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The Influence of Emergency RNs' Characteristics and Readiness for Change on Their Intention to Implement Evidence-Based Practice

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by

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DEDICATION

This dissertation and doctoral
nursing degree are dedicated to
my loving husband,

GUY S. NACCARATO

and

in loving memory of
my mother and father-in-law,

Irene E. and Silvio A. Naccarato
(1916-2011) (1911-1987)

for it was their philosophy of 'developing the mind'
and belief that knowledge was the gateway to
life's success and happiness.

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MARY KATHRYN NACCARATO. The Influence of RNs' Characteristics and Readiness for Change on Their Intention to Implement Pressure Ulcer Prevention Guidelines (Under direction of Teresa Kelechi)

ABSTRACT

Emergency departments are a major source of hospital admissions with patients at risk for pressure ulcer development. Yet, there is a paucity of literature in two key areas: emergency RNs' role in PU prevention and their knowledge, skills, attitudes and intentions toward implementation of PU prevention guidelines. Manuscript 1 was an integrative review that found multiple factors--knowledge, attitudes, and environmental--that affect nurses' use of PU prevention. Manuscript 2 was an integrative review that found the readiness for change construct as a precursor to implementing an organizational or individual change. Some nurse researchers suggest a readiness assessment as the first step in the evidence-based practice implementation process. However, research is needed to develop a valid and reliable instrument to measure nurses' readiness for change. Manuscript 3 was a cross-sectional study that found factors from the readiness for change framework and Theory of Planned Behavior significantly influenced emergency RNs' intention to implement pressure ulcer prevention guidelines. Readiness variables of appropriateness and personal valence combined with TPB variables of subjective norm and perceived behavioral control to affect significantly the emergency RNs' intention to implement PU prevention guidelines. In conclusion, this study demonstrated the usefulness of combining the Theory of Planned Behavior and readiness for change construct in order to assess individual intention and readiness for change.

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Chapter 1

INTRODUCTION

Emergency departments (ED) are a major source of hospital admissions with patients at risk for pressure ulcer (PU) development. In 2006, 30% of the 117 million ED visits were with elderly patients, resulting in 6.2 million admissions to US hospitals (Pham et al., 2011). Yet, there is a paucity of literature in two key areas: emergency RNs' role in PU prevention and their knowledge, skills, and attitudes toward implementation of PU prevention guidelines. Despite well-established PU prevention guidelines (N.P.U.A.P., 2009), the incidence of hospital acquired pressure ulcers (HAPU) has remained relatively unchanged from 2000 (8.2%) to 2008 (6.5%), yet during this time, the risk (moderate and high Braden scores) of PU development increased from 6% to 9% (VanDenKerkhof, Friedberg, & Harrison, 2011). Hospital patients admitted from the ED may contribute to that increased PU risk percentage. In fact, an ED study reported an incidence of 4.9% for PUs among ED patients and incidence of 15.7% for ED patients over 75 years of age (Dugaret et al., 2012).

Further, pressure ulcer care consumes large sums of healthcare dollars annually. Costs of care associated with PUs range from $20,900 to $151,700 per PU (AHRQ, 2011a). Hospitals have become burdened with the cost of HAPUs since the United States (US) government, Center for Medicare/Medicaid Services, stopped payment for HAPU in October 2008 (Compas & Brown, 2009). Thus, implementation of PU prevention guidelines has become even more critical (M. Prior, Guerin, & Grimmer-Somers, 2008). A recent study demonstrated early prevention of PUs among elderly ED patients with

pressure-reduction mattresses reduced the incidence of PUs from 1.90% to 1.48% (Dugaret et al., 2012). More research is warranted to determine whether guideline-guided prevention approaches are widespread or poorly implemented in the busy ED. Research gaps were mitigated in this study thru investigation of emergency RNs' readiness and intention to implement PU prevention guidelines.

Each year the number of older adults visiting the ED increases as does the number of patients admitted to the hospital from the ED (Niska, Bhuiya, & Xu, 2010). In older adults, immobility, malnourishment, and moisture are major risk factors for PU development (S. Robinson, 2007; Tarpey, Gould, Fox, Davies, & Cocking, 2000). In as little as two hours, tissue ischemia can begin (Defloor, De Bacquer, & Grypdonck, 2005). Environmental factors, such as ED equipment (structure and size) and supplies which lack PU prevention properties, may create obstacles for the ED nurse who attempts to implement PU prevention (Naccarato & Kelechi, 2011). For example, narrow ED stretchers that make repositioning difficult or impossible and thin mattress pads that lack redistribution properties put ED patients are at risk for PU development. In addition to equipment limitations, another barrier to PU prevention could be lack of adherence to PU prevention guidelines in a department where PU prevention has not historically been prioritized. While ED nurses may discuss such guidelines, studies to investigate this individual factor of adherence to PU prevention guidelines have not been reported in the literature. This study initiated research pertinent to emergency RNs' readiness for change and intention to implement PU prevention guidelines.

Implementation of clinical practice guidelines remains poor across settings of care, despite the broad dissemination of these guidelines. Clinical guidelines are

systematically developed to assist practitioners in making treatment decisions (Grimshaw et al., 2006). Research findings indicate multiple factors influence guideline implementation: awareness, attitudes, self-efficacy, organizational factors, subjective norms, perceived behavioral control (Kortteisto, Kaila, Komulainen, Mantyranta, & Rissanen, 2010), and knowledge and skill (Francke, Smit, de Veer, & Mistiaen, 2008; Wallin, Bostrom, & Gustavsson, 2012). This research integrated factors from the Theory of Planned Behavior (TPB) (Ajzen, 1991) and the Readiness for Change (RFC) construct to measure emergency RNs' intention and readiness to implement PU prevention guidelines.

The Theory of Planned Behavior (TPB) offers an explanation of human behavior in terms of three constructs amenable to change: attitudes, subjective norms, and perceived behavioral control. An attitude toward any behavior is produced from favorable or unfavorable beliefs about the consequences of the behavior (Ajzen, 2006). Beliefs about the expectations of others toward the behavior yields a subjective norm (Ajzen, 2006). Perceived behavioral control refers to beliefs about factors that may facilitate or impede performance of the behavior (Ajzen, 2006). According to TPB, the strength of a behavioral intention is determined by more favorable attitudes and subjective norms as well as greater perceived control (Ajzen, 2006). Thus, TPB posits a relationship between 'stated intention' and 'behavior' (Eccles et al., 2006). In a systematic review by Eccles and colleagues (2006), self-reported intention was found to be predictive of clinicians' behavior with a medium to large effect size. Therefore, TPB was used as the theoretical base for measuring emergency RNs' intention to implement

PU prevention guidelines. The TPB provided the model (Figure 1) from which items were extracted to measure attitude, subjective norms, and perceived behavioral control.

Readiness for change (RFC) is defined as an attitude influenced by the "content (what is being changed), the process (how change is implemented), the context (circumstances under which the change is occurring), and the individuals (characteristics of those being asked to change) involved" (Holt, Armenakis, Field, & Harris, 2007, p 235). According to the RFC framework, readiness reflects the extent to which an individual is cognitively and emotionally inclined to accept, embrace, and adopt change (Holt, Armenakis, Field, et al., 2007). Readiness has been shown to be an important factor in individual support for change (Armenakis & Bedeian, 1999; Holt, Armenakis, Field, et al., 2007). Assessment of readiness prior to the introduction of the change has been encouraged (Cunningham et al., 2002) and has been examined from multiple angles, with various foci including the change process, its content, its context, or attributes of the individuals affected (Holt, Armenakis, Harris, et al., 2007). Based on this prior theoretical base, this study measured potential relationships at the level of individuals among the constructs of readiness for change and TPB factors.

This study shifted current clinical practice guideline implementation focus to the individual RNs involved in the change rather than the change content, process, or context. By understanding specific variables such as intention (attitude, subjective norm, and perceived behavioral control) and the readiness for change (appropriateness, management support, change efficacy, and personal valence), a better understanding of variables that could predict emergency RNs' intention to implement PU prevention guidelines was achieved. This empirical knowledge could contribute to quality improvement in the ED

setting, notably the system of PU prevention and ED staff roles and responsibilities that must be considered when targeting practice improvements.

The focus of this doctoral dissertation emerged from the research evolution pertaining to HAPUs, PU prevention, emergency patients, and emergency nursing. Research necessarily shifted from a focus on effective emergency patient PU prevention interventions to a more basic focus on the emergency RNs' readiness for and intention to implement PU prevention guidelines. Recent articles suggest interest is increasing pertaining to PU prevention in emergency nursing. Research beginning with the recipient of change-the emergency RN-seemed to be a logical beginning. The long-range goal is to develop an assessment instrument to measure emergency RNs' readiness and intention to change, one that can be used to develop an implementation plan for and clinical practice guidelines.

SPECIFIC AIMS

This dissertation consists of three manuscripts: (1) an integrative review of psychometric properties of instruments used to measure nurses' knowledge of PU prevention; (2) an integrative review of nurses' readiness for evidence-based practice; and (3) an investigation and analysis of the influence of emergency RNs' characteristics and readiness for change on their intention to implement PU prevention guidelines. This research identified individual characteristics and applied a theoretical and conceptual framework shown to influence an individual's readiness and intention to change clinical practice in the context of emergency nursing. Ultimately this dissertation extended an understanding of the TPB model and the readiness for change construct.

Aim 1: To appraise and synthesize the literature on instruments used to measure nurses' knowledge of PU prevention.

The first manuscript is a comprehensive integrative review of the literature on instruments to measure nurses' knowledge of PU prevention. Studies were included if they used an instrument to measure nurses' PU prevention knowledge. A total of 14 instruments were analyzed. Results revealed multiple methodological and psychometric concerns: uneven or ambiguous application of theoretical frameworks, inconsistent inclusions of various nursing domains, validity, reliability, and feasibility. Despite these issues, the Pressure Ulcer Knowledge Assessment Instrument was found to be the most valid and reliable instrument to measure nurses' knowledge of PU prevention. Future research to mitigate these concerns would lead to the development of a valid and reliable instrument to measure nurses' knowledge and application of PU prevention. Continued scientific inquiry guided by a psychometrically sound instrument may offer the most promising insights about nurse and environmental factors contributing to PU prevention.

Aim 2: To appraise and synthesize the literature on nurses' readiness for evidence-based practice.

The second manuscript is a comprehensive integrative review of the literature on nurses' readiness to implement evidence-based practice. Seven studies were included that investigated the concept of readiness pertaining to the implementation of evidence-based practice. Findings indicated the readiness for change concept appeared as a phenomenon in the context of EBP implementation. Readiness for change was recommended as a precursor to EBP change; however, there is a paucity of nursing literature on nurses' readiness for change to EBP. There has been limited attention given

to exploring the readiness for change concept and strategies to enhance nurses' implementation of EBP. More research is needed to understand how to assist nurses in moving from being ready to change to actually adopting and using EBP.

Aim 3: To evaluate the influence of emergency RNs' characteristics and readiness for change on their intention to implement PU prevention guidelines.

The third investigation is a cross-sectional study to identify key characteristics of ED RNs' and significant readiness for change variables that influence their intention to implement PU prevention guidelines. Building upon the Theory of Planned Behavior (TPB) and readiness for change construct, this study combined two frameworks in order to assess readiness and intention cognitively and emotionally. The RFCQ (readiness for change questionnaire) measured participants' cognitive response to change; whereas the TPB measured their effective response to change. A cross-sectional descriptive and comparative study was conducted throughout the US, including Alaska and Hawaii, using a web-based survey. A total of 428 surveys were completed during March 2013. The results indicated two readiness variables-- appropriateness and personal valence-- combined with two TPB variables-- subjective norm and perceived behavioral control— to significantly affect the emergency RNs' intention to implement PU prevention guidelines. Thus, the study demonstrated the usefulness of combining the TPB and readiness for change constructs as an assessment instrument.

Chapter 2

PAPER I – INTEGRATIVE REVIEW

MARY NACCARATO. Integrative Review: Measuring Nurses' Knowledge of Pressure Ulcer Prevention. Under consideration with the Journal of Advanced Nursing.

Abstract

Aim: To identify instruments with psychometric relevance and quality to measure nurses' knowledge of pressure ulcer prevention.
Background: Knowledge about pressure ulcer prevention guidelines by the nurse may influence a decrease in hospital acquired pressure ulcer rate. However, synthesis of the literature is not yet available that evaluates the psychometric properties of instruments designed to measure nurses' knowledge of PU prevention.
Data Sources: *CINAHL, PubMed, PsychoInfo*, and *Advanced Google Scholar* databases.
Design: Integrative literature review
Review Methods: This integrative review included studies using an instrument to measure nurses' pressure ulcer prevention knowledge from 1992-December 2012 in peer-reviewed journals. Exclusions were non-English manuscripts and measurement of only nurses' affective domain pertaining to pressure ulcer prevention.
Results: The search strategy yielded 101 references; 23 studies with 14 instruments were retrieved, synthesized, analyzed and appraised for psychometric relevance and quality. A set of 14 instruments met relevance criteria.
Conclusion: Multiple gaps pertaining to psychometric properties were identified and included: theoretical framework, nursing domains, validity, reliability and feasibility. Despite these gaps, the *Pressure Ulcer Knowledge Assessment Instrument*, was found to be the most valid and reliable instrument to measure nurses' knowledge of PU prevention.

Summary Statement:

Why is this review needed?

- Nurses' knowledge of pressure ulcer prevention is essential for application of pressure ulcer prevention guidelines.
- Literature synthesis is not available to identify psychometric relevant instruments to measure nurses' knowledge of pressure ulcer prevention.

What are the key findings?

- Only one instrument, the Pressure Ulcer Knowledge Assessment was found to be the most valid and reliable instrument to measure nurses' knowledge of pressure ulcer prevention.
- Multiple gaps were discovered relevant to instrument design and psychometric testing.

How should the findings be used?

- Continue testing the *Pressure Ulcer Knowledge Assessment* instrument to mitigate the psychometric gaps identified in this review.
- Future research should utilize a psychometric relevant instrument to discover nurse and environmental factors of pressure ulcer development.

Keywords: knowledge, literature review, pressure ulcer, prevention and control, psychometrics

Introduction

Hospital acquired pressure ulcers (HAPUs) continue to be problematic worldwide despite evidence, from a variety of settings, indicating early implementation of pressure ulcer (PU) prevention decreases the HAPU incidence (VanGilder, Amlung, Harrison, & Meyer, 2009). Inadequate knowledge of prevention methods and poor translation of that knowledge has been shown to influence the development of a PU. Multiple instruments designed to measure nurses' knowledge of PU prevention are prominent in the literature; yet the most valid and reliable instrument has not been established. Therefore, this integrative review compares the psychometric properties of these instruments in order to assist the reader in the identification of the best instrument for measuring nurses' knowledge of PU prevention.

Studies from the international nursing community suggest: the magnitude of the HAPU problem, an interest in establishing HAPU root causes, and the need for solutions to eradicate HAPUs. In the United States alone, hospitalizations involving HAPUs increased almost 80% between 2006 and 2008 (AHRQ, 2011b). A European prevalence study in 2010 revealed almost 90% of the patients at risk did not receive appropriate preventive care (Vanderwee et al., 2011).

Nursing performs a major role in PU prevention. Adequate knowledge about PU prevention appears as one essential element for appropriate application of PU prevention guidelines (Beeckman, Defloor, Schoonhoven, & Vanderwee, 2011; Demarre' et al., 2011). Studies spanning the last 30 years investigated patient, nurse, and environment elements of PU prevention. The nurse-focused studies revealed multiple instruments

measuring various nursing cognitive domains related to PU prevention. Thus, an integrative review seems warranted to compare and evaluate these instruments.

The Review

Aim

The aim of this psychometric integrative review is to identify instruments with psychometric relevance and quality properties to measure nurses' knowledge of PU prevention. This aim will be achieved through a systematic summary, synthesis and appraisal of the selected empirical literature.

Design

A integrative review is a specific review method designed to summarize past empirical literature (R. Whittemore & K. A. Knafl, 2005). The psychometric integrative review method was selected to provide a comprehensive understanding of the instruments designed to measure nurses' knowledge of PU prevention. Because the comprehensive scope of the review includes a summary, analysis, and appraisal of empirical literature there is a potential to build nursing science, inform future research, and change nursing practice.

Search Methods

A systematic search was conducted in *CINAHL, PubMed, PsychoInfo*, and *Advanced Google Scholar* databases. The search combined search fields using controlled vocabulary from CINAHL headings: 1) pressure ulcer, knowledge, literature review, psychometrics; and PubMed Mesh Terms such as: 2) pressure ulcer, prevention and control; and PsychoInfo field codes 2) knowledge, attitudes, and practice.

Search Outcome

A total of 156 articles published between 1992 and 2012 were identified. An English filter was applied, and duplicates were removed after combining database searches, yielding 101 references. Literature relevant to instruments for measuring nursing knowledge of PU prevention was extracted from peer-reviewed journals by using the following criteria:

- Any research studies that provided empirical data on an instrument measuring nurses' knowledge of PU prevention
- Data exclusively reporting on PU prevention and nursing knowledge with:
    - PU prevention defined as the prevention of pressure ulcers for a patient at high risk for developing them
    - Nursing knowledge defined as both knowledge levels of individual nurses (registered nurse, licensed practical nurse) and nurse assistants.

Quality Appraisal – Psychometric Principles and Methods

The quality of research instrument design and application enhances the ability to utilize and apply study findings (DeVon et al., 2007). This systematic literature search identified 23 studies using 14 different instruments to investigate nurses' knowledge of PU prevention. The purpose of this psychometric integrative review is to summarize, appraise, and synthesize the measurement principles and practices of the 14 instruments utilized between 1992 and 2012 to apply the research findings to enhance PU prevention nursing practice.

Data Abstraction

Developed over the past 30 years, fourteen instruments (Table 1) measured nurses' knowledge of PU prevention. These instruments were assessed for application of

theoretical framework and the psychometric properties of instrument description, scoring, measurement method, validity, reliability, and feasibility. Table 2 summarizes the analysis. The research studies are listed in chronological order.

Synthesis

Theoretical Framework

Most scientists would support the principle that theory guided research enhances the process (Fawcett, 1992). Yet, a theoretical framework was infrequently reported in the studies selected for this review. Only three of the 23 studies conducted between the years 1992 and 2012 devoted a separate section to theoretical application within their research methodology.

Several theories were used in the three investigations to examine nurses' knowledge of PU prevention. For example, Hayes, Wolf, and McHugh (1994) applied two theories—Adult Learning and Traditional Learning—to examine nurses' independence and self-direction in learning PU prevention. The New Methods Theory guided the research of Halfens and Eggink (1995) for the purpose of studying nurses' current knowledge regarding nursing methods in preventing PUs. In contrast, Strand and Lindgren (2010) deployed the Theory of Planned Behavior to investigate nurses' knowledge and attitudes about PU prevention. The Theory of Planned Behavior suggests a relationship among beliefs influenced by education, knowledge, and experience and the nurses' intention to implement PU prevention in their practices. Strand and Lindgren modified an instrument combining items developed by Moore and Price (2004) and Lewin et al. (2003). The modified instrument was used to examine nurses' education

about, knowledge of, and individual skills used, in PU prevention. The remaining seven studies failed to mention or refer to a theoretical framework.

Nursing Domain

The 14 instruments under review were developed for the purpose of measuring cognitive domain in the context of PU prevention. The cognitive domain consists of six categories: 1) knowledge, 2) comprehension, 3) application, 4) analysis, 5) synthesis, and 6) evaluation. All the instruments included items that measured knowledge. Knowledge was the exclusive domain in the Modified SIKS, PUKT, Knowledge Test, Pancorbo-Hidalgo, and PUKAT. The application category was measured in the SIKS, Hill, PURTT, Halfens, Modified Maylor and Halfens, and the Modified Moore & Price and Lewin instruments. None of the instruments measured all six cognitive domain categories. In addition to the cognitive domain, four instruments contained affective domains such as attitudes (Modified Moore & Price and Lewin; Knowledge and Attitude), beliefs (Halfens), and perception (PURTT, SIKS).

Sample and Setting

Convenience sampling occurred in 17 studies; the six remaining studies utilized randomization. Sample size varied from 29 to 1453 participants. Power analysis to determine appropriate sample size was not reported in any of the 23 studies. Multiple healthcare settings and countries were represented. The hospital was the exclusive or dominant setting in 18 studies. Six of the 23 studies included non-hospital settings such as long term care and home care Bostrom and Kenneth, 1992, (Demarre' et al., 2011; Goodridge, Biglow, LeDoyen, & Hordienko, 1998; Pancorbo-Hidalgo, Garcia-Fernandez, Lopez-Medina, & Lopez-Ortega, 2007), private personal care (Goodridge et

al., 1998), and municipal healthcare center (Kallman & Suserud, 2009). Six countries from four different continents, North and South America, Europe, and Asia suggested the international concern with the development of PUs. One South Pacific Island, New Zealand, was also represented.

Subjects

A mixture of nursing roles made up the sample in the 20 studies. Registered nurses (RN) were exclusively sampled in eight studies. In contrast, RNs and licensed practical nurses (LPN) comprised the sample in five studies. Further sample variation occurred in five studies by sampling additional members of the nursing team, including nurse assistants, nurse interns or student nurses (sometimes referred to as enrolled nurses). Considering the direct caregiver role of LPNs, NAs, and nursing students, it seemed valuable to learn about their knowledge of PU prevention.

The major demographic factors collected from the participants were 1) age, 2) gender, 3) nursing degree, 4) type of undergraduate nursing education, 5) years of clinical practice, and 6) time frame from last PU education program. Overall, the typical study participant could be described as a female RN, who graduated from a diploma or two-year degree program, who had provided direct patient care for an average of 5-10 years, and who had not completed PU education within 12 months of completing the survey.

Instrument Evaluation Using Psychometric Principles and Methods

The 14 instruments were designed to measure nurses' knowledge in PU prevention and were tested between 1992 and 2012. Six of the 14 instruments were utilized in more than one study, with the PUKT instrument administered in five of the 23

studies. Four instruments were used twice: SIKS, PURTT, Halfens, and Moore & Price and Lewin Questionnaire.

Subsequent studies following the seminal research for each instrument resulted in modification of the instrument and/or research methods. For example, Duimel-Peeters, Hulsenboom, Berger, Snoeckx, and Halfens (2006) utilized the Modified Halfens Questionnaire to study nurses' knowledge and beliefs rather than barriers of PU prevention in the former study by Panagiotopoulou and Kerr (2002). In contrast, the Modified Moore & Price and Lewin Questionnaire focused on nurses' knowledge, attitudes and beliefs in the Strand and Lindgren (2010) study, versus the original study by Kallman and Suserud (2009), in which the Modified Moore & Price and Lewin Questionnaire examined nurses' knowledge, application, attitudes, possibilities, and barriers.

Studies representing multiple applications of the PUKT instrument depicted research methodology variations in setting, sample, and design. Sample changes in the study by Pieper and Mattern (1997) added LPNs to the original RN sample. Healthcare settings were expanded to non-hospital settings in the study by Goodridge et al. (1998). Multiple applications of the same instrument offered an opportunity to refine psychometric properties of validity, reliability and feasibility, yet research reports suggest otherwise.

Instrument Description

Self-report, the most common type of measurement method to collect behavioral data was the data collection method used for all 14 instruments. A questionnaire, one type of self-report measure, consists of items answered directly by the respondent (Waltz,

Strickland, & Lenz, 2010). In other words, the study participant directly reports knowledge. In contrast, the Hill Survey contained two parts, with Part I using observation and Part II using the self-report method. This method combination enabled the researchers to examine both application and knowledge categories of the cognitive domain.

The number of questionnaire items ranged from 11 to 100, the Knowledge Test and PURTT, respectively. Seven of the 14 instruments grouped items into subscales for measuring the different PU prevention dimensions, such as risk factors, risk assessment, skin inspection, and interventions. Four instruments in which subscales were not reported were the SIKS, Hill Survey, and Knowledge Test.

Most of the questionnaires included in this review utilized closed-ended questions with various types of responses. The SIKS and PURTT responses were yes/no/don't know, versus the PUKT response of true/false/don't know. Four instruments, Modified Halfens, Pancorbo-Hidalgo Survey, Modified Moore & Price and Lewin, and PUKAT used Likert scales. The Likert scale labels varied from useful, sometimes useful, and not useful to always, sometimes, never, and don't know. The Knowledge Test by Tweed and Tweed (2008) involved multiple choice questions. Insufficient detail was reported to determine the questionnaire or response method employed by Hill (1992) for the Hill Survey.

Scoring

Seven instruments presented in this review used the major measurement frameworks known as criterion-referenced and norm-referenced. Criterion-referenced measures evaluate a subject's performance relative to a predetermined set of behaviors

(Waltz et al., 2010). The pressure ulcer prevention guidelines were the set of behaviors used in each study to determine the quality or correctness of participants' responses. In contrast, norm-referenced measures evaluate a subject's performance relative to the performance of other subjects in a defined comparison group (Waltz et al., 2010). A total of 14 studies used the criterion-reference framework. Three studies, Hayes et al. (1994), Duimel-Peeters et al. (2006), and Zulkowski and Ayello (2005), employed a norm-referenced framework. A combination of criterion and norm-referenced frameworks was used in the remaining three studies: Sinclair et al. (2004), Kallman and Suserud (2009), (Beeckman et al., 2011); Beeckman et al. (2009), and (Demarre' et al., 2011). All 20 studies appropriately linked the research questions, measurement frameworks, and statistical processes.

Method of Measurement

Questionnaire delivery methods and response rates varied among the studies. Five studies distributed questionnaires via the postal service: Bostrom and Kenneth (1992), Halfens and Eggink (1995), Duimel-Peeters et al. (2006), Hulsenboom, Boors, and Halfens (2007), and Zulkowski and Ayello (2005). Response rates for postal delivery ranged from 34 to 76%. An in-person delivery method was used for 12 studies, with each study achieving 100% response. Response rates decreased when in-person delivery was combined with postal or manual return. Pieper and Mattern (1997), Pancorbo-Hidalgo et al. (2007), and Strand and Lindgren (2010) used a combined delivery method including hand delivery of the questionnaire and an anonymous return using a collection box or surface mail. Pancorbo-Hidalgo et al. (2007) reported a 37%

response rate, and Strand and Lindgren (2010) achieved a 76% response rate. Reports of four studies Pieper and Mattern (1997), Miyazaki, Caliri, and dos Santos (2010), Tweed and Tweed (2008), and Beeckman et al. (2009) did not specify their questionnaire's method of delivery or return.

Validity

Validity and reliability are two fundamental measurement concepts. Validity refers to the ability of the instrument to measure the attributes under study. The Model of Construct Validity by DeVon et al. (2007) guided the validity evaluation of the 14 instruments. According to the model, translational validity includes both face and content validity. Criterion validity, on the other hand, can be evaluated according to concurrent, predictive, convergent, and discriminant validity.

Face validity. Face validity is a subjective assessment, the easiest to measure, and the most common type reported in the literature (DeVon et al., 2007). Experts or lay people may evaluate face validity of an instrument by reviewing its grammar, syntax, organization, appropriateness, and logical flow (DeVon et al., 2007). The level of agreement between the reviewers is a common method for reporting face validity. Face validity was reported for SIKS by Bostrom and Kenneth (1992); Hill Survey; PURTT; Halfens, Modified Halfens Questionnaire by Panagiotopoulou and Kerr (2002) and Hulsenboom et al. (2007); *PUKT* by Pieper and Mott (1995), Pieper and Mattern (1997), and Goodridge et al. (1998); Knowledge Test; Wilkes Questionnaire; Pancorbo-Hidalgo Survey; Modified Moore & Price and Lewin; and PUKAT. The number of expert reviewers ranged from three to nine. Either the term 'expert' or professional/job title such as RN or clinical specialist, educator, or enterstomal nurse was reported. Level of

agreement between experts was not included in the study reports. Seven studies, including Provo, Piaacentine, and Dean-Baar (1997), Hill (1992), Hulsenboom et al. (2007), Duimel-Peeters et al. (2006), Sinclair et al. (2004), Zulkowski and Ayello (2005), and Miyazaki et al. (2010), did not report validity of any type.

