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STRATEGIES TO PREVENT HOSPITAL ACQUIRED PRESSURE INJURIES IN THE
INTENSIVE CARE UNIT

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TABLE OF CONTENTS

LIST OF TABLES5

LIST OF FIGURES6

ABSTRACT.....7

 Clinical Significance.....8

PROBLEM.....10

SYNOPSIS OF MICROSYSTEM.....11

 Organization’s Readiness for Change.....13

 Statement of the Problem.....15

 Needs Assessment Related to Achievement of Objectives.....17

 Organization’s Strategic Plan.....19

 Stakeholder Involvement.....20

REVIEW OF THE LITERATURE.....21

 Objectives.....27

METHODOLOGY.....27

 Intervention Plan/Implementation/Setting.....27

 Evaluation Plan.....29

 Timeline.....30

 Protection of Human Subjects Address Ethical Considerations.....30

RESULTS AND FINDINGS.....31

 Discussion.....32

TABLE OF CONTENTS—Continued

RESULTS AND FINDINGS

Strengths.....36

Limitations.....36

Sustainability.....37

DNP Essentials.....37

Conclusions.....40

REFERENCES.....41

APPENDIX A: ACTION PLAN FOR DNP PROJECT PROPOSAL.....45

APPENDIX B: PROGRAM EXPENSES49

LIST OF TABLES

Table	Page
1. Percentage and Number of Cases for HAPIs in the ICU for Year 2019 and Year 2020...15	
2. Project Timeline.....31	

LIST OF FIGURES

Figure	Page
1. RN Experience	11
2. Year2 2019-2020 NDNQI Quarterly Findings of Patients with HAPIs in the ICU	13
3. Year 2019 Characteristics of HAPIs in the ICU	13
4. Year 2020 Characteristics of HAPIs in the ICU	15
5. Number of RN Attendance at Educational Suite by Week.....	33
6. Rate of Utilization of Braden Scale to Assess Integumentary Risk.....	33
7. Visual Documentation of High-Risk Anatomy by ICU Staff.....	34
8. Year 2021-January-May Characteristics of HAPIs in the ICU	34

Abstract

Background. Despite prevention strategies, hospital acquired pressure injuries continue to occur, especially in intensive care units. This led to an impetus for nurses to have a robust knowledge of pressure injuries to promulgate prevention strategies in their practice.

Significance of the Problem. The hospital acquired pressure injury rate in the medical surgical intensive care unit for the years 2019 and 2020 at Hospital X was greater than the national benchmark.

Purpose. The global aim statement was to improve the quality of patient care by developing an evidence based educational suite in collaboration with interdisciplinary team members for prevention of hospital acquired pressure injuries.

Objectives. The objectives included creating an evidence based educational suite, utilizing a standardized scale to assess risk factors, and refining the visual documentation of high-risk anatomy.

Methods. This Quality Improvement Project took place in the intensive care unit of Hospital X. The educational session in a dedicated classroom was followed by a tandem integumentary assessment. The utilization of a standardized scale and the visual documentation of high risk anatomy was logged daily.

Outcomes. Among 48 nurses, 43 (90%) attended the evidence based educational suite and performed a tandem integumentary assessment. Among 1,896 opportunities for a skin risk, 1,580 (83%) were completed. The visual documentation of high-risk anatomy by ICU staff went from 17% to 65% compliance.

Implications for Practice. A multidisciplinary team looked at the evidence-based care regarding hospital acquired pressure injuries and assisted the care team to be able to work within the means of the technology and equipment which is available.

