
- Ajzen, I. (2006). Constructing a TPB Questionnaire: Conceptual and Methodological Considerations Retrieved October 3, 2016 from <u>http://www.unibielefeld.de/ikg/zick/ajzen%20construction%20a%20tpb%20quest</u> <u>ionnaire.pdf</u>
- Akbar, H., Anderson, D., & Gallegos, D. (2015). Predicting intentions and behaviors in populations with or at-risk of diabetes: A systematic review. *Preventive Medicine Reports*, 2, 270–282.

- Alhazzani, W., Lim, W., Jaeschke, R. Z., Murad, M. H., Cade, J., & Cook, D. J. (2013). Heparin thromboprophylaxis in medical-surgical critically ill patients: a systematic review and meta-analysis of randomized trials. *Critical care medicine*, 41(9), 2088-2098.
- American Association of Critical Care Nurses. (2016). AACN Practice Alert Scope and Impact of the Problem: Preventing Venous Thromboembolism in Adults. Retrieved from

https://static1.squarespace.com/static/579770cd197aea84455d6908/t/57d8520ef5e 231ace9626ea5/1473794575821/venous-thromboembolism-pa.pdf

- American Heart Association. (2017). What is venous thromboembolism? Retrieved from <a href="http://www.heart.org/HEARTORG/Conditions/More/What-is-venousThromboembolism-VTE\_UCM\_479052\_Article.jsp#.WQE80lKZORs">http://www.heart.org/HEARTORG/Conditions/More/What-is-venousThromboembolism-VTE\_UCM\_479052\_Article.jsp#.WQE80lKZORs</a>
- analyses in clinical child and adolescent psychology. *Journal of Clinical Child and Adolescent Psychology*, 35(3), 456-479.
- Antony. A, Moly, K. T & Dharan, D. (2016). Assessment of knowledge and self-Reported clinical practice on prevention of deep vein thrombosis (DVT) among staff nurses. *Journal of Nursing and Health Science*. 5 (1),18-24
- Appleby, B. (2016). Exploring the value of an extended theory of planned behavior model: to explain nurses' and health care assistants' instrumental research utilization intentions in clinical practice (Doctoral dissertation, University of Birmingham).
- Appleby, B., Roskell, C., & Daly, W. (2016). What are health professionals' intentions toward using research and products of research in clinical practice? A systematic review and narrative synthesis. *Nursing open*, 3(3), 125-139.
- Arabi, Y. M., Khedr, M., Dara, S. I., Dhar, G. S., Bhat, S. A., Tamim, H. M., & Afesh, L. Y. (2013). Use of intermittent pneumatic compression and not graduated compression stockings is associated with lower incident VTE in critically ill

patients: a multiple propensity scores adjusted analysis. *CHEST Journal*, 144(1), 152-159.

- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84, 191-215.
- Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall.
- Barrera, L. M., Perel, P., Ker, K., Cirocchi, R., Farinella, E., & Uribe, C. H. (2013). Thromboprophylaxis for trauma patients. *Cochrane Database of Systematic Reviews*. doi: 10.1002/14651858.cd008303.pub2
- Bendinelli, C., & Balogh, Z. (2008). Postinjury thromboprophylaxis. *Current opinion in critical care, 14* (6), 673-678.
- Bertani, L., Carone, M., Caricati, L., Demaria, S., Fantuzzi, S., Guarasci, A., & Pirazzoli,
  L. (2016). Using the Theory of Planned Behavior to explore hospital-based
  nurses' intention to use peripherally inserted central catheter (PICC): a survey
  study. *Acta Bio Medical for Health Professions*, 87(4-S), 23-29.
- Bockheim, E. D. (2011). *Effect of a nursing educational intervention on the prevention of ventilator-associated pneumonia in the neonatal intensive care unit* (Doctoral dissertation, Ball State University).
- Boonyawat, K., & Crowther, M. A. (2015, February). Venous thromboembolism prophylaxis in critically ill patients. In Seminars in thrombosis and hemostasis. 41(1),068-074.
- Bovill, E. G., & van der Vliet, A. (2011). Venous valvular stasis–associated hypoxia and thrombosis: what is the link? *Annual review of physiology*, *73*, 527-545.
- Brose, K.M.J., and A.Y.Y. Lee. (2008). Cancer-Associated Thrombosis: Prevention and Treatment. *Current Oncology* 15 (1), 58–67.

