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The effect of using a turn clock to cue patient repositioning for pressure ulcer prevention in an acute care setting

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THE EFFECT OF USING A TURN CLOCK TO CUE PATIENT REPOSITIONING FOR PRESSURE ULCER PREVENTION IN AN ACUTE CARE SETTING

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THE EFFECT OF USING A TURN CLOCK TO CUE PATIENT REPOSITIONING FOR PRESSURE ULCER PREVENTION IN AN ACUTE CARE SETTING

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ABSTRACT

Hospital-acquired pressure ulcers, a nursing care quality indicator, are becoming increasingly common in United States acute care facilities. In fiscal year 2007, the Centers for Medicare and Medicaid Services (CMS) recorded 257,412 "avoidable" Stage III and Stage IV pressure ulcers acquired in our nation's hospitals on patients who were admitted to receive care for their primary diagnosis (CMS, 2007). Pressure ulcers are associated with pain and suffering, loss of function, increased length of stay, increased morbidity and mortality, and significant financial burden (Ayello & Lyder, 2008). In October 2008, the CMS discontinued payments for additional costs associated with pressure ulcers acquired during hospitalization, leading to significant financial implications for acute care facilities and increased interest in pressure ulcer prevention programs (CMS, 2008). Repositioning patients approximately every two hours is a foundational element in preventing pressure ulcers (Ayello & Lyder, 2007).

The purpose of this investigation was to determine if there is a difference in documented patient care staff repositioning behaviors when a turn clock is used to cue patient repositioning. Data collected can assist nursing leadership in improving pressure ulcer prevention, thus increasing patient safety.

This investigation utilized a convenience sample of patient care staff ($N = 38$) on the oncology unit of a midwestern regional medical facility. Patient care staff assigned to patients with a pressure ulcer risk assessment score on the Braden Scale of 18 or less were included in the investigation. A power analysis provided an estimated result of 392. For both the pre-intervention phase (not cueing with a turn clock) and the intervention phase (cueing with a turn clock) of the investigation, 392 patient care staff documentations of "every two hour" patient repositions were assessed ($N = 784$). The data were obtained from the facility's electronic medical record repositioning documentation.

The research question was, "In the acute care setting, is there a statistically significant difference between documented patient care staff repositioning behaviors cued with a turn clock (post-intervention) and those not cued with a turn clock (pre-intervention)?" This question included several comparison analyses.

Pre-intervention and post-intervention repositioning documentation for positioning intervals were compared. Pre-intervention data ($n = 392$) revealed 289 repositions occurring approximately every two hours while 103 repositions did not occur approximately every two hours. Post-intervention data ($n = 392$) results showed an increase to 318 repositions occurring approximately every two hours with a decrease to 74 repositions that did not occur approximately every two hours. A chi-square analysis was computed to determine if there was a difference between the number of times that staff documented repositions approximately every two hours. Findings indicated that staff cued with a turn clock were significantly more likely to reposition their patients

approximately every two hours than staff who were not cued with a turn clock, X^2 (1, N = 784) = 6.14, p < .05.

A post-hoc analysis was completed on the post-intervention data to compare the documented positions with the positions specified on the turn clock-repositioning schedule. Only the documented intervals that included a lateral or back reposition in the bed were included (N = 313). A sign test analysis was computed to determine whether the number of correctly documented positions (n = 169) was significantly greater than the number of incorrectly documented positions (n = 144) and if the number of correctly documented positions was greater than chance. Findings indicated that the correctly documented positions were not significantly greater than the incorrectly documented positions (p = .0874), thus the probability of a correctly documented position were no greater than chance based on the specified .05 significance level.

Results of this investigation have shown that use of the turn clock as a cue for patient repositioning significantly increased documented staff repositioning behaviors at approximately every two-hour intervals. However, the turn clock was not shown to be an effective means for ensuring repositions to specified positions.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDIXES

CHAPTER 1 – INTRODUCTION

Pressure ulcers have been a problem for patients and health care providers for centuries (Institute for Healthcare Improvement [IHI], 2007). Since the days of Nightingale, pressure ulcer (PrU) development has been associated with poor nursing care (Lyder, 2006). Hospital-acquired pressure ulcers (HAPUs), considered to be reasonably preventable (Lyder, 2003), are a significant issue for this country's acute care facilities and are becoming increasing common in our nation's hospitals (Ayello & Lyder, 2007; Wurster, 2007).

Previously called bedsores, pressure sores, or decubitus ulcers (Pieper, 2007), PrUs are generally located over bony prominences. In 2007, the National Pressure Ulcer Advisory Panel (NPUAP) redefined a PrU as "a localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear and/or friction" (NPUAP, 2007a, ¶ 4). While many contributing factors are associated with PrU development, these lesions usually develop as a result of soft tissue compression between a bony prominence and an external surface for a prolonged period of time (NPUAP, 2007a; Pieper, 2007). If pressure is not relieved, ischemia and necrosis of the affected tissue will ultimately develop (Pieper, 2007), often before any visible signs are present on the surface of the skin.

The last several decades have brought multiple changes to the health care arena in the United States, which significantly affect the subject of HAPUs (Aiken, Clarke, Sloane, Sochalski, & Silber, 2002; Page, 2004), including insurance reimbursement modifications, cost-containment efforts, and rapid increases in health care technology.

Shorter hospital stays, an aging nursing work force, sicker and more technology-dependent patients, an increase in the elderly population, and a serious hospital nursing shortage have compounded the situation. These issues translate into heavier workloads for nurses and increased demands on nursing's time, including greater responsibilities, interruptions in the workflow, and increased documentation requirements (Page, 2004). Transformations affecting nurses' work environment can contribute to health care mistakes, including errors of omission.

Superman actor Christopher Reeves' death from an infected Stage IV PrU in 2004 caused an unprecedented amount of public interest and outcry regarding the topic of PrUs and patient safety (Catania et al., 2007). This public awareness led to unexpected changes in policy and healthcare expectations in terms of patient safety and pressure ulcer prevention (PUP). One important recent safety-based initiative is *The Five Million Lives Campaign* from the IHI (IHI, 2007), which purposed six innovative interventions to save patient lives and prevent injuries. One of these interventions is to prevent PrUs by the use of scientifically based guidelines (IHI, 2008). A number of health care organizations are now increasing efforts to eliminate HAPUs, including the National Quality Forum (NQF), Healthy People 2010, the Centers for Medicare and Medicaid Services (CMS), and The Joint Commission (The Joint Commission, 2008).

One of the most compelling reasons for promoting PUP in today's health-care scene is the rule change initiated by the CMS (CMS, 2007), seemingly based on the controversial belief that all PrUs are preventable (Wound Ostomy and Continence Nurses Society [WOCN], 2009). This rule change, which became effective October 2008,

discontinued the higher Diagnostic Related Grouping (DRG) payments to hospitals for Stage III and IV PrUs that were not present when the order for admission was written.

A number of elements have been included in recent successful PUP studies, including timely PUP risk assessment, moisture management, daily skin inspection, optimal nutrition and hydration, and minimizing pressure (Ayello & Lyder, 2007; Baldelli & Paciella, 2008; Catania et al., 2007; Courtney, Ruppman, & Cooper, 2006; Gibbons, Shanks, Kleinhelter, & Jones, 2006; Griffin, Cooper, Horack, Klyber, & Schimmelpfenning, 2007). The IHI (2008) noted that repositioning patients approximately every two hours is one of the key elements in PUP which has been proven to be especially effective in minimizing the effects of pressure. This investigation examined the effectiveness of a turn clock tool to cue patient care staff to reposition patients considered at risk for PrU at approximately two hour intervals.

Statement of the Problem

HAPUs are a major problem in our nation's hospitals. In fiscal year 2007, the CMS recorded 257,412 avoidable stage III and IV PrU cases (see Chapter II for PrU stage descriptions) acquired in acute care facilities alone (CMS, 2008). Approximately 60,000 acute care patients die each year from complications resulting from HAPUs (Redelings, Lee, & Sorvillo, 2005). Levenson (2004) stated that PrUs were listed as one of the top three hospital errors that eventually resulted in patient deaths in 2000 and 2001. More recently, a study by the National Center for Patient Safety (2008) revealed that HAPUs were included among the most common types of medical errors in acute care from 2004 to 2006. Lyder and Ayello (2008) warned that with our nation's aging

population, increasingly fragmented care, and the nursing shortage, the incidence of HAPUs would most likely continue to rise. Hospitalized elderly patients are much more prone to PrUs due to their skin changes and comorbidies, creating an even more pressing issue. PrUs are associated with human pain and suffering, increased length of hospital stay, serious infections or sepsis, loss of function, morbidity and mortality, and significant financial burden (Ayello & Lyder, 2008; Reddy, Gill, & Rochon, 2006).

Treatment for PrUs is expensive. Lyder and Ayello (2008) reported that the cost of treating one PrU is 2.5 times that of prevention. The average cost per HAPU was estimated at $43,180 per hospitalization (CMS, 2008) while the total cost for treatment of HAPUs in the United States is approximately $11 billion per year (Reddy et al., 2006; Redelings et al., 2005). Losing the CMS reimbursement monies has forced acute care facilities to place a far greater importance on effective PUP practices.

Hundreds of articles have been written in regards to PUP (Gibbons et al., 2006). However, very little scientifically validated evidence actually exists in regards to nursing knowledge and practice regarding prevention of PrUs. The purpose of regularly repositioning patients is understood to redistribute pressure and maintain circulation to vulnerable tissues, diminishing the risk of PrU development. Conclusive research does not exist to suggest exactly *how often* patients must be repositioned to prevent ischemia of soft tissue, although two hours in a single position is the maximum duration of time currently recommended for patients with a normal circulatory capacity (IHI, 2008). Repositioning patients approximately every two hours is a foundational element in most PUP protocols and successful studies (Ayello & Lyder, 2007; Baldelli & Paciella, 2008;

Catania et al., 2007; Courtney et al., 2006; Gibbons et al., 2006, Griffin et al., 2007). Investigations such as this are crucial to identify if a turn clock tool is an effective repositioning cue for patient care staff.

Purpose of the Investigation

The purpose of this investigation was to determine if there is a difference in patient care staff repositioning behaviors when a turn clock is used to cue patient repositioning for patents at risk for PrUs in the acute care setting. No studies have been published to determine the actual effect of the turn clock on patient care staff repositioning behavior. Data collected can assist nursing leadership in acute care facilities improve PUP, thus increasing patient safety.

Significance of the Investigation

Nursing, the largest profession of the health care workforce in the U.S., is at the forefront of protecting and safeguarding the patient from HAPUs (Lyder & Ayello, 2008, Page, 2004). Hospital surveyors often equate HAPU occurrences with neglect (Robinson et al., 2003). Thus, maintaining skin integrity and PUP is a vital part of nursing care. The development and progression of HAPUs can be affected by the behaviors of patient care staff (Pokorny, Koldjeski, & Swanson, 2003).

Although PUP requires a multi-disciplinary approach, HAPUs are considered to be nursing care quality indicators. In 1995, the American Nurses Association (ANA, 2004) proclaimed that the maintenance of skin integrity is a nursing-sensitive process indicator that reflects the quality of nursing care. Wurster (2007) stated, “a hallmark of quality nursing care is excellent skin care” (p. 267). Wurster suggested that greater

quality of care leads to improved patient outcomes, with HAPU development suggesting a direct link to the nursing care issues.

Maintaining a culture of PUP on an acute care unit is often difficult to sustain and requires support of administration (Lyder & Ayello, 2008). Bryant and Nix (2007) noted that there has historically been a gap in health care between what is known by nursing and what is practiced. Thus, an effective nurse leader is paramount in improving patient outcomes while assisting staff towards best practices. Undeniably, nursing practice is experiencing a time of rapid changes, which represents a significant challenge for nurse leaders. Change can be uncomfortable for many nurses since it disrupts normal routines, generally increases workloads, and often is perceived as only temporary. To ensure unit success of an aspect of patient care, it is necessary for nurse leaders to motivate the staff while adopting a consistent, collaborative, knowledgeable, and evidence-based approach towards best practice (Wurster, 2007). Attitudes, unit culture, staffing levels, motivation, and lack of administration support by nurse leaders may be factors affecting the investigation's outcome and be applicable for further research.

This investigation will provide baseline information regarding the effectiveness of the turn clock tool as well as additional conclusive information in terms of PUP in the acute care setting. The focus of the investigation will be to determine whether the use of a turn clock tool affects repositioning behaviors of patient care staff for acute care patients at-risk for development of PrUs. The information gained may be an opportunity to improve nursing practice and patient safety/outcomes.

Theoretical Framework

The theoretical framework for this investigation was based on Orem's Theory of Nursing Systems (2001) for nursing agency. The Theory of Nursing Systems is one aspect of Orem's general theory, the Self-Care Deficit Nursing Theory, which explains how people can be helped by nursing actions (Foster & Bennett, 2002). Integrated within Orem's theories are central concepts relating to a patient's ability to perform usual self-cares and the need for nursing interventions. A peripheral concept incorporated in these theories is *basic conditioning factors* such as age, health state, and health care system factors (Foster & Bennett, 2002). *Nursing agency*, the ability of a nurse to aid a patient in meeting self-care needs, is an important term in the Theory of Nursing Systems. When a person's self care needs exceed his/her ability to meet these needs (self-care deficit), nursing agency is needed (Foster & Bennett, 2002).