Content validity. The second dimension of translational validity of the instrument involves content validity testing. Content validity was reported in the seminal research of three instruments: PUKT (1995), Pancorbo-Hidalgo Survey (2007), and PUKAT (2009). Additional content validity assessments were conducted and resulted in modifications to the instrument with PURTT (1999), Modified Halfens (2002), and Modified Moore & Price and Lewin (2010). However, only four studies using the PUKAT instrument reported using a rating scale or content validity index to quantify content validity results (Beeckman, Defloor, Demarre', Van Hecke, & Vanderwee, 2010; Beeckman et al., 2011; Beeckman et al., 2009; Demarre' et al., 2011).

Criterion-based validity. Criterion-based validity is the second category of construct validity testing. However, criterion-based validity was not described nor reported in any of the studies included in this review.

Reliability

Reliability, the second fundamental measurement concept, refers to consistency (Di Iorio, 2005). In other words, a reliable instrument means the scores produced are consistent over time. Three types of reliability assessment—equivalence, stability, and internal consistency—can be conducted (Waltz et al., 2010). Four instruments—PURTT, PUKT, Modified Halfens, and PUKAT—were determined reliable according to internal consistency results. These results were reported in six studies: Hayes et al. (1994), Pieper

and Mattern (1997), Beitz, Fey, and O'Brien (1998), Hulsenboom et al. (2007), Pancorbo-Hidalgo et al. (2007), and Beeckman et al. (2009). An acceptable stability reliability result of the PUKAT was achieved using the test-retest method (Beeckman et al., 2009). Rather than repeating reliability testing of the PUKAT, subsequent study reports (Beeckman et al., 2010; Beeckman et al., 2011; Demarre' et al., 2011) utilized the reliability results from the PUKAT seminal study by Beeckman and colleagues in 2009.

Feasibility

Feasibility can be defined as completion time. Two studies reported completion times of 15 minutes for the PUKT (Pieper & Mattern, 1997) and 30 minutes for the Knowledge Test (Tweed & Tweed, 2008) instruments. Wilkes and colleagues (1996) reported pilot testing was conducted to determine completion time of the Wilkes Questionnaire; however, results were not included in the report. The remaining 21 studies did not included instrument feasibility test results.

Results

This psychometric integrative review compared 14 instruments developed to measure nurses' knowledge of PU prevention. Issues in instrument development were identified in the following categories: theoretical, research methodology and psychometric principles of validity, reliability, and feasibility.

Theoretical Issues

As presented in the research summary section, three studies included a theoretical framework. Researchers, Strand and Lindgren (2010) presented the best description of the relationship between the Theory of Planned Behavior, the *Modified Moore & Price and Lewin Questionnaire*, research questions, and measurement research methods to

study nurses' knowledge in PU prevention. One proposition within this theory indicates intention to perform or not perform a behavior based on three factors: attitudes, subjective norms, and perceived behavioral control. The instrument developed to measure the concept of intention would include questions relating to attitudes, subjective norms, and perceived behavioral control. The inter-connectedness between theory and research instrument builds a framework for testing hypotheses and ultimately expanding the body of knowledge. A future study, using the Theory of Planned Behavior, could perform hypothesis testing. For instance, a hypothesis that nurses' attitudes about PU prevention influence their use of prevention guidelines would be grounded in the Theory of Planned Behavior. Such research would aid in the expansion of nursing science by contributing findings applicable to the problem of PU development and theoretical knowledge.

Research Methodology Issues

Nursing domain. Examination of the sample across the reviewed studies revealed six important findings: a) participants were mostly RNs, b) participants were mostly bedside clinicians with 5-10 years of experience, c) most nurses practiced in hospitals, d) most nurses held diploma or an associate degree, e) most nurses received PU education less than 12 months of completing the survey, and g) pressure ulcer knowledge improved following education. Despite the homogeneity of the sample and the positive effect of education on PU knowledge, the problem of PU development remains high. These findings suggest PU prevention may be influenced by variables other than knowledge. With the international nursing sector leading the way, recent research has initiated macro-level examination of PU prevention. Three studies conducted in Greece

(Panagiotopoulou & Kerr, 2002), Sweden (Kallman & Suserud, 2009), and the Netherlands (Strand & Lindgren, 2010) utilized questionnaires to investigate nursing cognitive and affective domains and system variables that may influence PU prevention. Based on the studies in this review, investigating PU prevention from a macro-level or systems approach seems warranted.

Health behavior research suggests a weak association between knowledge and health behaviors. Pressure ulcer prevention knowledge alone may be insufficient in the prevention of PU development. Knowledge is more than information. In fact, knowledge involves an understanding of information to accomplish a purpose or goal (Anderson & Wilson, 2009). The instruments in this review tested nurses' cognitive domains of knowledge and/or comprehension. Missing were the cognitive domains of application, analysis, synthesis, and evaluation. Research efforts are needed to develop a domain-sampling instrument that includes all of the cognitive domains to gain insight into which domain, or combination of domains is most influential in PU prevention.

Self-report questionnaire. There are several advantages for selecting a questionnaire to study nurses' knowledge. For example, a self-report questionnaire offers convenience and efficiency to the researcher and study participants. For the researcher, recording of participant responses, particularly closed-ended questions, is easy to code and enter into a database. The closed-ended question design provides response options that streamline completion by the participant. Additionally, participant anonymity is relatively easy to uphold when using a questionnaire, thereby creating a confidential environment to collect sensitive information pertaining to age, gender, race, years of nursing practice, nursing knowledge, and nursing behaviors.

Further, disadvantages of a self-report questionnaire should be considered when planning a research methodology. Overall, study participants were RNs, graduating from a diploma or two-year degree program, providing direct patient care for an average of 5-10 years, and usually not completing recent PU education. Based on these findings the disadvantages of most concern include: inability to adapt questions and their wording to respondent's individual learning needs and styles, inability to probe complex issues such as PU prevention in depth; as for post-delivered questionnaires the inability to control the conditions of administration. Such disadvantages may have contributed to the low PU knowledge scores reported. A structured observation of nurses caring for patients at risk for PU development and/or conducting interviews in focus groups rather than a written questionnaire may offer new findings associated with implementation of PU prevention or the development of PUs.

Psychometric Issues

Validity. Face and content validity descriptions for nine of the 14 instruments appeared in the research reports. Experts were used to establish validity, yet level of agreement or actions taken following validity testing was usually not reported. Content validity refers to the assessment process whereby the instrument items are compared with the content domain (DeVon et al., 2007). In other words, the items written for the instrument adequately represent the concept, or in this review, nurses' knowledge of PU prevention. The most comprehensive validity report was provided by Beeckman et al. (2009) about the PUKAT, indicating a clear definition and dimensions of nurses' knowledge of PU prevention. From a validity perspective, the PUKAT would be an excellent choice for future research studies.

Reliability. Reliability test results were reported for five of the 14 instruments. The reliability report for the PUKAT (Beeckman et al., 2009) included both stability and equivalence results which suggested this instrument to be the most reliable.

Feasibility. No problems were reported with the use of paper-pencil questionnaire completed at home or in the clinical setting. These settings are outside the clinical work setting which offers the nurse an environment without patient care demands and perhaps fewer interruptions. In person response (100%) exceeded mailed response rate, which ranged from 34% to 76%. Reports of feasibility concentrated on time (Pieper & Mattern, 1997; Tweed & Tweed, 2008; Wilkes et al., 1996), completion rate (Strand & Lindgren, 2010), and reading level (Beitz et al., 1998; Hayes et al., 1994). No issues were reported with Likert scale response categories. Overall, feasibility was under-reported.

Discussion

Multiple gaps were discovered relevant to instrument design and psychometric testing. Each gap---theoretical framework, nursing domain, and psychometric properties of validity, reliability and feasibility-- offers an opportunity to rethink the research process purpose in the study of PU prevention. Future research aimed to mitigate these gaps will lead to the development of a valid and reliable instrument to measure nurses' knowledge and application of PU prevention.

Conclusion

In summary, utility of the 14 instruments in this review has not been established. This review discovered the Pressure Ulcer Knowledge Assessment Instrument (Beeckman et al., 2009) to be the most valid and reliable instrument for studying nurses'

knowledge of PU prevention; yet further psychometric testing seems warranted. For example, rigorous application of psychometric properties of this instrument in diverse nursing populations globally would enhance its usefulness. Continued scientific inquiry guided by a psychometric relevant and quality instrument may offer the most promising insights about nurse and environmental factors of PU development. Causal factors could pave the way for testing interventions that will convert PU prevention from a conceptual phenomenon to a reality.

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Table 1. Instruments Measuring Nurses' Knowledge of PU Prevention

Instrument	Year	Country
Skin Integrity Knowledge Survey (SIKS)	1992	United States
Modified Skin Integrity Knowledge Survey (SIKS)	1997	United States
Hill Survey	1992	United States
Pressure Ulcer Risk & Treatment (PURTT)	1994	United States
Halfens Instrument	1995	Netherlands
Modified Halfens	2002	Greece
Questionnaire	2006	Netherlands
Pressure Ulcer Knowledge Test (PUKT)	1995	United States
Modified Pressure Ulcer Knowledge Test (PUKT)	2010	Brazil
Knowledge Test	1998	Canada
Wilks Questionnaire	2004	United States
Pancorbo-Hidalgo Survey	2010	New Zealand
Modified Moore & Price and Lewin	1996	Hong Kong
Pressure Ulcer Knowledge Assessment Instrument (PUKAT)	2007	Spain
	2009	Sweden
	2010	Sweden
	2009	Netherlands
	2010	Belgium
	2011	
Knowledge & Attitude Instrument	2011	Belgium

Table 2. Studies using Instruments to Measure Nurses' Knowledge of PU Prevent
Key: NR=not reported

Instrument Year Reverence	Theory	Nursing Domain	Sample	Setting	Subjects
Skin Integrity Knowledge Survey (***SIKS***) Bostrom & Kenneth, 1992	NR	knowledge application	n=245 convenient	hospital home care	RN
Modified Skin Integrity Knowledge Survey (***SIKS***) Provo, 1997	NR	knowledge	n=67=Phase I n=51=Phase II convenient	hospital	RN Advanced patient care assistant Nursing assistant Nurse intern
Hill Survey Hill, 1992	NR	knowledge	n=19 convenient	hospital	RN
Pressure Ulcer Risk & Treatment Test (***PURTT***) Hayes, 1994	Adult Learning Theory Traditional Learning Theory	knowledge application	n=102 random	hospital	RN LPN Nurse assistant
Pressure Ulcer Risk & Treatment Test (PURTT) Beitz, 1999	NR	knowledge (*perception*)	n=86 convenient	hospital	RN
Halfens Instrument Halfens & Eggink, 1995	Adopting New Methods Theory	knowledge application (*beliefs*)	n=373 random	hospital	RN
Modified Halfens Questionnaire Panagiotopoulou, 2002	NR	knowledge application (*barriers*)	n=118 convenient	hospital	RN Enrolled RN

Modified Halfens Questionnaire Hulsenboom, Bours, & Halfens, 2007	NR	knowledge application *(beliefs)*	n=873 (1991 = 351 & 2003 = 522) random	hospital	RN
Pressure Ulcer Knowledge Test (PUKT) Pieper & Mott, 1995	NR	knowledge	n=228 convenient	hospital	RN
Pressure Ulcer Knowledge Test (PUKT) Pieper & Mattern, 1997	NR	knowledge	n=306 convenient	hospital	RN LPN
Modified Pressure Ulcer Knowledge Test (PUKT) Goodridge, Biglow, LeDoyen & Hordienko, 1998	NR	knowledge	n=1450 convenient	hospital home care long term care personal care in home	RN LPN
Modified Pressure Ulcer Knowledge Test (PUKT) Sinclair, 2004	NR	knowledge	n=654 convenient	hospital	RN LPN
Pressure Ulcer Knowledge Test (*PUKT*) Zulkowski, 2005	NR	knowledge	n=241 convenient	hospital (urban & rural)	RN
Pressure Ulcer Knowledge Test (PUKT) *Miyazaki, 2010*	NR	knowledge	n=657 convenient	hospital	RN Nurse Technician Nurse auxillary
Knowledge Test Tweed & Tweed, 2008	NR	knowledge	n=		

Wilkes Questionnaire Wilkes, Bostock, Lovitt & Dennis, 1996	NR	knowledge *(barriers)*	n=34 convenient	hospital	RN BSN nursing students
Pancorbo-Hidalgo Survey Pancorbo-Hidalgo, 2007	NR	knowledge	n=74 convenient	hospital primary health center long term care	RN LPN
Modified Moore & Price and Lewin Quesstionnaire Kallman & Suserud, 2009	NR	knowledge application *(attitudes) (possibilities) (barriers)*	n=154 random	hospital municipal healthcare center	RN
Modified Moore & Price and Lewin Questionnaire Strand & Lindgren, 2010	NR	knowledge (attitudes) (barriers)	n=146 convenient	hospital	RN Enrolled nurse
Pressure Ulcer Knowledge Assessment Test (PUKAT) Beeckman, Vanderwee, Demarre, Paquay, Van Hecke & Defloor, 2009	NR	knowledge	n=608 convenient	hospital	RN Nursing student
Pressure Ulcer Knowledge Assessment Test (PUKAT) Beeckman, Vanderwee, Demarre, Paquay, Van Hecke & Defloor, 2010	NR	knowledge	n=608 convenient	hospital	RN RN students
Pressure Ulcer Knowledge Assessment	NR	knowledge (attitude)	n=553 random	hospital	RN

Test (PUKAT) Beeckman, Defloor, Schoohoven & Vanderwee, 2011					
Pressure Ulcer Knowledge Assessment Test (PUKAT) *Derrarre, Vanderwee, Defloor, Verhaeghe, Schoonhoven & Beeckman, 2012*	NR	knowledge (attitude)	n=145 random	nursing home	RN Nursing Assistant

Table 3. Psychometric Properties Measuring Nurses' Knowledge of PU Prevention

Key: NR=not reported; RR=response rate; V=Validity; R=Reliability; F=Feasibility; PU=Pressure Ulcer

Instrument	Measurement Method	Instrument Description	Scoring	Validity/ Reliability/ Feasibility
SIKS				
□ *Bpstrom & Kenneth, 1992*	Self report Paper-pencil Mailed questionnaire 46-73% RR	Questionnaire: 15 items 12 yes/no 3 unstructured questions Criterion reference framework	Cut off score NR Nominal=yes/no Categorical & unstructured questions	Face V=clinical specialists R NR F NR
□ *Provo, 1997*	Self report Paper-pencil In-person delivery 100% RR	# items NR Criterion reference framework	Cut off score NR Nominal=yes/no	V NR R NR F NR
HIII				
□ *Hill, 1992*	Self-report Paper-pencil In-person delivery 100% RR	# items NR Observation Questionnaire Criterion & Norm reference framework	Cut off score=90% of 100 total Nominal scale=0-10 points	V NR R NR F NR
PURTT				
□ *Hayes 1994*	Self-report Paper-pencil In-person delivery 100% RR	100 items – 3 categories: * risk subscale (35 items) * assessment (30 items) * treatment (35 items) Norm reference	Cut off score NR Total possible=100 points Nominal=true/false	Face V= nurse experts Overall R= Coefficient=0.660 Risk=0.259 Assessment=0.308 Treatment=0.518 Cochran's Q=3060.43, p-0.000 on pretest

		framework		F= avg. item difficulty=0.80
Beitz, 1999	Self-report Paper-pencil In-person delivery 100% RR	100 items – 3 categories: * risk subscale * assessment (30 items * treatment (35 items) Criterion reference framework	Cut off score=80% of total points Nominal=true/false Categorial=learning needs Assessment=3 point Likert (not important, somewhat; very important)	Face V= 5 nurse experts Content V: 4 enterstomal nurse specialists R=Internal Consistency, Overall Coefficient=0.66 Subscale Internal consistency risk 0.26; Assessment=0.31 Treatment=0.52 F=avg item difficulty=0.80; 20-30 mins to complete; test & survey completed after education session
Halfens				
Halfens & Eggink, 1995	Self-report Paper-pencil Mailed questionnaire 76% RR	27 items Criterion reference framework	Cut off score NR 4 point Likert (always, sometimes, never, don't know)	Face V=clinical specialists R NR F NR
Modified Halfens				
Panagiotopoulou, 2002	Self-report Paper-pencil In-person delivery with confidential return 71% RR	# items NR Criterion reference framework	Cut off score NR 4 point Likert (strongly agree, agree, disagree, strongly disagree; assigned score NR)	Face & Content V=6 expert educators, experienced researchers & tissue viability nurses R NR F NR

Duimel-Peters, 2006	Self-report Paper-pencil Mailed questionnaire with confidential return 52-62% RR	# items NR Norm reference framework	Cut off score NR 4 point Likert (always, sometimes, never, don't know) 3 point Likert (useful, sometimes useful, not useful)	V NR R NR F NR
Hulsenboom, Bours & Halfens, 2007	Self-report Paper-pencil In-person delivery 45% RR	28 items Criterion & Norm reference frameworks	Cut off score=70% judged correctly 4 point Likert (useful, sometimes useful, not useful, don't know)	V NR R=factor analysis F NR
PUKT				
Pieper & Mott, 1995	Self-report Paper-pencil In-person delivery RR NR	47 items subscales: (prevention, staging, wound) Criterion & Norm reference frameworks	Cut off score=90% correct responses Nominal=true/false/don't know	Face V=10 nurses Content V=enterstomal experts R NR F=nurses able to read and understand
Pieper & Mattern, 1997	Self-report Paper-pencil In-person delivery with anonymous return RR NR	47 items subscales: (prevention, staging, wound) Criterion & Norm reference frameworks	Cut off score=90% correct responses Nominal=true/false/don't know	Face & Content V from 1995 study R=coefficient alpha RN: total score=0.85; subscore coefficient alpha: prevention=0.80; staging=0.49; wound=0.59; R=coefficient alpha Critical Care RN: total score=0.91; subscore coefficient alpha prevention=0.88; staging=0.62;

				wound=0.73 F=clarity, item understandable, logical structure by 10 nurses; 15 min completion
Goodridge, Biglow, Ledoyen & Hordienko, 1998	Self-report Paper-pencil In-person delivery with confidential return 34% RR	24 items subscales (risk factors, basic skin care, positioning, support surfaces, documentation) Criterion & Norm reference frameworks	Cut off score NR	V NR R=completed results NR F NR
Sinclair, 2004	Self-report Paper-pencil In-person delivery 100% RR	53 items subscales (prevention=32 items; staging=8 items; wound=13 items) Criterion & Norm reference frameworks	Cut off score=total score Nominal=true/false/don't know	V NR R NR F NR
Zulkowski, 2005	Self-report Paper-pencil Mailed delivery 52% RR	47 items subscales (prevention, staging, wound) Norm reference framework	Cut off score=mean total score Nominal=true/false	V NR R NR F NR
Miyazaki, 2010	Self-report Paper-pencil In-person delivery	47 items subscales (prevention=33 items;	Cut off score=90% correct responses Nominal=true/false/don't know	V NR R NR F NR

	RR NR	assessment=8 items; staging=8 items Criterion reference framework		
Knowledge Test				
Tweed & Tweed, 2008	Self-report Paper-pencil In-person delivery RR NR	11 items Criterion reference framework	Cut off score=76% Pre/Post test within 2-20 weeks of education session	Face & Content V=8 international experts R NR F=7 nurses; 30 min to complete
Wilkes				
Wilkes, Bostock, Lovitt & Dennix, 1996	Self-report Paper-pencil In-person delivery 100% RR	# items NR subscales (risk, prevention, staging, barriers) Norm reference framework	Cut off score NR Data type NR	Face V=6 experts with acceptable agreement level for clarity Content V NR R NR F=6 experts results NR
Pancorbo-Hidalgo				
Pancorbo-Hidalgo, 2007	Self-report Paper-pencil In-person delivery with mail return 37% RR	37 items subscales (prevention=16 items; treatment=21 items) Criterion reference framework	Cut off score NR Nominal = 3 point Likert scale (always, sometimes, never) % knowledge index % implementation index	Face & Content V=3 experts results NR R=Cronbach alpha=0.92 internal consistency F NR
Modified Moore & Price and Lewin Questionnaire				
Kallman & Suserud, 2009	Self-report Paper-pencil In-person delivery	47 items subscales (risk=23 items;	Cut off score=90% Categorical=open-ended questions Knowledge &	Face & Content V=3 experts with acceptable agreement level

	with 1 reminder 67% RR	prevention=6 items: practice=17 items: attitude=11 items: possibilities= 2 items: barriers=4 items) Criterion & Norm reference frameworks	practice=mean, medial, mode, SD Staging photo=%correct	R NR F=4 RNs: 4 Nurse Assistants results NR
☐ *Strand & Lindgren, 2010*	Self-report Paper-pencil In-person delivery with anonymous return 46% RR	# items NR subscales NR Criterion reference framework	Cut off score NR Data type NR	Face & Content V=4 RNs, 4 enterstomal experts results NR R NR F=4 RNs: 4 enterstomal experts with high non-completion rate for open-ended questions thus, changed to closed-ended questions
PUKAT				
☐ *Beeckman, Vanderwee, Demarre, Paquay, Van Hecke & Defloor, 2009*	Self-report Paper-pencil In-person delivery RR NR	28 items subscales (etiology & development= 6 items: classification & observation= 5 items: nutrition=1 item: pressure/shear reduction=7 items: pressure/shear	Cut off score NR Nominal (yes/no/don't know) 3 point Likert (not relevant: some what relevant: relevant)	Face & Content V=9 PU experts: 3 point agreement level: Content V Index=0.78-1.00: Construct V=item difficulty 0.27-0.87, discriminating index=0.10-0.65: quality of response=0.03-

		duration=5 items) Criterion & Norm reference		0.58 R=internal consistency Cronbachs alpha=0.77 R=test/retest within 1 week, correlation coefficient for each theme R Coefficient ≥ 0.70 satisfactory F=5 PU experts, 5 nursing students; 30 mins time to complete
Beeckman, Vanderwee, Demarre, Paquay, Van Hecke & Defloor, 2010	Self-report Paper-pencil Delivery method NR RR NR	28 items subscales (etiology & development= 6 items; classification & observation= 5 items; nutrition=1 item; pressure/shear reduction=7 items; pressure/shear duration=5 items) Criterion & Norm reference	Cut off score NR Nominal (yes/no/don't know) 3 point Likert (not relevant; some what relevant; relevant)	Face & Content V=9 PU experts, Discriminating Index=0.20-0.40 Construct V, Content Validity Index R=internal consistence Cronbach's alpha=0.70 or greater R=test/retest, reliability coefficients ≥ 0.70 satisfactory F=5 PU experts, 5 nursing students
Beeckman, Defloor, Schoohoven & Vanderwee, 2011	Self-report Paper-pencil Delivery method NR RR NR	28 items subscales (etiology & development= 6 items;	Cut off score=60% satisfactory knowledge Maximum score=26 Nominal	Construct V=results from Beeckman et al. 2010 R=internal

		classification & observation= 5 items; nutrition=1 item; pressure/shear reduction=7 items; pressure/shear duration=5 items) Criterion & Norm reference	(yes/no/don't know) 3 point Likert (not relevant; some what relevant; relevant)	consistency Cronbach's alpha=0.77 R=test/retest within 1 week, correlation coefficient for each theme, stability=0.88 F NR
Demarre, Vanderwee, Defloor, Verhaeghe, Schoonhoven & Beeckman, 2011	Self-report Paper-pencil Delivery method NR RR NR	PUKAT=26 items of 5 categories: aetiology, classification, nutrition, risk assessment, & prevention to reduce amount/duration of pressure & sheer APuP=13 items of five subscale domains: personal competency, priority of PU prevention, impact of PU, responsibility in PU prevention	Cut off score NR High knowledge achievement=upper 27% & low knowledge achievement=lower 27%. APuP-4 point Likert (1=strongly disagree to 4=strongly agree)	Content Validity Index=0.78-1.00; Item difficulty ranged from 0.27-0.87 R NR F NR

Chapter 3

PAPER II – INTEGRATIVE REVIEW

Naccarato, M.K., and Kelechi, T.J. Nurses' Readiness for Evidence-Based Practice. Under consideration with Worldviews on Evidence-Based Nursing journal.

Abstract

Background: Evidence-based practice has emerged as a dominant theme in nursing science, practice, education and policy. Current research findings, however, indicate implementation of evidence to change practice yields mixed outcomes and takes too long. Some researchers have argued nurses' readiness for change to evidence-based practice may be a key factor in implementation. However, missing from the nursing literature is a theoretical framework guiding the readiness for change concept and a valid, reliable instrument to measure nurses' readiness for change.
Aims: The research aims were: 1) determine how nurses' readiness is defined, conceptually and operationally; 2) determine what theoretical or conceptual frameworks guide readiness for change; 3) determine what factors or themes are associated with readiness for change; 4) determine what instruments have been used to measure nurses' readiness for change.
Methods: Integrative review using Hawker and colleagues review method.
Results: Seven studies (between 2004 and 2011) investigated nurses' readiness for implementing evidence-based practice with qualitative, quantitative, or mixed-methods design. None of the studies examined the readiness for change concept or factors that influence implementation of evidence-based practice.
Discussion: Synthesis was difficult because of multiple differences and quality in the research process across the studies.
Implications for Practice:
The readiness for change construct offers a new approach to categorizing barriers and examining relationships among barriers and individual or organizational level responses to change.
Conclusion:
Achieving evidence-based practice in nursing is integral to the drive for quality patient outcomes, healthcare system efficiency, and cost containment. Readiness for change has been recommended as a precursor to evidence-based practice change; yet review findings highlight the paucity of nursing literature on nurses' readiness for change. More research is needed to examine methods to measure readiness for change construct, both individually and organizationally, and its influence on evidence-based practice implementation.

Keywords: readiness; readiness for change; nursing practice, evidence-based practice

Nurses' Readiness for Change to Evidence-Based Practice: An Integrative Review

Evidence-based practice (EBP) has emerged as a dominant theme in nursing science, practice, education and policy. Nurse researchers worldwide have investigated EBP structure, process and outcomes, in search of the most effective EBP implementation method. Current research findings, however, indicate implementation of evidence to change practice yields mixed outcomes and takes too long (Rudman, Gustavsson, Ehrenberg, Bostrom, & Wallin, 2012; Wallin et al., 2012). Implementation appears to lag behind the development of various EBP models despite demands from nursing leaders, healthcare systems, insurance payors and consumers to implement EBP in order to reduce healthcare errors and costs (Eizenberg, 2010; Fineout-Overholt, Williamson, Kent, & Hutchinson, 2010; Flodgren, Rojas-Reyes, Cole, & Foxcroft, 2012; P. Prior, Wilkinson, & Nevills, 2010; Rycroft-Malone, 2008).

Healthcare systems accelerated the movement to improve patient safety following the Institute of Medicine report *To Err Is Human: Building a Safer Health System* (Larkin, 2009). Evidence-based interventions have been shown effective in improving patient safety through standardization of care; decrease variation among healthcare providers, and reduction in errors (Carroll & Rudolph, 2006; McKeon, Oswaks, & Cunningham, 2006; Walsh, 2010). Estimates indicate that approximately $720 billion was spent in the United States in 2008 due to poor quality health care. Those costs could be reduced by 30% if patients received evidence-based care (Buntin, Damberg, & Haviland, 2006).

Nurses' implementation of EBP remains sluggish with estimates of 8-30 years before a sustained practice change takes hold (Hutchinson & Johnston, 2006). This slow

pace continues despite the introduction of shared-governance nursing structures, theory-guided nursing research, implementation and translational sciences (Munten, Bogaard, Cox, Garretsen, & Bongers, 2010; E. Thompson, Estabrooks, Scott-Findlay, Moore, & Wallin, 2007) and pleas for improved patient safety and outcomes. Studies continue to report nurses do not use evidence to guide practice (Bonner & Sando, 2008; Solomons & Spross, 2011). While nurses report positive attitudes toward research, many say they do not use the evidence in their day-to-day work (Bjorkstrom & Hamrin, 2001; Kuuppelomaki & Tuomi, 2005). In place of evidence, nurses guide their clinical practice based on knowledge gained through interactions with colleagues and patients, policies, audit results (Gerrish & Clayton, 2004), what others have taught them (Rowe, 2007), or accepted routines (Sarajarvi, Haapamaki, & Paavilainen, 2006). Several barriers have been identified that obstruct the nurses' implementation of EBP (Solomons & Spross, 2011; Walsh, 2010). Both individual and organizational barriers may influence nurses' readiness and implementation of EBP (Pravikoff, Tanner, & Pierce, 2005; Thiel & Ghosh, 2008; Wallin et al., 2012). Without addressing such barriers or nurses' readiness for change, nurses will continue to be unlikely to embrace a culture of providing evidence-based care (Cullen & Adams, 2012; Pravikoff et al., 2005).