- Brown, A. (2012). Preventing venous thromboembolism in hospitalized patients with cancer: improving compliance with clinical practice guidelines. *American Journal of Health-System Pharmacy*, 69(6).
- Beduz, M. A. (2012). The Role of Attitudes, Subjective Norms, Perceived Behavioral Control and Context in Nurses' Behavioral Intentions (Doctoral dissertation).
- Carmack, C. C., & Lewis-Moss, R. K. (2009). Examining the Theory of Planned Behavior Applied to Condom Use: The Effect-Indicator vs. Causal-Indicator Models. *The Journal of Primary Prevention*, 30(6), 659–676.
- Cassista, J., Payne-Gagnon, J., Martel, B., & Gagnon, M. P. (2014). Applying theory to understand and modify nurse intention to adhere to recommendations regarding the use of filter needles: an intervention mapping approach. *Nursing research and practice*, 2014.
- Centers for Disease Control and Prevention. (2016). Venous thromboembolism (blood clots).

Retrieved from http://www.cdc.gov/ncbddd/dvt/facts.html

- Choi, S. H., & Kim, Y. H. (2016). Factors affecting Korean registered nurses' intention to implement smoking cessation intervention. *Osong public health and research perspectives*, 7(1), 63-70.
- Conner, M., Kirk, S. F., Cade, J. E., & Barrett, J. H. (2001). Why do women use dietary supplements? The use of the theory of planned behavior to explore beliefs about their use. *Social science & medicine*, *52*(4), 621-633.
- Conner, M., & Armitage, C. J. (1998). Extending the theory of planned behavior: A review and avenues for further research. *Journal of applied social psychology*, 28 (15), 1429-1464.
- Cook, D., Crowther, M., Meade, M., Rabbat, C., Griffith, L., Schiff, D., ... & Guyatt, G. (2005). Deep venous thrombosis in medical-surgical critically ill patients: prevalence, incidence, and risk factors. *Critical care medicine*, *33* (7), 1565-1571.

- Cook, D., Duffett, M., Lauzier, F., Ye, C., Dodek, P., Paunovic, B., ... & Sinuff, T. (2014). Barriers and facilitators of thromboprophylaxis for medical-surgical intensive care unit patients: A multicenter survey. *Journal of critical care*, 29(3), 471-e1.
- Cornélio, M.E, Gallani, M.C, Godin, G., Rodrigues, R.C, Mendes, R.D, Nadruz, W.J. (2009). Development and reliability of an instrument to measure psychosocial determinants of salt consumption among hypertensive patients. *Revista Latino-Americana de Enfermagem*, 17(5):701–7.
- Costello, A. B., & Osborne, J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical assessment, research & evaluation*, 10(7), 1-9.
- Darlington, R. (1968). Multiple regression in psychological research and practice. *Psychological Bulletin*, *69*(3), 161-182.
- Das, S., Sahoo, A., Swain, R. (2014). Effectiveness of the planned teaching program on deep vein thrombosis among the staff nurses of selected hospital. *Journal of Nursing and Health Science*, 3 (1): 48-51.
- den Exter, P. L., van Es, J., Erkens, P. M., van Roosmalen, M. J., van den Hoven, P., Hovens, M. M., ... & Huisman, M. V. (2013). Impact of delay in clinical presentation on the diagnostic management and prognosis of patients with suspected pulmonary embolism. *American journal of respiratory and critical care medicine*, 187 (12), 1369-1373.
- Duff, J., Walker, K., & Omari, A. (2011). Translating venous thromboembolism (VTE) prevention evidence into practice: a multidisciplinary evidence implementation project. *Worldviews on Evidence-Based Nursing*, 8 (1), 30-39.
- Duffy, M. E. (2006). Translating instruments into other languages: Basic considerations. *Clinical Nurse Specialist, 20*(5), 225-226.