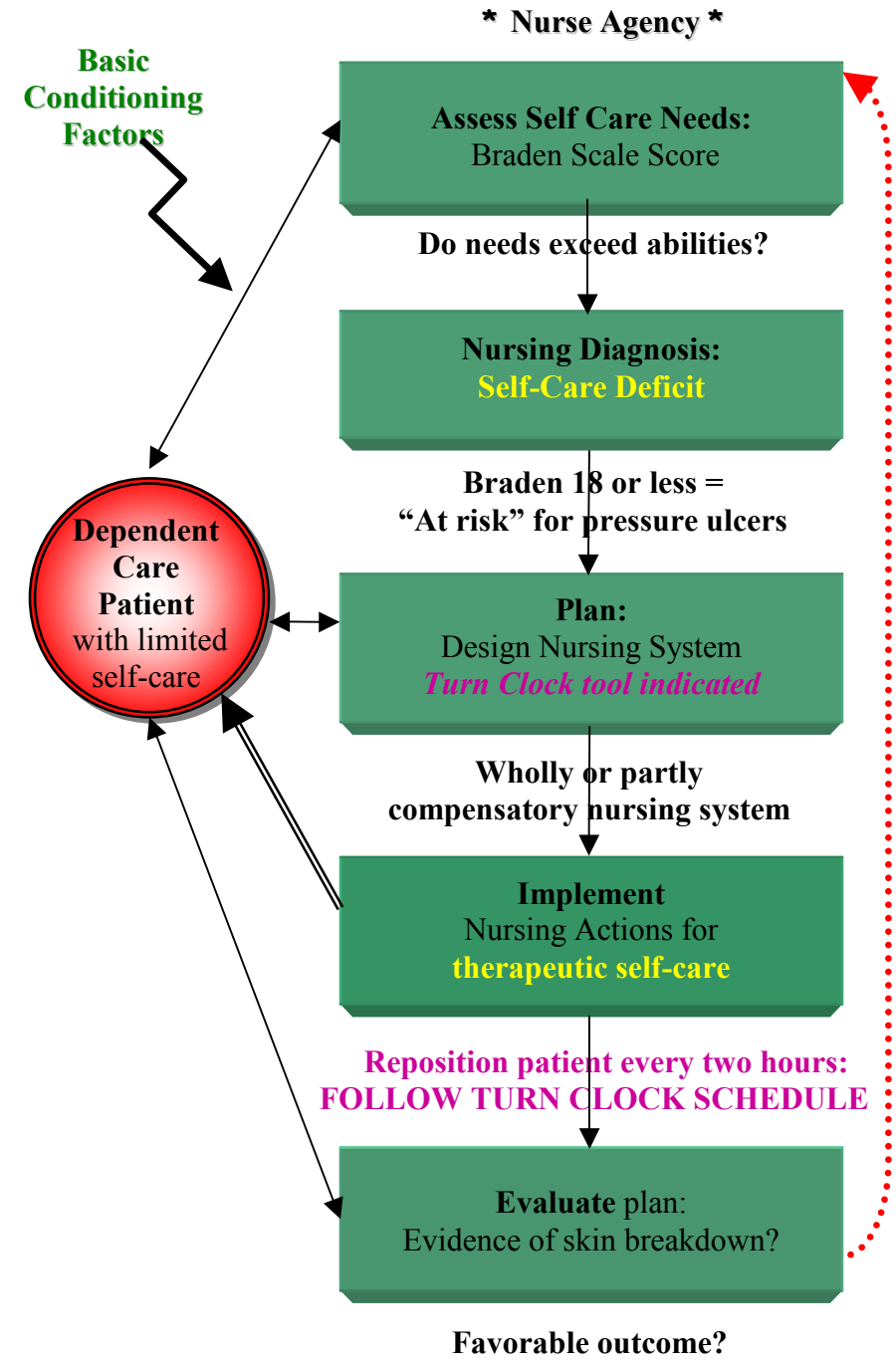
Taylor (2002) described Orem's nursing systems as wholly compensatory, partly compensatory, and supportive-educative. Only the wholly and partly compensatory systems will be considered in the framework of this investigation. Many hospitalized patients are unable to meet their own self-care needs. These patients require a *wholly compensatory system* for therapeutic self-care, which compensates for their inability to engage in their own self-care, and supports and protects them while they are unable to care for themselves. Other patients are able to perform some of their own activities of daily living but still need a measure of help from others, requiring the *partly compensatory nursing system* to assist as required. Patients at risk for HAPUs would require either the wholly compensatory or partly compensatory nursing system.

Orem viewed nursing as a helping service in relation to the nature and extent of patients' self-care limitations (Orem, 2004). For successful PUP, it is essential to identify acute care patients at risk for PUs and immediately implement reliable prevention aspects for all patients identified as being at risk (IHI, 2008). A nurse caring for a patient with a self-care deficit would assess the patient to determine PrU risk. The facility in this investigation uses the copyrighted Braden Scale (Braden & Bergstrom, 1988) as a PrU risk assessment tool (see Appendix A). Patients with Braden Scale scores 18 or less are classified "at risk" for PrUs. A nurse would also assess the patient for basic nursing needs and would consequently design a nursing system to meet these needs. This nursing system would include an appropriate plan of care, including posting a turn clock to cue patient repositions every two hours. The nurse agent would then decide to engage or not engage in this behavior. An evaluation of the care provided for favorable outcomes would follow (see Figure 1).

Definitions of Variables

For the purpose of this investigation, the following terms were used:

1. Patient Care Staff: Theoretically, patient care staff is defined as (1) the assigned employees of a facility who provide direct care to patients with self-care deficits, (2) an individual engaging in nursing agency, and (3) individuals assigned as "regular staff" to the unit receiving the intervention. The operational definition included the acute care employees of the investigational facility's oncology unit, including Registered Nurses (RNs) and Licensed Practical Nurses (LPNs) licensed to practice in the state of Kansas and



◆ Investigational Aspects

◆ Orem's Theory of Nursing Systems

Figure 1. Schematic Model of Investigational Framework

unlicensed assistive personnel (certified nursing assistants [CNA's] and nurse technicians [NTs]) who have completed a certification course.

2. Patient: Theoretically, a patient is defined as an individual who is under the care of a health care professional (Orem, 2001). Operationally, a patient was defined as an individual who is receiving care on the hospital unit during the investigation.
3. At-risk patient: Theoretically, an at-risk patient is defined as an individual under the care of a health care professional who exhibits qualities that renders him/her vulnerable to specific complications. Operationally, an at-risk patient was defined as an individual under the care of a health care professional who is at increased risk for development of a PrU with a Braden Scale Scores (see Appendix A) of 18 or less (Braden & Bergstrom, 1988).
4. Turn clock: Theoretically, a turn clock is defined as a cue to patient care staff to remember to reposition patients. Operationally, a turn clock was defined as an image of a clock face on a paper that was posted on the room door of patients with Braden Scale Scores 18 or less. Positions were individualized for patient needs by nurses writing the expected positions on this paper clock. Instructions for use were included on the turn clock tool.
5. Patient-repositioning behaviors (or repositioning behaviors): Theoretically, patient-repositioning behaviors is defined by the activity of patient care staff members as they reposition at-risk patients to prevent HAPUs and other complications of immobility. Operationally, patient-repositioning behaviors

was defined as documented repositions by patient care staff according to the schedule posted on the turn clock while patients in their care remain at-risk for PrUs (Braden Scale Score of 18 or less).

Research Question

The research question for this investigation was as follows:

1. In the acute care setting, is there a statistically significant difference between documented patient care staff repositioning behaviors cued with a turn clock (post-intervention) and those not cued with a turn clock (pre-intervention)?"

Assumptions

The assumptions for this investigation are listed below:

1. The theory of nursing systems explained how nursing agency (patient care staff) assists a patient in meeting self-care needs for positive patient outcomes.
2. Patient care staff correctly assessed PrU risk by the Braden Scale assessment.
3. Patient care staff desired to care for patients to the best of their ability to prevent development of PrUs.

Delimitations

The delimitations for the investigation are delineated below:

1. The patient care staff may have unintentionally skewed results by awareness that they are in an investigation.
2. This investigation collected data on patient care staff repositioning behaviors on at-risk patients only within the selected facility, which is a small convenience sample.

Limitations

The limitations for this investigation are listed below:

1. The investigational time frame may have fallen on periods of unusual conditions in terms of patient population, acuity, and census.
2. The investigational time frame may have fallen on periods of unusual staffing conditions.
3. This investigation included a *non-randomized* and small patient and staff convenience sample, which leads to concerns about generalizability to the general population and threats to external validity.

Summary

Investigations such as this must occur to determine if the use of a turn clock has an effect on patient care staff repositioning behaviors caring for patients at-risk of HAPUs. Using alerts or cues to remind staff to reposition patients have been shown to be helpful (Ayello & Lyder, 2008) unless there are barriers to these behaviors (Moore & Price, 2004). Nursing leadership will benefit from information gained in investigations such as this.

HAPUs are an undesirable nursing outcome associated with multiple serious and detrimental effects to patients as well as to a hospital's reputation. It is important to spare patients pain and suffering by preventing HAPUs. Since the CMS views HAPUs as reasonably preventable and the new CMS ruling blocks reimbursement for development of Stage III and IV HAPUs, nursing is entering a new era of accountability in terms of PUP. Chapter II will provide a review of the literature on the topic.

CHAPTER II – REVIEW OF LITERATURE

Chapter I addressed the need for nursing research to determine if a turn clock tool would significantly affect patient-repositioning behavior. Chapter II will explore theoretical and research literature that will portray the historical and clinical significance of pressure ulcer (PrU) prevention, etiology, risk assessment, and risk factors of PrUs, and pressure ulcer prevention (PUP) measures with an emphasis on repositioning patients approximately every two hours.

In the early 1900s, the average lifespan for Americans was 47.9 years. People generally died too early for their skin to age or become fragile. Recent data showed that the average lifespan has increased to 77.8 years and continues to rise (Centers for Disease Control & Prevention [CDC], 2007). Elderly patients' skin is significantly more prone to breakdown and PrUs. Krapfl and Gray (2008) warned "we are approaching a perfect storm, where our population is becoming older, sicker, and heavier" (p. 576), resulting in increasing numbers of patients who need PUP at a time when the nursing workforce is aging, combating high censuses, multiple distractions, and staff shortages. Nursing behaviors often determine whether an at-risk patient will develop a PrU or not.

PUP has been an important component of care since ancient times (Armstrong et al., 2008). Rafferty and Traynor (2002) proclaimed that the subject of PrUs is practically synonymous with nursing research. This subject was one of the earliest nursing problems to be researched. However, very few subjects have ever occupied the attention of researchers to this magnitude with so little actual results. Reddy et al. (2006) presented a systematic review of randomized clinical trials regarding PUP strategies and found only a

few methodologically sound trials showing strong evidence of preventative interventions. Thus, minimal conclusive evidence is available for evidenced-based practice (EBP). Since PrUs have been described as one of the most costly and physically debilitating complications of the 20th century (Shahin, Dassen, & Halfens, 2009), it is paramount for nursing to generate evidence-based PUP interventions from methodologically sound and safe clinical trials.

Etiology of Pressure Ulcers

The National Pressure Advisory Panel (NPUAP, 2007a) presented an updated definition of PrUs in 2007: "A pressure ulcer is localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear and/or friction" (¶ 4). PrUs occur most frequently over bony prominences where unrelieved pressure damages underlying the tissue (Ayello & Lyder, 2007). Bony prominences most at risk for PrUs include the sacrum, heels, ischial tuberosities, and trochanters. The sacrum and heels are the most common hospital acquired PrU (HAPU) sites (Baranoski, 2006; Pieper, 2007).

Most PrUs are related to the effects of three tissue forces: *pressure*, *shear*, and *friction* (Baranoski, 2006). Pressure is a perpendicular force that compresses tissues between a bony prominence and an external surface, leading to diminished tissue perfusion and ischemia. Shear is a force parallel to the skin surface such as when a person slides down in bed from the head of the bed being elevated greater than 30°. This shear force can affect blood supply and possibly lead to ischemia, cellular death, and necrosis.

Friction is the force that resists shearing of the skin. Repeated epidermal shedding or avulsion of sheets of epidermis may result in denuded areas of the dermis.

Although pressure is the foremost causative factor in PrU formation, several aspects combine to determine whether the pressure is sufficient to lead to ulcer formation. These aspects, which are assessed by PrU risk assessment tools, include: *intensity* and *duration of pressure*, which are affected by patient mobility factors and *tissue tolerance*, which is influenced by the individual's nutritional status, perfusion, and age.

Pieper (2007) noted that the *intensity* of pressure is dependent on *capillary closing pressure.* Burton and Yamada (1951) describe capillary closing pressure as the minimal amount of pressure required to collapse a capillary. The amount of pressure required to collapse capillaries must exceed capillary pressure, which is generally understood to be 32 mm Hg, although it actually ranges from 12 to 32 mm Hg (Lutz, 2008). Intact sensations of healthy individuals are a protective mechanism from external pressures applied to body tissue in excess of the capillary closing pressure. When the discomfort from pressure is sensed, the healthy person shifts positions, thereby avoiding capillary closure and tissue anoxia. However, people who are unable to sense discomfort or are unable to move are at an increased risk for PrUs.

Duration of pressure influences the effects of pressure and is critical to reduce (Pieper, 2007). Low pressures for long periods of time and high pressures for short amounts of time are both capable of creating an ischemia in affected tissues (Ayello & Lyder, 2007).

Tissue tolerance is the capability of the skin and its supporting structures to endure pressure without complications (Pieper, 2007) and depends on the ability of the skin and underlying structures such as blood vessels, lymphatic system, muscles and subcutaneous tissue to work together to combat externally applied pressure. Both *intrinsic and extrinsic factors* affect tissue tolerance and are considered to be *risk factors* for the development of PrUs. Researchers have identified more than 100 risk factors for PrU development (Lyder, 2003). Baranoski (2006) stated that extrinsic factors include pressure, shear, friction, moisture & dermal irritants. Intrinsic factors include extremes of age and body mass index (BMI), malnutrition, diabetes mellitus, reduced mobility, sepsis, fever, hypotension, psychological stress, decreased tissue oxygenation, incontinence, use of vasoactive drugs, steroid use, smoking, and a history of previous PrUs (Baranoski, 2006; Pieper, 2007).

Tissue changes that occur with PrU formation follow a predictable series of events, including nonblanchable erythema to ecchymosis to necrosis (Pieper, 2007). Occlusion of the capillary blood flow beyond the normal capillary filling pressure creates tissue ischemia or hypoxia, which initially presents as pallor. If the pressure is relieved at this point, a transitory compensatory mechanism known as reactive hyperemia results in which the affected blood vessels dilate. The erythemic area will blanch or turn white when compressed with a finger with the erythema promptly returning. Blanching is an early indicator of pressure and resolves with a timely relief of pressure. However, if relief of pressure does not occur when the pallor sign occurs, tissue ischemia begins to develop. Eventually capillaries leak due to increased permeability, metabolic wastes and proteins

accumulate in the interstitial space, the tissues become edematous and inflamed, perfusion ceases, and cellular death occurs. Muscles are known to be significantly more sensitive to the effects of ischemia than the skin. Thus, visible changes at the skin level are often referred to as the "tip of the iceberg" (Pieper, 2007, p. 216).