According to Melnyk and colleagues (2004) nurses' belief in EBP and EBP implementation was significantly ($p=0.001$) influenced by a mentor within the organization. Generally, organizational leaders have been shown to influence, positively or negatively, the culture of EBP (Retsas, 2000; C. Thompson et al., 2001; Udod & Care, 2004). Furthermore, the literature indicates organizational structure and support influences a culture of learning (Gerrish & Clayton, 2004; Retsas, 2000; Rycroft-Malone,

2004). Organizational context and facilitation to support individuals, teams, and organizations have been shown to influence EBP implementation (Harvey et al., 2002; Rycroft-Malone, 2008). While some researchers argue in favor of a systems or organizational change approach, Melnyk and colleagues (2011) have added the dimension of organizational assessment of nurses' readiness for change to EBP to their Advancing Research and Clinical Practice through close Collaboration (ARCC) EBP process model.

Readiness for Change

Organizational. Overall, change has the potential to be adopted and implemented, as well as the potential to fade out or not take root (Jaskyte & Dressler, 2005). Increasing evidence suggests readiness may be a key factor in effectively implementing and sustaining a change (Holt, Armenakis, Harris, et al., 2007; Robbins, Collins, Liaupsin, Illback, & Call, 2003). In healthcare, organizational readiness for change has become a prominent concept in the quality and performance improvement literature with the hope of implementing and sustaining change. Readiness, as a concept in healthcare and nursing, has been studied in terms of patient's cognitive abilities and behaviors (Baker & Stern, 1993; Prochaska et al., 1994; Titler & Pettit, 1995), yet minimal attention has been given to nurses' readiness for change. Additionally, there is a paucity of nursing research on nurses' readiness for change pertaining to evidence-based practice implementation.

Individual. Prominent barriers to EBP implementation are: lack of time, lack of support, limited nursing interest, and lack of knowledge (Gale & Schaffer, 2009; Pravikoff et al., 2005; Soh et al., 2011; Solomons & Spross, 2011; Tanner, Pierce, & Pravikoff, 2004; Waters, Crisp, Rychetnik, & Barratt, 2009). Some researchers have

argued individual nurses' knowledge about evidence (McLeary & Brown, 2003) or the reduction of barriers to change (D. T. Holt, A. A. Armenakis, H. S. Feild, & S. G. Harris, 2007b) may not be as important as addressing nurses' readiness for change (Thiel & Ghosh, 2008). Conceptualization of readiness for change, for purposes of this review, refers to an individual's attitude to a particular change (Holt, Armenakis, Harris, & Feild, 2007). However, missing from the nursing literature is a theoretical framework guiding the readiness for change concept and a valid, reliable instrument to measure nurses' readiness for change. These gaps will be further examined in this integrative review by summarizing, analyzing and appraising research findings about nurses' readiness for EBP.

The purpose of this review is to describe the following aims:

1) how nurses' readiness is defined, conceptually and operationally.
2) what theoretical or conceptual frameworks guide readiness for change.
3) what factors or themes are associated with readiness for change.
4) what instruments have been used to measure nurses' readiness for change.

Literature Review

The literature review process method developed by Hawker and colleagues (2002) was selected for its ability to examine the different research methodologies, including quantitative, qualitative and mixed-methods, and used to identify literature pertaining to EBP implementation.

Methods

A combination of electronic databases, systematic review repository, the Internet, and manual review of references were searched to identify research studies. Four

electronic databases were used, including CINAHL, PubMed, PsychInfo, Google Advanced Scholar, BioMed Open Access, and JANE (Journal Author Name Estimator). The search combined search fields using controlled vocabulary from CINAHL and PubMed headings: 1) evidence-based practice, 2) nursing practice, 3) evidence-based, 4) readiness for change, 5) organizational change, 6) change, organizational. Manual searching was conducted from references found in individual articles and by identifying key researchers in the field. Additionally, systematic review systems such as The Cochrane Library were searched for applicable research studies. A total of 98 studies published between 1998 and 2013 were identified. The mixed studies criteria developed by Hawker, et al. (2002), was systematically applied to identify the most relevant studies for this integrative review.

Quality Appraisal - Stage 1,2, & 3 Criteria

Stage 1. The literature search generated twelve research studies for review. The mixed studies criteria were applied in three assessment stages: stage 1 – accept/reject (Table 1): stage 2 – data extraction (Table 2), and stage 3 – appraisal for methodological rigor (Table 3- appraisal categories & Table 4- appraisal criteria).

Assessment for rejection/acceptance, stage 1, consisted of four factors: 1) relevance to the specified research questions; 2) the context of the material (i.e. the setting and the professionals involved); 3) the source of the data as originating from professionals or a client group, and 4) the type of study. Assessment questions developed for stage 1 were specific to this integrative review's purpose and aims. Answers to these questions resulted in 'acceptance' or 'rejection' of the study for inclusion in this review. Ninety-eight studies were evaluated in stage 1. Seven studies were accepted.

Stage 2. Stage 2, data extraction, involved the use of a research methodology assessment rubric. Details were recorded for each study, including study purpose/aim, research questions/hypothesis, readiness for change level, theory/concept, methods (design, setting, sample), data method and analysis and results. Table 2 summarizes study details from the stage 2 data extraction.

Stage 3. Stage 3, appraisal, consisted of six categories pertaining to the research process. The topics were: abstract and title; introduction and aims; method and data; sampling; data analysis, and /ethics and bias. Operational definitions were used to score each research category (Table 3). Definitions developed by Hawker, et al. (2002), were used for the first four topics. Definitions for topic five (data analysis) and topic six (ethics and bias) were obtained from published research references (Polit & Beck, 2008; Sandelowski, Voils, & Varroso, 2006; Whittemore, Chase, & Mandle, 2001). A four-point Likert scale, with 1 = Very Poor to 4 = Good, was used to rank the research quality of the study report. An overall calculated summed score (7 very poor; 24 good) indicated the methodological rigor of each empirical study (Hawker et al., 2002). A calculated sub-score (1 very poor; 4 good) indicated the methodological rigor for each research category (Hawker, et al., 2002). A summary of the total scores with sub-scores is presented in Table 4.

Results – Overall Study Comparisons

Seven studies conducted between 2004 and 2011 investigated the concept of readiness for change among nurses' utilizing evidence-based practice with qualitative, quantitative, and mixed-methods design. Both individual and organization levels of readiness for change were examined. Four studies focused on individual readiness for

change, two studies concentrated on organization readiness, and one study examined both individual and organization readiness. An international perspective was identified, with representation from three continents: the United States contributed three studies, while Australia and Malaysia each contributed one study. All studies were descriptive. None of the studies tested an intervention. The purpose of each of the studies is described in Table 2.

Theoretical Frameworks

Four studies reported using a theoretical framework to guide study design. Organizational change theory was utilized by Stevens, Lee, Law, and Yamada (2007) to explore the perspectives of health care professionals about factors that influence change in a neonatal intensive care unit. Only one study, Stevens, et al., (2007), clearly stated the link between the theory and the study hypothesis. The hypothesis indicated successful implementation of best practices would be reflective of the understanding of organizational factors that influence these changes. Survey instruments were developed using the information literacy theory in the studies conducted by Tanner et al. (2004) and Thiel and Ghosh (2008). Because Tanner et al. (2004) recognized a similarity between the five steps of information literacy and the steps of EBP; a survey was designed to test that assumption. Building upon the work of Tanner et al. (2004), Thiel and Ghosh (2008) combined the informational literacy for EBP framework with the environmental readiness framework to develop a survey for assessing registered nurses' readiness for EBP. The readiness for change concept was implied as a conceptual framework rather than stated in the report by Pravikoff et al. (2005). Three studies, Gale and Schaffer (2009), Waters et al. (2009), and Soh et al. (2011), did not report a theoretical framework.

Despite the use of theory to guide research design, none of the reviewed studies utilized the entire readiness for change concept. Instead, specific readiness for change factors in the individual and organization categories were examined. For example, individual readiness for change factors, such as knowledge, attitudes, skills of identification, access, retrieval, evaluation and implementation, and culture, were investigated (Pravikoff et al., 2005; Soh et al., 2011; Tanner et al., 2004; Thiel & Ghosh, 2008; Waters et al., 2009). The knowledge and skills factors were tested in all five studies. The organizational readiness for change factors examined in the studies consisted of the following: leadership, motivation, communication, culture, relationships, and resources (Gale & Schaffer, 2009; Soh et al., 2011; Stevens et al., 2007). All three of these studies examined leadership, culture, and resources.

Setting and Subjects

Registered nurses in various settings on several continents were the targeted subjects for all seven studies. The settings included national samples of 3000 nurses in the United States (Pravikoff et al., 2005; Tanner et al., 2004) to a convenience sampling of RNs working in an intensive care unit in Malaysia (N=81) (Soh et al., 2011), a neonatal intensive care unit in the United States (N=154) (Stevens et al., 2007), medical/surgical units in the United States (N=426) (Gale & Schaffer, 2009), (Thiel & Ghosh, 2008) (N=205), and a combination of student and experienced nurses in Australia (N=383) (Waters et al., 2009). Additionally, the two studies outside the U.S. contained sub-sets of registered nurses. The Australian study (Waters et al., 2009) selected three different groups of nurses: senior nursing students (prior to obtaining a RN license), recent qualified RNs (recent graduates with less than one year experience and RN license

recipients), and senior experienced RNs working in a hospital setting. In the Malaysian study, bedside clinicians, nursing managers, and pain management nurse specialists were sampled (Soh et al., 2011).

Sampling Strategies

Six of the seven studies utilized convenience sampling. While there were two nationally conducted studies, Tanner et al., (2004) and Pravikoff et al., (2006); only Pravikoff et al., (2006) used a geographic randomization selection to ensure RNs throughout the continental United States were represented. Randomization strengthened the research rigor and generalizability of the results reported by Pravikoff et al., (2006) compared to the convenience sampling of RNs from a national nursing publication database selected by Tanner et al., (2004). A stratified sampling technique was utilized for the Australian study (Waters et al., 2009) in order to compare the three different sub-groups of nurses.

Qualitative Design

One study utilized qualitative design methods. Stevens et al., (2007) conducted semi-structured interviews with open-ended questions in both individuals and focus groups of neonatal intensive care unit nurses to learn factors that influence implementation of best practices. Interviews and group discussions were audiotaped and transcribed verbatim. Content analysis was performed using Mayring's approach (Mayring, 2000). A team of reviewers utilized inductive reasoning to categorize the data and identify emerging themes. Analysis continued until 90% agreement was reached. Except for the study purpose and hypothesis, the qualitative procedures seemed appropriate and achieved an overall quality rating of good (21 out of a possible 24, Table

4). The study purpose and research question reported by Stevens et al., (2007) were more consistent with quantitative rather than qualitative research methods. For example, the term 'factors' instead of 'themes' was used in the purpose and research question statements; additionally, a relationship between factors and successful implementation of evidence was implied with the research question.

Quantitative Design

Quantitative methods were utilized in four studies (Pravikoff et al., 2005; Tanner et al., 2004; Thiel & Ghosh, 2008; Waters et al., 2009). Each of the four studies selected a descriptive, exploratory design to determine the individual nurses' readiness for EBP. Additionally,

Thiel and Ghosh (2008) investigated readiness for change at an organization level. The readiness for change concept pertaining to EBP was included in two purpose statements (Tanner, et al., 2004; Thiel & Ghosh, 2008). The other two purpose statements focused on access to resources (Pravikoff, et al., 2005) and knowledge and attitudes towards EBP (Waters, et al., 2009). A research question/s or hypothesis was used by three of the four studies, with the study by Pravikoff et al., (2005) not reporting or implying a research question or hypothesis. Only one study Tanner, et al., (2004) utilized the readiness for EBP change concept in the research question; yet the purpose statement for this study centered on access to resources. Conceptual and operational definitions of readiness for change were absent from all four studies. Evaluation of congruency between research purpose, question/hypothesis and methodology was challenging due to the lack of definitions.

The four studies achieved a 'fair' rating for methods and data collection. A paper survey was used by all four studies. Distribution method and number of survey items varied. Surveys were distributed by mail in two of the studies with one reminder (Pravikoff, et al., 2005; Waters, et al., 2009). The study by Thiel and Ghosh (2008), however, used in-person delivery, which has been shown to achieve higher response rates (Anseel, Lievens, Schollaert, & Choragwicka, 2010). Mailed surveys reported the lowest response rates of 21% (Pravikoff, et al., 2005) and 37% (Waters, et al., 2008), compared to the in-person survey response rate of 59%. Response rates for both delivery methods, with and without response enhancing techniques, were consistent with current survey response guidelines (Anseel et al., 2010).

Modified questionnaires from previous studies were utilized in three studies (Pravikoff, et al., 2005; Thiel, et al., 2008; Waters, et al., 2009). Tanner et al., (2004), however, independently designed a five-item questionnaire. The instrument developed by Thiel et al., (2008) consisted of 123 items, whereas the survey distributed by Pravikoff et al., (2005) contained 93 items. Neither of the studies reported the length of time needed to complete the survey. For the third survey, Waters, et al., (2008) did not report the number of items nor the survey's completion time.

Sampling reports from the four studies were appraised as 'fair' or 'poor' (Table 5). Size calculations were not reported in any of the four studies. Sample size calculations would have strengthened the quality all four of the studies, particularly Pravikoff et al., (2005) and Thiel and Ghosh (2008), with 93 and 123 questionnaire items, respectively. Waters at al., (2009) used ANOVA statistics to determine differences between the three nursing sub-groups; however, effect size was not reported.

Mixed Methods Design

One study (Soh, et al., 2011) integrated quantitative and qualitative methods. The mixed studies approach offered the researcher triangulation of quantitative and qualitative data to examine both individual and organizational readiness for change. Soh, et al., (2011) explored intensive care nurses' readiness for change using a survey and focus group interviews. However, only quantitative data analysis results were reported. Content analysis of field notes and informant interviews were not reported. This study received the lowest overall quality score of 11 compared to the other six studies (Table 5). Sub-score quality ratings ranged from 'very poor' to 'fair'. Some researchers would argue mixed methods design could enhance the validity of the results; however, this enhancement could not be determined with the type of report provided by Soh et al., (2011).

Ethics and Bias

Research ethics and bias is the last appraisal category developed by Hawker, et al.(2002). Research ethics refers to adherence, by the principal investigator, to professional, legal, and social obligations to the study participants. Also, research bias means any actions or missed action by the principal investigator that could distort the study.

Both institutional review board approval and the informed consent processes were minimum expectations for meeting ethical research principles. Six of the seven studies reported institutional review board approval prior to conducting the study. Three studies (Thiel, et al., 2008; Gale, et al., 2009, and Soh, et al., 2011) reported the process for obtaining informed consent from the participants. Additionally, reports by Thiel and

Ghosh (2008) and Gale, et al., (2009) included content of the informed consent, such as study purpose, risks, and benefits. Only one report, Waters and colleagues (2009), did not address either institutional review board approval or informed consent process. Considering the qualitative study by Stevens et al., and quantitative study by Waters and colleagues was conducted in 2007 and 2009 respectively, it was surprising to learn neither reports included information about the informed consent process.

Bias refers to any influence, which can distort or undermine research study validity and threaten its ability to reveal the truth (Polit & Beck, 2008). Bias can result from a number of factors in both qualitative and quantitative studies. For example, bias influenced the quality of the sampling category in six of the seven studies. The sampling category in six studies received a numerical score of '2', meaning 'poor' quality. A mixture of non-nursing healthcare professional roles, such as educator, pain specialist, student nurse, unknown job classification, respiratory therapist, and pharmacist, created sample heterogeneity. None of the reports indicated how sample size was adjusted to accommodate the heterogeneity. Rather, readiness for change responses from the various respondents, were combined for the study results. In contrast, the qualitative study by Pravikoff, et al., (2005) received a score of '3' or 'fair' because the report indicated respondents not meeting sample criteria were excluded. While bias can rarely be avoided totally, the researcher has the ability to control and responsibility to report strategies for controlling bias (Polit & Beck, 2008; Sandelowski et al., 2006; R. Whittemore & K. Knafl, 2005).

Discussion

The current state of research about nurses' readiness for change to EBP was reviewed in seven nursing studies. The findings indicate the readiness for change concept appeared as a phenomenon in the context of EBP implementation, despite the variation in research quality and methodology of the seven studies. The instruments and interview questions used in the seven studies were developed from several theoretical frameworks and focused on EBP implementation barriers rather than the entire readiness for change concept. Except for the environmental readiness framework utilized by Thiel and Ghosh (2008), the frameworks selected for the studies did not pertain to readiness for change. All seven nursing studies, however, indicated implementation of EBP involves individual and organizational change.

Integrative Review Aims

Readiness for change definition and theory. The readiness for change concept was implied rather than defined, tested or used to guide research design in all seven studies. The term readiness appeared in the title of five studies (Tanner, et al., 2004; Pravikoff, et al., 2005; Thiel, et al., 2008; Gale, et al., 2009; Soh, et al., 2011). The near-synonymous term preparedness was found in the research title by Waters and colleagues (2009); while, Stevens et al. (2007) did not use the term readiness or other similar terms in the research title.

Three studies utilized the term readiness in the study purpose (Thiel, et al., 2008; Gale, et al., 2009; Soh, et al., 2011); however, the research questions for those studies did not contain the term readiness. Only one study by Thiel and Gosh, (2008) utilized an environmental readiness framework, developed by the Registered Nurses' Association of

Ontario (RNAO), which suggested readiness to be a state rather than a process. The state of readiness was a 'dedicated' period of time to identify the ability to implement EBP, according to Thiel (2008). Additionally, the environmental readiness framework became the foundation for developing the survey used in the study.

Readiness for change factors or themes and instruments. The seven studies presented a variety of individual and organizational readiness for change factors and themes. The studies also differed in the content of the instruments used to measure readiness for change. All of the factors were categorized as barriers rather than facilitators of readiness for change. The most frequently cited individual barriers to adopting evidence-based practice pertained to the lack of value for research, lack of understanding the electronic database, lack of computer access, sources of evidence for decision-making, lack of ability to evaluate and apply evidence, attitudes, education level, and knowledge of EBP. Organizational barriers included the presence of other goals with greater priority, nurse staffing issues (recruitment, retention, lack of enough staff), organizational budget for information resources, access to information, equipment and supplies, and the risk of negative patient outcomes. Organizational themes, which differed from the barriers, were authority structure for clinical decision-making and communication.

Content of the survey instruments or semi-structured interview questions pertaining to readiness for change differed for each study. Six of the seven studies developed instruments from previous nursing and medical EBP research. One study (Thiel & Ghosh, 2008) utilized the EBP framework for study design. For example, data

was collected about EBP awareness, identification of resources, retrieving evidence, evaluating evidence, applying evidence, knowledge of EBP, and education about EBP.

Three studies utilized content from other EBP survey instruments to develop their own instrument. Thiel and Ghosh (2008) modified the Nursing Evidence-Based Practice Survey by Titler, Hill, Matthews, and Reed (1999). The survey incorporated the Nurses' Attitudes Toward EBP Scale (NATES) used in previous studies (Landstrom & Thiel, 2006; Opalek & Thiel, 2006; Picard & Thiel, 2006). In contrast, Waters et al. (2009) adapted a survey used to determine the attitudes of general practitioners of medicine towards evidence-based medicine. Soh and colleagues (2011) selected the revised professional practice environment (RPPE) survey developed by Erickson, Duffy, Ditomassi, and Jones (2009) to describe the professional practice environment. In contrast, Stevens and colleagues (2007) developed semi-structured interview questions based on organizational change and process improvement theories rather than EBP research or models.

Conclusion

In conclusion, the study findings from this review were consistent with results form EBP implementation process research pertinent to EBP barriers. However, the results from this review did not mitigate the gap about the readiness for change factors, instrumentation to measure those factors, or address the role of the readiness for change concept in EBP implementation. A theoretical framework or instrument to measure readiness for change was not reported in the studies, even though the ARCC model has added an organizational readiness for change dimension to the EBP implementation process. While the nursing discipline continues investigating readiness for change to

EBP, other disciplines like psychology and business have readiness for change frameworks to consider.

Review Limitations

Synthesis of the research findings was difficult because of multiple differences and quality in the research process across the studies. Different theoretical frameworks, and different instruments contributed to the synthesis difficulty. None of the study designs utilized the readiness for change conceptual framework. None of the studies reported sample size calculations or power analysis for the one comparative study. Most studies reported content validity of the instrument, yet none of the studies reported reliability. There were no interventional studies to investigate ways to minimize barriers or enhance readiness for change to EBP. There were no longitudinal studies to measure sustainability of using the EBP change, nor were observational studies to examine nurses' actions based on their EBP clinical decision-making. All studies collected nurse demographics, yet only the study by Waters and colleagues (2009) compared nurse managers' to staff nurses' barriers to EBP. While all seven studies were descriptive, none of the studies examined the readiness for change concept or factors in relation to the implementation of EBP; studied the relationship between readiness for change factors and EBP implementation barriers; or investigated psychometric properties of a readiness for change instrument.

A need exists to identify and overcome individual and organizational barriers before the implementation of change in nursing practices. Based on the findings of this review, a cultural and knowledge shift in the EBP implementation process is needed for nurses to be successful and sustain the change. More research is needed to understand

nurses' readiness for change concept in the EBP process model. The readiness for change conceptual framework, introduced by Holt and colleagues (2007)(Table 5) is one option for nursing. The framework demonstrates barriers can occur at both the individual and organizational levels. Likewise, barriers can be grouped according to psychological and structural dimensions of readiness for change at the individual or organizational levels. The framework further suggests structural factors, both individual and organizational, may influence the collective readiness for change. For example, at the individual level, the characteristics of organizational members themselves, such as training and numbers of staff, are structural factors that will impact collective readiness for change (McCluskey & Cusick, 2002). Each study in this review reported barriers and grouped them into individual or organizational barrier categories, yet did not examine the interactions between the type of barrier or its impact on individual or organizational readiness for change. Therefore, the readiness for change framework offers a new and more comprehensive approach to categorizing barriers and examining relationships among barriers and individual or organizational level responses to change.

Implications

Achieving evidence-based practice in nursing is integral to the drive for quality patient outcomes, healthcare system efficiency, and cost containment. Accordingly within evidence-based practice is the need to change behaviors of individuals and groups in order to embed new practices. Readiness for change has been recommended as a precursor to EBP change; however, overall findings from this integrative review highlight the paucity of nursing literature on nurses' readiness for change to EBP. Limited attention has been given to exploring systematically the readiness for change concept and

strategies to enhance nurses' use of EBP. Continued refinement of this concept is warranted as healthcare shifts attention toward EBP and patient outcomes.

Further research is needed to examine methods to measure the readiness for change concept, both individually and organizationally, as well as its influence on EBP implementation. More psychometric testing is needed with nurses to validate an instrument that reliably measures their readiness for change factors. Also important is an instrument that is reasonable in length and easy to administer. Interventional studies are needed to investigate how readiness for change will increase nurses' use of EBP. Creative and effective collaboration between education, practice, and regulatory sectors is imperative to shape future understandings and dialogue about the nurses' use of EBP in relation to patient outcomes. More research is needed to understand what strategies assist nurses in moving from being ready to change to actually adopting and using EBP.

Nurses' readiness to implement EBP is a complex concept; it will evolve and change to reflect trends in nursing practice and health care. The time is now to explore ways to enhance nurses' readiness for EBP.

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Table 1: Stage 1. Acceptance/Rejection Assessment

Author/s: **Reviewer**	**Date of Publication**
Relevance to Research Questions	**How was readiness for change defined?** **What factors were reported to influence readiness for change?** **What barriers were identified as influencing readiness for change EBP?** **To what extent did readiness for change influence use of EBP?**
Individual Readiness for Change	**What individual factors influence readiness for change?**
Organizational Readiness for Change	**What organizational factors influence readiness for change?**
Source of Data	**Nursing Professionals**
Study Type	**Empirical Study** **Theoretical paper** **Qualitative research paper** **Quantitative research paper**

Adapted from Hawker, et al., (2002)

Table 2. Data Extraction Summary Table

Key: CNS/NP (clinical nurse specialist, nurse practitioner), EBP (evidence-based practice); EBNP (evidence-based nursing practice); NR (not reported), RNAO (registered nurses association of Ontario, RR (response rate).