- Eldosoky E. I. (2008): Effect of a training program for nurses about preventive measures of deep vein thrombosis. Doctorate thesis, Faculty of nursing; Suez Canal University. Egypt.
- El-Meanawi, N. and EL-Hefnawy.Kh. (2016). Effect of educational program regarding mechanical prophylaxis of deep vein thrombosis on nurses' knowledge and practice. *International Journal of Current Research*, 8 (2), pp. 26189-26198.
- El-Rashedy, N. A., Reda, N. A., & Mehany, M. M. (2008). Effect of Implementing Nursing Guidelines on Occurrence of Deep Venous Thrombosis for Critically Ill Patients. *Journal of High Institute of Public Health*, 38 (1), 200-228.
- Emanuele, P. (2008). Deep vein thrombosis. *AAOHN J*, *56*(9), 389-392. doi:10.3928/08910162-20080901-02
- Faaul, F., Erdfelder, E., Buchner, A., & Lang, A. (2009). Statistical power analysis using G\*Power 3.1: Test for correlation and regression analysis. *Behavior Research Methods*, 41(4), 1149-1160.
- Fekri, M. S., Zade, M. Kh., & Fatehi, S. (2014). The Association of Deep Vein Thrombosis with Cancer Treatment Modality: Chemotherapy or Surgery? *Iranian Red Crescent Medical Journal*, 16(9), e14722. <u>http://doi.org/10.5812/ircmj.14722</u>
- Fornell, C., Tellis, G. J., & Zinkhan, G. M. (1982). Validity assessment: A structural equations approach using partial least squares. Proceedings, American Marketing Association Educators'Conference.
- Francis, J.J, Eccles, M.P, Johnston .M, Walker. A, Grimshaw J, Foy R, (2004). A manual for health services researchers Constructing questionnaires based on the theory of planned behavior. Retrieved from http://www.rebeqi.org/ViewFile.aspx?itemID=212
- Gagnon, M. P., Cassista, J., Payne-Gagnon, J., & Martel, B. (2015). Applying the Theory of Planned Behavior to understand nurse intention to follow recommendations

related to a preventive clinical practice. *Journal of Research in Nursing*, 20(7), 582-593.

- Ghahremani, L., Niknami, S., & Nazari, M. (2012). The Prediction of Physical Activity Intention and Behavior in Elderly Male Residents of a Nursing Home: A Comparison of Two Behavioral Theories. *Iranian Journal of Medical Sciences*, 37(1), 23–31.
- Gould, M. K., Garcia, D. A., Wren, S. M., Karanicolas, P. J., Arcelus, J. I., Heit, J. A., & Samama, C. M. (2012). Prevention of VTE in no orthopedic surgical patients: antithrombotic therapy and prevention of thrombosis: American College of Chest Physicians evidence-based clinical practice guidelines. *CHEST Journal*, 141(2\_suppl), e227S-e277S.
- Grant, J. D., Stevens, S. M., Woller, S. C., Lee, E. W., Kee, S. T., Liu, D. M., ... & Elliott, C. G. (2012). Diagnosis and management of upper extremity deep-vein thrombosis in adults. *Thrombosis and homeostasis*, 108(6), 1097.
- Greer, I. A., & Thomson, A. J. (2001). Thromboembolic disease in pregnancy and the puerperium: acute management. *Guidelines and Audit Committee of the Royal College of Obstetricians and Gynaecologists (RCOG). London: RCOG.*
- Guadagnoli, E., & Velicer, W. F. (1988). Relation of sample size to the stability of component patterns. *Psychological Bulletin*, 103, 265-275.
- Guyatt, G. H., Akl, E. A., Crowther, M., Gutterman, D. D., & Schuünemann, H. J. (2012). Executive summary: antithrombotic therapy and prevention of thrombosis: American College of Chest Physicians evidence-based clinical practice guidelines. *Chest Journal*, 141 (2\_suppl), 7S-47S.
- Haddad, T. C., & Greeno, E. W. (2006). Chemotherapy-induced thrombosis. *Thrombosis* research, 118(5), 555-568.
- Hair, J.F., Anderson, R.E., Tatham, R.L., & Black, W.C. (1998). *Multivariate data analysis* (5<sup>th</sup> ed.). Upper Saddle River, NJ: prentice Hall.