Pressure Ulcer Stages

The NPUAP redefined the stages of PrUs in 2007, adding several new stages to the original four stages (NPUAP, 2007a). *Suspected deep tissue injury* is a newly identified stage. It is defined as "purple or maroon localized area of discolored intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear" (NPUAP, 2007a, ¶ 5). A s*tage I* PrU is defined as "intact skin with non-blanchable redness of a localized area usually over a bony prominence" (¶ 7). S*tage II* is a "*partial thickness* loss of dermis presenting as a shallow open ulcer with a red pink wound bed, without slough…[and] may also present as an intact or open/ruptured serum-filled blister" (¶ 9). Slough is yellow, brown, or gray devitalized fibrinous tissue that adheres to the wound bed in strings (Ramundo, 2007).

Stage III, IV, and unstageable PrUs are *full thickness* wounds. *Stage III* is defined as "full thickness tissue loss. Subcutaneous fat may be visible but bone, tendon or muscle are not exposed. Slough may be present but does not obscure the depth of tissue loss. [Stage III ulcers] may include undermining and tunneling" (NPUAP, 2007a, ¶ 11). Undermining is the dead space that is found under the skin edge, running parallel to the skin (Baranoski, 2006). *Stage IV* is "full thickness tissue loss with exposed bone, tendon or muscle. Slough or eschar may be present on some parts of the wound bed. [This stage]

often includes undermining and tunneling" (¶ 13). Finally, an *unstageable* PrU is defined as "full thickness tissue loss in which the base of the ulcer is covered by slough (yellow, tan, gray, green or brown) and/or eschar (tan, brown or black) in the wound bed" (¶ 15).

Pressure Ulcer Prevention Programs

With the potentially devastating effects of cellulitis, osteomyelitis, loss of limb, sepsis, and increased mortality that PrUs can cause for patients (Agostini, Baker, & Bogardus, 2001), preventing HAPUs is a high priority (Reddy et al., 2006). The Agency for Health Care Policy and Research (AHCPR, 1992), now the Agency for Healthcare Research and Quality (AHRQ), created an EBP guideline to predict and prevent PrUs by protecting patients from pressure that causes ischemic changes over bony prominences. The four main goals established by this guideline included: (1) identification of patients at-risk of developing PrUs, (2) prevention of injury, (3) protection from external risk factors, and (4) reduction of PrU incidence through educational programs. Following release of this guideline, a number of other organizations worldwide have written prevention and treatment guidelines, including the American Nurses Association (ANA, 2004), the AHRQ (Courtney et al., 2006), Institute for Healthcare Improvement (IHI, 2007), Joanna Briggs Institute (2008), the NPUAP (2007b), and the Wound Ostomy and Continence Nurses Society (WOCN, 2003). Furthermore, the NPUAP recently collaborated with the European Pressure Ulcer Advisory Panel (EPUAP) to present a worldwide evidence-based clinical practice guideline (Lundgren, 2009). Health care institutions use these guidelines to develop PUP protocols, which are based on currently

available best evidence. Following successful implementation of a PUP program, HAPU rates decrease (Robinson et al., 2003).

PUP must begin upon admission to the hospital (Jastremski, 2002). Delaying interventions puts patients with risk factors at an increased possibility for developing a HAPU (Schoonhoven, Bousema, & Buskens, 2007). Pieper (2007) stated that the components of effective PUP programs include (1) risk assessment; (2) skin assessment; (3) reduction of intrinsic and extrinsic risk factors; (4) patient, family, and staff education; and (5) evaluation. The NPUAP (2007b) added nutrition and mechanical off-loading to this list. Agostini et al. (2001) included improving immobility and adequate documentation of skin integrity issues. Ayello and Lyder (2007) included moisture management and repositioning at-risk patients at least every two hours. Repositioning is indisputably one of the most labor-intensive of all the PUP interventions (Krapfl & Gray, 2008). Risk assessment and repositioning will be discussed in detail in this chapter.

Risk Assessment

Identification of PrU risk factors led to the development of PrU prediction tools. The Braden Scale (Braden & Bergstrom, 1988) is a widely used assessment tool to identify at-risk patients (Agostini et al., 2001) and is the risk assessment scale used at the facility in this investigation (see Appendix A). The Braden Scale has six categories called subscales: sensory perception, moisture, activity, mobility, nutrition, and friction/shear. Ayello and Braden (2001) stated that these subscales effectively address the two primary etiologic factors in PrU development: intensity and duration of pressure (sensory perception, mobility, and activity subscales) and tissue tolerance for pressure (moisture,

nutrition, and friction/shear subscales). A cut-off score of 18 for adult patients is appropriate to begin PUP interventions (Ayello & Braden, 2002). Knowing who is and who is not at risk determines which interventions should be implemented to prevent HAPUs (Jastremski, 2002).

Repositioning

Pressure relief is vital for PUP as it reduces the duration of pressure on bony prominences, which is the most critical element in the PrU formation process (Defloor, De Bacquer, & Grypdonck, 2005; Jastremski, 2002; Pieper, 2007). Lyder (2006) reported that for the past three decades, the gold standard in practice has been to reposition patients approximately every two hours. Changing position for complete pressure relief is traditionally taught in nursing school, routinely recommended in nursing textbooks, and required in clinical practice (Hagisawa & Ferguson-Pell, 2007; Reddy et al., 2006; Sharp & McLaws, 2005). However, the *origins* of this standard of care to reposition patients approximately every two hours to prevent the development PrUs are unknown (Knowlton & Brown, 2008). The practice may simply be the result of tradition. Maylor (2004) hypothesized that the every two hour repositioning interval might be attributed to the length of time it took for nurses in the Crimean War hospitals to work their way down one side of the ward and up the other as they attended to wounded soldiers. Trumble (1930) recommended repositioning patients every two hours as a means of PUP and treatment as early as the 1930s. Thomas (2001) wrote that the every two-hour repositioning schedule was empirically deduced in 1946 by Guittmann's work with spinal-injury patients. Kosiak (1961) recommended repositioning patients about every

two hours based on interface pressure readings from healthy, active adults. However, Norton, McLaren, and Exton-Smith's (1962) pioneering study, which will be reviewed in detail later in this chapter, was credited as the impetus behind the every two-hour repositioning recommendation in AHCPR's (1992) clinical practice guidelines.

Changing a patient's position by manually repositioning approximately every two hours is perhaps the *simplest* method known to limit the duration of pressure to vulnerable tissue, allowing for compressed areas to reperfuse before tissue death occurs (Krapfl & Gray, 2008; Maylor, 2004). Although repositioning at-risk patients at two-hour intervals is accepted as a gold standard of care and has high face validity, very little conclusive evidence exists to verify the efficacy of this time interval (Agostini et al., 2001; Defloor et al., 2005; Jastremski, 2002; Joanna Briggs Institute, 2008; Krapfl & Gray, 2008; Thomas, 2001). More research into this topic is difficult due to potential patient harm. Considering that nursing texts and published guidelines from health care organizations include this practice (AHCPR, 1992; IHI, 2007; National Database of Nursing Quality Indicators [NDNQI], 2009; NPUAP, 2007b; WOCN, 2003), and physicians expect this from nursing care (Krishnagopalan, Johnson, Low, & Kaufman, 2002), repositioning an at-risk patient approximately every two hours is expected if the patient's condition allows and if it is consistent with overall patient goals (Hess, 2008). Despite gaps in knowledge of the ideal frequency of repositioning, the every two-hour interval for repositioning continues to be an essential component of a PUP in our country.

Repositioning cues. When a HAPU is detected, evidence of mechanical off-loading is the first thing scrutinized, including documentation of regular repositioning.

Unfortunately, attention to physically repositioning patients at risk of a HAPU is often delayed (Robinson et al., 2003). In the midst of a nurse's typically busy day, it can be difficult to remember to regularly reposition patients at risk. Turn schedules are rarely utilized in acute care settings (Pieper, Sugrue, Weiland, Sprague, & Heiman, 1998). Ayello and Lyder (2007) advocated using alerts and cues to remind staff to reposition patients in a timely manner. Posting a turn schedule or clock may serve as an effective reminder for staff to reposition patients at risk for PrUs and which position to use for an effective rotation of sites (AHCPR, 1992; Hess, 2008; Lyder, 2006; NPUAP, 2007b; Pieper, 2007). Krapfl and Gray (2008) noted that posting repositioning reminder signs might have some effect on improving consistency, at least in the short term.

Issues with staff repositioning efforts. Inadequate time, staffing shortages, motivation, attitudes, knowledge, experience, and administration factors have all been shown to affect PUP behaviors of patient care staff. It has been suggested that turn schedules place a huge demand on nursing time (Bergstrom, Braden, Boynton, & Bruch, 1995; Krapfl & Gray, 2008). Given the current high census and staffing shortage issues, little time may be left to devote to repositioning patients (Maylor, 2004; Robinson et al., 2003). Research has demonstrated that it takes approximately 3.5 minutes per staff member to reposition a patient (Xakellis, Frantz, & Lewis, 1995). Thomas (2001) reported that a higher hospital staff to patient ratio was necessary to affect timeliness of repositioning activities, which would subsequently increase the costs of care.

Patient care staff tend to underestimate their patients' risk of developing HAPUs (Padula, Osborne, & Williams, 2008). Robinson et al. (2003) reported that nurses are

generally more motivated to take PUP precautions when they notice *visible signs* of non-blanchable erythema over their patients' bony prominences (a Stage I PrU) rather than to respond to the warning provided by the presence of specific risk factors.

Research about patient care staff members' educational levels, experience, and knowledge in relation to PUP actions has been contradictory. Reddy et al. (2006) stated, "many physicians and nurses report feeling that they lack education regarding PrU management" (p. 982). Nursing knowledge scores were found to be higher the more recently a nurse had attended an educational course about PrUs (Pieper & Mott, 1995). Nurses scored better in PrU knowledge if they had a higher education, but experience level did not affect knowledge (Sinclair et al., 2004). Dunton, Gajewski, Klaus, and Pierson (2007) found that incidence of HAPUs decreased when a more experienced staff with a higher RN-to-patient ratio cared for acute care patients. Bryant and Nix (2007) found that although education level is important, it does not guarantee behavioral changes such as adoption of new PUP clinical practice patterns. Although knowledge about PrU risk factors is usually fairly high, patient care staff generally do not consider PUP to be a high priority (Bostrom & Kenneth, 1992; Sinclair et al., 2004). Furthermore, nurses often do not apply their knowledge about PUP in their bedside practice (Maylor, 2004).

The mere existence of a PUP protocol in an institution does not ensure a reduced HAPU ratio. Clarke et al. (2005) found that patient care staff must be willing to change their clinical practice, administration must be supportive, and that the organization must provide adequate resources, education, personnel, equipment, and supplies. The success of any newly introduced intervention depends on the degree to which both the

organization's management and the patient care staff members have made PUP a priority (Catania et al., 2007). Nurse leaders must promote a positive attitude towards PUP since attitudes are important in influencing behavior (Ajzen & Fishbein, 1980). When nursing leadership stresses the importance of repositioning patients to the standard of care, it is achieved at least the majority of the time (Traver, Tyler, Hudson, Sherrill, & Quan, 1995). It is clear that PUP must become a unit *priority* for a successful outcome and improved clinical outcomes (Clarke et al., 2005). Support from nurse leaders is paramount for successful implementation of a new PUP intervention.

Barriers. Introduction of a new PUP intervention requires an examination of barriers to successful implementation. Best practice is possible when barriers or gaps are identified and removed (Orsted, Rosenthal & Woodbury, 2009). An individual's reaction to and decision about a new clinical practice expectation develops over time (Bryant & Nix, 2007). Nursing leadership's failure to account for their staff's beliefs, values and expectations could lead to patient harm (Maylor, 2001). Provo, Piacentine, and Dean-Baar (1997) noted insufficient time, low staffing, lack of product availability, and low priority of PUP for some staff members as specific barriers. Nurse aides reported a lack of specific assignment to the task plus insufficient time and staff as reasons for not repositioning patients in a timely manner (Helme, 1994). Additionally, nurses reported excess paperwork prevented them from adequate monitoring of repositioning for at-risk patients.

Critique of Research Studies

Although voluminous studies exist on the topic of PrU development, few were conducted with sound methodological processes. Most of studies on this topic were reported casually, without clear statistical analysis provided. Fifteen studies will be reviewed in this chapter. Six studies are PUP programs that utilized bundles of care to reduce HAPU rates. Several of these studies are held up as *industry standards* of successful PUP studies (Catania et al., 2007; Gibbons et al., 2006). Only studies that included repositioning patients as part of the intervention will be included. Four studies regarding experimentation with the two-hour repositioning interval practice will be critiqued, several of which are *landmark studies* that are frequently quoted in PUP clinical guidelines (Knox, Anderson, & Anderson, 1994; Norton et al., 1962; Seiler, Allen, & Stähelin, 1986). Finally, five compliance studies will be reviewed with variables including staff behaviors, attitudes, educational aspects and/or common barriers to PUP.

Pressure Ulcer Prevention Bundles of Care Studies

Baldelli and Paciella (2008) used a pre-posttest, repeated measures, longitudinal, quasi-experimental design to test the effectiveness of PUP program. Data indicated that HAPU rates at the study facility were consistently above national benchmarking rates but patient care staff was unaware of these results. The intervention was a comprehensive, evidence-based educational program. The sample size was only listed as "large" (p. 140) and included all adult inpatients. The independent variable (IV) was the PUP program. This program utilized a bundle, a theme "*Check, Rock and Roll Around the Clock,"* and the use of "turn clocks" as a visual reminder. Eight PUP elements formed the bundle,

which included repositioning at-risk bedfast patients every two hours. New positions for staff support/ education were implemented for bedside consultation with staff. The dependent variable (DV) was the prevalence and incidence rates, operationalized by the National Pressure Ulcer Prevalence and Incidence Study by KCI USA, Inc. Validity and reliability of the instrument was not included in the article. Following implementation of the program, monthly prevalence and incidence audits were completed over a six-month period with results feedback returned to each unit for review. The annual benchmarking study was compared with pre-intervention studies. The benchmarking data were utilized as a non-equivalent control group for this study for comparison to the facility's data. Results were presented in terms of a "significant decrease" of PrU prevalence and incidence from the previous year and that data was below the national benchmarking levels following the study. Bar graphs illustrated the data visually. Strengths of the study included the large sample size, well-designed, effective intervention, and multiple waves of measurement to prepare for the annual benchmarking survey. Limitations included confusing and hard-to-read bar graphs and a lack of available statistical evidence.