	Tanner 2004	**Pravikoff 2005**	**Stevens 2007**	**Thiel 2008**	**Gale 2009**	**Waters 2009**	**Soh 2010**
Purpose/ Aim	Identify information literacy, knowledge, competency of U.S. professional nurses; describe access to research in order to address barriers to EBNP	Examine U.S. RNs' perceptions of their access to evidence based resources and their skills in using those resources	Explore the perspectives of health care professionals on factors that influence change to policies, protocols, and practices in nenonatal intensive care unit	Assess RNs' readiness for EBP	Determine organizational readiness for integrating evidence into practice	Determine current knowledge and attitudes towards EBP	Assess organizational readiness and factors to drive clinical practice improvement

	Tanner 2004	Pravikoff 2005	Stevens 2007	Thiel 2008	Gale 2009	Waters 2009	Soh 2010
Research Question/ Hypothesis	1. Are nurses ready for evidence-based practice?	NR	H1. Successful implementation of the best practices identified in the literature would be reflective of the understanding of organizational factors that influence these changes within the NICU	1. What are the EBP informational needs of nurses? 2. What are nurses' perceptions of their abilities to engage in EBP? 3. What is the workplace culture? 4. What are nurses' attitudes toward EBP? 5. What are the strengths and challenges before initiating EBP?	1. What are the factors that affect the adoption or rejection of EBP changes and differences in nurse manager and staff nurse perceptions	H1. New and experienced (recent qualified & senior experienced) Australian nurses are adequately prepared to meet national competency standards for practice within an EBP framework	1. What are the barriers and facilitators for implementation of EBP?
Theory	Information Literacy	Readiness for Change implied	Organizational Change	Environmental Readiness framework (RNAO)	Rogers Diffusion of Innovation	NR	NR
Readiness for Change Level	Individual	Individual	Organization	Individual	Individual & Organization	Individual	Individual & Organization

	Tanner 2004	Pravikoff 2005	Stevens 2007	Thiel 2008	Gale 2009	Waters 2009	Soh 2010
Methods	Quantitative	Quantitative	Qualitative	Mixed methods	Mixed methods	Quantitative	Mixed methods
Study Design	Descriptive, exploratory,	Descriptive, exploratory	Descriptive, exploratory	Descriptive, exploratory, mixed methods	Descriptive, exploratory	Descriptive, exploratory	Descriptive, exploratory
Setting	United States specific work settings NR	United States hospital, nursing home, community, school health, nonhospital occupational health, nonhospital ambulatory care	Multi-site 13 neonatal Intensive Care Unit	Moderate-sized teaching hospital in Mid-West USA	Level 1 Trauma Center 8 acute and critical nursing units	Australia University & hospital	Malaysian Hospital Intensive care units
Subjects	RNs from anational (U.S.A.) nursing publication database	RNs from anational (U.S.A) publishing company	RNs, other health professionals (respiratory, pharmacy, dietician) and non-licensed providers (house keeper) and non Multiple roles-staff, management,	RNs working in moderate-sized teaching hospital	Staff nurses and nurse managers	2 Groups of RNs 1) state registered-university educated & hospital educated 2) final year nursing students	Intensive Care Unit RNs (staff nurse, manager, acute pain nurse specialist) Intensive Care Unit patients

			education				
IRB approval Ethics	IRB approved Informed consent not reported	IRB approved Informed consent not reported	IRB approved Informed consent not reported	IRB approved Cover letter distributed to each participant explained study purpose, risk & benefits Completed survey implied informed consent	IRB approved In-person description of study purpose, Risks & benefits; To nurse managers; Letter to staff nurse – purpose, risks & benefits	IRB NR Informed consent NR	IRB approved Informed implied with return of survey
Sample	Convenience sample of 3000 RNs	Geographically stratified (based on response percentage) random sample of 3,000 U.S. RNs	Purposive sampling 154 participants 76 individual interviews 14 focus groups with total of 78 participants. Participants in either individual or focus group interview-not both	Convenience sample of 205 RNs (made up 25% of the RNs employed in that facility) roles-staff nurse, manager/charge nurse, clinical researcher, CNS/NP, educator	Nonrandomized sample of 426 nurses (67 staff nurses or 7.5% of total staff & 20 nurse managers or 42%)	Stratified, random sample of 383 nurses 126 experienced nurses 257 final year nursing students	Convenience sample of 81 RNs
Instrument	5 item,					Adapted survey	39 items RPPE

Investigator designed Item responses not reported Content validity reported, persons conducting content validity not reported Reliability NR	93 item questionnaire with various responses: yes/no/don't know; 5-point Likert scale (never to always), rank order from a list of 10 or 6 Content validity with experts in nursing, nursing informatics, and information science Reliability NR	Semi-structured individual and focus group interviews, with open-ended questions	123 items total: 10 items demographics 64 items Environmental Readiness framework 35 items Informational Literacy for EBP 14 item EBP culture: organizational & unit Content validity and reliability NR Cross-sectional survey Investigator Designed 5 Sections 1) Environmental readiness framework by RNAO 2) Informational Needs-modified Informational Literacy for EBP (Pravikoff, 2005)	12 items survey with additional demographic questions Barriers to EBP and reasons to adopt changes used a 5 point Likert scale (strongly disagree to strongly agree) 3 open-ended questions about expectations for EBP Content validity by EBP council members Reliability NR	(Waters, 2006) # items not reported Attitudes measured on a 10-point visual analogue scale Perceptions measured on five-point Likert scale (1 = no ability to 5 = good level of ability) Face and content validity by 50 nursing students attending post-registration education courses Reliability N	(revised professional practice environment) using a 4-point Likert scale 10 items Sustainability Index. Maximum Total Score 100. Cut points: 45 or lower – some action needed; 55 or above suggest reason for optimism; near 100 indicates higher chances of successful sustainability 14 item – knowledge component using a 10-point Likert Scale Face validity with five

				3) EBP Culture: organization & unit – nursing EBP survey (Titler, 1999) 4) Perceived EBP knowledge-5 point Likert scale (strongly disagree – strongly agre5) Attitudes of EBP-Nurses' Attitudes Toward EBP Scale (NATES)- 5 point Likert scale (strongly disagree – strongly agree)			critical care nurses. Words translated into Bahasa Malaysia dialect Quantitative: medical record, nurse survey Qualitative: field notes, interviews of key informants
	Tanner 2004	**Pravikoff 2005**	**Stevens 2007**	**Thiel 2008**	**Gale 2009**	**Waters 2009**	**Soh 2010**
Data Method & Analysis	Mailed survey, self-report	Mailed survey, self-report; reminder cards followed by 2nd mailing	Four experienced interviewers received training Interviews were audio-taped	In-person delivery by management staff	In-person delivery of paper survey during staff meeting; & workplace mailbox delivery	Mailed survey, self-report; survey reminder on web-site of organization distributing the survey	In-person delivery of survey
Response Rate	Response rate 37.2%	Response Rate 37%	30 minutes – individual interview	Response Rate 59%	Response Rate 21.5%	Response Rate 21%	Response Rate 92.6%

Statistics	Descriptive statistics, percentile for demographics and information literacy	Percentile for yes/no/don't known & Likert scale responses Rank order summary table	75 minutes – focus group interview Mayring's approach to content analysis Using inductive reasoning, data categorized from emerged themes Team of reviewers analyzed transcriptions separately. Analysis continued until a 90% agreement among reviewers with triangulating data individually or as a team.	Descriptive statistics for demographics & informational literacy Cronbach's alpha to measure knowledge measure scale = 0.80; unit culture scale 0.75; organizational culture 0.74	Quantitative: Descriptive and inferential statistics including frequencies, means, cross-tabs, t tests, ANOVA, Chi Sq, Likert scale changed to yes/no (yes= strongly agree and agree; no = neutral, disagree, strongly disagree) Qualitative – Content analysis used to determine themes	Descriptive statistics for demographics Mean, SD for scale items ANOVA to determine differences between groups. Grp 1 (university prepared) recent qualified nurses Grp 2 hospital trained senior experienced Grp 3 final yr nursing student Demographics of the 3 groups similar	Descriptive statistics for demographics and patient's medical condition %, mean, SD Qualitative – Face validity using five nurse experts Interviews analyzed using thematic analysis Emergent themes discussed with research team until consensus reached
Results	Top 3 Organizational barriers in rank	Information 67% needed to seek information 67%	3 Categories with sub-categories	Informational Literacy 1) 72.5% ask colleagues 2) 83% read	Quatitative Top 3	Attitudes Pre-	Barriers with associated facilitators and actions reported;

order: 1) 40% Presence of other goals with greater priority 2) 23% difficulty recruiting and retaining nursing staff 3) 19% organizational budget for information resources Top 3 Personal barriers in rank order: 1) 15% lack of value for research in practice 2) 14% lack of understanding of the structure of	obtained information from colleague 58% not use research reports Resource 57% had medical library at facility 3% of the libraries only for physicians 36% had access to electronic databases 83% successful users of Internet 19% confident in searching CINAHL 36% confident in serarching MEDLINE 83% did not	1) Human resources- sub-categories of staffing issues & consistency in practice 2) Organizational structure- subcategories of approval process & multidisciplinary approach to care 3) Communications sub-categories of frequency, consistency, rationale for change, & Feedback process	journal articles monthly 3) 78% indicated on-line resources were adequate or better. Perceived EBP knowledge 1) Moderate knowledge level Significant Correlations 2) Knowledge & level of education (rho – 0.154, $p < 0.01$) & years in nursing (rho – 0.223, $p < 0.05$) EBP Culture – Unit & Culture 1) Higher unit culture score (mean = 20.5, SD = 4.47) than organizational culture (20.5, SD 4.47) Significant correlations Nursing education (rho = 0.225, p = <	Barriers 1) insufficient time 2) lack of staff 3) not right equipment or supplies available No significant differences between staff nurses and nurse managers Nurse with less than 3 yrs experience were more likely to rank insufficient time as a barrier ($F=3.394$, $p=0.038$) Significant difference between 3 age groups on lack of	registration nurses more likely to view their colleagues as welcoming EBP than hospital-trained nurses ($t = 3.22$; $p=0.002$) Pre-registration nurses more likely than hospital-trained ($t=4.55$; $p=0.0$) and university prepared ($t=4.26$; $p=0.0003$) that implementing EBP improves patient care, Pre-registration nurses less likely to believe	statistical analysis of the relationship between barriers and facilitators not reported 8 Barriers 1) No routine monitoring of EBP 2) Limited resources 3) EBP monitoring additional workload 4) Staff reluctance to participate in change 5) Inadequate feedback 6) Lack of leadership support 7) Lack of efficiency in using nursing process 8) Hierarchical organizational structure

electronic database 3) 8% lack of computer access	ask for library assistance Individual Barriers Top 3 1) Lack of value for research 2) Lack of understanding of organization electronic database 3) Difficulty accessing research materials Organizational Barriers Top 3 1) Presence of other goals with higher priority 2) Difficulty in recruiting and retaining nursing staff 3) Organization	0.05) & years in nursing (rho=0.217, p=< 0.05) Both unit and organizational cultures (rho=0.450, p < 0.01)related to EBP knowledge (rho=0.504, p=<0.01) &	interest; use of EBP. Age grp 26-41 having the greatest lack of interest (F=4.17; p= 0.019) Top 3 Reasons to Adopt EBP Changes 1) personal interest in topic 2) personally valuing the evidence 3) avoiding risk of negative consequences to the patient No significant difference between staff nurse and nurse manager 2 significant differences between staff	adopting EBP places extra demands on nurses compared to hospital-trained (t=2.67; p=0.012) & university prepared (t=2.53; p=0.017) Percentage of nursing practice based on EBP ranged from 30-80% with avg. 60%. Knowledge of EBP More than 60% unable to recall attending any courses related to EBP, including 64% of pre-registration	2 Facilitator Categories 1) Executive leadership and support 2) Research advisory committee Professional Practice Environment (RPPE) 3 components with highest mean scores: 1) Internal work motivation (M 3.24; SD 0.3) 2) Relationship with physician (M 3.04; SD 0.53) 3) Cultural sensitivity (M 3.04; SD 0.24) Sustainability Index Scores ranged from 13.4% to 100%;

al budget for purchase of information resources	nurse and nurse manager r/t application of EBP 1) staff nurses agreed EBP does not take into account the limitations of the practice setting compared to nurse manager (Pearson x2 = 5.117; p=0.024) 2) Greater % of nurse managers agreed that insufficient information could be accessed for questions about the practice change (Pearson x2 = 7.503; p =	group 45% of all respondents viewed EBP guidelines and protocols as the most appropriate method for moving from opinion-based to EBP practice Accessing evidence Received formal training in conducting literature search ranged from 43% hospital-trained, 61% university-prepared and 74% pre-registration nurses Ability to conduct	(M 75.21; SD 21.71) 55% (n=84%) of participants indicated optimism for change Knowledge Score Scores ranged from 74 to 140; (n=66; M 124.84; SD 14.66) Qualitative results field notes and key informant interviews not reported

0.006) 2 Significant Differences for demographic characteristics	literature search rated highest with pre-registration nurses
1) Full time nurses more likely to agree EBP helps them make decisions than part time nurses (Pearson x2 p=0.044) 2) Nurses 42-60 years had the highest % of disagreement on item that practice changes have been practical and fit with unit workflow (Pearson x^{2} = 7.690; p= 0.021)	Appraising Evidence 74% pre-registration, 42% hospital-trained, 54% university prepared received formal training to appraise evidence 77% pre-registration, 50% hospital-trained, 50% university prepared had performed a critical appraisal 56% pre-registration, 20% hospital-trained, 26%

	Qualitative 16 themes with 5 themes per question Role themes (provide resources, education, change agent, facilitator, role model, learn and implement change, support and advocate for practice change Adopting EBP themes (improve pt. care & outcomes, improve work environment, increase professional accountabilit y, improve efficiency, comply with regulatory	university-trained familiar with critical appraisal checklists Applying Evidence to Practice Moderate ability to translate evidence into practice by all 3 groups

					agencies How is institution doing with practice changes themes (institution poor, fair, improving; too many changes; using regulatory requirements as rationale interpreted negatively; difficulty sustaining changes, lack of resources seen as barrier)		
Intervention	None	None	None	None	None	None	Interventions pertaining to specific EBP topics for the ICU patient

Table 3: Appraisal Criteria Operational Definitions

1, Abstract and title: Did they provide a clear description of the study?

Good	structured abstract with full information and clear life
Fair	abstract with most of the information
Poor	inadequate abstract
Very poor	no abstract

2. Introduction and aims: Were there a good background and clear statement of the of the research?

Good	Full but concise background and to discuss/study containing up-to-date literature review and high-lightening gaps in know Clear statement of aim AND objectives including research questions
Fair	Some background and literature review Research questions outlined
Poor	Some background but no aim/objectives/questions, OR Aims/objectives but inadequate background
Very Poor	No mention of aims/objectives No background or literature review

3. Method and data: Is the method appropriate and clearly explained?

Good	Method is appropriate and described clearly Clear details of the data collection and recording
Fair	Method appropriate, description could be better Data described
Poor	Questionable whether method is appropriate Method described inadequately Little description of data
Very Poor	No mention of method, AND/OR Method inappropriate, AND/OR No details of data

4. Sampling: Was the sampling strategy appropriate to address the aims?

Good	Details of who was studied and how they were recruited Why this group was targeted The sample size was justified for the study Response rates shown and explained
Fair	Sample size justified Most information given, but some missing
Poor	Sampling mentioned but few descriptive details
Very Poor	No details of sample

* 5. Data Analysis: Quantitative analysis utilized appropriate statistics to answer research question/hypothesis? Qualitative analysis determining key ideas?

Good	Quantitative: statistical methods consistent with the research question/hypothesis and provided Sufficient statistical results to summarize sample, describe research variables, and document methodological features Qualitative: details of the search for themes, regularities, and patterns in data, researcher emersion in the data, and validation of findings
Fair	Quantitative & Qualitative: most information given, but some missing
Poor	Quantitative & Qualitative: themes mentioned, but few data analysis details provided
Very Poor	Quantitative & Qualitative: no details of data analysis provided

* 6. Ethics & Bias:	Was the research ethical procedures & researcher bias explained?
Good	Details of IRB approval, participant informed consent, and researcher bias reported
Fair	Most information given, but some missing
Poor	Few details of research ethics & bias provided
Very Poor	No details of research ethics & bias provided

Adapted from Hawker (2002)
* (Polit & Beck, 2008; Sandelowski et al., 2006; Whittemore et al., 2001)

Table 4. Appraisal of the Literature

Research Study	Abstract & Title	Introduction & Aims	Method & Data	Sampling	Data Analysis	Ethics & Bias	Total Score **24 possible**
Tanner 2004	**4**	**3**	**3**	**2**	4	4	**20**
Pravikoff 2005	**4**	**4**	**3**	**3**	4	4	**22**
Stevens 2007	4	4	3	2	4	4	**21**
Thiel 2008	**4**	**4**	3	2	4	4	**21**
Gale 2009	4	3	2	2	4	4	**19**
Waters 2009	4	3	3	2	2	1	**15**
Soh 2011	2	2	2	1	2	2	**11**

Table 5. **Readiness for Change Framework**

	Readiness to Change Factors	
	Psychological	**Structural**
Level of Analysis	Factors reflecting the extent to which the members of the organization are cognitively and emotionally inclined to accept, embrace, and implement a particular change	Factors reflecting the extent to which the circumstances under which the change is occurring enhance or inhibit the acceptance and implementation of change
Individual	**Appropriateness** belief a specific change is correct for the situation that is being addressed **Principal support** – belief that formal and informal leaders are committed to the success of the change and that it is not going to be another passing fad **Change efficacy** – belief that the individual can successfully change **Valence** – belief that the change is beneficial to the individual	**Knowledge, skills, and ability alignment** – extent to which the organizational members' knowledge, skills, and abilities align with the change
Organizational	**Collective commitment** – shared belief and resolve to pursue courses of action that will lead to successful change implementation **Collective efficacy** – shared belief in their conjoint capabilities to organize and execute the courses of action required to implement change successfully	**Discrepancy** – an understood difference between the current state or practice and a more desirable state (without a particular change to address the issue in mind) **Support climate** – sufficient tangible and an encouraging intangible environment to support implementation **Facilitation strategies** – a set clearly articulate goals and objectives that are supported by detailed implementation plan defining roles and system to measure progress

Adapted from Holt et al., (2007)

Chapter 4

The Influence of Emergency RNs' Characteristics and Readiness for Change on their Intention to Implement Pressure Ulcer Prevention Guidelines

Introduction

Problem

Emergency departments (ED) are a major source of hospital admissions with patients at risk for pressure ulcer (PU) development. In 2006, 30% of the 117 million ED visits were of elderly patients, resulting in 6.2 million admissions to US hospitals (Pham et al., 2011). Yet, there is a paucity of literature addressing emergency RNs' role in PU prevention, as well as their knowledge, skills and attitudes toward implementation of PU prevention guidelines. Despite well-established pressure ulcer (PU) prevention guidelines (NPUAP & EPUAP, 2009), the incidence of hospital acquired pressure ulcers (HAPU) remained relatively unchanged from 2000 (8.2%) to 2008 (6.5%), yet during this time the risk (moderate and high Braden score risk) of PU development increased from 6% to 9% (VanDenKerkhof et al., 2011). Hospital patients admitted from the ED may have contributed to that increased PU risk percentage. In fact, an ED study reported a 4.9% incidence of PUs among ED patients and 15.7% for ED patients over 75 years of age (Dugaret et al., 2012).

Further, pressure ulcer care consumes large sums of healthcare dollars annually. Costs of care associated with PUs range from $20,900 - $151,700 per PU (AHRQ, 2011a). Hospitals have become burdened with the cost of HAPUs since the United States (US) government, Center for Medicare/Medicaid Services, stopped payment for HAPU in

October, 2008 (Compas & Brown, 2009). Thus, implementation of PU prevention guidelines has become even more critical (M. Prior et al., 2008). A recent study demonstrated early prevention of PUs among elderly ED patients, with pressure-reduction mattresses reducing the incidence of PUs from 1.9% to 1.48% (Dugaret et al., 2012). More research is warranted to determine whether guideline-guided prevention approaches are widespread or poorly implemented in the busy ED. This study aimed to mitigate the research gaps by investigating emergency RNs' readiness and intention to implement PU prevention guidelines.

Significance

PU Risk Factors in Emergency Nursing. Each year the number of older adults visiting the ED increases, as does the number of patients admitted to the hospital from the ED (Niska et al., 2010). In older adults, immobility, malnourishment and moisture are major risk factors for PU development (S. Robinson, 2007; Tarpey et al., 2000). In as little as two hours, tissue ischemia can begin (Hagisawa & Ferguson-Pell, 2008). Environmental factors, such as ED equipment (structure and size) and supplies, which lack PU prevention properties may create obstacles for the ED nurse who attempts to implement PU prevention (Naccarato & Kelechi, 2011). For example, narrow ED stretchers make repositioning difficult or impossible and, along with thin mattress pads that lack redistribution properties, place the ED patient at risk for PU development. Another obstacle may be the lack of adherence to PU prevention guidelines. While ED nurses may discuss such guidelines with co-workers, studies to investigate implementation or adherence to PU prevention guidelines have not been reported in the

literature. This study will initiate a foundation of understanding pertinent to emergency RNs' readiness for change and intention to implement PU prevention guidelines.

Barriers to Clinical Practice Guideline Implementation. Implementation of clinical practice guidelines remains poor, despite the broad dissemination of these guidelines (Francke et al., 2008). Clinical guidelines, such as those for PU prevention, are systematically developed to assist practitioners in making treatment decisions (Grimshaw et al., 2006). Research findings indicated multiple factors influence guidelines implementation: awareness, attitudes, self-efficacy, organizational, subjective norms, and perceived behavioral control (Kortteisto et al., 2010), knowledge and skill (Francke et al., 2008; Wallen et al., 2010). This research integrated factors from the Theory of Planned Behavior (TPB) (Ajzen, 1991) and the Readiness for Change (RFC) construct to measure emergency RNs' intention to implement PU prevention guidelines.

Theoretical Model. The Theory of Planned Behavior (TPB) (Appendix A) was selected to explain human behavior in terms of three constructs amenable to change: attitude, subjective norms, and perceived behavioral control. An attitude toward the behavior is produced from favorable or unfavorable beliefs about the consequences of the behavior (Ajzen, 2006). Beliefs about the expectations of others toward the behavior yields a subjective norm (Ajzen, 2006). Perceived behavioral control refers to the belief about factors that may facilitate or impede performance of the behavior (Ajzen, 2006). According to TPB, the strength of a behavioral intention is determined by more favorable attitudes and subjective norms as well as greater perceived control (Ajzen, 2006). Thus, TPB posits a relationship between 'stated intention' and 'behavior' (Eccles et al., 2006). In a systematic review by Eccles and colleagues (2006), self-reported intention was found

to be predictive of clinicians' behavior with a medium to large effect size. TPB will be used as the theoretical base for measuring emergency RNs' intention to implement PU prevention guidelines. The TPB provides the "intention" model from which items will be extracted to measure attitude, subjective norm, and perceived behavioral control.

Readiness for Change Construct. Readiness for change is defined as an attitude influenced by the "content (what is being changed), the process (how change is implemented), the context (circumstances under which the change is occurring), and the individuals (characteristics of those being asked to change) involved" (D. Holt, A. Armenakis, H. S. Feild, & S. G. Harris, 2007, p. 235). According to the readiness for change framework (Figure 2), readiness reflects the extent to which an individual is cognitively and emotionally inclined to accept, embrace, and adopt change (Holt, et al., 2007). Readiness has been shown to be an important factor in individual support for change (Armenakis, Harris, & Feild, 1999; D. T. Holt, A. A. Armenakis, H. S. Feild, & S. G. Harris, 2007a). Assessment of readiness prior to the introduction of the change has been encouraged (Cunningham et al., 2002) and has been examined from the change process, content, context, or individual attributes (D. T. Holt, A. A. Armenakis, et al., 2007a). This study measured the relationship between the constructs of readiness for change and TPB factors.

Importance to Practice. This study shifted current clinical practice guideline implementation focus to the individual involved in the change rather than the change content, process, or context. A conceptual review by Sheeran (2002) indicated control is a key component in the intention-behavior relations. A person "must have control over performing a behavior if the intention to perform that behavior is to be realized."

according to Sheeran (2002). Thus, readiness for change and TPB variables were combined to measure control in multiple ways. For example, perceived behavioral control in TPB aims to measure control relating to an individual's ability and opportunity; whereas management support and personal valence in the readiness for change construct includes control relating to cooperation, resources, and ability. By understanding specific variables, such as intention (attitude, subjective norm, and perceived behavioral control) and readiness for change (appropriateness, management support, change efficacy, and personal valence), a better understanding of variables that could predict emergency RNs' intention to implement PU prevention guidelines will be achieved. This empirical knowledge could contribute to quality improvement in the ED setting, notably the system of PU prevention care, and ED staff roles and responsibilities that must be considered when targeting practice improvements.

Purpose, Research Questions & Aims

The purpose of this study was to identify the ED RN characteristics and readiness for change variables that influence their intention to implement PU prevention guidelines. Three research questions and aims were addressed.

RQ1. What are underlying factors in the readiness for change construct and Theory of Planned Behavior (separately and combined) when used in a sample of emergency RNs' relative to implementation of PU prevention guidelines?

Aim 1. To investigate, in a sample of emergency RNs, the latent and important variables that comprise: readiness for change (appropriateness, management support, change efficacy, and personal valence) and that are accounted for by the Theory of Planned Behavior (attitude, subjective norm, perceived behavioral control, and intention);

and readiness for change combined with the Theory of Planned Behavior, using exploratory factor analysis.

RQ2. What is the relationship between emergency RNs' readiness for change (appropriateness, management support, change efficacy, personal valence) and intention (attitude, subjective norm, perceived behavioral control) to implement PU prevention guidelines?

Aim 2. To measure emergency RNs' intention to implement PU prevention guidelines, using a web-based survey that includes the readiness for change questionnaire and items derived from the Theory of Planned Behavior.

RQ3. What is the relationship between personal (education level, years of emergency nursing experience), employment (nursing role, years employed as an emergency nurse in current facility) and system (facility type) characteristics of emergency RNs' with readiness for change and intention to implement PU prevention guidelines?

Aim 3. To identify emergency RNs' personal, employment, and system characteristics associated with readiness for change and intention to implement PU prevention guidelines, using a web-based survey.

Methods

Design

A cross-sectional descriptive study was conducted throughout the US, including Alaska and Hawaii, using a web-based survey. Emergency nurses working in the US were contacted directly or indirectly by email or in person by the principal investigator (PI). In-person contact was made during the Emergency Nurse Association (ENA)

annual conference in Fort Lauderdale, FL. The principal investigator (PI) personally distributed 500 survey announcements during the ENA conference in March 2013.

Email survey announcement was the primary contact method following the ENA conference. Emergency nurses were directly contacted using email addresses obtained from the ENA chapter website. The ENA chapters, totaling 464 in January 2013, were listed by state and contained email addresses for state and chapter officers as well as committee chair. Emails were distributed to members in all 50 US States. The indirect contact method consisted of the PI sending an email to nursing colleagues and requesting them to distribute the survey announcement to emergency nurses. The survey respondent was asked to submit a mailing zip code that was used by the PI to estimate the response by state. The members received a follow-up email request in states without responses within seven days. A total of 1,144 emails were sent during March 2013, with approximately 40 emails distributed daily. The 430 emergency RNs who completed the survey worked in 46 states, including Alaska and Hawaii. The states not represented were South Dakota, West Virginia, Wyoming, and Utah.

Regardless of the contact method, each emergency nurse could confidentially access the web-based survey from a URL link provided in the email or paper announcement distributed by the PI.

Sample & Setting

Inclusion criteria were: adults, age 20 and above, English-speaking, ability to read and write English, and currently employed as full-time, part-time, or per diem emergency RN. Membership in ENA was not required. Exclusion criteria were emergency RNs

without access to a computer with Internet capabilities. All 428 completed surveys were retained for data analysis.

Human Subjects Protection

The study received Institutional Review Board approval from the Medical University of South Carolina prior to participant recruitment and distribution of the survey flyer and email announcements. An information letter (Appendix D), in the form of a web-based survey cover page, was used to inform participants about the study purpose, benefits and risks, the survey design, and an estimation of 15 minutes to complete.

Participant consent was obtained prior to completing the survey by requiring the participant to acknowledge reading and understanding the study by clicking on a box labeled "I have read and understand." Participants were informed of potential remuneration in the form of entering a drawing to win an electronic tablet computer. Entry into the drawing was voluntary and was accomplished by providing a form for participation in the drawing separate from the survey responses to maintain participant confidentiality. A total of 355 participants entered the drawing. The winner of the drawing was selected randomly using an electronic random number estimator from the numbers assigned to each drawing entry after data collection was completed.

Instrument Development

The survey was designed and developed from a review of the available relevant literature concerning development of a Theory of Planned Behavior questionnaire (Ajzen, 2006; Francis et al., 2004) and readiness for organizational change: the systematic

development of a scale by Holt and colleagues (2007). Details about determinations of content validity, cognitive assessment, and pilot testing follow.

The survey of potential items developed for the study contained 54 items grouped into five parts: Part A) PU prevention definition (2 items), Part B) emergency patients at risk for PU development scenarios (5 items), Part C) Theory of Planned Behavior (19 items: attitude 7 items, subjective norm 6 items, perceived behavioral control 6 items, intention 3 items), Part D) change communication scenario (3 items), Part E) readiness for change construct (25 items: appropriateness 9 items, management support 6 items, change efficacy 7 items, personal valence 3 items). Scale items were developed from the TPB (Ajzen, 2006; Francis et al., 2004) and readiness for change (D. T. Holt, A. A. Armenakis, et al., 2007a) literature. Also, definitions for TPB and readiness for change variables were developed from the literature and placed at the beginning of each variable section of the survey. Each item consisted of a 7-point bipolar, adjective scale (e.g., harmful-beneficial). Potential items were assessed by a group of experts.

Content validity. Five experts, three nurse scientists knowledgeable in the use of the Theory of Planned Behavior and two RNs (one clinical RN; one certified wound ostomy continence nurse) knowledgeable of pressure ulcer prevention guidelines, agreed to participate in content validity testing of the survey instrument. A web-based content validity questionnaire was developed rather than using an interview, to provide the experts living in separate states easy access to the questionnaire. Experts were informed of the questionnaire via an email sent by the PI. Also, more efficient data analysis was possible with the web-based questionnaire as opposed to an interview method of data collection.

Questionnaire items were grouped according to the theoretical construct, such as attitude, intention for TPB or appropriateness and management support for readiness for change, and the type of scenario. Experts were asked to rate the representativeness and clarity of each item, as well as goodness of fit between response options and the key construct using a 4-point scale. The representativeness scale ranged from 1-not representative to 4-representative. The clarity scale ranged from 1-not well written, distinct, and at an appropriate reading level for the emergency RN to 4-well written, distinct, and at an appropriate reading level. The response scale ranged from 1- does not measure the construct to 4-does measure the construct. A higher score reflected a well-constructed item or scenario.