- Hair, J. F. Jr., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L (2006).*Multivariate data analysis* (Sixth Edition). New Jersey: Prentice-HallInternational.
- Hair, Joseph F., G. Tomas M. Hult, Christian M. Ringle, and Marko Sarstedt. 2016. A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). 2nd edition, Thousand Oaks: Sage.
- Hanes, E. (2013). Deep vein thrombosis. *Nursing*, *43*(8), 43.doi: 10.1097/01.nurse. 0000431944.08030.90
- Hatcher, L. (1994). A Step-by-Step Approach to Using the SAS® System for Factor Analysis and Structural Equation Modeling. Cary, N.C.: SAS Institute, Inc.
- Ho, K.M., & Tan, J.A. (2013). Stratified meta-analysis of intermittent pneumatic compression of the lower limbs to prevent venous thromboembolism in hospitalized patients. *Circulation*, 128, 1003-1020.
   <a href="https://doi.org/10.1161/CIRCULATIONAHA.113.002690">https://doi.org/10.1161/CIRCULATIONAHA.113.002690</a>
- Ho, W. K. (2010). Deep vein thrombosis: risks and diagnosis. *Australian family* physician, 39 (7), 468.
   <u>http://www.unibielefeld.de/ikg/zick/ajzen%20construction%20a%20tpb%20quest</u> ionnaire.pdf
- Hudson, SH. (2012). Venous Thromboembolism: Reducing the Risks. Retrieved from <a href="https://www.nursece.com/courses/93-venous-thromboembolism-reducing-the-risks">https://www.nursece.com/courses/93-venous-thromboembolism-reducing-the-risks</a>
- Hulley, S. B., Cummings, S. R., Browner, W. S., Grady, D., & Newman, T. B. (2013). *Designing clinical research*. Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins.
- Hung, C. C., Lee, B. O., Liang, H. F., & Chu, T. P. (2016). Factors influencing nurses' attitudes and intentions toward medication administration error reporting. *Japan Journal of Nursing Science*, 13(3), 345-354.

- Ibrahim, M., Ahmed, A., Mohamed, W.Y., & Abduo, S.E. (2015). Effect of compression devices on preventing deep vein thrombosis among adult trauma patients: a systematic review. *Dimensions of Critical Care Nursing*, 34(5), 290-300.
- Islam, Sh. (2017). *Thrombosis and Embolism: from Research to Clinical Practice*. (n.d.). Retrieved September 19, 2017, from http://www.springer.com/us/book/9783319221076
- Jaccard, J., Guilamo-Ramos, V., Johansson, M., & Bouris, A. (2006). Multiple regression
- Javadi, M., Kadkhodaee, M., Yaghoubi, M., Maroufi, M., & Shams, A. (2013). Applying theory of planned behavior in predicting of patient safety behaviors of nurses. *Materia socio-medical*, 25(1), 52.
- Jha, A. K., Larizgoitia, I., Audera-Lopez, C., Prasopa-Plaizier, N., Waters, H., & Bates,
  D. W. (2013). The global burden of unsafe medical care: analytic modelling of observational studies. *BMJ quality & safety*, 22 (10), 809-815.
- Jonas, K., Reddy, P., van den Borne, B., Sewpaul, R., Nyembezi, A., Naidoo, P., & Crutzen, R. (2016). Predictors of nurses' and midwives' intentions to provide maternal and child healthcare services to adolescents in South Africa. BMC Health Services Research, 16, 658.
- Kabrhel, C., Varraso, R., Goldhaber, S. Z., Rimm, E. B., & Camargo, C. A. (2009).
  Prospective Study of BMI and the Risk of Pulmonary Embolism in
  Women. *Obesity (Silver Spring, Md.)*, *17*(11), 2040–2046.
- Kamphuisen, P. W., & Lee, A. Y. (2012). Catheter-related thrombosis: lifeline or a pain in the neck? *ASH Education Program Book*, 2012(1), 638-644.
- Ke, L. S., Chiu, T. Y., Lo, S. S., & Hu, W. Y. (2008). Knowledge, attitudes, and behavioral intentions of nurses toward providing artificial nutrition and hydration for terminal cancer patients in Taiwan. *Cancer nursing*, 31(1), 67-76.
- Keith, T. (2006). Multiple regression and beyond. PEARSON Allyn & Bacon.
- Kesieme, E., Kesieme, C., Jebbin, N., Irekpita, E., & Dongo, A. (2011). Deep vein thrombosis: a clinical review. *Journal of blood medicine*, *2*, 59.