Catania et al. (2007) used a quasi-experimental pre-post test design to lower HAPU rates at the James Cancer Hospital at Ohio State University Medical Center by developing and implementing a bundle of care called the *Pressure Ulcer Prevention Protocol Interventions* (PUPPI). The staff conducted a baseline NDNQI prevalence audits to compare with post-intervention data. A large number of patients were evaluated during this study *(N* = > 700). The IV was the PUPPI intervention. The DV was the HAPU rate, operationalized by the NDNQI prevalence studies. The risk for PrUs was

operationalized by Braden Scale Scoring (Braden & Bergstrom, 1988). The Braden Scale tool was reported to have demonstrated validity and reliability in predicting PrUs with a sensitivity of 83%, a specificity of 64%, and an interrater reliability of at least 95%. A staff educational in-service was provided on the facility's skin care products, skin assessment, documentation, critical thinking, and proper scoring with the Braden Scale. A quality improvement team was formed to monitor results. A PUPPI tool was developed and implemented utilizing EBP guidelines from WOCN, NPUAP, and AHRQ, including repositioning patients every two hours. No validity or reliability was included for this tool, which functioned as the PUP plan of care. All RNs completed an audit of their patients that included Braden scoring, laboratory parameters and a skin assessment. Subsequently, patient care associates audited the chart for documentation of the PUPPI interventions.

The prevalence data were presented only as raw data compared to the NDNQI benchmarking data in a graph (Catania et al., 2007). Within three months of implementing PUPPI, the facility's HAPU rates had reduced by greater than half and was maintained for more than two years. Prevalence was reduced to well below the NDNQI benchmarking data. Strengths of the study included the large number of subjects, careful analysis of the culture and literature before implementation to decrease possibility of failure, analysis of the facility's weakness, and well-constructed PUPPI tool. Limitations were the lack of reported data from the audits and the use of prevalence data rather than the more powerful incidence data.

Elliot, McKinley, and Fox (2008) used a quasi-experimental, repeated measures, longitudinal design to reduce the prevalence of PrUs by increasing the use of prevention strategies, including regular repositioning, in an intensive care unit (ICU). The investigators conducted a baseline prevalence survey prior to initiation of a quality improvement intervention intended to impact bedside practice over time, one-on-one clinical instruction with visual reminders. A prevalence survey was conducted every month for two years following the intervention with the resulting data posted as feedback for staff. During this lengthy study, a large number of skin assessments of at-risk ICU patients were completed ($N = 563$). The IV was the quality improvement program. The DV was the rate of HAPU in the prevalence surveys. The risk for PrUs was operationalized by the Waterlow Pressure Ulcer Risk Assessment Scale (Waterlow, 1991). PrU staging was operationalized by an un-named "internationally recognized staging scale" (Elliot et al., 2008, p. 330). The prevalence survey tool was also not named in the article. Validity and reliability of the instruments was not noted. During the prevalence surveys each month, each patient was assessed for the number, stage, and location of PrUs, nursing strategies employed to prevent PrUs, as well as determining if the ulcers originated in the ICU or elsewhere.

The baseline survey results were compared to the post-intervention frequency results over time (Elliot et al., 2008). The prevalence data were reported as raw numbers and percentage rates. The overall prevalence percentage dropped from 50% to 8.3% over the course of the study. The most likely anatomical location remained the heel throughout the study. Strengths of the study included its large sample, longitudinal, repeated waves

design, and effective intervention. The investigators provided information and timely data feedback to staff with a powerful impact on the unit's culture, emphasizing a return to the basics of care. Weaknesses included use of prevalence rather than incidence data and a poorly described intervention.

Gibbons et al. (2006) used a quasi-experimental, repeated measures design to decrease HAPUs by using a comprehensive approach, including a "SKIN" (Surfaces, Keep the patients turning, Incontinence management, Nutrition) bundle. This investigation emphasized staff accountability and had a goal of zero HAPU for this facility. All inpatients admitted to the St. Vincent's Medical Center, a 528-bed facility were included in this investigation but the specific number of patients included was not included. Patient demographics were not reported. The IV was the SKIN bundle intervention. A PrU team was formed early in the planning phase to review literature and the facility's PUP policies and procedures. A Hill-Rom prevalence study was then conducted. Reliability and validity of this instrument was not included in the article. Culture modifications to affect staff priorities of care and include skin status in the hand-off communication were implemented first, with a focus on staff empowerment. Nursing leadership was influential in supporting the changes, even holding weekly skin meetings. A multi-faceted educational process of skin as an organ, assessment, use of the Braden Scale (Braden & Bergstrom, 1988), and PrU ulcer staging education was provided and reinforced thoroughly. Nurse leaders monitored compliance issues closely utilizing an audit tool developed by the facility. The DV was the rate of HAPUs operationalized by calculated PrU ratios by St. Vincent on a weekly, monthly and quarterly basis as well as

the quarterly Hill-Rom prevalence surveys and annual incidence survey. The results demonstrated a significant reduction in HAPUs at the 95% confidence level (from 2.4 per 1000 patient days to 1.81). Strengths of the study were interventions based on both internal and external evidence, a focus on cultural aspects and modifying them before the implementing the intervention to facilitate removal of some potential barriers. Limitations included an unrealistic goal of zero HAPUs for a facility of that size and difficult-to-compare graphs without providing clear statistical analysis of these data.

McInerney (2008) used a quasi-experimental, pre-post, longitudinal design to decrease prevalence of HAPUs in two United States acute care facilities by using an assortment of interventions. All adult inpatients admitted to this two-hospital, 548-bed system entered into the study with the exception of obstetrical and mental health care patients. The IV included initiation of electronic medical records (EMR) for nursing charting and order entry, the Braden Scale for PrU risk assessment (Braden & Bergstrom, 1988), automatically generated consults to the Wound, Ostomy, and Continence nurse (WOC nurse) for Braden Scores below 13, pressure relief measures, and an interdisciplinary team for protocol decisions. The DV was the HAPU rate, operationalized by the prevalence studies. A prevalence study was completed before the study began with HAPU prevalence at 12.8% compared with 8.5% nationally. It was reported that more than half of these HAPUs were located on the heels. It was not reported which prevalence tool was utilized.

Following the baseline prevalence audit, the hospital system began the intervention (McInerney, 2008). The WOC nurse entered pressure relief orders in the

EMR according to EBP guidelines based on PrU risk with the most common orders noted as "*turn every two hours* and *elevate heels*" (p. 76). A second WOC nurse was added as part of the intervention for the purposes of staff education and monitoring of patients. Prevalence studies were completed every six months for more than four years following the study. Results showed the HAPU prevalence rate had decreased to 5.1%, compared with 8.2% nationally 18 months after the intervention. However, heel HAPUs still accounted for more than half of the ulcers, which prompted the researchers to initiate a follow-up study for heel HAPUs. The follow-up study included the introduction of a new protective heel boot protocol and new powered airbeds. The results from this follow-up intervention showed zero heel HAPUs at the following prevalence survey. The researchers projected a cost savings for the facilities from this study of a total of $11,466,000 for the next year. Strengths of the study included the large sample size, the long-term nature of the study, use of EBP, follow-up actions, a team approach to problem solving, and the significant cost savings. Weaknesses included the casual data reporting, and lack of specific detail about the intervention prevalence tool.

Walsh and Plonczynski (2007) used a prospective, multi-phase quasi-experimental design following retrospective chart audits to determine whether identification of comorbidities would reduce heel HAPUs. The sample was patients admitted to a 333-bed hospital ($N = 242$). The IV of this study was the *phase two* interventions, to be detailed below. The DV was heel HAPU rate as operationalized by a prevalence survey. The instrument utilized throughout the study was a confidential

history and assessment questionnaire created specifically for this study. No validity or reliability was reported. Medical records were also reviewed.

This study was conducted in four phases (Walsh & Plonczynski, 2007). *Phase one* was a retrospective chart audit to determine risk factors of patients with heel PrUs. Medical records ($N = 70$) were reviewed over a two-year period by the researchers, resulting in five variables significant for heel HAPUs. *Phase two* began with facility-wide policy changes and educational programs. Policy changes included a new skin care protocol, two-hour turn schedule clocks posted in every patient room, and standardized timing of the daily Braden Scale risk assessments (Braden & Bergstrom, 1988). The nursing staff then received a tailored educational program. For 10 days, nurses on the selected intervention units performed more frequent and improved risk assessments using the Braden Scale scoring in addition to assessing for the specific comorbidities identified in *Phase one*. The risk scores then suggested tailored interventions. *Phase three* compared HAPU occurrences on intervention units with control units in two separate prevalence audits. A statistically significant difference resulted regarding the incidence of heel HAPUs ($X^2 = 86.37$, $p < .01$). *Phase four* included comparison of two heel off-loading devices with a staff survey following trials with each product. Strengths of the study included early implementation of PUP interventions based on risk assessment to prevent heel HAPUs and staff involvement. Weaknesses included lapses in PUP protocols which may have had an impact on the results and that the Hawthorne effect might have contributed to lowered HAPU rates.

Two-Hour Repositioning Interval Studies

Defloor et al. (2005) used a randomized clinical trial with cluster randomization and four intervention regimens compared to a standard care group to evaluate the effects of four different PUP regimens with either frequent repositioning or the use of a pressure-reducing mattress plus less frequent repositioning. Geriatric nursing home patients (N = 868) comprised the sample in this study. Inclusion criteria included a Braden Scale score (Braden & Bergstrom, 1988) of less than 17 and informed consent. The mean age of the sample was 84.4 years with a mean Braden scale of 13.2. The IV in this study was the repositioning schedule. The DV in this study was the occurrence of PrUs, operationalized by the researcher's clinical observation utilizing the AHCPR (1992) PrU classification system. Patients who were randomized to the every two hours (n = 65) and every three hours (n = 65) schedule were placed on a standard institutional mattress while patients who were turned every four hours (n = 65) and every six hours (n = 65) were placed on a viscoelastic foam mattress. The remaining patients (n = 576) received standard care, which included complementary PUP interventions based on nursing staff clinical judgment. All subjects in the intervention groups were repositioned in the 30° lateral position and 30° semi-Fowlers position to reduce interface pressures to the trochanter and sacral regions. Findings indicated that subjects who were repositioned every four hours and placed on viscoelastic foam mattress had a significantly lower PrU incidence than subjects in standard care group and the other three intervention groups. The incidence of PrUs grade II or higher was 14.3% in the two-hour group compared to only three percent in the four-hour group. A surprising result was that there was no

significant difference (p = .69) between repositioning schedules or surfaces in the amount of time before non-blanchable erythema developed compared to standard prevention.

Strengths of the study included the lengthy observation period, investigators knowledgeable in tissue interface concepts, and rigorous standards of investigation (Defloor et al., 2005). Possible weakness included a lack of standardization of time spent out of bed, no recording of the number of patients who spontaneously repositioned themselves between repositioning intervals, and that the presence of study patients on the units could have affected staff repositioning behaviors for the standard care patients. It was notable that the study units had to call in extra staff to help complete the demands of the turn schedules required for the study, which clearly shows how labor-intensive repositioning schedules can be for patient care staff. This issue indicates a possible barrier for this investigation's time-clock intervention.

Knox et al. (1994) used a quasi-experimental study with Latin-square design to investigate the effect of the frequency of repositioning on the occurrence of PrUs. A non-random convenience sample of older, healthy adults (N = 16) participated in this study under laboratory conditions aged 61 to 78 with a mean age of 70.5 (SD 5.32). The IV in this study was the repositioning schedule. Subjects with Caucasian skin types (n = 11) and dark skin types (n = 4) were placed in a position for two-hours, then in another position for one and a half-hours and finally in yet another position for one-hour. The positions used in randomized sequence were the supine position, lateral position 90° right and lateral position 90° left. The DV included skin surface temperature and change in skin surface color, interface pressure, and pain. Skin surface temperature change was

operationalized by a YSI Series 400 disposable thermistor temperature probe. Interface pressure between bony prominences and the mattress was operationalized by a Next Generation Digital Interface Evaluator that was placed between the bed surfaces and the bony prominences being monitored. Reliability of the instruments was stated to be ± 0.2° and 0.2 millimeters of mercury (mm Hg) respectively by the manufacturers. Pain was operationalized by the McGill's Pain Intensity Scale (McCaffery, 1979) with subjects rating their level of discomfort at 15-minute intervals during the intervention. No specific reliability or validity for this instrument was reported. Both trochanters and the sacrum were the sites used for measurement. Skin color changes were recorded using photographs taken of affected bony prominences at the end of each turn interval. Findings indicated that the greatest increase in skin surface temperature occurred at the end of the two-hour turn interval rather than after the one-hour or the one and a half- hour intervals and in the trochanteric positions ($p = .0005$). No significant differences in color or interface pressure were found with respect to the length of the turn interval or body position. Strengths of the study included safety mechanisms, well-controlled environment, and the low attrition rate. Possible weaknesses included short duration of the study, greater proportion of female subjects ($n = 15$) compared to male subjects ($n = 1$), few subjects, and the use of the temperature probe under bony prominences could have distorted pressure surfaces.

Norton et al. (1962) conducted a series of three studies of factors concerning the development of PrUs and their prevention in their landmark study. The purpose of the third study, which is the study of interest, was to determine if the incidence of HAPUs

could be reduced by frequently repositioning patients. The PrU risk assessment tool for this study was a rudimentary scale of the modern Norton Scale (Norton, 1989), including physical and mental condition, activity, mobility and incontinence. This quasi-experimental cohort study, conducted in a nursing research unit in a large hospital in North London, utilized a sample of elderly, female, newly admitted, hospitalized patients ($N = 100$). All subjects were free of PrUs at the start of the study. The IV was frequent position change for the subjects. One group of patients ($n = 32$) patients was turned every two to three hours and another group ($n = 68$) was turned every four hours or less frequently (every six to 12 hours) depending on patient condition. The DV for this study was development of HAPUs, which was operationalized by a definition of certain PrU criteria from Groth (1943). This definition included two forms of PrU. One of the forms described the current NPUAP (2007a) Stage II through Stage IV while the other form described suspected Deep Tissue Injury and unstageable PrUs. Stage I PrUs were not included in the investigation.

Results showed that HAPUs developed in nine patients out of 100 regardless of frequent repositioning (Norton et al., 1962). However, HAPUs were reduced to four percent compared with 19%. The researchers concluded that frequent repositioning to relieve pressure is an effective prophylactic measure even for very ill patients in poor general condition. They also concluded that patient care staff require close supervision to ensure compliance with repositioning. Strengths of the study included the letter written by Norton to the ward nurses to help increase compliance and cooperation with the study, the same observers performing study recordings on every subject at weekly intervals to

increase internal validity, and comparison of relatively equivalent groups. Weakness included use of a small ward with a higher nurse-to-patient ratio than usual to accomplish the study requirements, and non-equivalent incontinence control between the control and intervention units, which led to a known confounding variable.