Content validity assessment was completed in January, 2013 by all five experts. A content validity index (CVI) using the alpha coefficient was calculated for each item. An alpha coefficient of 0.80 or greater was considered acceptable agreement to retain the item. A total of 37 items were retained and 17 items removed. The 25 readiness for change items were retained. One PU prevention definition was retained. Definitions for each TPB and readiness for change variable were retained unchanged. The revised survey consisted of 37 items grouped into four parts: Part A) emergency patients at risk for PU development (3 items), Part A) Theory of Planned Behavior (12 items, 3 items for each variable: attitude, subjective norm, perceived behavioral control, intention), Part C) change communication scenarios (2 items), Part D) readiness for change construct (25 items representing 4 variables: appropriateness, management support, change efficacy, personal valence). Appendix C contains a sample survey. Cognitive assessment was completed with the revised survey.

Cognitive Assessment. Cognitive assessment was conducted by verbal probing to evaluate emergency RN comprehension, interpretation, recall, and judgment. Appendix A contains the cognitive assessment plan. Three emergency RNs (1 charge nurse, 1 day staff nurse, 1 night staff nurse) working full time in a community hospital in Florida agreed to participate in the cognitive assessment. Two types of scenarios were written for the survey and placed before the Theory of Planned Behavior and Readiness for Change survey items. Three scenarios pertaining to an adult emergency patient at risk for pressure ulcer development preceded the Theory of Planned Behavior questions. In contrast, before the readiness for change questions, two scenarios described a staff meeting or change of shift huddle to introduce implementation of pressure ulcer prevention in emergency nursing. Overall, the three emergency RNs indicated the survey questions were clearly written, wording was not problematic, and content structure of the scenarios conveyed a typical emergency patient as well as typical methods used to introduce nursing practice changes. All survey items were retained unchanged.

Pilot Testing. The instrument was prepared for pilot testing following the expert feedback and cognitive assessment results. One question about time to complete the survey was added for pilot testing. Three emergency nurses known by the researcher and not familiar with the survey, were contacted and informed about the pilot study. An email announcement of the survey, which contained the URL link to the web-based survey approved by the IRB, was sent to each emergency nurse. The response rate was 100% (n = 3). All questions were answered and the average completion time was 12 minutes. The link to the drawing question was also tested and found to function appropriately.

Measures

Theory of Planned Behavior. Three items per variable were selected based on content validity, cognitive assessment, pilot testing, and Generalized Intention Method recommended by Francis and colleagues (2004). The Generalized Intention Method was designed to directly measure the variables when actual performance of the behavior is not possible to observe. Attitude toward a behavior is the degree to which performance of the behavior is positively or negatively valued (Ajzen, 2006). "Subjective norm is the perceived social pressure from important people to engage or not engage in a behavior" (Ajzen, 2006). Perceived behavioral control refers to people's confidence in their ability to perform a behavior (Ajzen, 2006). Intention refers to an individual's readiness to perform a behavior (Ajzen, 2006). Operationally, an overall score for each variable (attitude, subjective norm, perceived behavioral control, intention) was calculated using the mean score of the three items per variable. Additionally, an overall intention score was calculated using the mean score from the three variables (attitude, subjective norm, perceived behavioral control).

Readiness for Change. Part B contained 25 items. These items were taken from the readiness for change questionnaire (RFCQ) developed by Holt and colleagues (2007) to measure readiness for change variables and included: appropriateness, management support, change efficacy, and personal valence. The items used a 7-point bipolar, adjective scale with responses ranging from strongly disagree to strongly agree. Permission to use the RFCQ was received from Dr. Danny Holt in August 2012. Holt's 25-item RFCQ was developed using a systematic item-development framework and initially was tested with 900 organization members participating in public and private

companies (D. T. Holt, A. A. Armenakis, et al., 2007a). A four-factor model, representing the four readiness for change factors, emerged from the exploratory analysis. A replication study of 228 employees using confirmatory factor analysis reported acceptable coefficient alphas (0.80 for appropriateness; 0.79 for management support; 0.79 for change efficacy; 0.65 for personal valence). For the purpose of this study, readiness for change construct was used as an independent and dependent variable; with its' four factors as independent variables.

Appropriateness refers to the individual's beliefs about the need for change and that the organization will or will not benefit from implementation of the change. Operationally, appropriateness was measured with nine items on the RFCQ. The mean score of the nine items provides a measure of the overall appropriateness toward implementation of PU prevention guidelines. Management support refers to the extent to which the individual believes the organization's leadership and management are committed to the change (D. T. Holt, A. A. Armenakis, et al., 2007a). Six items measured management support, with the mean score of those items determining the overall management support. Change efficacy refers to the extent the individual would perform well and be successful in the implementation of the change (D. T. Holt, A. A. Armenakis, et al., 2007a). Operationally, change efficacy was measured with seven items. Personal valence is the extent to which an individual will or will not benefit from implementation of the change (D. T. Holt, A. A. Armenakis, et al., 2007a). Operationally, personal valence was measured with three items. The overall readiness score was calculated from the mean scores of each variable (appropriateness, management support, change efficacy, personal valence).

Data Analysis Procedures

Descriptive statistics, such as frequencies and estimates of central tendency (mean) and dispersion (SD) were calculated to describe the personal, employment, and facility characteristics of emergency RN respondents. Quantitative methods included exploratory factor analysis, independent t-test, ANCOVA, MANOVA, and regression analysis, and were conducted using SPSS version 20.

Exploratory factor analysis, to answer research question one, assessed whether items of both the readiness for change and the TPB instruments cluster within the same factors explaining underlying latent variables as indicated in the literature. Principal component analysis utilizing varimax rotation and evaluated with the following criteria: eigenvalue, variance, scree plot, and residuals. Further, a set of regression models was used to examine whether readiness for change and TPB variables predict emergency RN's intention to implement PU prevention guidelines. In these models, intention was used as the dependent variable and attitude, subjective norm, perceived behavioral control, appropriateness, management support, change efficacy, and personal valence were used as independent variables individually and combined.

The influence of emergency RNs' characteristics on readiness for change and TPB variables was the focus of research question two. Independent t-tests were used to examine the differences in readiness for change and TPB means scores between categories of emergency RNs' characteristics. Two categories were established for each of the personal, employment, and system variables, which represented the emergency RN characteristics. The variables were dichotomized as follows: personal [age in years: age < 18-40 years verses age 41-75 years; education level: AD/Diploma verses BSN; clinical

certification: certified verses not certified; years of nursing experience: ≤ 15 years verses >15 years; years of emergency nursing experience: ≤ 10 years and >10 years]; employment [years employed as an emergency nurse in current facility was ≤ 5 years and >5 years; nursing role by title: RN/CNI-V verses Manager/Charge Nurse/CNS/Educator]; employment status: [full time verses not full time]; system [hospital type: Community/Rural verses Urban teaching and non-teaching; emergency department annual visits (range): ≤ 60,000 and > 60,000, emergency care by patient type: adult verses adult/pediatric]. The independent t-test used a calculated means score for each TPB and RFC variable. The mean score ranged from 1 to 7 based on the 7-point bi-polar scale, with 1- most negative and 7- most positive. Five score categories were established as: score 1-2 very negative; score 3 slightly negative; score 4 neutral; score 5 slightly positive; score 6-7 very positive.

Group differences were further analyzed using analysis of covariance (ANCOVA), with readiness for change and TPB variables individually as the dependent variable and the emergency RNs' characteristic groups as independent variables and as covariates. In addition, multivariate analysis of variance (MANOVA) was used to examine the relationships between a set of dependent variables and independent variables such as emergency RNs' characteristics, readiness for change, and TPB variables. Box's tests were used to determine whether the assumption of homogeneity of variance was fulfilled and Wilks' Lambda test statistics were used to interpret the MANOVA results.

The third research question was answered using stepwise multiple regression to investigate the influence of emergency RNs' characteristics and readiness for change variables on intention to implement PU prevention guidelines. A summary of the results

is reported in Table 8. Variables of emergency RN characteristics, TPB and readiness for change with statistically significant results obtained previously were entered into four models.

Results

Demographics

The sample of 428 emergency RNs (Table 1) was predominantly female (87%, n=372), 41-50 years of age (29%, n=122), held a baccalaureate degree in nursing (43%, n=183) and certification in emergency nursing (CEN) (41%, n=176). Most of the respondents were staff nurses (59%, n=255), employed full time (81%, n=349), caring for adult and pediatric patients (55%, n=235), working in a community hospital (46%, n=196) with greater than 61,000 annual emergency visits (93%, n=105).

The respondents worked in nursing on average 17.5 years (SD=11.5), with almost 13 years (12.8 years, n=428) devoted to emergency nursing and an average of 8 years (SD=7.7) in their current facility. The majority of emergency nurses reported the presence of unit-based nursing practice council (74%, n=317) despite an almost even distribution of Magnet (37%, n=158) and non-Magnet (42%, n=179) designated facilities. The respondents reported following PU prevention guidelines (yes=30%, n=130; sometimes=27%, n=166), not following (30%, n=130) or that guidelines were discussed, yet not implemented (9%, n=38). Table 1 contains a summary of the participant demographic results.

Research Question 1 – Theory and Construct Variables

Exploratory factor analysis (EFA) was conducted to determine what underlying structures exist for the 25 variables of the readiness for change construct and the 12 variables of the Theory of Planned Behavior. Results from EFA will address research question one.

Readiness for Change. A summary of exploratory factor analysis conducted on the readiness for change construct is presented in two tables: Table 2 reports the total variance explained; Table 3 reports the rotated component matrix. Seven cases contained missing date and were removed prior to analysis, resulting in 423 cases entered into analysis. The four analysis criteria were: determinant for the correlation matrix was 1.37, KMO = 0.920, Bartlett's Test of Sphericity was statistically significant ($p<0.001$), and scree plot. Principal component analysis produced a four-component solution meeting the four criteria.

Exploratory factor analysis using varimax rotation extracted four underlying components in the RFCQ that relate to an individual's readiness for change (Table 2). The first component accounted for 18.95% of the total variance in the original variables. The second component accounted for 16.64% of total variance. The third component accounted for 13.21%. The fourth component accounted for 11.06% of total variance. The first component consisted of 9 out of 25 variables from the RFCQ, with absolute loadings ranging from 0.44 to 0.77 (Table 3). Component two consisted of five variables with absolute ranges from 0.50 to 0.83. Six variables loaded on component 3 with loadings ranging from 0.50 to 0.72, while four variables loaded on component 4 with loadings ranging from 0.62 to 0.74.

Theory of Planned Behavior. A summary of exploratory factor analysis conducted on the Theory of Planned Behavior is located in two tables: Table 4 reports the total variance explained; Table 5 reports the rotated component matrix. One case contained missing data and was removed prior to analysis, resulting in 429 cases entered into analysis. Determinant for the correlation matrix was 0.007, KMO 0.902, and significant results of Bartlett's Test of Sphericity ($p < 0.001$), and scree plot. Principal component analysis produced a three-component solution; however, only component one and two met the four analysis criteria. The scree plot showed inflexion that would justify retaining two components.

Exploratory factor analysis using varimax rotation extracted three underlying components in the TPB questionnaire pertaining to an individual's intention to implement a change (Table 4). The first component accounted for 29.40% of the total variance in the original variables. The second component accounted for 19.54% of the total variance and the third component contributed 14.34 % of the total variance. The first component consisted of 7 out of 12 variables from the TPB questionnaire, with absolute loadings ranging from 0.40 to 0.86 (Table 5). The second component consisted of three variables with absolute loadings ranging from 0.68 to 0.71. The third component consisted of two variables with absolute loadings ranging from 0.68 to 0.79. Two components were retained because of the convergence of the scree plot and each component containing three or more variables.

Combined Readiness for Change and Theory of Planned Behavior. A third exploratory factor analysis was conducted using both Theory of Planned Behavior and readiness for change items. Table 6 reports the total variance explained; Table 7 reports

the rotated component matrix. Eight cases with missing data were removed prior to analysis, resulting in 422 cases entered into analysis. The analysis criteria were: determinant for the correlation matrix was 0.007, KMO 0.902, significant results of Bartlett's Test of Sphericity ($p<0.001$) and scree plot. Principal component analysis produced a seven-component solution meeting the four criteria.

Exploratory factor analysis using varimax rotation extracted seven components revealed seven underlying components pertaining to an individual's readiness for change and their intention to implement a change (Table 6). The first component accounted for 15.39% of the total variance in the original variables. The second component accounted for 12.85% of the total variance. The third component accounted for 9.81% of the total variance. The fourth component accounted for 8.47% of the total variance. The fifth component accounted for 6.66% of the total variance followed by components six and seven contributing 5.41% and 4.039% of the total variance respectively.

The first component consisted of 10 of the 37 variables with absolute values ranging from 0.432 to 0.725 (Table 7). The second component consisted of six variables with absolute loadings ranging from 0.505 to 0.831. The third component consisted of six variables with absolute loadings ranging from 0.514 to 0.637. The fourth component consisted of four variables with absolute loadings ranging from 0.625 to 0.711. The fifth component consisted of three variables with absolute loadings ranging from 0.630 to 0.725. The sixth component consisted of four variables with absolute loadings ranging from 0.360 to 0.599. The seventh component consisted of three variables with absolute loadings ranging from 0.519 to 0.687.

Research Question 2 & 3 Relationship Among TPB and RFC Variables and RN Characteristics

Comparison of TPB and RFC mean scores by RN Characteristics. The TPB mean score for subjective norm was statistically significantly higher, indicating a more positive response for: community/rural compared to urban teaching/non-teaching hospital ($p = 0.055$) and Diploma/AD nursing education compared to BSN ($p = 0.004$). The TPB mean score for intention was statistically significantly higher, indicating a more positive response for: BSN compared to Diploma/AD nursing education ($p = 0.004$); >15 years compared to ≤ 15 years of nursing experience ($p = 0.038$). Nurses who were using PU guidelines reported statistically significantly higher appropriateness compared to nurses not using PU guidelines ($p = 0.006$). The RFC variable of management support was statistically significantly higher, indicating a more positive response for: Diploma/AD compared to BSN nursing education ($p = 0.031$); ≥ 6 years compared to ≤ 5 years of emergency nursing in their current facility ($p = 0.035$); manager/charge nurse/CNS/Educator compared to RN/CNI-V nursing role by title ($p = 0.010$). Nurses who had > 5 years of emergency nursing in their current facility reported statistically significantly higher personal valence compared to nurses with ≤ 5 years of emergency nursing ($p = 0.028$). Finally, no statistically significant differences in TPB or RFC mean scores were reported for Magnet designation categories, unit-based practice council groups, age groups, emergency RN years categories, or categories of number of annual ED patient visits.

ANCOVA. Differences in TPB and RFC scores between groups were further evaluated using ANCOVA, with emergency RNs' characteristic groups as independent

and covariate variables (CoV). Statistically significant differences were found between several emergency RNs' characteristics in readiness for change and TPB mean scores. Inclusion of the CoVs [unit-based practice council, nursing education, Magnet designation, hospital type, age group] resulted in a positive, statistically significant ($p < 0.05$) ANCOVA models with the use of PU guidelines as the independent variable and using the following dependent variables: attitude, subjective norm, intention, management support, change efficacy. For example use of PU guidelines was associated with a more positive attitude about the change. Further, nursing education and unit-based practice council were associated with a more positive subjective norm influence on implementation of PU prevention guidelines. Also, Magnet designation was associated with a more positive intention to implement PU prevention guidelines; while age group was associated with a more positive belief in change efficacy or benefit. However, the overall CoV effect was small, ranging from 0.015 to 0.169.

MANOVA. Only one independent variable (IV), using PU guidelines, showed a statistically significant effect on the dependent variables, attitude, subjective norm, intention, appropriateness, management support, change efficacy, and personal valence. Using PU guidelines as IV resulted in a statistically significant yet small effect on attitude, subjective norm, intention, appropriateness, management support, change efficacy, and personal valence.

Regression. With intention as the dependent variable, attitude was entered in the first model and accounted for 49.21% of the variance ($p < 0.001$) in intention. Appropriateness was added as an additional IV in the second model, followed by subjective norm in the third model and perceived behavioral control in the fourth model

Table 8). Each predicting variable increased the variance, resulting in a total variance of 62% in intention explained by the IVs in the model. Thus, the model suggests having a positive attitude about the change, positive peer support (subjective norm) for the change, positive individual beliefs (appropriateness) about the need for the change and one's confidence (perceived behavioral control) in the ability to perform a behavior are positively associated with emergency RNs' intention to implement the change. For example, the stronger the belief in the need for changes, the higher the RNs' intention.

Discussion

The purpose of this study was to identify levels of readiness for change in emergency RNs, their characteristics and variables that influence their intention to implement PU prevention guidelines. The goal was to develop a foundation of understanding of emergency RNs' readiness for and intention to change practice pertinent to the implementation of PU prevention guidelines. The underlying assumption was that readiness is an important factor in individual support for change; yet few studies have been published about nurses' readiness for change in practice. This study focused on the *individual*: the emergency RN rather than the change content, process, or context related to implementation of PU prevention guidelines. Previous research has investigated nurses' intention to implement clinical practice guidelines. However, a paucity of literature exists about nurses' readiness to implement a practice change and their intention to change. Therefore, the Theory of Planned Behavior and readiness for change literature were integrated to guide the preliminary work needed to contribute to this foundation of understanding.

The results show Emergency RNs' intention to implement PU prevention guidelines was influenced by their attitude about the change, appropriateness of the change, subjective norm or peer response to the change, and perceived behavioral control or personal decision to implement the change. Personal, employment, and facility characteristics of the emergency RNs lacked statistically significant effects on their intention or readiness to implement PU prevention guidelines.

Research Question 1 – Underlying Structure of TPB and Readiness for Change

Theory of Planned Behavior. Research question one focused on the identification of the latent and important variables accounted for by the TPB model. Intention was not predicted by attitudes, subjective norms, and perceived behavioral control. Instead, intentions were grouped with attitudes and one perceived behavioral control belief pertaining to the ED RNs' confidence in implementing PU prevention guidelines. In contrast all three subjective norm variables comprised component two. The TPB results from this study were unexpected and differed from Ajzen's theory which indicated attitude, subjective norm, perceived behavioral control and intention should be independent variables.

Similar to this study, Cameron (2010) reported a strong relationship between attitude and intention when investigating an individual's intention to help others use social networking systems. Other studies (Fen, 2008; Feng & Wu, 2005) supporting Ajzen's model investigated intentions for performing activities known to be beneficial, such as reporting child abuse and exercise. In contrast, Blake and White (2010) cautioned using TPB when there is a lack of prior experience with the intended behavior (Blake & White, 2010). Perhaps this study would have supported Ajzen's theory if

implementation of PU prevention guidelines in the ED was shown to be efficacious and a sufficient number of ED RNs using the guidelines were included in the model.

Readiness for Change. Research question one also investigated the underlying structure of the readiness for change construct. Results from this study indicated individual readiness for change was predicted by four components, with only component two, management support, as an independent variable. Results of components one, three and four were more complex then expected because the component contents were a mixture of change efficacy (individual ability to perform the change), appropriateness (system need for change) and personal valence (individual benefits of the change) variables. Such a combination suggested participants had difficulty distinguishing between individual and organizational change benefits. Results from this study differed from findings reported by Holt and colleagues (2007a) during RFCQ instrument development in a government service industry and Kavaliauskaite (2010), who used the RFCQ to measure employee readiness for contracting in Lithuanian municipalities. In both of these studies, the four readiness for change components--appropriateness, management support, change efficacy, and personal valence--were reported as independent variables compared to the current study. It is possible refinement in the wording of the items in this study could assist in distinguishing between individual and organizational benefits.

Combined TPB and Readiness for Change. Exploratory factor analysis also investigated underlying structures and latent variables with the TPB and readiness for change construct combined. Seven components were extracted. Independent variables appeared in component two (management support), component three (appropriateness),

component four (personal valence), component six (change efficacy), and component seven (perceived behavioral control). Component one was a combination of TPB (attitude, intention, subjective norm) and RFC (appropriateness). Attitude appeared as the dominant theme in component one. Component five consisted of RFC appropriateness (organization benefit) and change efficacy (individual benefit) variables. Overall, the combined exploratory factor analysis suggests RFC measures variables different from TPB.

Also of interest, from the third factor analysis results, is the combination of positive and negative values in the same component, suggesting interpretation can vary between individuals and within the individual. For example, some individuals considered the change to be legitimate and worthwhile, while others thought the change did not make sense and time should not be spent on the change. In contrast, the same individual may indicate the change will improve overall efficiency, yet that individual may lack the skills needed to make the change.

Research Question 2 & 3 - Relationship Among Variables and RN Characteristics

Research questions two and three investigated relationships between emergency RNs' characteristics, TPB and RFC variables on the emergency RNs' intention to implement PU prevention guidelines. Emergency RNs' intention to implement PU prevention guidelines were influenced by four factors: attitude, appropriateness, subjective norm, and perceived behavioral control; whereas emergency RNs' characteristics lacked statistically significant effects on their intention.

The importance of appropriateness and personal valence on adopting and sustaining the change has been reported in the readiness for change research. Likewise,

TPB research findings suggests subjective norm and PBC show a strong effect on intention (R. Robinson & Doverspike, 2006; Truong, 2009). However, missing from the literature are reports about the combination of RFC and TPB on intention. For purposes of this study, the RFCQ was selected because the variables appeared to differ conceptually and operationally from those included in TPB. Further support for combining readiness for change variables with TPB variables (Brief & Weiss, 2002; Kavaliauskaite, 2010; Rafferty, Jimmieson, & Armenakis, 2013) suggests two different methodologies aid in the assessment of the cognitive and affective components of change readiness.

The lack of significant effect by the emergency RNs' characteristics on intention was a surprise. Emergency RNs' characteristic categories were based on major barriers to implementation of clinical practice guidelines reported in the literature (Wallen et al., 2010). For example, nurse knowledge and experience are considered barriers; thus, highest level of education, years of experience as an RN and years as an emergency RN were collected in this study. Most barriers in previous studies have been collected using subjective rating scales or qualitative methods. Subjective rating scales measure a latent characteristic like knowledge or ability. The term latent implies a underlying, unobservable characteristic influencing an individual's response (Di Loro, 2005). In contrast to subjective scales, this study collected emergency RNs' characteristics using response choices that were mutually exclusive (respondent must make a choice), a precise value, or a range of precise values. Thus, the measurement precision indicated statistically significant variation between groups; however, the variation did not have a significant effect on intention. Further research seems warranted to test the validity and

reliability of instrument questions aimed to objectively measure barriers to implementation of a change.

Limitations

Given the preliminary nature of this study, there are limitations that need to be acknowledged. First, a selection bias occurred when forming the groups of emergency RNs' characteristics despite the large sample size of 428 participants. For example, participant length of time working in current ED facility was separated into two groups (1-5 years or 6-50 years) to achieve statistical significance; however, the 6-50 years group seems like a large range in employment years. This bias may have contributed to the lack of statistically significant effect of emergency RNs' characteristics on readiness for change and intention to implement PU prevention guidelines.

Application of a new instrument, which combined two valid and reliable instruments such as TPB and RFCQ, could be considered a second limitation. Although there were a number of statistically significant findings, further testing of its psychometric properties would strengthen the support for this instrument and its variables. A third limitation relates to the hypothetical scenarios. Participants were asked to indicate their readiness to implement PU prevention guidelines using hypothetical scenarios of emergency patients at risk for pressure ulcer development. This limitation may have contributed to the participant's difficulty in distinguishing between TPB and RFC variables, as well as differentiating individual and organization benefits of the change. Finally, the fourth limitation refers to the self-report, web-based survey design method. Response bias related to readiness for change and intention to implement

PU prevention guidelines could occur because of the professional, social, and employment values that would not be captured from a self-report survey.

Implications for Emergency Nurses and Future Research

Evidence suggests clinical practice guidelines like PU prevention can positively impact patient care of emergency patients admitted to the hospital; yet, most emergency RNs responding to this survey did not intend to change their practice, had a negative attitude toward this practice change, and could identify the benefits of these guidelines for themselves, fellow emergency RNs, or the hospital where they worked. Findings from this study suggest emergency RNs' attitudes, their beliefs about organizational benefits from the change, peer beliefs in the change, and their control over the decision to implement a change impacts their readiness for change and intention to change practice. In other words, findings from this study suggest a preparatory step to assess individual readiness and intention in implementation plans.

Most change or performance improvement projects used in healthcare lack a preparatory step involving assessment of the individual or recipient of change. Instead, change implementation plans are often developed following a decision to change and focus on the change process and outcome rather than the individual. Information gleaned from this preparatory step may benefit emergency managers, educators, clinical nurse specialists, and emergency RNs involved in implementing PU prevention guidelines.

Change seems to dominate the healthcare industry; thus application of study findings may reach beyond emergency nursing to other disciplines involved in implementing a change. Incorporating an assessment of individual readiness and

intention related to an identified change into the process and outcome implementation plan may be beneficial.

Conclusion

In conclusion, the findings represent a preliminary step towards a theoretically based understanding of individual factors that impact a behavioral change. At the individual level of change, a combination of the readiness for change construct and the TPB appears to be an appropriate model for further study of this phenomenon. A mixed-methods research study to investigate the 'lived experience' and observations of emergency RNs' implementing PU prevention guidelines would contribute to an understanding of the relationship between readiness and intention with the behavior of implementation. Finally, recognizing the factors influencing emergency RNs' intended implementation of PU prevention behaviors and developing appropriate interventions could lead to successful implementation and reduce the risk of PU development in emergency patients admitted to the hospital. Findings from this study provide a substantive base for understanding the readiness and intention phenomena and add to the scientific body of knowledge related to PU prevention in emergency nursing.