- Khorana AA. (2009). Cancer and thrombosis: implications of published guidelines for clinical practice. *Annals of Oncology*, *20*(10):1619–30.
- Khorana, A. A., Dalal, M., Lin, J., & Connolly, G. C. (2013). Incidence and predictors of venous thromboembolism (VTE) among ambulatory high-risk cancer patients undergoing chemotherapy in the United States. *Cancer*, 119(3), 648-655.
- Kim, J. Y., Khavanin, N., Rambachan, A., McCarthy, R. J., Mlodinow, A. S., De Oliveria, G. S., ... & Mahvi, D. M. (2015). Surgical duration and risk of venous thromboembolism. *JAMA surgery*, 150(2), 110-117.
- Knowles, S., Lam, L. T., McInnes, E., Elliott, D., Hardy, J., & Middleton, S. (2015).
  Knowledge, attitudes, beliefs and behavior intentions for three bowel management practices in intensive care: effects of a targeted protocol implementation for nursing and medical staff. *BMC nursing*, *14*(1), 6.
- Ko, N. Y., Feng, M. C., Chiu, D. Y., Wu, M. H., Feng, J. Y., & Pan, S. M. (2004).
  Applying theory of planned behavior to predict nurses' intention and volunteering to care for SARS patients in southern Taiwan. *The Kaohsiung journal of medical sciences*, 20(8), 389-398.
- Kortteisto, T., Kaila, M., Komulainen, J., Mäntyranta, T., & Rissanen, P. (2010).
  Healthcare professionals' intentions to use clinical guidelines: a survey using the theory of planned behavior. *Implementation Science*, 5(1), 51.
- Kress, J. P. (2009). Clinical trials of early mobilization of critically ill patients. *Critical care medicine*, *37* (10), S442-S447.
- Kucher, N. (2011). Deep-vein thrombosis of the upper extremities. *New England Journal of Medicine*, *364*(9), 861-869.
- Kujur, R., Rao, S. M., Badwaik, G., & Paraswani, R. (2012). Thrombosis associated with right internal jugular central venous catheters: A prospective observational study. *Indian Journal of Critical Care Medicine: Peer-Reviewed, Official Publication of Indian Society of Critical Care Medicine, 16*(1), 17–21.

- Lavoie, M., Godin, G., Vézina-Im, L. A., Blondeau, D., Martineau, I., & Roy, L. (2016). Psychosocial determinants of nurses' intention to practice euthanasia in palliative care. *Nursing ethics*, 23(1), 48-60.
- Lechner, L., de Vries, H., & Offermans, N. (1997). Participation in a breast cancer screening program: Influence of Past Behavior and Determinants on Future Screening Participation. *Preventive Medicine*, 26, 473-482.
- Lee, J. A., Grochow, D., Drake, D., Johnson, L., Reed, P., & van Servellen, G. (2014).
   Evaluation of hospital nurses' perceived knowledge and practices of venous thromboembolism assessment and prevention. *Journal of Vascular Nursing*, 32 (1), 18-24.
- Li, F., Walker, K., McInnes, E., & Duff, J. (2010). Testing the effect of a targeted intervention on nurses' compliance with "best practice" mechanical venous thromboembolism prevention. *Journal of Vascular Nursing*, *28* (3), 92-96.
- Loewenthal, K. M., (2001). An introduction to psychological tests and scales. New York, NY: Psychology Press.
- Lok, J. G. (2013). *Nurses' Awareness of and Intention to Use Music Therapy in Practice* (Doctoral dissertation).
- López, J. A., & Chen, J. (2009). Pathophysiology of venous thrombosis. *Thrombosis research*, 123, S30-S34.
- Mahan, C. E., Borrego, M. E., Woersching, A. L., Federici, R., Downey, R., Tiongson, J.,
  ... Spyropoulos, A. C. (2012). Venous thromboembolism: Annualized United
  States models for total, hospital-acquired and preventable costs utilizing longterm attack rates. *Thrombosis and Hemostasis*, 108 (2), 291-302.
  doi:10.1160/th12-03-0162
- Makic, M. B. F. (2014). Preventing postsurgical venous thromboembolism. *Journal of Peri Anesthesia Nursing*, 29(4), 317-319.
- Malato, A., Dentali, F., Siragusa, S., Fabbiano, F., Kagoma, Y., Boddi, M., ... & Napolitano, M. (2015). The impact of deep vein thrombosis in critically ill

patients: a meta-analysis of major clinical outcomes. *Blood Transfusion*, *13* (4), 559.