Seiler et al. (1986) used a quasi-experimental, pre-post design to determine if repositioning patients side-to-side using 30° lateral positions would affect skin oxygen tension at bony prominences. The sample was comprised by healthy volunteer subjects (N = 11) including women (n = 11) and men (n = 2), aged 18 to 42 years (mean of 25 years) and weights comparable to those of the geriatric population. The IV in this study was the type of mattress the subjects laid on and various reclining positions. The subjects rested on a normal hospital mattress alternating with a super-soft mattress, which was described as having an indentation value between 35 and 46 mm to prevent localized pressure. They were positioned in supine, 30° lateral, and 90° lateral positions on these mattresses. The DV in this study was the measurement of the transcutaneous partial pressure of oxygen (tc PO_2) as operationalized by a Clark type oxygen sensor, developed by Roche Switzerland. Validity and reliability of the instrument was not indicated. A baseline value of skin oxygen tension was determined with the subjects in the prone position with no pressure on either the tissues or on the sensor, the sacral skin in the 90° lateral position and the skin over the greater trochanter in the supine position. Subjects were then positioned in the various positions on the two different surfaces with tc PO_2 being monitored at the fourth minute of pressure in each position.

Findings for the sacral skin baseline tc PO_2 value in the prone position was a mean of 81.2 mm Hg with a significant drop to a mean value of 12.8 mm Hg ($p < .005$) on a normal mattress (Seiler et al., 1986). This value dropped significantly ($p < .005$) to a mean of 42.6 mm Hg on the super-soft mattress. In the 30° laterally inclined positions in the normal and soft mattresses, the sacral tc PO_2 was 77.3 mm Hg and 77.9 mm Hg respectively, which was not significant in comparison with the baseline readings. The 90° lateral positions also did not show significant deviations from the baseline for the sacral readings. The baseline reading in the prone position for the mean trochanter tc PO_2 was 85.7 mm Hg. In the supine and the 30° lateral positions, the readings were unchanged from baseline due to the lack of pressure on these areas in both types of mattresses. However, in the 90° lateral position on a normal hospital bed, the readings fell significantly to a mean of 8.6 mm Hg ($p < .005$) and even on the soft mattress, the readings fell significantly to a mean of 31.2 mm Hg ($p < .05$). These results demonstrate the need to abandon the 90° lateral position when positioning patients. A strength for the study was the use of scientific measurements to determine safety of positions. Limitations of the study were the small number of subjects and the use of young healthy subjects to extrapolate results to elderly and immobile patients.

Patient Care Staff Compliance Studies

Krishnagopalan et al. (2002) used a prospective longitudinal observational study to determine if immobilized patients in an intensive care unit (ICU) were turned every two hours per standard of care and to determine prevailing attitudes about patient positioning among ICU physicians. A convenience sample of mixed medical/surgical

ICU patients ($N = 74$) at three hospitals was observed for a total of 566 total patient hours of observation. Another aspect of the study was a random sampling of ICU physicians ($N = 392$) who were emailed a three-question attitudes survey. The IV in this study was the recording of changes of body position recorded at 15-minute intervals at three ICUs in different hospitals plus the physician attitude survey. The ICUs were all 11 to 14-bed units, multidisciplinary, university affiliated, had similar nurse to patient ratios (1:2), and were accredited by Joint Commission on Accreditation of Healthcare Organizations. Patients with an expected length of stay of more than 18 hours and were unable to reposition themselves were included in the study unless they were on specialty beds with automated turns. A team completed the observations identically and the same staff member observed patients at 15-minute intervals. Patients were observed for greater than five hours. Staff was blinded to the observational nature of the study with coded data recording. If staff asked about the study, they were told that the observers were "evaluating monitor function" (p. 2589). The DV in the study was the amount of time patients remained in a position before being turned as well as the results of the attitudes survey for ICU physicians.

Results from the repositioning observation showed that 97% of the patients did not receive the minimum standard of every two-hour body repositioning (Krishnagopalan et al., 2002). However, 23% of the patients were repositioned by the third or fourth hour. A total of 28% were not repositioned by staff for the entire observation period with the mean observation time was 7.7 hours (*SD* 1.6 hours), a median of eight hours, with 77% of the patients being observed for more than a period of seven hours. The physician

survey resulted in a poor response rate (n = 72, 18.4%). Eighty-three percent of the physician responders felt that the standard of ICU care was the every two-hour repositioning interval while 90% felt that this repositioning interval was helpful in preventing complications of immobility. Only 57% felt that this standard of care was being met in their ICU. Strengths of the study were the meticulous observation of repositioning behaviors and documentation, clearly delineated inclusion and exclusion criteria, and similar intervention units. Limitations may include the "blinding" of the nurses to the nature of the observers' true purpose and the exceptionally low physician response rate.

Lyder et al. (2001) used a nationwide retrospective cohort study with medical record abstraction to evaluate care processes of hospitalized elderly patients at risk for PrUs. The sample for this study was hospitalized Medicare patients aged 65 or older (N = 1803) with diagnoses that denote increased risk for HAPUs: pneumonia (n = 1029), cerebrovascular disease (n = 583), or congestive heart failure. The mean length of stay for sample was 10.2 days (range, 5-66). The mean age was 79.8 years with the majority of patients being aged between 75 to 84 years. The majority of the sample was white (n = 1508) with a higher predominance of women (n = 1047). The IV in this study was the retrospective chart review, which extracted data regarding six processes of care for PUP: use of daily skin assessments, use of a pressure-reducing device, documentation of being at risk, repositioning for a minimum of every two hours, nutritional consultation, and staging of PrUs. Trained medical abstractors collected the study data from the records, including demographic information, clinical characteristics, risk factors, and

compliance with quality indicators within 48 hours of admission. Inter-rater reliability was reported to be excellent. The DV in this study was the documented compliance with the processes of care and development of HAPUs, including stage I PrUs. Descriptive statistics were used to describe the sample. Associations between processes of care and incidence of HAPUs were determined with Kaplan-Meier survival analyses.

Results indicated that nursing compliance with PUP recommendations is problematic (Lyder et al., 2001). Skin assessment had a consistently high compliance rate (94%) so it was excluded from the analysis. The remaining hospital compliance rates with PUP were very low. Patients who received a pressure-reducing device 48 hours after admission had a higher incidence of PrU development during week one, which may have reflected un-noticed PrUs that were actually present on admission. Only 7.5% of bed bound patients received this device within 48 hours. Risk assessment was documented on only 22.6% of patients. Patients who were documented as at risk for PrUs and who were turned every two hours actually had a significantly higher incidence of HAPUs during the third week of their hospitalization. Repositioning every two hours only occurred for 66.2% of the subjects. Nutritional consultation was associated with a lower incidence of HAPUs but it was not statistically significant. Only 34.3% of nutritionally compromised patients received a nutritional consult. The total incidence rate of PrUs was 32% at 21 days. The overall HAPU rate was 6.1%, which is much lower than most hospital incidence studies. Strengths of the study included the large sample size and collection of pertinent data from the records while limitations included the retrospective nature of the

study with no method to verify if the sample actually were turned every two hours or if the skin actually was assessed as documented.

Moore and Price (2004) used a cross-sectional survey method to identify Irish hospital staff nurses' attitudes, behaviors, and perceived barriers towards PUP. The investigation utilized six urban teaching hospitals with a population of 1300 nurses. Full-time staff nurses (N = 300) who work in the area of PUP and PrU treatment were randomly selected. The IV was staff nurses' attitudes, behavior, and perceived barriers towards PUP. The DV was bedside practice. The variables were operationalized by a questionnaire. The authors created the questionnaire to collect the data using review of literature and used an iterative process for content validity and clarity. Validity and reliability of the instrument was not clearly stated. The questionnaire sections on attitudes and clinical behaviors utilized closed-questions with a 5-point Likert scale. The perceived barriers portion used open-ended questions. A pilot study was then completed with the questionnaire, followed by item analysis to measure reliability, which resulted in a revision of the tool. The questionnaire was delivered in person to the study sites for distribution. Completed questionnaires were either returned via collection boxes or by mail with a stamped, addressed envelope for convenience. A follow-up letter and survey were sent out to staff that did not return the questionnaire. Surveys were collected and data analysis were completed using the statistical package for social sciences (SPSS) for statistical analysis of the closed-ended questions and SPSS text smart for the open-ended questions.

Results for Moore and Price's study (2004) indicated that the sampled nurses demonstrated a positive attitude towards PUP (median = 40, range 28-50). The nurses notably felt that PUP is time-consuming (41%), others felt that it was a low priority (51%), and yet others were noted to be less interested in PUP than other aspects of nursing care (28%). The most frequently indicated barriers to PrU risk assessment were "the patient" (60%), lack of time (60%), and lack of staff (36%). The authors concluded that although a positive attitude towards prevention practices prevailed, the barriers prevented this attitude from being portrayed at the bedside, which resulted in inconsistent prevention behaviors. Additionally, increased formal PUP training was needed. Strengths of the study included the detail-oriented study design. Limitations included the possibility of skewed responses due to the generational views of the youthful sample and the high non-response rate.

Vanderwee, Grypdonck, and Defloor (2007) used a randomized clinical trial to determine if using the appearance of non-blanchable erythema (NBE) instead of a risk assessment tool as a cue for staff to implement preventative measures for HAPUs would result in increased incidence. This study included 14 inpatient wards in six Belgian hospitals. Each hospital participated for a period of five months. The sample consisted of patients admitted to surgical, internal or geriatric wards (N = 1617). Patients were randomly assigned to either the experimental (n = 826) or the control (n = 791) groups. The experimental groups were not provided with an intervention until NBE was observed on the daily skin assessment of pressure points performed by bedside nurses. If NBE was observed, one of two interventions of pressure redistribution was employed randomly,

use of a polyethylene-urethane mattress (PUM) plus repositioning patients every four hours or an alternating pressure air mattress (APAM). The control group received standard precautions with PUP using PUM or APAM bed surfaces for all patients with a Braden Scale Score for PrU risk (Bergstrom, Braden, Laguzza, & Holman, 1987) less than 17 and/or patients who developed NBE even if the score was 17 or greater. The IV in this study was the method of determining when to begin the PUP protocol, either with Braden Scale scores or NBE. The DV was the incidence of PrUs. Both groups received a score on the Braden Scale risk assessment tool on admission and every three days thereafter. Validity and reliability of the instruments were not included in the article. However, inter-rater reliability of the unit nurses and the data nurse who performed independent weekly scoring of random patients to correlate with nursing staff findings was confirmed as "high" by using a Kappa test (Vanderwee et al., 2007, p. 329). Written consent was obtained from participants with the lowest number available on the provided envelopes containing study information was assigned to the patient. The study information, protocol, and record were kept in the patient chart.

SPSS was used to perform data analyses (Vanderwee et al., 2007). The results for this study showed no significant difference in occurrence of PrUs between usage of the PUM or APAM ($p = 0.99$). Although the overall rate of incidence was not significantly different ($p = 0.99$) between the experimental NBE group and the control group, data displayed showed multiple contradictions. The sensitivity of the risk assessment methods used for the control group (Braden score of less than 17) was 81.1% with the sensitivity of using NBE as an indicator to begin preventative measures was only 46.6%. PrUs

developed much more rapidly in the control group relying on NBE as an indicator (p = 0.01). This finding indicates that postponing interventions until NBE appears is not an optimal prevention practice. Strengths of the study included the large sample size, two-year time span, and no attrition while limitations include the complicated design with two separate surfacing options for both groups, and the use of 17 for the cut-off point rather than 18. To wait until a patient has an obvious Stage I PrU (NBE), which has been clearly shown to deteriorate to a higher stage 13.7% of the time in an observational study (Halfens, Bours, & Van Ast, 2001) appears to be deliberately putting patients at an unacceptable risk.

Wedge and Gosney (2005) used a prospective randomized pre-posttest experimental design to reduce the prevalence of PrUs by improving bed-making practices and determining whether written or verbal education was more effective. Twelve wards containing 245 beds were utilized in the investigation with permanent staff employees (N = 234). The IV in this study was education (written or verbal). The DV was bed-sheet tightness. Researchers worked together on consensus regarding the bed-sheet tightness scorings. Validity and reliability of instruments was not reported. The researchers did not reveal the nature of the investigation to the participants to reduce the Hawthorne effect. The wards were selected for one of two groups by computerized randomization. Group A received written instructions for improved bed-making practices while group B received written instructions plus three separate verbal instruction sessions from one of the researchers. A pre-intervention survey was performed, indicating that beds were being made too tightly for the pressure-reducing mattresses in the facility. One month following

completion of the intervention, the survey was repeated. Both surveys were completed during the first shift of the day. SPSS was used to analyze the data using chi-square. The investigation revealed that the number of correctly made beds had risen significantly from 113 (46%) to 215 (87.8%) ($X^2 = 68.03$, $p = .001$). However, there was no significant difference between the two groups in terms of the educational method used ($p = 0.987$). The investigators concluded that *written material* is the most effective teaching method for busy bedside nurses. Strengths of the study were the rigid adherence to the experimental design and statistical analysis while limitations included verbal instruction that occurred in the middle of a busy ward with many distractions instead of in a classroom setting and group B providing verbal education to their coworkers who were unable to attend educational sessions.

Summary of Research

Fifteen recent studies were reviewed for current information on the topic. The studies that reviewed bundled approaches to PUP offered a number of aspects for consideration to this investigation. Each of these studies used HAPU rates for the outcome measures and supported the use of repositioning as a PUP intervention. Several studies also included bedside turn clock schedules in their interventions. Most of the studies utilized the Braden Scale scoring (Braden & Bergstrom, 1988) for the risk assessment tool as well as education for the staff prior to beginning the interventions with on-going support. Nursing leadership influence was necessary for success of most of the interventions as well. Culture modifications were included in some of the studies.

The studies that experimented directly with repositioning aspects were primarily landmark studies that considered pressure physiology at bony prominences in response to duration of pressure. The outcome of several of these studies revealed a major barrier that will need to be addressed for a successful outcome for this investigation: the labor-intensiveness of the every two-hour interval. Conflicting evidence was presented regarding the efficacy of repositioning patients a minimum of every two hours versus other recommendations such as repositioning less often on a special mattress or more often for HAPU prevention and patient comfort.

The compliance studies showed that too often patients are not being repositioned according to the standard of care, even if the documentation reflects appropriate repositioning. Patients that are too ill to turn themselves rely on the patient care staff to protect them from harm by repositioning them appropriately, as reflected in Orem's Theory of Nursing Systems (Orem, 2001). Attitudes, education level, empowerment, and staffing levels all must be taken into consideration when implementing a new PUP intervention. Appropriate educational techniques and follow-up are also important. These studies show how important nursing leadership involvement is to the success of the program.