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Table 1. Study Sample

TABLE 1: PATIENT CHARACTERISTICS (N=428)	
Gender, n (%)	
Male	56 (13%)
Female	372 (87%)
Age, mean (SD)	43 (11.5)
Age, n (%)	
20-30	79 (18%)
31-40	107 (25%)
41-50	122 (29%)
> 50	120 (28%)
Highest Nursing Education Level, n (%)	
Diploma	15 (3.5%)
AD	126 (29%)
BSN	183 (43%)
MSN	97 (23%)
Doctorate	5 (1%)
Other	2 (0.5%)
Clinical Certification, n (%)	
CEN	176 (41%)
CCRN	17 (4%)
CFRN	9 (2%)
Other	123 (29%)
Not Certified	103 (24%)
Years of Nursing Experience, mean (SD)	17.5 (11.5)
Years of Emergency Nursing Experience, mean (SD)	12.8 (9.8)
Years of Emergency Nursing in Current Facility, mean (SD)	8 (7.7)
Most Frequent Emergency RN role, n (%)	
RN + Clinical Nurse I-V	255 (59%)
Charge Nurse	46 (11%)
Management	61 (14%)
Educator	55 (13%)
Clinical Specialist (including CNS)	11 (3%)
Employment Status, n (%)	
Full Time	349 (81%)
Part Time	53 (12%)
Per diem (less than 3 months in same facility)	4 (1%)
Per diem (greater than 3 months in same facility)	22 (5%)

Table 1. Study Sample

TABLE 1: PATIENT CHARACTERISTICS (N=428) CONTINUED	
Hospital Type, n (%)	
Community	196 (46%)
Rural	28 (6%)
Urban, non-teaching	38 (9%)
Urban, teaching	166 (39%)
Hospital Location by State	11 (52%)
46 States	428 respondents
South Dakota, West Virginia, Wymoning, Utah	0 respondents
ED Annual Visits/Year, n (%)	
20-40,000 visits/year	96 (22%)
41-60,000 visits/year	104 (24%)
61-80,000 visits/year	94 (22%)
> 80,000 visits/year	105 (25%)
	29 missing (7%)
ED Care by Patient Type, n (%)	
Adult	171 (40%)
Pediatric	11 (3%)
Adult & Pediatric	235 (55%)
Triage	1 (0.1%)
Fast Track (minor care)	6 (1%)
Adult Psych	4 (0.9%)
Pediatric Psych	0
Magnet/Pathway to Excellence Designation, n (%)	
Yes	158 (37%)
No	179 (42%)
In process of applying Magnet designation	69 (16%)
In process of applying Pathway to Excellence Designation	10 (2%)
Discussion only	12 (3%)
Unit-based Nursing Practice Council, n (%)	
Yes	317 (74%)
No	94 (43%)
In process of developing unit-based nursing practice council	17 (4%)
ED Follows PU Prevention Guidelines, n (%)	
Yes	130 (30%)
No	144 (34%)
Sometimes	116 (27%)
Discussed, not implemented	38 (9%)

Table 2. Readiness for Change Total Variance Explained

Table 2. Readiness for Change						
Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.965	35.858	35.858	4.732	18.953	18.953
2	2.969	11.874	47.733	4.161	16.642	35.595
3	1.843	7.373	55.105	3.303	13.211	48.806
4	1.189	4.757	59.863	2.764	11.056	59.863

Table 3 Readiness for Change - Rotated Component Matrix

Table 2. Readiness for Change				
	1	2	3	4
Appropriateness (legitimate reasons for change)	.770			
Appropriateness (worthwhile for me)	.776			
Appropriateness (number of rational reasons)	.764			
Appropriateness (It doesn/t make sense for us to initiate this change)	-.742			
Appropriateness (Time should be spent on something else)	-.638			
Change Efficacy (don't believe there is anything for me to gain)	.638			
Appropriateness	.572			
Change Efficacy	.444			
Management Support		.834		
Management Support		.833		
Management Support		.825		
Management Support		.820		
Management Support		-.500		
Personal Valence (change will disrupt personal relationships I have)			.723	
Personal Valence (I will lose some of my status)			.691	
Personal Valence (My future will be limited)			.680	
Change Efficacy (I can learn everything required to change)			-.656	
Change Efficacy (Some tasks I will not be able to do)			.511	
Change Efficacy (I have the skills needed to change)			-.502	
Appropriateness (Change makes my job easier)				.743
Appropriateness (Change will improve our organization)				.706
Change Efficacy (I can handle the change)				.636
Change Efficacy (I do not anticipate problems adjusting to the work)				.618

Table 4. Theory of Planned Behavior - Total Variance Explained

Table 4. Theory of Planned Behavior						
Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.158	42.987	42.987	3.529	29.408	29.408
2	1.419	11.824	54.811	2.345	19.541	48.949
3	1.018	8.485	63.296	1.722	14.346	63.296

Table 5. Theory of Planned Behavior - Rotated Component Matrix

Table 5. Theory of Planned Behavior			
	1	2	3
Attitude (harmful-beneficial)	.862		
Attitude (worthless-valuable)	.835		
Attitude (bad-good)	.816		
Intention (I want)	.667		
Intention (I intend)	.602		
Intention (I expect)	.561		
Perceived Behavior Control (I am confident)	.406		
Subjective Norm		.713	
Subjective Norm		.707	
Subjective Norm		.687	
Perceived Behavior Control (Beyond my control)			-.799
Perceived Behavior Control (Change is Up to Me)			.683

Table 6. Combined Theory of Planned Behavior and Readiness for Change – Total Variance Explained

Table 6. Combined Theory of Planned Behavior and Readiness for Change Total Variance Explained						
Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	12.757	34.478	34.478	5.696	15.395	15.395
2	3.388	8.157	43.635	4.758	12.859	28.255
3	2.012	5.437	49.072	3.631	9.815	38.069
4	1.590	4.298	53.371	3.134	8.470	46.539
5	1.229	3.321	56.692	2.464	6.660	53.199
6	1.146	3.096	59.788	2.003	5.415	58.613
7	1.060	2.864	62.652	1.494	4.039	62.652

Table 7. Combined Theory of Planned Behavior and Readiness for change – Rotated Component Matrix

	Component						
	1	2	3	4	5	6	7
Attitude (bad-good)	.724						
Attitude (harmful-beneficial)	.725						
Attitude (worthless-valuable)	.715						
Intention (I intend)	.686						
Intention (I expect)	.666						
Intention (I want)	.654						
Appropriateness (worthwhile for me)	.562						
Subjective Norm (most ED nurses like me implement PU prevention guidelines)	.451						
Appropriateness (Organization/ED will benefit)	.440						
Subjective Norm (people important to me)	.432						
Management Support		.831					
Management Support		.826					
Management Support		.819					
Management Support		.806					
Management Support		.804					
Management Support		-.505					

Table 7. Combined Theory of Planned Behavior and Readiness for Change
Rotated Component Matrix

	Component						
	1	2	3	4	5	6	7
Appropriateness (Change matches priorities of organization/ED)			.637				
Appropriateness (Legitimate reasons for change)			.603				
Change Efficacy (Nothing for me to gain)			-.602				
Appropriateness (Number of rationale reasons)			.578				
Appropriateness (Time should be spent on something else)			-.565				
Appropriateness (Doesn't make sense for us to change)			-.514				
Change Efficacy (past experiences gives me confidence I will perform well)			.435				
Change Efficacy (I can learn everything required for the change)				.711			
Personal Valence (This change will disrupt my personal relationships)				-.688			
Personal Valence (I am worried I will lose some of my status)				-.678			
Personal Valence (My future in this job will be limited)				-.625			

Table 7. Combined Theory of Planned Behavior and Readiness for Change Rotated Component Matrix

	Component						
	1	2	3	4	5	6	7
Change Efficacy (There are some tasks that will be required that I do not know)						-.599	
Perceived Behavioral Control (I am confident)						.512	
Change Efficacy (I do not anticipate any problems)						.472	
Change Efficacy (I have skills needed to make the change)						.458	
Perceived Behavioral Control (Change is up to me)							-.687
Perceived Behavioral Control (Beyond my control)							.612
Subjective Norm (I feel under pressure)							.519

Table 8. Stepwise Multiple Regression – Model Summary

Table 8. Stepwise Multiple Regression - Coefficients					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	β	Std. Error	Beta		
Step 1					
Constant	.408	.280		1.458	.146
Attitude	.887	.050	.702	17.646	.000
Step 2					
Constant	-1.297	.358		-3.625	.000
Attitude	.657	.057	.520	11.462	.000
Appropriateness	.672	.096	.316	6.972	.000
Step 3					
Constant	-1.480	.338		-4.383	.000
Attitude	.573	.055	.453	10.341	.000
Appropriateness	.542	.093	.255	5.844	.000
Subjective Norm	.295	.045	.255	6.562	.000
Step 4					
Constant	.1.919	.372		-5.162	.000
Attitude	.554	.055	.438	10.014	.000
Appropriateness	.514	.092	.242	5.570	.000
Subjective Norm	.285	.045	.247	6.386	.000
Perceived Behavioral Control	.158	.059	.098	2.701	.007

Dependent variable: intention

Figure 1. Theory of Planned Behavior (adapted from Ajzen, 2006)

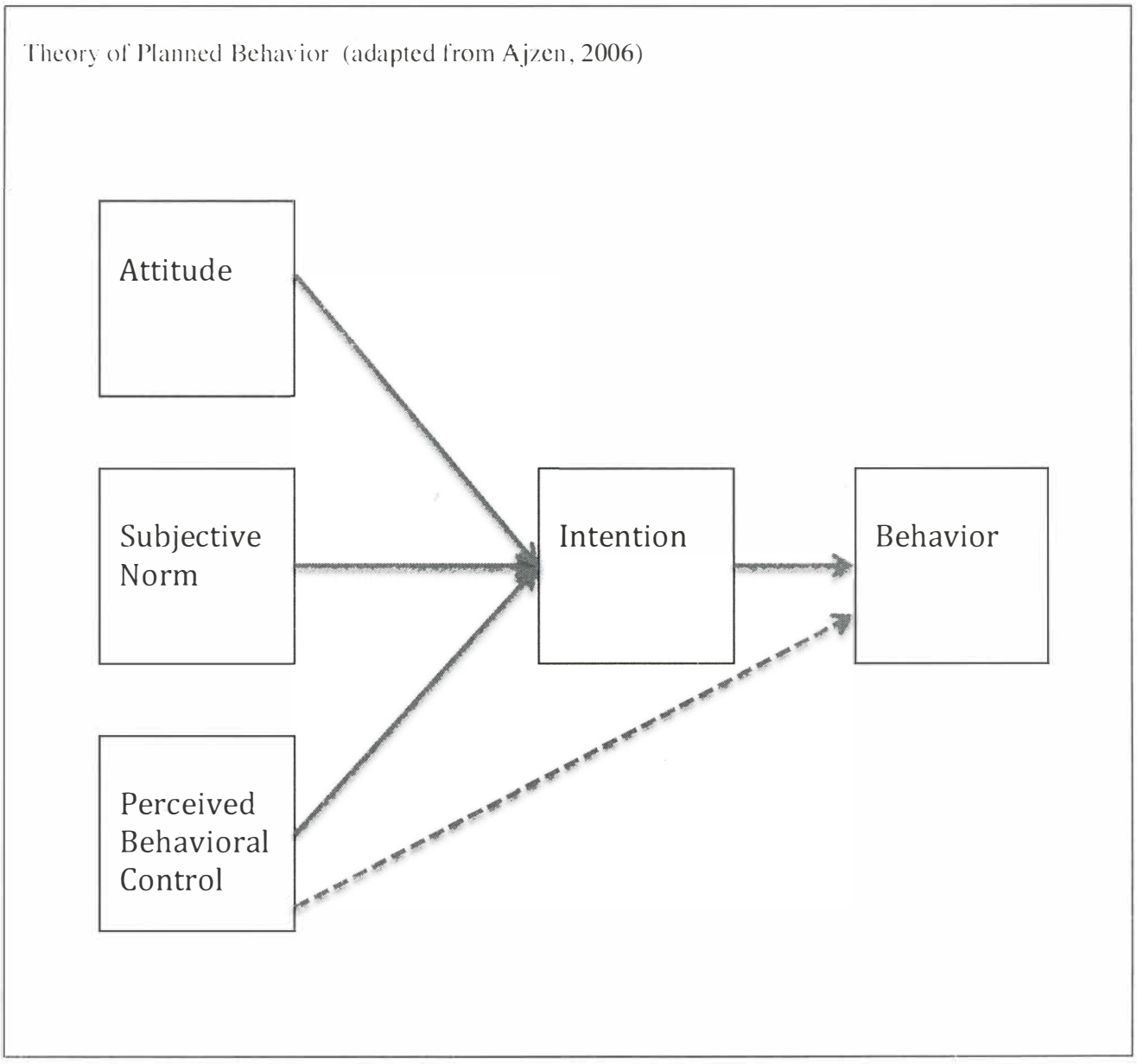


Figure 2. Readiness for Change (adapted from Holt, et al., 2007)

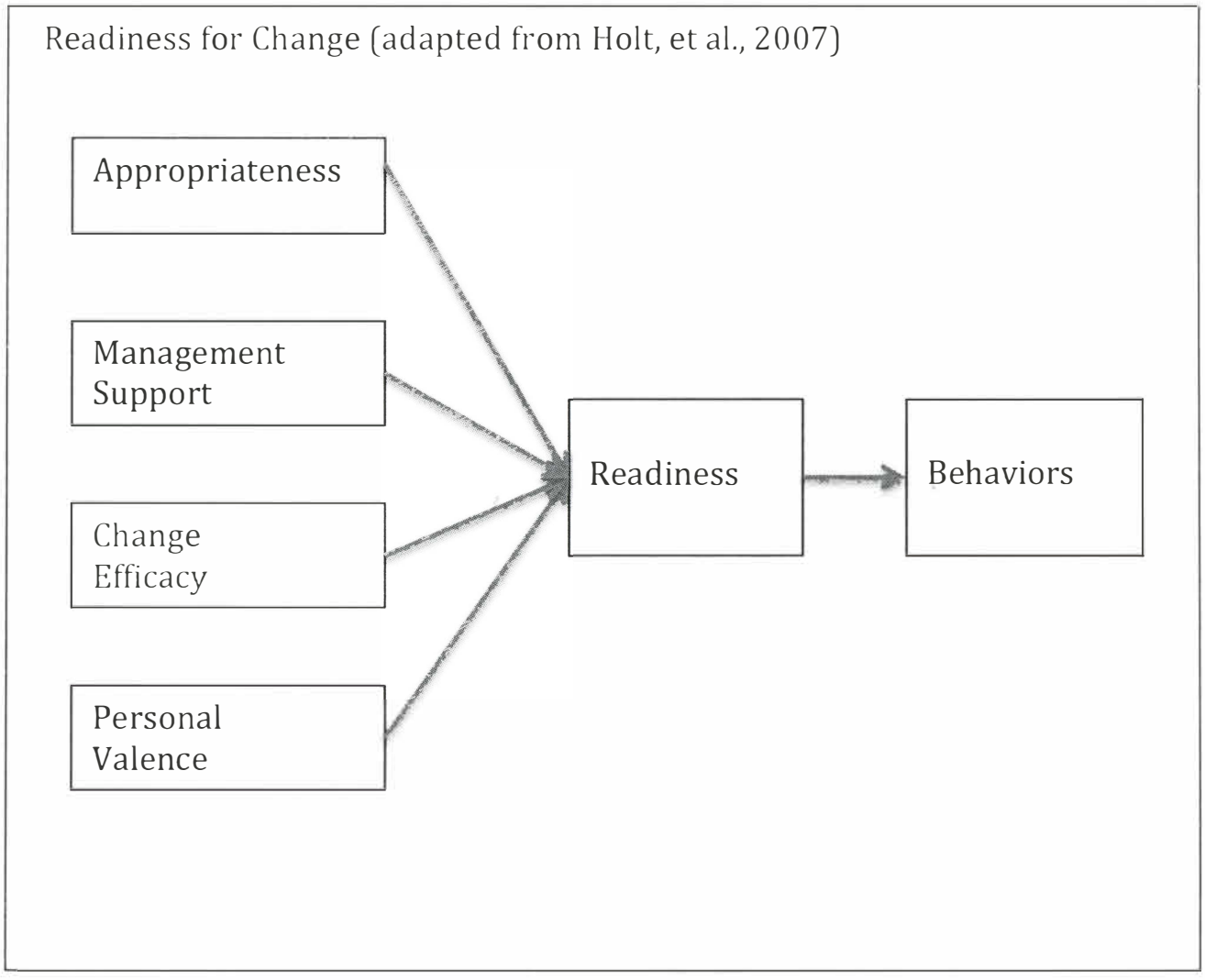
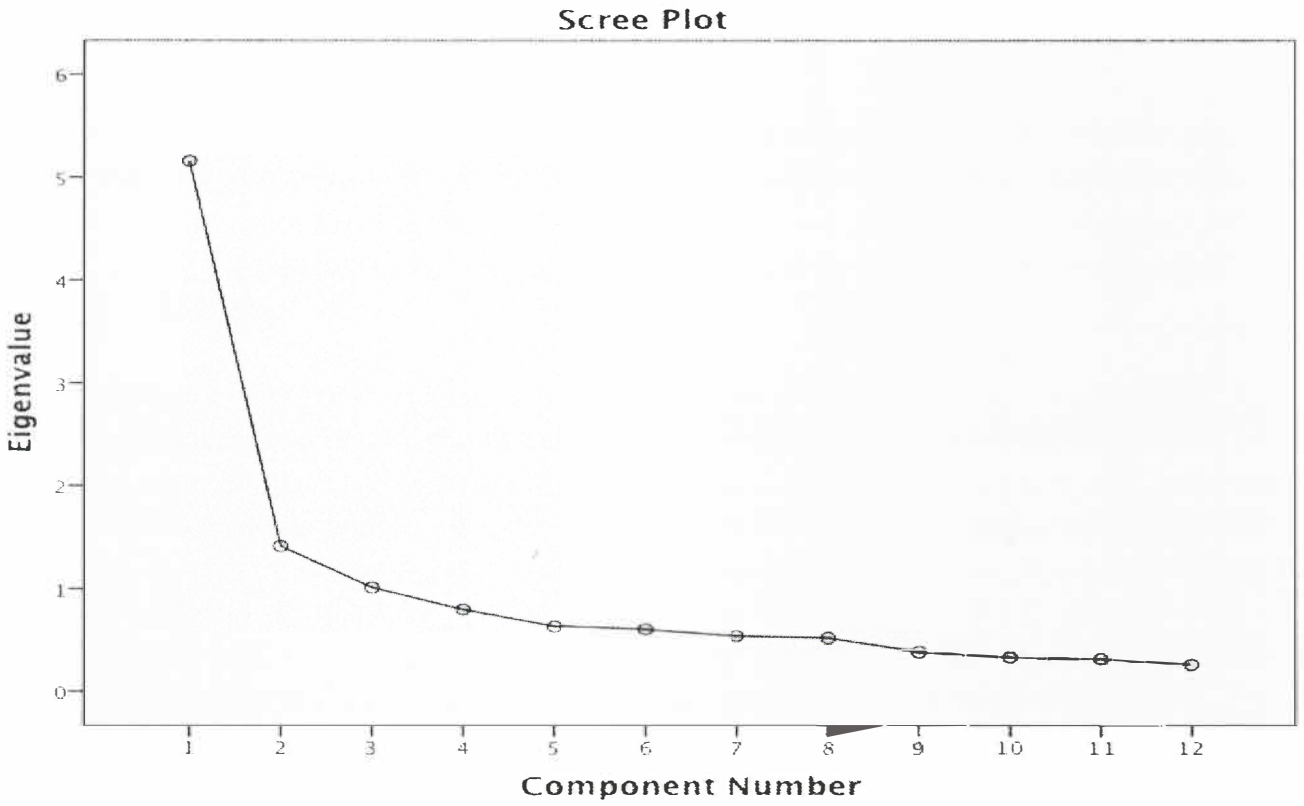


Figure 3. Theory of Planned Behavior – Scree Plot



Appendix A. Cognitive Assessment Plan

Cognitive Assessment – 3 emergency RNs

* Verbal probing as assessment method

Purpose: To learn how emergency RNs understand and respond to survey items and whether their interpretations of the items are similar to the instrument developers (Di Loro, 2005). In particular the researcher is interested in learning how emergency RNs interpret the term pressure ulcer (PU) prevention guidelines, and change related to PU prevention guidelines.

The underlying assumption of Cognitive Assessment is individuals use a series of cognitive processes to answer questions (Di Loro, 2005). The five components of cognitive assessment are: comprehension, interpretation, recall, judgment, and response. Think aloud and verbal probing are the two primary methods for conducting cognitive assessment. Verbal probing is reported to be less difficult then think aloud and allows the researcher to focus attention on pertinent issues(Priede & Farrall, 2011) ; thus, verbal probing will be used to conduct the cognitive assessment for the ED RN PrUP survey. The researcher hopes to learn problems and processes such as: terms that are not understood by or that have different meanings for the respondents, vagueness or ambiguity in the item.

Cognitive Assessment Plan:

- 37 items (TPB & RFC)
- 3 emergency RNs (novice emergency RN, advanced emergency RN, experienced RN)
- recording method – tape recording & written notes by interviewer)

Verbal Probing Procedure:

- Introduction – explain procedure and ensure participant confidentiality
- Participant emergency nursing experience.
    1. Ask the participant to select the category of emergency nursing experience that best represents them:
        a. Novice – no experience
        b. Advanced Beginner – demonstrates marginally acceptable performance
        c. Competent – on the job two to three years, able to see his/her actions in terms of long-range goals or plans
        d. Proficient – perceives situations as wholes, rather than in terms of aspects, and performance is guided by maxims
        e. Expert – no longer relies on an analytical principal (rule, guideline, maxim) to connect her/his understanding of the situation to an appropriate action. The expert nurse, with his/her enormous background of experience, has an intuitive

grasp of the situation and zeros in on the accurate region of the problem. (Benner, 1982)

- The respondent will be asked to answer each question as it is written.
- Questions about PrUP guidelines:
    1. What came to your mind when you were asked about PU guidelines?
    2. How would you describe PU?
    3. What types of nursing activities came to your mind when you read the PU prevention guidelines explanation?
- Questions about emergency patient scenarios:
    1. What came to your mind when you read the emergency patient scenarios?
    2. What type of emergency patients did you think about when you read the scenarios?
    3. How would you describe the emergency patient at risk for PU development?
    4. Did the scenarios seem appropriate to you related to considering patients at risk for PU development?
- Questions about the word BEFORE:
    1. What does the word BEFORE mean to you?
    2. What time frame would BEFORE include?
    3. How far back in the emergency visit would you go?
    4. Would triage time be included?
- Questions about Readiness for Change:
    1. What came to your mind when you were asked about CHANGE (PU prevention guidelines)?
    2. What types of CHANGE activities did you think about?
    3. What came to mind when you read the words 'organization/ED department'?

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Survey

Select the number which best describes your interpretation of:

'representativeness' and 'clarity' for the survey question stem; &

'appropriateness' for the survey question response.

An area marked 'comment' is optional.

Thank you!

Background

1) My primary professional role is:

☐ Professor ☐ RN with CEN and/or CCRN ☐ RN with WOCN

2) The main content area of my expertise is:

☐ Theory of Planned Behavior ☐ Pressure Ulcer Prevention Guidelines ☐ Both Theory of Planned Behavior and Pressure Ulcer Prevention Guidelines

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The following questions pertain to a description of pressure ulcer (PU) prevention guidelines that will be placed within the stem of each Theory of Planned Behavior question.

Please pull down the choice which best describes your interpretation of 'representativeness' and 'clarity' for the PU description or scenario.

An area marked 'comment' is OPTIONAL.

PrUP1. ....to remove patient's clothing, visually inspect skin, photograph wounds, reposition patient every two hours, and document presence/absence of pressure ulcer PRIOR TO ADMISSION to the hospital

3) Representativeness:

☐ description IS NOT representative of pressure ulcer prevention guidelines ☐ description NEEDS MAJOR revisions to be representative of pressure ulcer prevention guidelines ☐ description NEEDS MINOR revisions to be representative of pressure ulcer prevention guidelines ☐ description IS REPRESENTATIVE of pressure ulcer prevention guidelines

4) Comment: _____

5) Clarity:

☐ the pressure ulcer prevention guidelines description IS NOT well written, distinct, and at an appropriate reading level for the emergency RN ☐ the pressure ulcer prevention guidelines description NEEDS MAJOR revisions to be well written, distinct, and at an appropriate reading level for the emergency RN ☐ the pressure ulcer prevention guidelines description NEEDS MINOR revisions to be well written, distinct, and at an appropriate reading level for the emergency RN ☐ the pressure ulcer prevention guidelines description IS WELL written, distinct, and at an appropriate reading level for the emergency RN

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6) Comment: _____

PrUP2...to remove clothing, inspect skin, photograph wounds, reposition patient, and document presence/absence of pressure ulcer PRIOR TO HOSPITAL ADMISSION

7) Representativeness:

☐ description IS NOT representative of pressure ulcer prevention guidelines ☐ description NEEDS MAJOR revisions to be representative of pressure ulcer prevention guidelines ☐ description NEEDS MINOR revisions to be representative of pressure ulcer prevention guidelines ☐ description IS REPRESENTATIVE of pressure ulcer prevention guidelines

8) Comment: _____

9) Clarity:

☐ the pressure ulcer prevention guidelines description IS NOT well written, distinct, and at an appropriate reading level for the emergency RN ☐ the pressure ulcer prevention guidelines description NEEDS MAJOR revisions to be well written, distinct, and at an appropriate reading level for the emergency RN ☐ the pressure ulcer prevention guidelines description NEEDS MINOR revisions to be well written, distinct, and at an appropriate reading level for the emergency RN ☐ the pressure ulcer prevention guidelines description IS WELL written, distinct, and at an appropriate reading level for the emergency RN

10) Comment: _____

The following survey questions pertain to INTENTION and READINESS for CHANGE in implementation of pressure ulcer prevention guidelines. Pressure ulcer prevention guidelines can include: * removing clothing * inspecting skin * photographing wounds * repositioning the patient * documenting presence/absence of pressure ulcer PRIOR to HOSPITAL ADMISSION. The phrase--pressure ulcer prevention guidelines-- will be used to represent the above activities. PrUP3...pressure ulcer prevention guidelines...

11) Representativeness:

☐ description IS NOT representative of pressure ulcer prevention guidelines ☐ description NEEDS MAJOR revisions to be representative of pressure ulcer prevention guidelines ☐ description NEEDS MINOR revisions to be representative of pressure ulcer prevention guidelines ☐ description IS REPRESENTATIVE of pressure ulcer prevention guidelines

12) Comment: _____

13) Clarity:

☐ the pressure ulcer prevention guidelines description IS NOT well written, distinct, and at an appropriate reading level for the emergency RN ☐ the pressure ulcer prevention guidelines description NEEDS MAJOR revisions to be well written, distinct, and at an appropriate reading level for the emergency RN ☐ the pressure ulcer prevention guidelines description NEEDS MINOR revisions to be well written, distinct, and at an appropriate reading level for the emergency RN ☐ the pressure ulcer prevention guidelines description IS WELL written, distinct, and at an appropriate reading level for the emergency RN

14) Comment: _____

The following emergency patient scenarios will be placed before the Theory of Planned Behavior questions.

Please pull down the choice which best describes your interpretation of 'representativeness' and 'clarity' for the scenario.

An area marked 'comment' is optional.

Sc1. Tomorrow a 72 y/o obese male presents with shortness of breath for the past 2 days, history of diabetes, hypertension, and renal failure.

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15) Representativeness:

☐ scenario IS NOT representative of an emergency patient ☐ scenario NEEDS MAJOR revisions to be representative of an emergency patient ☐ scenario NEEDS MINOR revisions to be representative of an emergency patient ☐ scenario IS REPRESENTATIVE of an emergency patient

16) Comment: _____

17) Clarity:

☐ the scenario IS NOT well written, distinct, and at an appropriate reading level for the emergency RN ☐ the scenario NEEDS MAJOR revisions to be well written, distinct, and at an appropriate reading level for the emergency RN ☐ the scenario NEEDS MINOR revisions to be well written, distinct, and at an appropriate reading level for the emergency RN ☐ the scenario IS WELL written, distinct, and at an appropriate reading level for the emergency RN

18) Comment: _____

Sc2. Tomorrow an 80 y/o thin female arrives via EMS from a nursing home with change in mental status.

19) Representativeness:

☐ scenario IS NOT representative of an emergency patient ☐ scenario NEEDS MAJOR revisions to be representative of an emergency patient ☐ scenario NEEDS MINOR revisions to be representative of an emergency patient ☐ scenario IS REPRESENTATIVE of an emergency patient

20) Comment: _____

21) Clarity:

☐ the scenario IS NOT well written, distinct, and at an appropriate reading level for the emergency RN ☐ the scenario NEEDS MAJOR revisions to be well written, distinct, and at an appropriate reading level for the emergency RN ☐ the scenario NEEDS MINOR revisions to be well written, distinct, and at an appropriate reading level for the emergency RN ☐ the scenario IS WELL written, distinct, and at an appropriate reading level for the emergency RN

22) Comment: _____

Sc3. Tomorrow an 82 y/o female arrives via EMS with suspected right hip fracture, who fell at home while walking to the bathroom; backboard in place and screaming in pain.

23) Representativeness:

☐ scenario IS NOT representative of an emergency patient ☐ scenario NEEDS MAJOR revisions to be representative of an emergency patient ☐ scenario NEEDS MINOR revisions to be representative of an emergency patient ☐ scenario IS REPRESENTATIVE of an emergency patient

24) Comment: _____

25) Clarity:

☐ the scenario IS NOT well written, distinct, and at an appropriate reading level for the emergency RN ☐ the scenario NEEDS MAJOR revisions to be well written, distinct, and at an appropriate reading level for the emergency RN ☐ the scenario NEEDS MINOR revisions to be well written, distinct, and at an appropriate reading level for the emergency RN ☐ the scenario IS WELL written, distinct, and at an appropriate reading level for the emergency RN

26) Comment: _____

Sc4. Tomorrow a 52 y/o male arrives with severe (10/10) upper left quadrant abdominal pain, nausea/vomiting times 4 days.