- Malek, L., Umberger, W. J., Makrides, M., & ShaoJia, Z. (2017). Predicting healthy eating intention and adherence to dietary recommendations during pregnancy in Australia using the Theory of Planned Behavior. *Appetite*, 116, 431-441.
- Matar, H. (2002): Evaluation of The Policy for Prophylaxis Against Venous Thromboembolism in Postoperative ICU. Retrieved from <u>http://srv4.eulc.edu.eg/eulc\_v5/Libraries/Thesis/</u>
- McFarland, L., Murray, E., Harrison, S., Heneghan, C., Ward, A., Fitzmaurice, D., & Greenfield, S. (2014). Current practice of venous thromboembolism prevention in acute trusts: a qualitative study. *BMJ open*, 4 (6), e005074.
- McKenzie, K. (2014). Nurses' intentions to give lifestyle support. *Nursing times*, *110*(26), 20-22.
- McKinney, O., Modeste, N. N., Lee, J. W., & Gleason, P. C. (2015). Predicting Malawian Women's Intention to Adhere to Antiretroviral Therapy. *Journal of Public Health Research*, 4(2), 533.
- McLeod, A. G., & Geerts, W. (2011). Venous thromboembolism prophylaxis in critically ill patients. *Critical care clinics*, 27 (4), 765-780.
- Mertler, C.A. & Vannatta, R.A. (2013). *Advanced and multivariate statistical methods*, 5<sup>th</sup> ed. Glendale, CA: Pyrczak Publishing.
- Minet, C., Potton, L., Bonadona, A., Hamidfar-Roy, R., Somohano, C. A., Lugosi, M., . . . Timsit, J. (2015). Venous thromboembolism in the ICU: main characteristics, diagnosis and thromboprophylaxis. *Critical Care*, *19* (1). doi:10.1186/s13054-015-1003-9.
- Miri, M., Goharani, R., & Sistanizad, M. (2017). Deep Vein Thrombosis among Intensive Care Unit Patients; an Epidemiologic Study. *Emergency*, 5 (1).

- Nelson, J. M., Cook, P. F., & Ingram, J. C. (2014). Utility of the theory of planned behavior to predict nursing staff blood pressure monitoring behaviors. *Journal of clinical nursing*, 23(3-4), 461-470.
- Osborne, J., & Waters, E. (2002). Four assumptions of multiple regression that researchers should always test. *Practical Assessment, Research & Evaluation*, 8(2). Retrieved from: <u>http://PAREonline.net/getvn.asp?v=8&n=2</u>
- Osborne, J. W., & Costello, A. B. (2004). Sample size and subject to item ratio in principal components analysis. *Practical assessment, research & evaluation*, 9(11), 8.
- Padilha, K.M, Gallani, M.C, Colombia, R.C. (2004). Development of an instrument to measure beliefs and attitudes from heart valve disease patients. *Revista Latino-Americana de Enfermagem*, 12(3):453–9.
- Pastores, S. M. (2009). Management of venous thromboembolism in the intensive care unit. *Journal of critical care*, 24 (2), 185-191.
- Piras, S. E. (2016). The Effect of Social Influence on Nurses' Hand Hygiene Behaviors (Doctoral dissertation, Vanderbilt University).
- Pinto, C. J. M., Colombo, R. C. R., & Gallani, M. C. B. J. (2006). Nurses' attitudinal and normative beliefs concerning hemodynamic assessment by pulmonary artery catheterization. *Revista Latin-American de Enfermagem*, 14 (6), 915-922.
- Polit, D. F, Beck, C. T., & Owen, S. V. (2007). Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Research in Nursing & Health*, 30(4), 459-67.
- Pomero, F., Ageno, W., Serraino, C., Borretta, V., Gianni, M., Fenoglio, L., ... & Dentali, F. (2014). The role of inherited thrombophilia in patients with isolated pulmonary embolism: A systematic review and a meta-analysis of the literature. *Thrombosis research*, 134(1), 84-89.
- Prandoni P, Falanga A, Piccioli A. (2005). Cancer and venous thromboembolism. *The Lancet Oncology*, *6*(6):401–10.