CHAPTER III – METHODOLOGY

This investigation researched the effect of a turn clock on repositioning behaviors of patient care staff on an acute care unit for patients at risk of pressure ulcer (PrU) development. The research design included manipulation of variables and a non-random sample. The pretest-posttest design allowed for comparison of data to determine if a significant difference resulted from the investigation. Polit and Beck (2008) classified this type of quasi-experimental investigation as a Level IIb design since it was a single trial that involves an intervention but lacked randomization. The sample was the patient care staff, the independent variable (IV) was the turn clock, and the dependent variable (DV) was the repositioning documentation provided by the sample.

Selection of Sample

This investigation utilized a non-randomized convenience sample of patient care staff on the oncology unit of a regional medical facility in the Midwest. The patient care staff assigned to patients with a PrU risk assessment score on the Braden Scale of 18 or less (at-risk for PrU development) were included in the investigation. Exclusion criteria for this investigation included patient care staff who were not caring for at-risk patients or are caring for at-risk patients who (1) refused to sign the consent form, (2) consistently refused to turn, (3) are too unstable for repositioning, and (4) were actively dying and PUP was no longer a therapeutic goal. In terms of threats to internal and construct validity, the sample of patient care staff and the at-risk acute care patients receiving care on this unit were likely to be an adequate representation of a typical patient care staff and hospitalized acute care population.

Power analysis reduces the risk for Type II errors in research studies (Polit & Beck, 2008). Since prior research to supply population means and standard deviation was lacking, the number of repositioning intervals required for this investigation was determined by performing a power analysis based on an estimate of effect size. The power analysis was computed for the two-tailed test by using the significance criterion (α) of .05, power (1 - β) of .80, and an effect size of .20, which Polit and Beck (2008) indicated is a common effect size range for a nursing study. The power analysis provided an estimated result of 392. Thus, for both the pre-intervention phase (not cueing repositions with a turn clock) and the intervention phase (cueing repositions with a turn clock) of the investigation, 392 patient care staff documentations of approximately "every two hour" patient repositioning intervals were assessed ($N = 784$).

Protection of Human Subjects

Approval for the investigation was obtained from the Fort Hays State University Nursing Research Ethics Review Committee (NREC) (see Appendix B) and the University's Institutional Review Board (IRB) (see Appendix C). Formal approval was then obtained from the medical facility (see Appendix D).

There were no identified risks to the patient care staff or their patients in this investigation. All data was stored in a locked cabinet that was accessible only by this researcher. The facility and individual patient care staff were not identified. No identifying information was included on the patient care staff demographic questionnaires for protection of privacy. Completion of this questionnaire implied consent for participation in the investigation. The at-risk patients' rights and privacy was protected

by the omission of all identifying information except room number and initials. Consent to participate in the investigation and for review of electronic medical records for the documentation of repositioning was obtained from the patients or their medical Durable Power of Attorney (DPOA) (see Appendix E).

Data Collection Procedure

The patient care staff of the oncology unit received a demographics questionnaire to complete (see Appendix F). To ensure honest responses, the subjects were assured in writing that their responses would be completely anonymous. To increase the rate of return, the unit clinical coordinators were asked to distribute the questionnaires to their team members, have them complete the forms, then return the completed form to a file folder housed in the coordinator's office. This investigator collected the completed forms at regular intervals.

Data collection occurred at two points in the investigation, during the pre- and post-intervention phases. During the pre-intervention phase, data were collected from documented repositionings recorded in the facility's electronic medical record (EMR), Siemen's Soarian® clinicals until a total of 392 approximately every two-hour intervals were completed. Pre-intervention data measured documented patient-repositioning behaviors that were not cued with a turn clock. For the purposes of this investigation, a 2.5-hour window was considered to meet the criteria of *approximately every two hours*. Intervals that resulted in a documentation of a reposition within this window were recorded and analyzed as "correct" and labeled as "yes. " Intervals that did not include a

documented reposition within this window were analyzed as “incorrect” and labeled as “no.”

Following completion of the pre-intervention data collection, the intervention phase began. The turn clock tool (see Appendix G) for the intervention was originally developed by Owensboro Medical Health System (Institute for Healthcare Improvement [IHI], n.d.) and was modified for the purposes of this investigation. The intervention phase began with education on the use of the tool. While Wedge and Gosney (2005) stated that written material is the most effective teaching method for busy bedside patient care staff, a number of teaching modalities were utilized. The education efforts were as follows:

1. A 22 by 28 inch poster was placed in a prominent location on the unit three days before the intervention began.
2. An email was sent to the director and unit clinical coordinators to describe the turn clock intervention and their role in facilitating the success of the intervention.
3. An email was sent to the staff via the unit director regarding staff expectations.
4. Turn clock packets, which included a written “step-by-step” process for implementing and using the tool, the patient consent form, and the paper turn clock tool, were developed and placed in a file folder at the unit clerks’ desk.
5. The unit clerks were educated on the process to help guide staff in locating the turn clock packets.

6. One-on-one education was provided to staff caring for patients with low Braden scores.

The procedure for utilizing the turn clock during the intervention included several simple steps. The nurses assessed their patients for PrU risk by the Braden Scale scoring (see Appendix A) per usual standard of care. If the obtained score was 18 or less, the nurse was directed to obtain the turn clock packet then review the consent form for participation (see Appendix E) with the patient or medical DPOA. After the signature was obtained, the nurse was to leave the consent form with the patient and place the signature page in a file folder at the clerk's desk. At this point, the nurse posted the turn clock on the patient's room door and individualized the turn schedule to fit the needs of the patient by handwriting positions such as "left, right, or back" on the face of the clock. Four-point directions for use were be posted on the turn clock document as well, including directions regarding (1) how to individualize the turn clock, (2) the amount of time before and after the designated turn-time that the patient is expected to be repositioned, (3) repositioning to the back or chair for meals during a time the patient is scheduled to be in a different position, and (4) expectations for chair activity.

After the intervention was implemented, the post-intervention data collection of the electronically documented repositioning then resumed for 392 more intervals. Additional information gathered during the post-intervention phase included recording the positions written on the individualized turn clocks posted on the doors of at-risk patients for comparison of the *expected* position to the *documented* position.

Debriefing for the patient care staff regarding the findings occurred following data analysis. The patient care staff members were presented with the data comparing documented repositioning behaviors prior to the intervention (not cued with the turn clock) to repositioning behaviors cued with the turn clock. Feedback was obtained from the staff about the experience of using the tool to cue repositioning.

Instruments

Demographic information about the patient care staff was collected via a self-report questionnaire (see Appendix F). This instrument contained questions to provide information on gender, age, length of time of working with hospitalized patients, educational level, and current position.

The Braden Scale for Pressure Sore Risk (Braden & Bergstrom, 1988) was the PrU risk assessment instrument utilized to determine if the acute care patients were at risk for hospital-acquired PrUs (HAPUs). The facility nurses have used the Braden Scale for a number of years and are comfortable with it (see Appendix A). The Braden Scale has six categories called subscales: sensory perception, moisture, activity, activity, mobility, nutrition, and friction/shear. These subscales are rated from one to four except for friction/shear, which is rated one to three (Pieper, 2007). Each rating is accompanied by a brief description of criteria for assigning the rating. Completed scoring ranges from six to 23. A cut-off score of 18 for adult patients is appropriate to begin PUP interventions (Ayello & Braden, 2002), as indicated on the schematic model of this investigation's framework (see Figure 1). Bergstrom et al. (1987) reported that the Braden Scale has demonstrated a high degree of interrater reliability for registered nurses (RNs)

(Pearson $r = 0.99$, agreement = 88%), but low interrater reliability for other care providers, including LPNs (Pearson $r = 0.83$ to 0.87, agreement 11% to 19%). Furthermore, predictive validity for the Braden Scale showed sensitivities that range from 70% to 100% and specificities ranging from 64% to 90%.

A third instrument that was utilized in this investigation was the facility's electronic patient medical (EMR) record documentation in the Siemens Soarian® clinicals. Patient repositioning documentation was electronically recorded by the patient care staff. This data was collected by this investigator as described in the data collection procedure.

Data Analysis

Descriptive statistics were used to organize and describe the demographic characteristics of the patient care staff. The demographic data from the staff questionnaires were analyzed using the Statistical Package for the Social Sciences (SPSS, 2005) software. Measures of central tendency and measures of variability including mean, range, and standard deviation were generated (Salkind, 2004).

The significance level for this investigation set at $p = .05$ to demonstrate that there is a five percent chance that any differences found were not due to the hypothesized reasons (Salkind, 2004). Since the IV (Turn Clock) is nominal (yes or no) and the DV (correct repositioning documentation) is also nominal (correct or incorrect), the non-parametric chi-square statistical test was used to examine the "before and after changes" in staff documentation in terms of positioning within the approximately every two hour time interval.

Summary

This chapter has presented the research design, selection of sample, protection of human participants, data collection procedure, and instruments. The data analysis plan was also discussed.

CHAPTER IV – FINDINGS

This investigation determined if there was a difference in patient care staff repositioning behaviors when a turn clock was used to cue patient repositioning. This chapter will present findings of data that were collected and analyzed from an acute care inpatient unit. The data were collected from the computerized documentation of patient repositions by patient care staff. No patient identifiers beyond initials and room number were collected. No staff identifiers were collected. Data were entered on a paper form then transferred to the Statistical Package for the Social Sciences (SPSS, 2005) for analysis. The level of significance for this investigation was set at 0.05.

Sample Characteristics

The sample in this investigation was the patient care staff ($N = 38$) from the oncology unit of a Mid-western medical center. Demographic information was obtained by completion of a brief questionnaire (see Appendix F). To maximize the rate of questionnaire return, the unit clinical coordinators were directed to distribute and collect simple demographic questionnaires from their "teams" of approximately six staff members each. Thirty-eight questionnaires were returned (100%). The demographic data analyzed included (a) gender, (b) age, (c) length of time of working with hospitalized patients, (d) education level, and (e) current position. The data for gender, educational level, and current position are summarized in Table 1.

Thirty-seven respondents of the patient care staff sample were female ($n = 37$, 97.4%) with one male subject (2.6%). Data for *age* were collected as scale data ($M = 33.87$, range = 41, $SD = 10.65$). *Experience of working with hospitalized patients*

Table 1

Demographic Characteristics of Sample (*N* = 38)

Variable	Characteristic	*n*	%
Gender	Male	1	2.6
	Female	37	97.4
Education level	High school or GED	1	2.6
	Some college	14	36.8
	Two-year college degree	13	34.2
	Four-year college degree	9	23.7
	Master's degree	1	2.6
Current position	Certified Nurse's Assistant	12	31.6
	Nurse Technician	1	2.6
	Licensed Practical Nurse	3	7.9
	Registered Nurse	16	42.1
	Clinical Coordinator	6	15.8

was also collected as scale data (*M* = 4.83, range = 19, *SD* = 4.23). Staff *educational level* revealed that one (2.6%) had completed high school or received a General Equivalency Degree (GED), 14 (36.8%) had attended some college, 13 (34.2%) reported obtaining a two-year college degree, nine (23.7%) had obtained a four-year college degree, and one staff member (2.6%) reported completing a Master's degree. *Current position* data revealed that 12 (31.6%) respondents were certified nursing assistants (CNA's), one

(2.6%) was a nurse technician (NT), 3 (7.9%) were licensed practical nurses (LPNs), 16 (42.1%) were registered nurses (RNs), and six (15.8%) were RNs in the management role of clinical coordinator.

Research Question Findings

One research question was utilized in this investigation. This question was, "In the acute care setting, is there a statistically significant difference between documented patient care staff repositioning behaviors cued with a turn clock (intervention) and those not cued with a turn clock (pre-intervention)?"

For each phase of the investigation, 392 staff-documented repositioning intervals were collected ($N = 784$). Room number and initials were gathered for the at-risk patients cared for by staff as a means of organizing the data. For each repositioning interval, the date, time, Braden scale score, and documented position were collected and analyzed. For the purposes of this investigation, a 2.5-hour window was considered to meet the criteria of *approximately every two hours*. This investigator determined if each repositioning interval was within this window and consequently labeled each interval with "yes" or "no." Additional information gathered during the *post*-intervention phase included the actual positions written on the individualized turn clocks for comparison of the expected position versus the documented position.

This research question required a comparison of the pre- and post-intervention repositioning documentation of positioning intervals. Pre-intervention data ($n = 392$) revealed 289 repositions occurring approximately every two hours while 103 repositions did not occur approximately every two hours. Intervention data ($n = 392$) results showed

an increase to 318 repositions occurring approximately every two hours with a decrease to 74 repositions that did not occur approximately every two hours. Given that the data were nominal, a chi-square analysis was computed to determine if there was a significant difference between the number of times that staff documented a reposition approximately every two hours from pre- to post-intervention. Findings indicated that staff cued with a turn clock were significantly more likely to reposition their patients approximately every two hours than staff who were not cued with a turn clock, X^2 (1, N = 784) = 6.14, $p < .05$.

Since the patient care staff were expected to use the turn clock to guide their repositioning behavior to accomplish effective rotation of sites, a post-hoc analysis was completed on the post-intervention data to compare documented positions with the positions specified on the turn clock-repositioning schedule. Only the documented intervals indicating a reposition of a patient *resting in bed* on a left, right, or back position were included in this data set (N = 313) for comparison with the position entered on the turn clock schedule. Documented intervals that matched the position entered on the individualized turn clock schedule were recorded as "correct." Conversely, documented intervals in which the at-risk patient was *not* repositioned as per the turn clock schedule were recorded as "incorrect." For these nominal data, the non-parametric sign test was utilized to determine if the number of correctly documented positions (n = 169, 54%) was significantly greater than the number of incorrectly documented positions (n = 144, 46%) and to calculate the probability that the correctly documented positions was greater than chance. The obtained sign test result (p = .175) was two-tailed. Since the SPSS (2005) software would not calculate a directional result, the statistic was obtained for these

binomial data by dividing the non-directional result by half. Findings indicated that the total of correctly documented positions was not significantly greater than the incorrectly documented positions (p = .0874), thus the probability of a correctly documented position was no greater than chance based on the specified .05 significance level.