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ED RN PrUP pretest

Dear Emergency RN, I am inviting you to participate in a research project that has been approved by the Institutional Review Board at the Medical University of South Carolina. The purpose of this survey is to find out your VALUES and BELIEFS about implementing pressure ulcer prevention guidelines in the emergency department. I appreciate that using these guidelines may be influenced by a range of factors; however, the survey is designed to measure THREE factors: * Emergency RNs' characteristics * Their INTENTION to implement pressure ulcer prevention guidelines * HOW READY they are to implement these guidelines COMPLETION time will be10-15 minutes to answer 37 questions. Some questions may appear similar; this is necessary, as previous research has found people respond differently to slightly different wording. Brief scenarios will be used as examples of emergency patients admitted to the hospital and at risk for pressure ulcer development. Scenarios will also be used to introduce the change in emergency nursing practice related to pressure ulcer prevention. Select the number (1-7) that best describes what you think or your experience in pressure ulcer prevention where you CURRENTLY work. There are no right or wrong answers. Try not to take too long over each response--what comes to mind first is more likely to reflect what you believe. Findings from this research project can be used by emergency RNs to develop strategies that promote use of pressure ulcer prevention guidelines. I plan to share the survey results as a poster or presentation at a national meeting, and/or publication. There are no known risks to you if you decide to participate in this survey. Participation is completely voluntary, anonymous and requires only your time. UPON COMPLETION of the survey you will have an opportunity to submit your name and email address for a drawing. Your name and email address will remain in a separate file from the survey responses. All information will be treated CONFIDENTIALLY. Please contact Mary Naccarato (t: 954-776-8995); naccarm@musc.edu for a summary of the research findings. Sincerely, Mary Naccarato PhD(c), RN, CCNS, CEN

The following questions are about ED RNs' INTENTION and READINESS TO CHANGE to pressure ulcer prevention guidelines for patients who are ADMITTED to the hospital from the Emergency Department. Pressure ulcer prevention guidelines includes: * removing clothing, * inspecting skin, * photographing wounds, * repositioning the patient every two hours, * documenting presence/absence of pressure ulcer PRIOR to HOSPITAL ADMISSION The PHRASE--PU prevention guidelines--will be used to represent the above activities

Think about the following Scenarios (chief complaint of emergency patient) as you answer the questions about Intention and Readiness to Change to PU prevention guidelines. Tomorrow an 80 y/o thin female arrives via EMS from a nursing home with change in mental status Tomorrow an 82 y/o female arrives via EMS with suspected right hip fracture, who fell at home while walking to the bathroom; backboard in place and screaming in pain Tomorrow a 52 y/o male arrives with severe (10/10) upper left quadrant abdominal pain, nausea/vomiting times 4 days

Attitude is the degree to which performance of PU prevention guidelines is positively or negatively valued.

For me to implement PU prevention guidelines before the emergency patient is ADMITTED to the HOSPITAL is:

1 = extremely BAD — 7 = extremely GOOD

(Place a mark on the scale above)

For me to implement PU prevention guidelines before the emergency patient is ADMITTED to the hospital is:

1 = extremely VALUABLE — 7 = extremely WORTHLESS

(Place a mark on the scale above)

FOR ME to implement PU prevention guidelines before the emergency patient is ADMITTED to the hospital is:

1 = extremely HARMFUL — 7 = extremely BENEFICIAL

(Place a mark on the scale above)

Subjective Norm is the perceived social pressure from important people to engage or not engage in PU prevention guidelines.

MOST EMERGENCY NURSES like ME implement PU prevention guidelines PRIOR to Hospital Admission	1 = extremely LIKELY to	7 = extremely UNLIKELY to
	(Place a mark on the scale above)	
I FEEL UNDER PRESSURE to implement PU prevention guidelines BEFORE Hospital Admission	1 = strongly DISAGREE	7 = strongly AGREE
	(Place a mark on the scale above)	
People who are IMPORTANT TO ME want me to implement PU prevention guidelines BEFORE Hospital Admission	1 = strongly AGREE	7 = strongly DISAGREE
	(Place a mark on the scale above)	

Perceived Behavior Control refers to ED RNs' confidence in their ability to perform PU prevention guidelines.

I AM CONFIDENT I could implement PU prevention guidelines BEFORE Hospital Admission	1 = strongly DISAGREE	7 = strongly AGREE
	(Place a mark on the scale above)	
MY IMPLEMENTING PU prevention guidelines BEFORE Hospital Admission is UP TO ME, I	1 = strongly AGREE	7 = strongly DISAGREE
	(Place a mark on the scale above)	
The DECISION to implement PU prevention guidelines BEFORE Hospital Admission is beyond MY CONTROL	1 = strongly DISAGREE	7 = strongly AGREE
	(Place a mark on the scale above)	

Intention refers to the ED RNs' readiness to perform PU prevention guidelines.

I INTEND to implement PU prevention guidelines BEFORE Hospital Admission...	1 = extremely LIKELY to	7 = extremely UNLIKELY to
	(Place a mark on the scale above)	
I EXPECT to implement PU prevention guidelines BEFORE Hospital Admission	1 = strongly DISAGREE	7 = strongly AGREE
	(Place a mark on the scale above)	
I WANT to implement PU prevention guidelines BEFORE Hospital Admission	1 = strongly AGREE	7 = strongly DISAGREE
	(Place a mark on the scale above)	

Readiness for Change

The following questions pertain to ED RN's readiness for change. Two scenarios are examples introducing a change, such as PU prevention guidelines to ED RNs.

Tomorrow, during the shift change huddle, you learn the emergency department will develop a plan to implement PU prevention guidelines. Interested staff nurses are invited to assist with this change.

Tomorrow, during the emergency department nursing staff meeting, the manager presents the plans for implementation of PU prevention guidelines. Interested staff nurses are invited to assist the manager and clinical nurse specialist in planning this change.

Move the CURSOR to a position on the scale from 1 to 7 which best describes your READINESS FOR CHANGE relating to implementation of PU prevention guidelines in the emergency department. Questions are grouped into 4 categories: appropriateness, management support, change efficacy, and personal valence.

Appropriateness refers to the ED RNs' beliefs about the need for PU prevention and that the organization/ED department will or will not benefit from this change.

In the long run, I feel it will be worthwhile for me if the organization/ED Department adopts this CHANGE (PU prevention guidelines).

1 = strongly AGREE — 7 = strongly DISAGREE

(Place a mark on the scale above)

It doesn't make sense for us to initiate this CHANGE (PU prevention guidelines)

1 = strongly DISAGREE — 7 = strongly AGREE

(Place a mark on the scale above)

I think that the organization will benefit from this CHANGE (PU prevention guidelines).

1 = strongly AGREE — 7 = strongly DISAGREE

(Place a mark on the scale above)

This CHANGE (PU prevention guidelines) makes my job easier.

1 = strongly DISAGREE — 7 = strongly AGREE

(Place a mark on the scale above)

There are a number of rationale reasons for this CHANGE (PU prevention guidelines) to be made.

1 = strongly AGREE — 7 = strongly DISAGREE

(Place a mark on the scale above)

This CHANGE (PU prevention guidelines) will improve our organization/ED Department's overall efficiency.

1 = strongly DISAGREE — 7 = strongly AGREE

(Place a mark on the scale above)

This CHANGE (PU prevention guidelines) matches the priorities of our organization/ED Department.

1 = strongly AGREE — 7 = strongly DISAGREE

(Place a mark on the scale above)

The time we are spending on this CHANGE (PU prevention guidelines) should be spent on something else.

1 = strongly DISAGREE — 7 = strongly AGREE

(Place a mark on the scale above)

There are legitimate reasons for us to make this CHANGE (PU prevention guidelines).

1 = strongly AGREE — 7 = strongly DISAGREE

(Place a mark on the scale above)

Management Support refers to the extent the ED RN believes the organization/ED Department's leadership and management are or are not committed to PU prevention guidelines.

Management has sent a clear signal this organization/ED Department is going to CHANGE (PU prevention guidelines).

1 = strongly DISAGREE — 7 = strongly AGREE

(Place a mark on the scale above)

This organization/ED Department's most senior nursing leader is committed to this CHANGE (PU prevention guidelines).

1 = strongly AGREE — 7 = strongly DISAGREE

(Place a mark on the scale above)

Our organization/ED Department's top nursing decision makers have put all their support behind this CHANGE (PU prevention guidelines).

1 = strongly DISAGREE — 7 = strongly AGREE

(Place a mark on the scale above)

I think we are spending a lot of time on this CHANGE (PU prevention guidelines) when the nursing manager doesn't even want it implemented.

1 = strongly AGREE — 7 = strongly DISAGREE

(Place a mark on the scale above)

Every nurse manager has stressed the importance of this CHANGE (PU prevention guidelines).

1 = strongly DISAGREE — 7 = strongly AGREE

(Place a mark on the scale above)

Our senior nursing leader has encouraged all of us to embrace this CHANGE (PU prevention guidelines).

1 = strongly AGREE — 7 = strongly DISAGREE

(Place a mark on the scale above)

Chance Efficacy means how the individual believes he/she has or does not have the skills to execute the CHANGE (PU prevention guidelines).

When this CHANGE (PU prevention guidelines) is implemented, I don't believe there is anything for me to gain.

1 = strongly DISAGREE — 7 = strongly AGREE

(Place a mark on the scale above)

My past experiences make me confident that I will be able to perform successfully after this CHANGE (PU prevention guidelines) is made.

1 = strongly AGREE — 7 = strongly DISAGREE

(Place a mark on the scale above)

Change Efficacy There are some tasks that will be required when we CHANGE (PU prevention guidelines) that I don't think I can do well.	1 = strongly DISAGREE ... 7 = strongly AGREE *(Place a mark on the scale above)*
I do not anticipate any problems adjusting to the work I will have when this CHANGE (PU prevention guidelines) is adopted.	1 = strongly AGREE ... 7 = strongly DISAGREE *(Place a mark on the scale above)*
When I set my mind to it, I can learn everything that will be required when this CHANGE (PU prevention guidelines) is adopted.	1 = strongly DISAGREE ... 7 = strongly AGREE *(Place a mark on the scale above)*
I have the skills that are needed to make this CHANGE (PU prevention guidelines) work.	1 = strongly AGREE ... 7 = strongly DISAGREE *(Place a mark on the scale above)*
When we implement this CHANGE (PU prevention guidelines), I feel I can handle it with ease.	1 = strongly DISAGREE ... 7 = strongly AGREE *(Place a mark on the scale above)*

Personal Valence means how much the individual will or will not benefit from implementing the CHANGE (PU prevention guidelines).

My future in this job will be limited because of this CHANGE (PU prevention guidelines).	1 = strongly AGREE ... 7 = strongly DISAGREE *(Place a mark on the scale above)*
I am worried I will lose some of my status in the organization/emergency department when this CHANGE (PU prevention guidelines) is implemented.	1 = strongly DISAGREE ... 7 = strongly AGREE *(Place a mark on the scale above)*
This CHANGE (PU prevention guidelines) will disrupt many of the personal relationships I have developed.	1 = strongly AGREE ... 7 = strongly DISAGREE *(Place a mark on the scale above)*

The final section of the survey collects information about emergency nursing.

Gender	☐ female ☐ male
Age in years: _____yrs (round to the nearest whole number)	_____
Highest level of nursing education achieved	☐ Nursing Diploma ☐ Associate Degree ☐ Bachelor's Degree ☐ Master's Degree ☐ Doctorate (PhD, DNP, EdD) ☐ Other

What clinical nursing certification do you currently carry?

- ☐ Certified Emergency Nurse
- ☐ Certified Critical Care Registered Nurse
- ☐ Certified Flight Registered Nurse
- ☐ Other certification
- ☐ Not certified

Select the nursing role you perform most of the time

- ☐ RN
- ☐ Charge Nurse
- ☐ Management (assistant manager, manager)
- ☐ Educator
- ☐ Clinical Specialist (including CNS)
- ☐ Clinical Nurse I
- ☐ Clinical Nurse II
- ☐ Clinical Nurse III
- ☐ Clinical Nurse IV
- ☐ Clinical Nurse V

How many years have you been employed as a NURSE? ____ yrs (round to the nearest whole number) _____

How many years have you been employed as an EMERGENCY NURSE? ____yrs (round to the nearest whole number) _____

How many years have you been employed as an emergency nurse in your CURRENT facility? ____yrs (round to the nearest whole number) _____

Emergency nursing employment status

☐ Full time ☐ Part time ☐ Per diem with contract of less than three months in same facility
☐ Per diem with a contract of greater than three months in same facility

What type of hospital do you currently work in?

- ☐ Community hospital
- ☐ Rural hospital
- ☐ Urban hospital, non-teaching
- ☐ Urban hospital, teaching

What is your zip code? _____

Does the emergency department where you work follow PU prevention guidelines?

- ☐ Yes
- ☐ No
- ☐ Sometimes
- ☐ Discussed, not implemented

What is the average number of emergency department visits per year?

- ☐ 20-40,000 visits per year
- ☐ 41-60,000 visits per year
- ☐ 61-80,000 visits per year
- ☐ greater than 81,000 visits per year

What type of emergency care do you provide most of the time?

- ☐ Adult
- ☐ Pediatric
- ☐ Adult & Pediatric
- ☐ Triage
- ☐ Fast Track (minor care)
- ☐ Adult Psych
- ☐ Pediatric Psych

Is the hospital where you currently work a Magnet designated facility?

☐ Yes ☐ No ☐ In the process of applying for Magnet designation ☐ Pathway to Excellence designation
☐ In the process of applying for Pathway to Excellence designation

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Does the emergency department where you work have a Unit-Based Nursing Practice Council?

☐ Yes ☐ No ☐ In the process of developing a unit-based nursing practice council

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Thank you for taking the time to complete the survey.

You have an opportunity to enter a drawing to win an electronic gift certificate.

Copy the URL link to the principal investigator - Mary Kathryn Naccarato--and provide your name, email address, and telephone number which will be kept in a separate file from the survey responses.
The subject of the email is: ED Survey

http://www.naccarat@musc.edu

Please encourage your Emergency Nursing friends to complete the survey. Your survey participation will HELP Advance EMERGENCY NURSING! Thank you.

Appendix D. Survey Flyer Announcement

Calling ALL Emergency RNs. As part of my PhD research, I need to hear from you and you will be compensated in the form of entry into a drawing.

Copy link into browser https://redcap.musc.edu/surveys/?s=W3pCFv to complete the **15 minute survey**.

Survey: The influence of Emergency RNs' Characteristics and Readiness for Change on Their

Intention to Implement Pressure Ulcer Prevention Guidelines

ALL Emergency RNs working in hospital emergency departments are invited to complete the web-based survey.
Directions for completing the survey and details about the research study will be provided when you access the link above.

The drawing winner will be chosen at random on April 15, 2013. Winner must be an Emergency RN.
Only one survey may be complete per person

Kindly forward this message to all the Emergency RNs you know

Sincerely,

Mary Kathryn Naccarato, PhD(c), RN, CCNS, CEN, Principal Investigator
Clinical Nurse Specialist: emergency and critical care services
mnaccarato@browardhealth.org t: 954.776.8995
Doctoral nursing student at the Medical University of South Carolina
naccarat@musc.edu

Appendix E. Comparison of mean scores by using PU guidelines

Comparison of mean scores by Hospital Type

	HTr (mean ± std)		Difference in means (± std error)	t-statistic	df	p-value
	CommRural n=224	Urban_TnonT n=204				
attitude	5.46 ± 1.17	5.51 ± 1.02	-0.05 ± 0.09	-5.41	426	<0.999
subjective norm	4.21 ± 1.23	4.02 ± 1.05	0.19 ± 0.11	1.76	426	<0.055
perceived behavioral control	4.45 ± 0.77	4.50 ± 0.80	-0.05 ± 0.07	-0.730	426	<0.641
intention	5.28 ± 1.32	5.20 ± 1.24	0.08 ± 0.12	0.681	426	<0.247
appropriateness	4.44 ± 0.63	4.37 ± 0.57	0.06 ± 0.05	1.137	426	<0.486
management support	3.93 ± 1.10	3.91 ± 1.03	0.02 ± 0.10	0.204	426	<0.461
change efficacy	4.59 ± 0.57	4.49 ± 0.52	0.09 ± 0.05	1.185	425	<0.134
personal valence	2.20 ± 1.11	2.24 ± 1.05	-0.03 ± 0.10	-0.351	426	<0.208

Appendix E. Comparison of mean scores by following PU Guidelines

	PUGr (mean ± std)		Difference in means (± std error)	t-statistic	df	p-value
	Yes n=130	No n=298				
attitude	5.72 ± 1.00	5.38 ± 1.01	0.34 ± 0.10	3.23	426	<0.801
subjective norm	4.72 ± 1.13	3.86 ± 1.05	0.85 ± 0.11	7.52	426	<0.435
perceived behavioral control	4.45 ± 0.77	4.50 ± 0.80	-0.00 ± 0.08	-0.10	426	<0.643
intention	5.28 ± 1.32	5.20 ± 1.24	0.71 ± 0.13	5.46	426	<0.845
appropriateness	4.44 ± 0.63	4.37 ± 0.57	0.30 ± 0.06	4.82	426	<0.006
management support	3.93 ± 1.10	3.91 ± 1.03	0.90 ± 0.10	8.73	426	<0.714
change efficacy	4.59 ± 0.57	4.49 ± 0.52	0.25 ± 0.05	4.49	425	<0.417
personal valence	2.20 ± 1.11	2.24 ± 1.05	-0.48 ± 0.11	-4.30	426	<0.720

Appendix F. Comparison of mean scores by Magnet/PTE Designation

	Magnet/PTEr (mean ± std)		Difference in means (± std error)	t-statistic	df	p-value
	Yes n=168	No n=260				
attitude	5.42 ± 1.04	5.52 ± 1.00	0.25 ± 0.05	-3.99	426	<0.938
subjective norm	3.96 ± 1.17	4.22 ± 1.22	0.25 ± 0.05		426	<0.840
perceived behavioral control	4.47 ± 0.80	4.48 ± 0.78	0.25 ± 0.05		426	<0.806
intention	5.07 ± 1.39	5.35 ± 1.30	0.25 ± 0.05		426	<0.509
appropriateness	4.33 ± 0.62	4.46 ± 0.59	0.25 ± 0.05		426	<0.506
Management support	3.79 ± 1.10	4.01 ± 1.03	0.25 ± 0.05		426	<0.194
change efficacy	4.50 ± 0.55	4.57 ± 0.54	0.25 ± 0.05		425	<0.905
personal valence	2.26 ± 1.08	2.20 ± 1.08	0.25 ± 0.05		426	<0.576

Appendix G. Comparison of mean scores by Unit Based Council

	UBCr (mean ± std)		Difference in means (± std error)	t-statistic	df	p-value
	Yes n=317	No n=111				
attitude	5.49 ± 1.03	5.46 ± 0.99	0.25 ± 0.05	-3.99	426	<0.744
subjective norm	4.11 ± 1.16	4.14 ± 1.10	0.25 ± 0.05		426	<0.762
perceived behavioral control	4.45 ± 0.79	4.54 ± 0.77	0.25 ± 0.05		426	<0.896
intention	5.25 ± 1.28	5.22 ± 1.28	0.25 ± 0.05		426	<0.520
appropriateness	4.41 ± 0.61	4.40 ± 0.57	0.25 ± 0.05		426	<0.411
Management support	3.94 ± 1.07	3.87 ± 1.06	0.25 ± 0.05		426	<0.963
change efficacy	4.56 ± 0.55	4.48 ± 0.52	0.25 ± 0.05		425	<0.332
personal valence	2.22 ± 1.06	2.24 ± 1.15	0.25 ± 0.05		426	<0.332

Appendix H. Comparison of mean scores by Age Group

	AgeGrpr (mean ± std)		Difference in means (± std error)	t-statistic	df	p-value
	18-40yrs n=182	41-75yrs n=242				
attitude	5.26 ± 1.01	5.65 ± 0.99	-0.39 ± 0.10	-3.99	426	<0.533
subjective norm	3.95 ± 1.17	4.26 ± 1.11	-0.39 ± 0.10		426	<0.523
perceived behavioral control	4.36 ± 0.82	4.55 ± 0.76	-0.39 ± 0.10		426	<0.242
intention	4.95 ± 1.27	5.46 ± 1.25	-0.39 ± 0.10		426	<0.223
appropriateness	4.29 ± 0.59	4.50 ± 0.60	-0.39 ± 0.10		426	<0.622
management support	3.68 ± 1.06	4.12 ± 1.02	-0.39 ± 0.10		426	<0.886
change efficacy	4.40 ± 0.53	4.64 ± 0.54	-0.39 ± 0.10		425	<0.252
personal valence	2.41 ± 1.07	2.08 ± 1.07	-0.39 ± 0.10		426	<0.299

Appendix I. Comparison of mean scores by Nursing Education

	NsgEdur (mean ± std)		Difference in means	t-statistic		
	BSN n=183	Dip/AD n=141	(± std error)		df	p-value
attitude	5.39 ± 1.03	5.56 ± 1.02	-0.39 ± 0.10	-1.44	426	<0.782
subjective norm	3.94 ± 1.21	4.37 ± 0.94		-3.43	426	<0.004
perceived behavioral control	4.47 ± 0.80	4.40 ± 0.79	0.25 ± 0.05	0.83	426	<0.789
intention	5.41 ± 1.40	5.40 ± 1.12	0.25 ± 0.05	-1.90	426	<0.006
appropriateness	4.35 ± 0.61	4.49 ± 0.59	0.25 ± 0.05	-2.05	426	<0.989
management support	3.71 ± 1.13	4.13 ± 0.91	-0.39 ± 0.10	-3.58	426	<0.031
change efficacy	4.53 ± 0.58	4.58 ± 0.52	-0.39 ± 0.10	-0.788	425	<0.168
personal valence	2.17 ± 1.06	2.27 ± 1.09	-0.39 ± 0.10	-0.813	426	<0.442

Appendix J. Comparison of mean scores by Nursing Years

	NsgYrsr (mean ± std)		Difference in means	t-statistic		
	1-15 yrs n=215	16 & greater n=213	(± std error)		df	p-value
attitude	5.28 ± 1.02	5.68 ± 0.97	-0.39 ± 0.10	-4.12	426	<0.842
subjective norm	3.98 ± 1.12	4.26 ± 1.15	-0.39 ± 0.10	-2.53	426	<0.393
perceived behavioral control	4.38 ± 0.79	4.57 ± 0.77	-0.39 ± 0.10	-2.57	426	<0.704
intention	5.01 ± 1.24	5.48 ± 1.28	-0.39 ± 0.10	-3.85	426	<0.038
appropriateness	4.30 ± 0.59	4.52 ± 0.60	-0.39 ± 0.10	-3.80	426	<0.662
management support	3.75 ± 1.03	4.10 ± 1.07	-0.39 ± 0.10	-3.40	426	<0.331
change efficacy	4.48 ± 0.55	4.60 ± 0.54	-0.39 ± 0.10	-2.16	425	<0.654
personal valence	2.38 ± 1.07	2.06 ± 1.07	-0.39 ± 0.10	3.04	426	<0.560

Appendix K. Comparison of mean scores by ED RN Years

	EDRNYrsr (mean ± std)		Difference in means	t-statistic		
	1-10 yrs n=211	11 & greater n=217	(± std error)		df	p-value
attitude	5.36 ± 1.01	5.60 ± 1.01	-0.39 ± 0.10	-2.42	426	<0.696
subjective norm	4.01 ± 1.10	4.23 ± 1.18	-0.39 ± 0.10	-1.97	426	<0.358
perceived behavioral control	4.41 ± 0.77	4.51 ± 0.80	-0.39 ± 0.10	-1.63	426	<0.882
intention	5.08 ± 1.26	5.39 ± 1.29	-0.39 ± 0.10	-2.53	426	<0.089
appropriateness	4.32 ± 0.59	4.49 ± 0.60	-0.39 ± 0.10	-3.03	426	<0.586
management support	3.78 ± 1.02	4.06 ± 1.09	-0.39 ± 0.10	-2.71	426	<0.223
change efficacy	4.50 ± 0.52	4.58 ± 0.57	-0.39 ± 0.10	-1.34	425	<0.109
personal valence	2.36 ± 1.04	2.09 ± 1.10	-0.39 ± 0.10	2.51	426	<0.068

Appendix L. Comparison of mean scores by ED Facility Years

	ED FacilityYrsr (mean ± std)		Difference in means	t-statistic		
	1-5 yrs n=203	6-50 yrs n=223	(± std error)		df	p-value
attitude	5.34 ± 1.01	5.61 ± 1.01	-0.39 ± 0.10	-2.71	426	<0.603
subjective norm	3.97 ± 1.06	4.26 ± 1.21	-0.39 ± 0.10	-2.62	426	<0.092
perceived behavioral control	4.45 ± 0.76	4.49 ± 0.82	-0.39 ± 0.10	-0.51	426	<0.306
intention	5.06 ± 1.30	5.40 ± 1.24	-0.39 ± 0.10	-2.73	426	<0.431
appropriateness	4.34 ± 0.59	4.46 ± 0.61	-0.39 ± 0.10	-1.95	426	<0.691
management support	3.77 ± 1.00	4.07 ± 1.11	-0.39 ± 0.10	-2.95	426	<0.035
change efficacy	4.54 ± 0.53	4.53 ± 0.56	-0.39 ± 0.10	0.54	425	<0.169
personal valence	2.33 ± 1.03	2.14 ± 1.12	-0.39 ± 0.10	1.85	426	<0.028

Appendix M. Comparison of mean scores by ED Visits

	ED Visitsr (mean ± std)		Difference in means (± std error)	t-statistic	df	p-value
	20-60,000 n=200	61,000 & greater n=199				
attitude	5.50 ± 1.00	5.50 ± 1.03	-0.39 ± 0.10	-3.99	426	<0.613
subjective norm	4.17 ± 1.14	4.07 ± 1.16	-0.39 ± 0.10		426	<0.851
perceived behavioral control	4.47 ± 0.78	4.51 ± 0.81	-0.39 ± 0.10		426	<0.488
intention	5.33 ± 1.28	5.19 ± 1.30	-0.39 ± 0.10		426	<0.782
appropriateness	4.46 ± 0.60	4.37 ± 0.60	-0.39 ± 0.10		426	<0.647
management support	4.01 ± 1.11	3.80 ± 1.03	-0.39 ± 0.10		426	<0.382
change efficacy	4.58 ± 0.57	4.55 ± 0.55	-0.39 ± 0.10		425	<0.601
personal valence	2.13 ± 1.06	2.31 ± 1.11	-0.39 ± 0.10		426	<0.602

Appendix N. Comparison of mean scores of ED Nurse Role

	NsgRoler (mean ± std)		Difference in means (± std error)	t-statistic	df	p-value
	RN/CN I-V n=255	Mgr/Chgr/CNS Edu n=173				
attitude	5.45 ± 1.00	5.53 ± 1.03	-0.39 ± 0.10	-0.88	426	<0.129
subjective norm	4.14 ± 1.14	4.09 ± 1.16	-0.39 ± 0.10	0.49	426	<0.488
perceived behavioral control	4.45 ± 0.81	4.52 ± 0.76	-0.39 ± 0.10	-0.85	426	<0.125
intention	5.20 ± 1.24	5.30 ± 1.33	-0.39 ± 0.10	-0.83	426	<0.138
appropriateness	4.37 ± 0.59	4.46 ± 0.61	-0.39 ± 0.10	-1.49	426	<0.995
management support	3.88 ± 1.01	3.99 ± 1.14	-0.39 ± 0.10	-1.05	426	<0.010
change efficacy	4.52 ± 0.55	4.57 ± 0.54	-0.39 ± 0.10	-0.83	425	<0.824
personal valence	2.29 ± 1.05	2.13 ± 1.11	-0.39 ± 0.10	1.45	426	<0.258

Appendix O. Summary of significant main effect of IV and significant effect of CoV on DV