- Puffer S. & Rashidian A. (2004). Practice nurses' intentions to use clinical guidelines. *Journal of Advanced Nursing*, 47(5), 500–509.
- Ramayah, Yeap, & Igatius, 2013 Ramayah, T., Yeap, J. A. L., & Igatius, J. (2013). An empirical inquiry on knowledge sharing among academicians in higher learning institutions. *Minerva*, 51(2), 131–154. doi:10.1007/s11024-013-9229-7
- Raskob, G. E., Silverstein, R., Bratzler, D. W., Heit, J. A., & White, R. H. (2010).
  Surveillance for deep vein thrombosis and pulmonary embolism:
  recommendations from a national workshop. *American journal of preventive medicine*, *38* (4), S502-S509.
- Restrepo, P., Jameson, D., & Carroll, D. L. (2015). An evidence-based quality improvement project to improve deep vein thrombosis prophylaxis with mechanical modalities in the Surgical Intensive Care Unit. *Journal of Nursing Care Quality*, 30 (1), 31.
- Rickles, F.R. (2006). Mechanisms of cancer-induced thrombosis in cancer. *Pathophysiology of Hemostasis and Thrombosis*,35(1–2):103–10.
- Ruppert, A., Steinle, T., & Lees, M. (2011). Economic burden of venous thromboembolism: a systematic review. *Journal of medical economics*, 14 (1), 65-74.
- Sander, R. (2013). Journal scan. *Nursing Older People*, 25(9), 15-15. Retrieved from https://journals.rcni.com/doi/abs/10.7748/nop2013.11.25.9.15.s18
- Sauls, D. J. (2007). Nurses' attitudes toward provision of care and related health outcomes. *Nursing Research*, *56*(2), 117-123.
- Sierra Navarré, R. (2017). Extension of the Theory of Planned Behavior to predict the intention to consume insect-based products: The moderating effect of food neophobia.

- Severinsen, M. T., Kristensen, S. R., Johnsen, S. P., Dethlefsen, C., Tjønneland, A., & Overvad, K. (2009). Anthropometry, body fat, and venous thromboembolism. *Circulation*, 120(19), 1850-1857.
- Sharifirad, G., Mostafavi, F., Reisi, M., Mahaki, B., Javadzade, H., Heydarabadi, A. B.,
  & Esfahani, M. N. (2015). Predictors of Nurses' Intention and Behavior in Using Health Literacy Strategies in Patient Education Based on the Theory of Planned Behavior. *Materia socio-medical*, 27(1), 22.
- Shieh, G. (2010). On the misconception of multicollinearity in detection of moderating effects: Multicollinearity is not always detrimental. *Multivariate Behavioral Research*, 45, 483- 507. doi: 10.1080/00273171.2010.483393
- Smith, A.Y. (2015). Attitude, subjective Norm, and Perceived Behavioral Control as Indicators for Nurse Educators' Intention to Use Critical Thinking Teaching Strategies: A Structural Equation Model Analysis (Doctoral dissertation) Retrieved from <u>http://digitalcommons.andrews.edu/cgi/viewcontent.cgi?article=2826&context=di</u>

Spencer, F. A., Gore, J. M., Lessard, D., Douketis, J. D., Emery, C., & Goldberg, R. J. (2008). Patient outcomes after deep vein thrombosis and pulmonary embolism: the Worcester Venous Thromboembolism Study. *Archives of internal medicine*, *168* (4), 425-430.

Springel, E (2016). Thromboembolism in Pregnancy. Retrieved from http://emedicine.medscape.com/article/2056380-overview

ssertations

- Stevens, J. P. (2009). *Applied multivariate statistics for the social sciences* (5th ed.). New York, NY: Routledge.
- Strand, T., & Lindgren, M. (2010). Knowledge, attitudes and barriers towards prevention of pressure ulcers in intensive care units: a descriptive cross-sectional study. *Intensive and critical care nursing*, 26(6), 335-342.