Several unit factors posed possible threats to interval validity of this investigation. One of the most significant factors included a new staffing grid that debuted the week the intervention began, unbeknownst to this investigator. This staffing grid resulted in fewer direct care staff available to provide cares compared to the pre-intervention phase with frustrated care givers who were less than willing to embark on the new turn clock intervention. Loud resistance to "another change" from a vocal minority caused initial chaos on the first day of the intervention. The clinical coordinators of the unit, who were expected to be positive role models for the staff in terms of adopting the intervention, were too distracted with new issues resulting from the staffing grid change to have time to effectively facilitate the use of the turn clock with their staff.

Summary

This chapter has presented this investigation's research questions, the data collected and statistical analysis of the results. The significance of the data will be discussed in Chapter V.

CHAPTER V – SUMMARY AND CONCLUSIONS

This chapter will provide a summary of the investigation, interpretation of the findings, and discussion of conclusions. Limitations of the investigation will be discussed along with recommendations for future research.

Summary of the Investigation

This quasi-experimental investigation examined the effect of a turn clock on patient care staff repositioning behaviors for pressure ulcer prevention (PUP) in a pre-post-intervention design on an oncology unit of a mid-western regional medical facility. The sample for this investigation was this unit's patient care staff ($N = 38$). The turn clock was the independent variable (IV) for this investigation (see Appendix G). The dependent variable (DV) was the documented patient repositions ($N = 784$) at approximately two-hour intervals by the patient care staff.

Interpretation of the Findings

Demographics results and interpretation of the findings from the investigation will be included in this discussion. Findings will be compared to studies in the nursing literature base.

Demographic Characteristics

The demographics of the patient care staff for *gender* show that the majority of the subjects were female. Nurses comprised 65.8% of the sample ($n = 25$), including the single male subject (4.0%). This finding was lower than expected since male nurses comprise about 10% of all nurses (United States Bureau of Labor Statistics, 2008).

Data received for *the number of years of working with hospitalized patients* was surprisingly low, indicating that this unit has a number of relatively inexperienced staff. Sinclair et al. (2004) stated that years of experience did not significantly affect PUP knowledge. On the other hand, a more experienced staff with a higher registered nurse (RN) to patient ratio has been shown to reduce the incidence of hospital acquired pressure ulcers (HAPUs) (Dunton et al., 2007). Although an inexperienced staff is generally understood as a negative finding in terms of patient safety (Page, 2004), it also indicates that fewer years have elapsed since the staff members' education. Studies have shown that knowledge scores were higher the more recently a nurse received education regarding pressure ulcer (PrU) care and prevention (Pieper & Mott, 1995).

In terms of *educational level*, the majority of the sample had attended some college, followed closely by subjects who had completed a two-year college degree. Only one staff member had a Master's degree. Studies have shown that nurses scored better in PrU knowledge if they had a higher education (Sinclair et al., 2004) yet education level does not necessarily guarantee behavioral changes such as adoption of new PUP clinical practice patterns (Bryant & Nix, 2007).

Research Question

The research question was, "In the acute care setting, is there a statistically significant difference between documented patient care staff repositioning behaviors cued with a turn clock (intervention) and those not cued with a turn clock (pre-intervention)?" According to the results of the current investigation, there is a statistically significant difference, X^2 (1, N = 784) = 6.14, $p < .05$, between the number of times that staff

documented repositions approximately every two hours from pre- to post-intervention phases. Although several studies included a turn clock in their PUP bundle of care studies (Baldelli & Paciella, 2008, Walsh & Plonczynski, 2007), no studies have been published that determined the actual effect of the turn clock on patient care staff repositioning behavior. Krapfl and Gray (2008) stated that posting repositioning reminder signs, such as a turn clock tool, might have some effect on improving consistency, at least in the short term. The Institute for Healthcare Improvement (IHI, n.d.) advocated posting a turn clock tool to alert staff that certain patients have been identified as being at risk for PrUs and to cue staff to reposition these patients approximately every two hours for prevention of HAPUs. The finding of this investigation substantiates these statements.

The post-intervention post-hoc analysis of documented positions compared to the turn clock schedule expected positions did not reveal a statistically significant finding (p = .0874). Thus, the probability of a correctly documented position was no greater than chance based on the specified .05 significance level. This result suggests that staff did *not* refer to the turn clock schedule to guide which side (left, right, or back) to reposition their patients for effective rotation of sites when their patients were resting in bed.

A number of reasons may be responsible for this finding. The turn clocks were posted on the *outside* room door as a visual cue in the hallway. Staff may not have taken adequate notice of which side to reposition their patient while they were still outside the room. Placing the turn clock inside the patient room would satisfy this barrier. Allowing staff more time to become accustomed to using the turn clock schedule as a repositioning cue before beginning data collection may have produced more favorable results. Finally,

the clinical coordinators of the investigational unit were too distracted by the staffing grid change to provide support to the staff in regards to adopting the turn clock intervention. Having reinforcement from the unit leaders may have increased the potential for a more positive outcome. Lyder and Ayello (2008) reported that maintaining a culture of PUP on an acute care unit requires support of nursing leadership. To ensure success of any new aspect of patient care, nurse leaders must positively motivate the staff while adopting a consistent, collaborative, knowledgeable, and evidence-based approach towards best practice (Wurster, 2007).

Debriefing Comments

A debriefing for the patient care staff to disseminate the findings was provided following data analysis. Patient care staff members were presented with the data comparing their repositioning documentation prior to the intervention (not cued with the turn clock) to their documentation following the intervention (cued with the turn clock). Feedback was requested from the staff regarding their experience of using the tool to cue repositioning for patients at risk for pressure ulcers. The following comments were provided:

1. "We can't turn our patients on the odd hour with this "even hour" turn clock schedule."
2. "Patients have other things going on that interfere with the turning schedule."
3. "It is difficult to get patients to follow a schedule. They do what they want to do and if they don't want to turn to that position, we can't make them."
4. "There's not enough staff available to turn patients every two hours."

5. “I think the turn clock is helpful to be able to look at your patients’ position and know if they were turned or not.”
6. “It is a good communication tool between nurses and aides.”
7. “It helps me know which side its time to turn my patients to.”
8. “It makes it easier to document because we don’t have to try to remember what side we turned patients to and when.”
9. “I used it as a schedule only for when my patients were *in bed*. I didn’t worry about it if they were in the chair or out of the room.”
10. “I think the turn clock schedule works best when you have a patient that is on complete bed-rest.”
11. “It causes extra turns at meal times with putting patients to their back from their left then we have to turn them to their right when they’re done eating.”

Some of the comments reflected a positive experience with using the turn clock to cue patient repositioning. Others represented *perceived barriers* to the turn clock, such as not being able to turn patients on the odd hour, uncooperative patients, and busy patients schedules. In response to these concerns, patient needs/desires clearly take precedence over the turn clock schedule. Patient care staff should use the turn clock as a cue to offer or encourage repositions to patients resting in bed, even if patients consistently refuse. Finally, staff may use the turn clock to guide repositions on the odd hour, if needed, returning to the even-hour schedule when possible.

Having “inadequate staff” available to complete the repositions approximately every two hours and “extra turns” caused by the turn clock at mealtimes were other

concerns that were voiced. Krapfl and Gray (2008) suggested that turn schedules place a huge demand on nursing time. Two staff members are required for most patient repositions. Xakellis et al. (1995) reported that it takes approximately 3.5 minutes per staff member to reposition a patient. This figure does not include the additional time required for addressing incontinence issues, toileting, or other care needs during the repositioning encounter. Studies that included repositioning patients approximately every two hours actually required extra staff above usual numbers to accomplish their goals (Defloor et al., 2005; Moore & Price, 2004; Norton et al., 1962).

Limitations

This investigation had a number of limitations, including threats to internal validity and design aspects. The unexpected change in the staffing grid between the ending of the pre-intervention phase on the evening of January 15, 2010 and the beginning of intervention phase on the morning of January 20, 2010 was an extraneous threat to the internal validity of this investigation. This change decreased the amount of staff available to provide repositioning for at-risk patients and altered unit dynamics compared to the pre-intervention phase (see Chapter IV for details).

A number of design aspects limited the results of this investigation. The data collection method utilized in this investigation focused only on the documented approximately every two-hour repositioning intervals by staff. Using a repeated measures design with data collected at the level of the individual staff member and/or utilizing multiple units or facilities for a larger sample size of participants would have increased the effect of the results. Utilizing a research monitor to verify repositions as they occur

with comparison to the documented repositions would have enhanced the accuracy of the results. Waiting until the staff had become accustomed to using the Turn Clock before beginning the data collection may have resulted in a different outcome for the post-intervention comparison of expected positions versus documented positions. Incorporating a change or behavioral theory in the framework of this investigation may have provided an explanation for the post-hoc findings. Finally, a design that allowed for the use of an inferential test statistic would also have provided a more powerful result.

Recommendations

Findings from this investigation provided baseline information about the effect of a turn clock to cue repositionings for patients considered to be at-risk for pressure ulcers. A statistically significant comparison was obtained for increased repositioning documentation when the turn clock cue was utilized to cue staff repositioning as compared to the pre-intervention phase. However, the documented positions were found to match the positions labeled on the turn clock schedule at a rate that was no better than chance. Based on these findings, the following recommendations for nursing research, practice, theory, and nursing education are provided for consideration.

Nursing Research

Armstrong et al. (2008) revealed that "the wealth of evidence" (p. 243) that exists for other fields of medicine is simply not available for PrUs. Caregivers must rely on best-known PUP practices, consensus documents, clinical practice guidelines, and established standards of care instead of research based evidence-based practice. Further

nursing research into this topic with definitive results is imperative. The following recommendations are based on this investigation:

1. Engage in and disseminate the results of acute care turn clocks studies on a larger scale utilizing the recommendations noted in the Limitations section.
2. Continue to investigate effective means of limiting duration of pressure on bony prominences for acute care patients, such as increased ease of repositioning by improved mechanical bed surfaces, effective repositioning time intervals for various tissue tolerance levels, and ideal support surfaces to protect all bony prominences, especially the vulnerable posterior heel.
3. Study the effect of demographic variables of patient care staff on attitudes and behaviors towards PUP.
4. Investigate techniques that result in consistent, effective, long-term improvement in patient care staff PUP behaviors.
5. Study the effect of patient care staff attitudes, unit culture, staffing levels, motivation, willingness to embrace change, and administrative support by nurse leaders on the success of implementing PUP interventions.

Nursing Practice

This investigation focused on an aspect of nursing practice that has recently shifted upwards in priority due to the recent rule change described in Chapter I. Although intact skin is an important barrier to maintain against environmental insults and good skin care is a potent intervention against breakdown (Gray, 2009), caring for patient's skin and regularly repositioning patients tend to become low priority on a busy acute care unit.

Nursing leadership has the potential of exerting a powerful influence with staff regarding the success of a tool such as the turn clock by portraying the expectation that it will be used. Leadership can utilize the turn clock tool to verify if patient repositions are being accomplished as expected by periodic rounding for evidence of staff compliance. However, unit barriers must be addressed before any intervention, such as the turn clock tool, will be successful for long-term behavioral change.

Nursing Theory

The investigational framework was based on Orem's Theory of Nursing Systems (2001). This framework functioned well to address the need for nursing agency to protect patients from harm by repositioning them when they are unable to reposition themselves. The partly and wholly compensatory nursing systems were considered in this investigation. Nurses assessed their patients for a self-care deficit by completing a Braden Scale scoring for PrU risk. Patients with scores of 18 or less were considered to require assistance with turning and a turn clock tool was utilized to cue staff repositions in a timely manner.

However, the patient care staff as a "nursing agent" ultimately made the decision whether or not to utilize the turn clock to cue their repositioning behaviors. Failure to reposition patients at-risk for PrUs can potentially result in a HAPU. This patient care staff action or non-action would be explained by incorporating a behavioral change theory such as Ajzen and Fishbein's (1980) Theory of Reasoned Action (TRA) into the framework of future research studies.

Nursing Education

PUP is often viewed as an *optional* nursing activity, something to do if "there is nothing else to do." Nursing education has the potential of altering this perception in nursing practice.

Nursing textbooks contain sections on skin care and PUP. Nursing education curriculum includes these topics as well, although generally covered very early in the program. Nurse educators need to bring the focus back to this topic during *each* semester's lectures and clinical rotations, reinforcing with nursing students about the negative effects of repositioning delays. Various methods of positioning patients to protect bony prominences and using a turn clock or turn schedule to cue repositions as best practice must be stressed. Educators need to instruct our future nurses to incorporate good skin care and PUP into their routines as they provide other cares for their patients. Nurse educators have the potential to help new nurses understand the need to return to the basics of care in this world of high technology.

Summary

HAPUs are an undesirable nursing care outcome associated with multiple serious detrimental effects to patients as well as to a hospital's reputation. Attention to repositioning patients is often delayed (Robinson et al., 2003). Studies have shown that patients are often not repositioned every two hours in busy acute care units. Lyder et al. (2001) found that 66.2% patients were not repositioned every two hours while Krishnagopalan et al. (2002) noted this finding for 97% of patients. However, use of a turn clock to cue repositioning behaviors *alone* is not adequate to prevent HAPUs, as

evidenced by the Norton et al. (1962) finding noting that nine percent of the patients in the study developed HAPUs even with frequent repositionings.

Losing the reimbursement monies with the Centers for Medicare and Medicaid Services (CMS) rule change of October 2008 has forced acute care facilities to place a far greater importance on effective PUP practices. Nurses have an exciting opportunity to capitalize on this uncertain climate by purposefully enhancing patient clinical outcomes and safety conditions while reducing the undesirable complication of HAPUs. Nurse-directed interventions such as effective cuing for patient repositioning could positively transform care at the bedside.

Results of this investigation have shown that use of the turn clock as a cue for patient repositioning for patients at risk for PrUs significantly increased staff repositioning behaviors at two-hour intervals. However, the turn clock was not shown to be an effective means for ensuring patients were repositioned to specified positions.