DV:IV - CoV	df	f	Sig	η^2
Attitude:PUGr				
IV:PUGr	1, 282	12.156	0.001	0.041
Subjective norm:PUGr				
IV:PuGr	1, 282	43.046	<0.001	0.132
CoV:UPCr	1, 282	4.647	0.032	0.016
CoV:NsgEdur	1, 282	8.041	0.005	0.028
Intention:PUGr				
IV:PUGr	1, 282	28.724	<0.001	0.092
CoV:Magnetr	1, 282	6.976	0.009	0.024
Overall Intention:PUGr				
IV:PUGr	1, 282	28.675	<0.001	0.092
CoV: Magnetr	1, 282	4.335	0.038	
Appropriateness:PUGr				
IV:PUGr	1, 282	15.676	<0.001	0.053
Mgmt Support:PUGr				
IV:PUGr	1, 282	52.144	<0.001	0.156
CoV:HospTyper	1, 282	4.946	0.027	0.017
CoV:NsgEdur	1, 282	14.503	<0.001	0.049
Chg Efficacy:PUGr				
IV:PUGr	1, 281	11.742	0.001	0.040
CoV:AgeGrpr	1, 281	6.934	0.009	0.024
Personal Valence:PUGr				
IV:PUGr	1, 282	13.523	<0.001	0.046
Overall Readiness:PUGr				
IV:PUGr	1, 282	19.319	<0.001	0.064
CoV:NsgEdur	1, 282	10.811	0.001	0.037
Attitude:NsgEdur				
CoV:PUGr	1, 282	12.156	<0.001	0.041
Subjective Norm:NsgEdur				
IV:NsgEdur	1, 282	8.041	0.005	0.028
CoV:UPCr	1, 282	4.657	0.032	0.016
CoV:PUGr	1, 282	43.046	<0.001	0.132
Intention:NsgEdur				
CoV:Magnetr	1, 282	6.976	0.009	0.024
CoV:PUGr	1, 282	28.724	<0.001	0.092
Overall Intention:NsgEdur				
CoV:Magnetr	1, 282	4.335	0.038	0.015
CoV:Nsgyrsr	1, 282	4.564	0.034	0.016

CoV:PUGr	1, 282	28,675	<0.001	0.092
Appropriateness:Nsg Edur				
CoV:PUGr	1, 282	15.676	<0.001	0.053
Mgmt Support:NsgEdur				
IV:NsgEdur	1, 282	14.503	<0.001	0.049
CoV:HospTyper	1, 282	4.946	0.027	0.017
CoV:PUGr	1, 282	52.144	<0.001	0.156
Chg Efficacy:NsgEdur				
CoV:PUGr	1, 281	11.742	0.001	0.024
CoV:AgeGrpr	1, 281	6.934	0.009	0.040
Personal Valence:NsgEdur				
CoV:PUGr	1, 282	13.523	<0.001	0.040
Overall Readiness:NsgEdur				
IV:NsgEdur	1, 282	10.811	0.001	0.037
CoV: PUGr	1, 282	19.319	<0.001	0.064
Attitude:HospTyper				
CoV:PUGr	1, 282	12.156	0.001	0.002
Subjective Norm:HospTyper				
CoV:UPCr	1, 282	4.647	0.032	0.016
CoV:PUGr	1, 282	43.046	<0.001	0.132
CoV:NsgEdur	1, 282	8.041	0.005	0.028
Intention:HospTyper				
CoV:Magnetr	1, 282	1.592	0.009	0.024
CoV:PUGr	1, 282	28.724	<0.001	0.092
Overall Intention:HospTyper				
CoV:Magnetr	1, 282	4.335	0.038	0.015
CoV:Nsgyrsr	1, 282	4.564	0.034	0.016
CoV:PUGr	1, 282	28.675	<0.001	0.092
Appropriateness:Hosp Typer				
CoV:PUGr	1, 282	15.676	<0.001	0.053
Management Support:HospTyper				
IV:HospTyper	1, 282	4.946	0.027	0.017
CoV:PUGr	1, 282	52.144	<0.001	0.156
CoV:NsgEdur	1, 282	14.503	<0.001	0.049
Chg				

Efficacy:HospTyper				
CoV:AgeGrpr	1, 282	6.934	0.009	0.024
CoV:PUGr	1, 282	11.742	0.001	0.040
Personal Valence:HospTyper				
CoV:PUGr	1, 282	13.523	<0.001	0.046
Overall Readiness:HospTyper				
CoV:PUGr	1, 282	19.319	<0.001	0.064
CoV:NsgEdur	1, 282	10.811	0.001	0.037
Attitude:EDRNyrsr				0.002
CoV:PUGr	1, 282	12.156	0.001	
Subjective Norm:EDRNyrsr				
CoV:UPCr	1, 282	4.647	0.032	0.016
CoV:PUGr	1, 282	43.046	<0.001	0.132
CoV:NsgEdur	1, 282	8.041	0.005	0.028
Intention:EDRNyrsr				
CoV:Magnetr	1, 282	6.976	0.009	0.024
CoV:PUGr	1, 282	28.724	<0.001	0.092
Overall Intention:EDRNyrsr				
CoV:Magnetr	1, 282	4.335	0.038	0.015
CoV:Nsgyrsr	1, 282	4.564	0.034	0.016
CoV:PUGr	1, 282	28.675	<0.001	0.092
Appropriateness:EDRNyrsr				
CoV:PUGr	1, 282	15.676	<0.001	0.053
Mgmt Support:EDRNyrsr				
CoV:PUGr	1, 282	52,144	<0.001	0.158
CoV:NsgEdur	1, 282	14.503	<0.001	0.049
CoV:HospTyper	1, 282	4.945	0.027	0.017
Chg Efficacy:EDRNyrsr				
CoV:AgeGrpr	1, 281	6.934	0.009	0.024
CoV:PUGr	1, 281	11.742	0.001	0.040
Personal Valence:EDRNyrsr				
CoV:PUGr	1, 282	13.523	<0.001	0.046
Overall Readiness:EDRNyrsr				
CoV: PUGr	1, 282	19.319	<0.001	0.064
CoV:NsgEdur	1, 282	10.811	0.001	0.037
Attitude:Nsgroler				

CoV:PUGr	1, 282	12.156	0.001	0.041
Subjective Norm:Nsgroler				
CoV:UPCr	1, 282	4.647	0.032	0.016
CoV:PUGr	1, 282	43.046	<0.001	0.132
CoV:NsgEdur	1, 282	8.041	0.005	0.028
Intention:Nsgroler				
CoV:Magnetr	1, 282	6.976	0.009	0.024
CoV:PUGr	1, 282	28.724	<0.001	0.092
Overall Intention:Nsgroler				
CoV:Magnetr	1, 282	4.335	0.038	0.015
CoV:PUGr	1, 282	28.675	<0.001	0.092
Appropriateness:Nsg roler				
CoV:PUGr	1, 282	15.676	<0.001	0.053
Mgmt Support:Nsgroler				
CoV: PUGr	1, 282	52.144	<0.001	0.159
CoV:NsgEdur	1, 282	14.503	<0.001	0.049
CoV:HospTyper	1, 282	4.946	0.027	0.017
Chg Efficacy:Nsgroler				
CoV:AgeGrpr	1, 282	6.934	0.009	0.024
CoV:PUGr	1, 282	11.742	0.001	0.040
Personal Valence:Nsg roler				
CoV:PUGr	1, 282	13.523	<0.001	0.046
Overall Readiness:Nsg roler				
CoV:PUGr	1, 282	19.319	<0.001	0.064
NsgEdur	1, 282	10.811	0.001	0.037
Attitude:EDRNfacilityr				
CoV:PUGr	1, 282	12.156	0.001	0.041
Subjective Norm:EDRNfacilityr				
CoV:UPCr	1, 282	4.647	0.032	0.016
CoV:PUGr	1, 282	43.046	<0.001	0.132
CoV:NsgEdur	1, 282	8.041	0.005	0.028
Intention:EDRN facility				
CoV:Magnetr	1, 282	6.976	0.009	0.024
CoV:PUGr	1, 282	28.724	<0.001	0.092
Overall Intention:EDRN facility				

CoV:Magnetr	1, 282	4.335	0.038	0.015
CoV:Nsgyrsr	1, 282	4.564	0.034	0.016
CoV:PUGr	1, 282	28.675	<0.001	0.092
Appropriateness:EDRN facilityr				
CoV:PUGr	1, 282	15.676	<0.001	0.053
Mgmt Support:EDRN facility				
CoV:PUGr	1, 282	52.144	<0.001	0.156
CoV:NsgEdur	1, 282	14.503	<0.001	0.049
CoV:HospTyper	1, 282	4.946	0.027	0.017
Chg Efficacy:EDRN facility				
CoV:AgeGrpr	1, 282	6.934	0.009	0.024
CoV:PUGr	1, 282	11.742	0.001	0.040
Personal Valence:EDRNfacilityr				
CoV:PUGr	1, 282	13.523	<0.001	0.046
Overall Readiness:EDRN facility				
CoV:PUGr	1, 282	19.319	<0.001	0.064
CoV:NsgEdur	1, 282	10.811	0.001	0.037

Chapter 5

CONCLUSION

This dissertation consists of three manuscripts: (1) an integrative review of psychometric properties of instruments used to measure nurses' knowledge of PU prevention; (2) an integrative review of nurses' readiness for evidence-based practice; and (3) an analysis of the influence of emergency RNs' characteristics and readiness for change on their intention to implement PU prevention guidelines. The information presented creates a foundation for future studies to test the feasibility in using a modified RFCQ and TPB questionnaire to assess readiness for and intention to implement PU prevention guidelines. The integrative review analysis of nurses' knowledge of PU prevention established the need for a valid and reliable instrument guided by a theoretical framework to measure nurses' knowledge and application of PU prevention. The readiness for change construct was delineated within the second manuscript as a precursor to implementing a change in nursing practice. Also, the integrative review analysis identified a paucity of nursing literature on nurses' readiness for change. This exploratory study demonstrated the usefulness of combining the Theory of Planned Behavior and readiness for change construct into one comprehensive assessment instrument to measure emergency RNs' readiness and intention to implement PU prevention guidelines. A comprehensive assessment instrument will fill the gap in research that identified the need to identify key factors that influence an emergency RNs' intention to implement PU prevention guidelines. Additionally, this dissertation has extended an understanding of the TPB model and the readiness for change construct that can be incorporated into change implementation plans within the healthcare industry.

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The Influence of Emergency RNs' Characteristics and Readiness for Change on Their Intention to Implement Pressure Ulcer Prevention Guidelines

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Introduction

- The focus of this research emerged from research pertaining to:
  - Hospital acquired pressure ulcers (HAPU),
  - Pressure ulcer (PU) prevention,
  - Emergency patients,
  - Emergency nursing,
  - Clinical practice guidelines,
  - Change readiness,
  - Theory of Planned Behavior

Significance of the Problem

- HAPU rate
  - 8.2% (2000)
  - 6.5% (2008)
- Risk of HAPU
  - 6.0% (2000)
  - 9.0% (2008)
- ED visits
  - ED pts
    - 4.9% incidence
    - 15.7% incidence in elderly
  - 30% of ED visits are elderly
  - ED length of stay – Avg 6 hrs
  - Tissue ischemia can begin in 2 hrs

Manuscripts

- **Manuscript 1:**
  - Measure nurses' knowledge of PU prevention
  - Integrative Review
  - Impact: knowledge is one only factor
- **Manuscript 2:**
  - Nurses' readiness for evidence-based practice
  - Integrative Review
  - Impact: readiness for change, Theory of Planned Behavior, implementation of PU prevention guidelines

Knowledge Gaps

- Readiness for change construct
- Emergency RNs' knowledge, skills, & attitudes toward implementation of PU prevention guidelines

Research Questions

- **1)** What are the underlying factors in the readiness for change construct and Theory of Planned Behavior (separately and combined) when used in a sample of emergency RNs' relative to implementation of PU prevention guidelines?

Research Questions

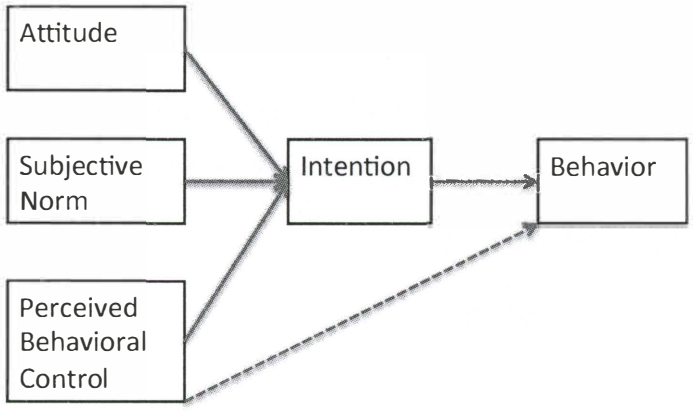
- **2)** What is the relationship between emergency RNs' readiness for change (appropriateness, management support, change efficacy, personal valence) and intention (attitude, subjective norm, perceived behavioral control) to implement PU prevention guidelines

Research Questions

- **3)** What is the relationship between personal (education level, years of emergency nursing experience), employment (nursing role, years employed as an emergency nurse in current facility), and system (facility type) characteristics of emergency RNs' with readiness for change and intention to implement PU prevention guidelines?

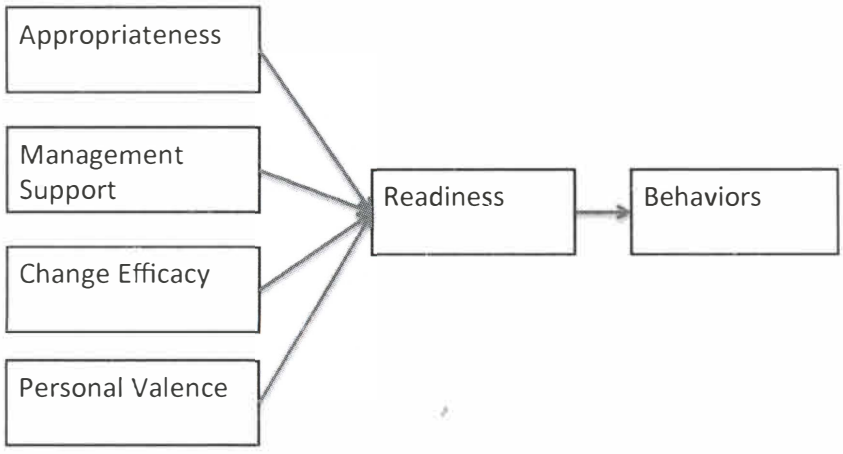
Theoretical Framework

Theory of Planned Behavior (adapted from Ajzen, 2006)



Conceptual Model

- Readiness for Change (adapted from Holt, et al., 2007)



Design

- Cross-sectional, descriptive study
- Web-based survey conducted throughout the United States
  - Direct contact – ENA conference, March 2013
  - Indirect contact by email

Methods

- Sample
  - Inclusion:
    - Adults (age 20 and above)
    - English-speaking, ability to read and write English
    - Currently employed as full-time, part-time, or per diem emergency RN
    - Membership in ENA was not required
  - Exclusion: emergency RNs without access to a computer with Internet capabilities

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Methods

- Survey Development
  - Content Validity
  - Cognitive Assessment
  - Pilot Testing

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Methods

- Final Instrument
  - PU Prevention definition
  - 3 Emergency patients at risk scenarios
  - 12 TPB items
  - 2 Change communication scenarios
  - 25 RFC items

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Measures
Conceptual & Operational Definitions

- Theory of Planned Behavior
  - **Attitude** - degree to which performance of the behavior is positively or negatively valued
  - **Subjective Norm** - perceived social pressure from important people to engage or not engage in a behavior
  - **Perceived Behavioral Control** – confidence one's ability to perform a behavior
  - **Intention** - individual's readiness to perform a behavior
  - **Overall score** for each variable = mean score of the items

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Measures
Conceptual & Operational Definitions

- Readiness for Change
  - **Appropriateness** – beliefs about the need for change & organization will benefit
  - **Management Support** – believes organization leadership and management are committed
  - **Change Efficacy** - extent individual will benefit from implementation
  - **Personal Valence** – individual does or does not have the skills
  - Overall variable score = mean score of the items

Data Analysis

- **Descriptive statistics** = frequencies, mean, SD
- **RQ1** = exploratory factor analysis
- **RQ2 & RQ3** = independent t-test, ANCOVA, MANOVA, regression

** SPSS version 20

Age in years: mean (SD)	43 (11.5)
Gender (female): n (%)	372 (87%)
Highest Education Level	
Diploma/AD	141 (33%)
BSN	183(43%)
Clinical Certifications	
CEN	176 (41%)
Other Certifications	149 (35%)
Not Certified	179 (42%)
Nursing Experience: mean (SD)	
Years of Nursing Experience	17.5 (11.5)
Years of Emergency Nursing	12.8 (9.8)
Years of Emergency Nursing in Current Facility	8 (7.7)
Emergency Nursing Role: n (%)	
RN/CNI-V	255 (60%)
Manager/Charge Nurse/CNS/Education	173 (40%)
Employment Status: n (%)	
Full Time	349 (82%)
Other	79 (18%)
Healthcare Facility Type: n (%)	
Community/Rural	224 (52%)
Urban-Teaching/Non-Teaching	204 (48%)
ED Annual Visits: n (%)	
≤ 60,000	200 (47%)
> 60,000	199 (46%)
Missing	30 (7%)
ED Care by Patient Type: n (%)	
Adult	171 (40%)
Adult/Pediatric	235 (55%)
Other	22 (5%)
Magnet/Pathway Designation: n (%)	
Yes	168 (39%)
No	260 (61%)
Unit-Based Practice Council: n (%)	
Yes	317 (74%)
No	111 (26%)

TABLE 1: NURSE CHARACTERISTICS (N=428)	
Employment Status: n (%)	
Full Time	349 (82%)
Other	79 (18%)
Healthcare Facility Type: n (%)	
Community/Rural	224 (52%)
Urban-Teaching/Non-Teaching	204 (48%)
ED Annual Visits: n (%)	
≤ 60,000	200 (47%)
> 60,000	199 (46%)
Missing	30 (7%)
ED Care by Patient Type: n (%)	
Adult	171 (40%)
Adult/Pediatric	235 (55%)
Other	22 (5%)
Magnet/Pathway Designation: n (%)	
Yes	168 (39%)
No	260 (61%)
Unit-Based Practice Council: n (%)	
Yes	317 (74%)
No	111 (26%)
Using PU Prevention Guidelines: n (%)	
Yes	130 (30%)
No	144 (34%)
Sometimes	116 (27%)
Discussed not implemented	38 (9%)

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Readiness for Change

Table 2. Readiness for Change						
Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.965	35.858	35.858	4.732	18.953	18.953
2	2.969	11.874	47.733	4.161	16.642	35.595
3	1.843	7.373	55.105	3.303	13.211	48.806
4	1.189	4.757	59.863	2.764	11.056	59.863

TABLE 3: READINESS FOR CHANGE				
	1	*2*	*3*	*4*
Appropriateness	.770			
Appropriateness	.776			
Appropriateness	.764			
Appropriateness	-.742			
Appropriateness	-.638			
Change Efficacy	.638			
Appropriateness	.604			
Appropriateness	.572			
Change Efficacy	.444			
Management Support		.834		
Management Support		.833		
Management Support		.825		
Management Support		.820		
Management Support		-.500		
Personal Valence			.723	
Personal Valence			.691	
Personal Valence			.680	
Change Efficacy			-.656	
Change Efficacy			.511	
Change Efficacy			-.502	
Appropriateness				.743
Appropriateness				.706
Change Efficacy				.636
Change Efficacy				.618

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Table 4. Theory of Planned Behavior						
Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.158	42.987	42.987	3.529	29.408	29.408
2	1.419	11.824	54.811	2.345	19.541	48.949
3	1.018	8.485	63.296	1.722	14.346	63.296

Table 5. Theory of Planned Behavior			
	1	2	3
Attitude	.862		
Attitude	.835		
Attitude	.816		
Intention	.667		
Intention	.602		
Intention	.561		
Perceived Behavior Control	.406		
Subjective Norm		.713	
Subjective Norm		.707	
Subjective Norm		.687	
Perceived Behavior Control			-.799
Perceived Behavior Control			.683

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Figure 1. Theory of Planned Behavior

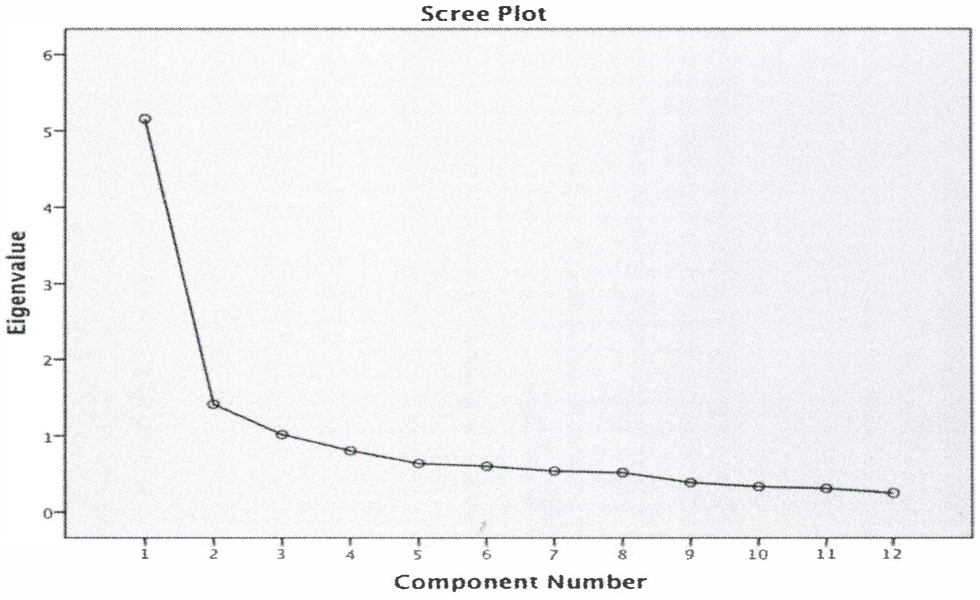

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Table 6. Combined Theory of Planned Behavior and Readiness for Change – Total Variance Explained

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	12.757	34.478	34.478	5.696	15.395	15.395
2	3.388	8.157	43.635	4.758	12.859	28.255
3	2.012	5.437	49.072	3.631	9.815	38.069
4	1.590	4.298	53.371	3.134	8.470	46.539
5	1.229	3.321	56.692	2.464	6.660	53.199
6	1.146	3.096	59.788	2.003	5.415	58.613
7	1.060	2.864	62.652	1.494	4.039	62.652

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Table 7. Combined Theory of Planned Behavior & Readiness for Change							
	1	2	3	4	5	6	7
Attitude	.724						
Attitude	,725						
Attitude	.715						
Intention	.686						
Intention	.666						
Intention	.654						
Appropriateness	.562						
Subjective Norm	.451						
Appropriateness	.440						
Subjective Norm	.432						
Management Support		.831					
Management Support		.826					
Management Support		.819					
Management Support		.806					
Management Support		.804					
Management Support		-.505					
Appropriateness			.637				
Appropriateness			.603				
Change Efficacy			-.602				
Appropriateness			.578				
Appropriateness			-.565				
Appropriateness			-.514				
Change Efficacy			.435				

Table 7. Combined Theory of Planned Behavior & Readiness for Change							
	1	2	3	4	5	6	7
Change Efficacy				.711			
Personal Valence				-.688			
Personal Valence				-.678			
Personal Valence				-.625			
Appropriateness					.725		
Appropriateness					.721		
Change Efficacy					.630		
Change Efficacy						-.599	
Perceived Behavioral Control						.512	
Change Efficacy						.472	
Change Efficacy						.458	
Perceived Behavioral Control							-.687
Perceived Behavioral Control							.612
Subjective Norm							.519

Results

- RQ3 – Independent t-tests
  - Independent Variables
    - 2 groups per characteristic
    - Personal: gender, age in years, education level by degree, clinical certification, years of nursing experience, years of emergency nursing
    - Employment: years employed as an emergency RN in current facility, nursing role by title, employment status by category
    - System: hospital type, ED annual visits by range, emergency care by patient type
  - Dependent Variables
    - TPB: attitude, subjective norm, perceived behavioral control, intention
    - RFC: appropriateness, management support, change efficacy, personal valence

RQ2 Independent t-tests

Subjective Norm

Higher	Lower	p value
Community/rural hospital	Urban Teaching/non-teaching hospital	p = 0.055
Diploma/AD nursing education	BSN nursing education	p = 0.004

RQ2 Independent t-tests

- Intention

Higher	Lower	p value
BSN	Diploma/AD nursing education	p = 0.004
>16 years nursing experience	≤ 16 years nursing experience	p = 0.038

Results

Appropriateness

Higher	Lower	p value
Yes, using PU guidelines	No, not using PU guidelines	p = 0.006

Results

Management Support

Higher	Lower	p value
Diploma/AD nursing education	BSN nursing education	p = 0.031
>6 years emergency nursing in current facility	≤6 years emergency nursing in current facility	p = 0.035
Manager/Charge Nurse/CNS/ Educator	RN/CNI-V	p = 0.010

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Changing What's Possible

MUSC Health
MEDICAL UNIVERSITY of SOUTH CAROLINA

RQ2 Independent t-tests

Personal Valence

Higher	Lower	p value
≤ 6 years emergency nursing in current facility	>6 years of emergency nursing in current facility	p = 0.028

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Changing What's Possible

MUSC Health
MEDICAL UNIVERSITY of SOUTH CAROLINA

RQ2 ANCOVA

Independent & CoVariate Variables

- 2 groups per characteristic
- Personal: gender, age in years, education level by degree, clinical certification, years of nursing experience, years of emergency nursing
- Employment: years employed as an emergency RN in current facility, nursing role by title, employment status by category
- System: hospital type, ED annual visits by range, emergency care by patient type

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RQ2 ANCOVA

- Statistically significant differences were found between several RNs' characteristics and readiness for change and TPB variables.

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RQ2 ANCOVA

- Most common covariate with statistically significant main effects on the dependent variables were:
  - Use of PU guidelines
  - Unit-based practice council
  - Magnet designation
  - Hospital type
  - Nurse education
  - Number of nursing years
  - Age groups

RQ2 ANCOVA

- Inclusion of CoVs [use of PU guidelines, unit-based practice council, nursing education, Magnet designation, hospital type, age group] resulted in statistically significant ANCOVA models with the use of PU guidelines as IV and using the DV: attitude, subjective norm, intention, appropriateness, management support, change efficacy, and personal valence.

- Overall, the CoV effect size was small, 0.015 to 0.169

RQ2 MANOVA

- Only one IV, using PU guidelines, showed a statistically significant small effect on the DVs:
  attitude, subjective norm, intention, appropriateness, management support, change efficacy, and personal valence.

Table 8. Stepwise Multiple Regression Coefficients

Model	Unstandardized Coefficients β	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig
Step 1					
Constant	.408	.280		1.458	.146
Attitude	.887	.050	.702	17.646	.000
Step 2					
Constant	-1.297	.358		-3.625	.000
Attitude	.657	.057	.520	11.462	.000
Appropriateness	.672	.096	.316	6.972	.000
Step 3					
Constant	-1.480	.338		-4.383	.000
Attitude	.573	.055	.453	10.341	.000
Appropriateness	.542	.093	.255	5.844	.000
Subjective Norm	.295	.045	.255	6.562	.000
Step 4					
Constant	-1.919	.372		-5.162	.000
Attitude	.554	.055	.438	10.014	.000
Appropriateness	.514	.092	.242	5.570	.000
Subjective Norm	.285	.045	.247	6.386	.000
Perceived Behavioral Control	.158	.059	.098	2.701	.007

Dependent variable: intention

Discussion

- RQ1: TPB & RFC underlying structures (separately & combined)
  - RFC: 4 components
  - RFC: statistically significant relationships with appropriateness, management support, change efficacy, and personal valence
  - Similar findings Holt, et al., 2007; Kavaliauskaite, 2010
  - TPB: 2 rather than 3 components
  - TPB: strong relationship between attitude and intention
  - Similar findings by Blake & White, 2010 in using TPB when there is a lack of prior experience
  - Combined: 7 components: mix RFC & TPB (1,5); management support (2); appropriateness (3), personal valence (4), change efficacy (6), perceived behavioral control (7)
  - Combined: new latent variables

Discussion

- RQ2 & 3 Relationship Among Variables & RN Characteristics
  - Statistically significant findings between groups of emergency RN characteristics
  - Statistically significant CoV findings, yet effect was small
  - MANOVA: Using PU guidelines statistically significant, yet small effect on DV

Discussion

- RQ2 & 3 Relationship Among Variables & RN Characteristics
  - Statistically significant regression model, 4 components: attitude, appropriateness, perceived behavioral control, subjective norm

Limitations

- Sample
- Self-report, web-based survey design

Conclusion & Implications

Questions & Answers