- Sutherland, J. L. (2015). *Predicting nurse practitioners' intentions and behaviors to perform routine HIV screening*. State University of New York at Binghamton.
- Tabachnick, B. G., & Fidell, L. S. (2007). Using multivariate statistics (5th edition).Boston, MA: Pearson Education, Inc.
- Teo, T. K. G., & Lee, C. B. (2010). Examining the efficacy of the theory of planned behavior (TPB) to understand pre-service teachers' intention to use technology.
- Terry, D., & O'Leary, J. (1995). The theory of planned behavior: The effects of perceived control and self-efficacy. *British Journal of Social Psychology*, *34*, 199-220.
- Tolma, E. L., Reininger, B. M., Evans, A., & Ureda, J. (2006). Examining the theory of planned behavior and the construct of self-efficacy to predict mammography intention. *Health education & behavior*, 33(2), 233-251.
- Tooher, R., Middleton, P., Pham, C., Fitridge, R., Rowe, S., Babidge, W., & Maddern, G. (2005). A systematic review of strategies to improve prophylaxis for venous thromboembolism in hospitals. *Annals of surgery*, 241(3), 397-415.
- Tufano, A., Coppola, A., Cerbone, A. M., Ruosi, C., & Franchini, M. (2011, April).Preventing postsurgical venous thromboembolism: pharmacological approaches.In Seminars in thrombosis and hemostasis. 37 (3), 252-266.
- Ullman, J. B. (2007). Structural equation modelling. In B. G. Tabachnick & B. G. Fidell (Eds.), Using multivariate statistics (5th ed., pp. 676–780). Boston, MA: Pearson Education Inc.
- Underwood, C. (2002). Belief and attitude change in the context of human development. *Sustainable human development in the twenty first century*, 2, 103-124.
- van Langevelde, K., Šrámek, A., & Rosendaal, F. R. (2010). The effect of aging on venous valves. Arteriosclerosis, thrombosis, and vascular biology, 30(10), 2075-2080.
- Von Brühl, M.-L., Stark, K., Steinhart, A., Chandraratne, S., Konrad, I., Lorenz, M., ... Massberg, S. (2012). Monocytes, neutrophils, and platelets cooperate to initiate

and propagate venous thrombosis in mice in vivo. *The Journal of Experimental Medicine*, 209(4), 819–835.

- Waltz, C.F., Strickland, O.L., & Lenz, E. R. (2010). *Measurement in nursing and health research*. New York, NY: Springer Publishing Co.
- Wang, L., & Zhang, Y. (2016). An extended version of the theory of planned behavior: the role of self-efficacy and past behavior in predicting the physical activity of Chinese adolescents. *Journal of sports sciences*, 34(7), 587-597.
- White, K. M., Starfelt, L. C., Young, R. M., Hawkes, A. L., Leske, S., & Hamilton, K. (2015). Predicting Australian adults' sun-safe behavior: Examining the role of personal and social norms. *British journal of health psychology*, 20(2), 396-412.
- White, K., Terry, D., & Hogg, M. (1994). Safer sex behavior: The role of attitudes, norms, and control factors. *Journal of Applied Social Psychology*, *24*, 2164-2192.
- Whiting, P. S., White-Dzuro, G. A., Greenberg, S. E., VanHouten, J. P., Avilucea, F. R.,
  Obremskey, W. T., & Sethi, M. K. (2016). Risk Factors for Deep Venous
  Thrombosis Following Orthopedic Trauma Surgery: An Analysis of 56,000
  patients. Archives of Trauma Research, 5(1), e32915.
- Williams, B., Onsman, A., & Brown, T. (2010). Exploratory factor analysis: A five-step guide for novices. *Australasian Journal of Paramedicine*, 8(3).
- Wynd, C. A., Schmidt, B., & Schaefer, M. A. (2003). Two quantitative approaches for estimating content validity. Western Journal of Nursing Research, 25(5), 508-518.
- Yang, G., De Staercke, C., & Hooper, W. C. (2012). The effects of obesity on venous thromboembolism: A review. *Open Journal of Preventive Medicine*, 2(4), 499– 509.

Zaher, G. F., & Abdelaal, M. A. (2012). Venous thromboembolism in cancer patients. In Pathophysiology and Clinical Aspects of Venous Thromboembolism in Neonates, Renal Disease and Cancer Patients.