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Appendix A:

The Braden Scale for Predicting Pressure Sore Risk

BRADEN SCALE FOR PREDICTING PRESSURE SORE RISK

Patient's Name _____ Evaluator's Name_____ Date of Assessment

SENSORY PERCEPTION ability to respond meaningfully to pressure-related discomfort	**1. Completely Limited** Unresponsive (does not moan, flinch, or grasp) to painful stimuli, due to diminished level of consciousness or sedation. OR limited ability to feel pain over most of body	**2. Very Limited** Responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness OR has a sensory impairment which limits the ability to feel pain or discomfort over ½ of body.	**3. Slightly Limited** Responds to verbal commands, but cannot always communicate discomfort or the need to be turned. OR has some sensory impairment which limits ability to feel pain or discomfort in 1 or 2 extremities.	**4. No Impairment** Responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort..
MOISTURE degree to which skin is exposed to moisture	**1. Constantly Moist** Skin is kept moist almost constantly by perspiration, urine, etc. Dampness is detected every time patient is moved or turned.	**2. Very Moist** Skin is often, but not always moist. Linen must be changed at least once a shift.	**3. Occasionally Moist:** Skin is occasionally moist, requiring an extra linen change approximately once a day.	**4. Rarely Moist** Skin is usually dry, linen only requires changing at routine intervals.
ACTIVITY degree of physical activity	**1. Bedfast** Confined to bed.	**2. Chairfast** Ability to walk severely limited or non-existent. Cannot bear own weight and/or must be assisted into chair or wheelchair.	**3. Walks Occasionally** Walks occasionally during day, but for very short distances, with or without assistance. Spends majority of each shift in bed or chair	**4. Walks Frequently** Walks outside room at least twice a day and inside room at least once every two hours during waking hours
MOBILITY ability to change and control body position	**1. Completely Immobile** Does not make even slight changes in body or extremity position without assistance	**2. Very Limited** Makes occasional slight changes in body or extremity position but unable to make frequent or significant changes independently.	**3. Slightly Limited** Makes frequent though slight changes in body or extremity position independently.	**4. No Limitation** Makes major and frequent changes in position without assistance.
NUTRITION <u>usual</u> food intake pattern	**1. Very Poor** Never eats a complete meal. Rarely eats more than ⅓ of any food offered. Eats 2 servings or less of protein (meat or dairy products) per day. Takes fluids poorly. Does not take a liquid dietary supplement OR is NPO and/or maintained on clear liquids or IV's for more than 5 days.	**2. Probably Inadequate** Rarely eats a complete meal and generally eats only about ½ of any food offered. Protein intake includes only 3 servings of meat or dairy products per day. Occasionally will take a dietary supplement. OR receives less than optimum amount of liquid diet or tube feeding	**3. Adequate** Eats over half of most meals. Eats a total of 4 servings of protein (meat, dairy products per day. Occasionally will refuse a meal, but will usually take a supplement when offered OR is on a tube feeding or TPN regimen which probably meets most of nutritional needs	**4. Excellent** Eats most of every meal. Never refuses a meal. Usually eats a total of 4 or more servings of meat and dairy products. Occasionally eats between meals. Does not require supplementation.
FRICTION & SHEAR	**1. Problem** Requires moderate to maximum assistance in moving. Complete lifting without sliding against sheets is impossible. Frequently slides down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures or agitation leads to almost constant friction	**2. Potential Problem** Moves feebly or requires minimum assistance. During a move skin probably slides to some extent against sheets, chair, restraints or other devices. Maintains relatively good position in chair or bed most of the time but occasionally slides down.	**3. No Apparent Problem** Moves in bed and in chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair.	

Total Score

Appendix B

Nursing Research Ethics Committee (NREC) Approval Letter

Subject: IRBNet message from Karen Trible
From: "Karen Trible" <no-reply@irbnet.org>
Date: Tue, December 15, 2009 1:29 pm
To: "Julie Wiens" <jawiens@scatcat.fhsu.edu>
Priority: Normal

Message from Karen Trible:

Re: [148590-1] THE EFFECT OF USING A TURN CLOCK TO CUE PATIENT REPOSITIONING FOR PRESSURE ULCER PREVENTION IN AN ACUTE CARE SETTING

Julie: your project was approved by NREC yesterday (4-0-0), as presented per your documentation, however it needs to be reviewed by the University IRB because of your vulnerable population, 65 years old or above and the fact that you are performing an intervention to a vulnerable population, so I will post the expedited review doc this afternoon, once I get it completed; and will send you another email at that time.

Regards,
Karen Trible

Appendix C

Institutional Review Board (IRB) Approval Letter

FORT HAYS STATE UNIVERSITY

Forward thinking. World ready.

OFFICE OF SCHOLARSHIP AND SPONSORED PROJECTS

DATE:	January 7, 2010
TO:	Julie Wiens, MSNc
FROM:	Fort Hays State University IRB
STUDY TITLE:	[148590-1] THE EFFECT OF USING A TURN CLOCK TO CUE PATIENT REPOSITIONING FOR PRESSURE ULCER PREVENTION IN AN ACUTE CARE SETTING
IRB REFERENCE #:	10-030
SUBMISSION TYPE:	New Project
ACTION:	APPROVED
APPROVAL DATE:	1-5-10
EXPIRATION DATE:	1-4-11
REVIEW TYPE:	Expedited
REVIEW CATEGORY:	Expedited review category # *5*

Thank you for your submission of New Project materials for this research study. Fort Hays State University IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received expedited review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All SERIOUS and UNEXPECTED adverse events must be reported to this office. Please use the appropriate adverse event forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

Please report all NON-COMPLIANCE issues or COMPLAINTS regarding this study to this office.

Please note that all research records must be retained for a minimum of three years.

Based on the risks, this project requires Continuing Review by this office on an annual basis. Please use the appropriate renewal forms for this procedure.

If you have any questions, please contact Leslie Paige at 785-628-4349 or lpaige@fhsu.edu. Please include your study title and reference number in all correspondence with this office.

Appendix D

Approval Letter from Data Collection Site

To: Julie Wiens/WC/HCI@Kansas
From: Patricia Edwards/AN/HPTL/HCI
Date: 01/07/2010 08:01 PM
cc: Kathy Loehr/RS/HPTL/HCI@Kansas
Subject: Re: Approval for Turn Clock Pilot – J. Wiens

Dear Julie, I have received your request to initiate a turn clock pilot on one of the nursing units at Promise. I grant approval to your request to conduct the investigation and to review the staff repositioning documentation in the Soarian electronic records maintaining patient confidentiality. I hope that this process can be rolled out very quickly to the rest of the nursing units. Let me know if you need anything else from me. thanks, Pat

Patricia Edwards, RN, BSN, MBA
VP of Patient Care Services
Promise Regional Medical Center
1701 East 23rd Ave.
Hutchinson, KS 67502

Phone: 620-665-2004
Fax: 620-513-3811
Email: edwardsp@promiseregional.com

Mission: We must do everything possible to deliver an exceptional experience of care for every patient and family member, every time, in every interaction.

Appendix E:

Consent for Participation

Consent to Participate in a Research Investigation

Fort Hays State University

Hospitalized Inpatients

Title of Investigation:	The effect of using a turn clock to cue patient repositioning
Principle Investigator:	Julie Wiens, RN, MSN(c) Promise Regional Medical Center 1705 E. 23rd Hutchinson, KS 67502 620-513-3668
Fort Hays State University:	Department of Nursing
Faculty Advisor:	Liane Connelly, PhD, RN, NEA-BC Stroup Hall 127 600 Park Street Hays, Kansas 67601-4099 785-628-4498

General Information

You are being asked to voluntarily take part in a research investigation. You may refuse to join, or you may withdraw your consent to be in the investigation, for any reason, and at any time *without consequences*.

This investigation is being conducted to learn if posting a turn clock changes repositioning behaviors of the patient care staff. The researcher will need your permission to review your electronic medical record for the documentation of your repositions.

This information could help other hospitalized patients in the future but you may not receive any specific benefit from the investigation. There are potential risks with any investigation, but it is believed these risks are minimal.

A description of the investigation is included. It is important for you to understand the information, so you can make an informed choice about participating in this research investigation.

You will be given a copy of this consent form. You should ask your nurse or the researcher any questions you have about this investigation at any time.

What is the purpose? The purpose is to learn if posting a turn clock schedule on your room door changes staff repositioning behaviors.

You are being asked to take part in this investigation because you are a patient on 3300 at this time and your calculated Braden Scale Score, which indicates pressure ulcer risk, is 18 or under. A low Braden Scale Score indicates that you are at a higher risk of developing a pressure ulcer during your hospitalization.

How long will the investigation last? Your involvement will last as long as you require care on 3300 and/or as long as your Braden Scale Score remains calculated at 18 or less.

What will happen in the investigation: Hospital staff on 3300 will determine if your Braden Scale score indicates if you are *at risk for pressure ulcer development.* If your Braden Scale Score shows that you are at risk, you (or someone appointed to make medical decisions for you) will review and sign the participant agreement form. The nursing staff will then post a Turn Clock on your room door and individualize a turn schedule on it to meet your needs.

What are the possible risks? There may be unexpected or previously unknown risks. You should report any problems to the researcher immediately.

What are the possible benefits? Research is designed to benefit society by gaining new knowledge. You may not benefit personally from being involved in this research investigation. Your family/friends may find it helpful to know when your nursing staff expects to reposition you next.

How will your privacy be protected? You will remain anonymous and will be identified only through numbers known to the researcher. You will not be identified in any report or publication about this investigation. The Fort Hays State University's Department of Nursing Research Ethics Committee and Institutional Review Board (IRB) have reviewed the details of the investigation thoroughly before it began.

Will you receive anything for being in this investigation? You will not receive any monetary benefits for taking part in this research investigation.

Will it cost you anything? There are no costs associated with being in the investigation.

What if you have questions about this investigation? You have the right to ask, and have answered, any questions you may have about this research. If you have questions or concerns that the patient care staff cannot address, you should contact the researcher listed on the first page of this form.

All research on human volunteers is reviewed by a committee that works to protect your rights and welfare. If you have questions or concerns about your rights as a research

subject, you may contact, anonymously if you wish, the IRB at Fort Hays State University (785-628-FHSU).

Participant's Agreement:

I have read the information provided above. I have asked all the questions I have at this time. I voluntarily agree to participate in this research investigation. I give permission to the researcher to review my electronic medical record for documentation of my repositions.

_____ _____

Signature of Research Participant or designee Date

_____

Printed Name of Research Participant or designee

Please separate this page, place it in the Turn Clock folder
in the Forms file cabinet at the clerk's desk.

Leave the first two pages of the Consent Form with your patient.

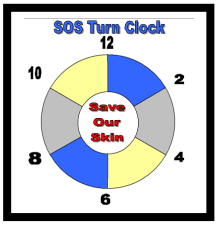
Appendix F:

Demographics Questionnaire

DEMOGRAPHICS QUESTIONNAIRE

In the upcoming days, 3300 will begin using a Turn Clock tool posted on the room doors of patients who have Braden Scale Scores of 18 or less. The purpose will be to determine if there is a difference in repositioning behaviors when a turn clock is used to cue patient repositioning. Data collected can assist nursing leadership in improving pressure ulcer prevention, thus increasing patient safety and outcomes.

Please take a few moments of your time to answer the following demographic questions. This questionnaire is completely anonymous so please do not put your name on it or identify yourself in any way.



1. Are you Male or Female?

- ☐ Male
- ☐ Female

2. What is your age?

_____ years old

3. What is the length of time you have worked with hospitalized patients?

- ☐ Less than 1 year
- ☐ _____ years

4. What is the highest level of education you have completed?

- ☐ High School/GED
- ☐ Some College
- ☐ 2-Year College Degree (ADN or _____)
- ☐ 4-Year College Degree (BSN or _____)
- ☐ Master's Degree

5. What is your current position at in this facility?

- ☐ CNA
- ☐ Nurse Tech
- ☐ LPN
- ☐ RN
- ☐ Clinical Coordinator

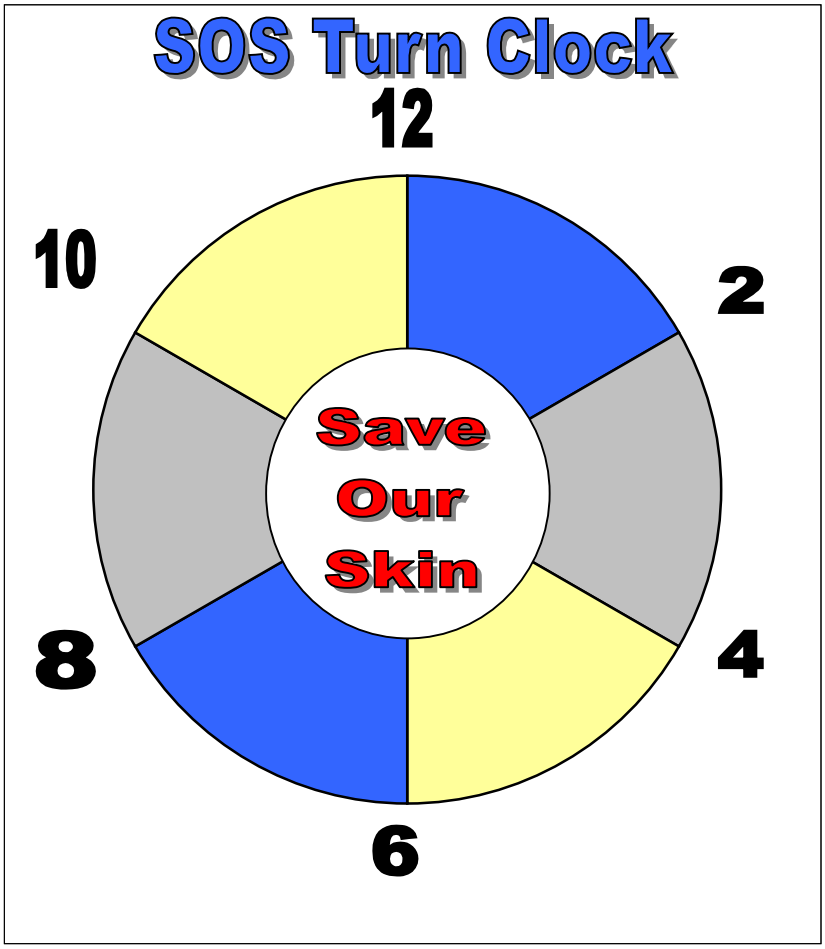
Thank you for taking the time to complete this questionnaire. Please return it to your clinical coordinator ASAP. If you have any questions or comments, please feel free to contact me by email at wiensj@promiseregional.com or by phone (513-3668).

Appendix G:

Turn Clock for Braden Scale Scores 18 or less

Turn Clock for Braden Scale Scores 18 or less

B = back L = left R = right



Directions

- Individualize the turn clock by **writing in the positions to be turned on** the face of the clock.
- Patients are to be turned within 10 minutes before & 10 minutes after the expected turn time.
- **Mealtimes**: Chair or HOB up fully. Return patients to the prescribed position 1 hour after the meal is over.
- Limit **chair activity** to 1 hour at a time. Patient to be placed in the prescribed position when returning to bed.