Keywords. Hospital acquired pressure injuries, patient injury, specialty education, nursing, intensive care, effectiveness

Strategies to Prevent Hospital Acquired Pressure Injuries in the Intensive Care Unit

Patient safety includes practices to reduce or eliminate risks of unnecessary harm (Bueno de Camargo et al., 2018). The prevention, identification, and treatment of hospital acquired pressure injuries (HAPIs), is a factor in reducing a patient's hospital stay which will help contain costs, prevent infections, decrease pain, and improve individual prognosis. A pressure injury is defined as a localized injury to the skin and/or underlying tissue usually over a bony prominence because of pressure (Chaboyer et al., 2015). A HAPI is one which occurs after 24 hours of arrival to the hospital. Pressure injury development is a multi-casual event. In many cases, the appropriate identification and mitigation of risk factors could prevent or minimize the formation of pressure injuries (Schmitt et al., 2017). Despite prevention strategies, HAPIs continue to occur, especially in the Intensive Care Unit (ICU) (Pittman et al., 2019). Since ICU patients are at high risk for development of pressure injuries, there is an impetus for nurses to have knowledge about pressure injuries and to reflect prevention strategies in their practice (Alderden et al., 2019; Bueno de Camargo et al., 2018).

Clinical Significance

Despite all the advances in health care, HAPIs remain a worldwide public health problem related to patient safety (Gaspar et al., 2019). Pressure injuries are more prevalent in the ICU due to many individualized patient factors. These may include the inability to perform life activities, because of physical inactivity and limited mobilization independently because of unconsciousness. Other additional factors requiring continuous care include severity of illness, nutritional status, temperature, use of vasopressors, poor tissue perfusion, multiple comorbidities, mechanical ventilation, infrequent repositioning, and medical devices such as endotracheal tubes which meet the patient's skin (Barakat-Johnson et al., 2018). Additionally, complications of high

morbidity and mortality rates, which include infection, pain, depression, and generalized prolonged hospital stays are factors for HAPIs. All patients in the ICU are at high risk for developing a HAPI.

The most common integumentary areas for HAPIs to develop in the ICU include the sacrum, heels, mouth, ears, nose, and occiput (Barakat-Johnson et al., 2018). Disrupted blood flow leads to tissue ischemia and eventually tissue death. It may take several days for the tissue damage to appear, indicated by changes in color, temperature, and texture. The common characteristics for most every pressure injury are described as having occurred from intense or prolonged pressure and when layers of tissue are moved in opposite, parallel directions. This results in the stretching, occluding, or tearing of blood vessels, leading to the disruption of blood flow to the affected area (Schmitt et al., 2017).

According to the National Pressure Ulcer Advisory Panel, (Schmitt, et al., 2017), the following are the descriptions of staging of pressure injuries:

- Stage 1 pressure injury is one in which the skin is intact and has non-blanchable erythema, not turning white or become pale when pressure is applied.
- Stage 2 pressure injury is a wound with partial skin loss with exposed dermis, pink or red in color, consisting of moist, viable tissue, or an intact or ruptured fluid-filled blister.
- Stage 3 pressure injury is a wound with full thickness loss of skin and has fat visible in the wound. This wound may have granulation tissue, slough, or eschar, and the extent of tissue destruction involved in the wound is not obscure.
- Stage 4 pressure injury involves the muscle, fascia, cartilage, tendon, ligament, or bone which is observable or directly palpable.

- Deep tissue pressure injury (DTI) is deep red, purple, or maroon in color, does not blanch, and is in a localized area with either intact or nonintact skin
- Unstageable pressure injury (UPI) has slough or eschar in the wound bed, obscuring the depth of tissue destruction. Upon examination, one is unable to see if the wound extends to fat, bone, tendon, or muscle. The slough is necrotic tissue which can be yellow, brown, green, or some combination of these colors.
- Medical device related pressure injuries (MDRPIs) are a term utilized to describe a HAPI which occurs due to a particular medical device. Patients with a medical device is at risk for MDRPI due to impaired sensation, poor perfusion, altered tissue tolerance, poor nutrition, edema, and tendency to develop moisture under the devices. Respiratory devices such as oxygen tubing, endotracheal devices, tubes/drains such as urine catheters, and compression stockings/braces are the four most common types of devices which causes HAPIs in patients.

Problem

The prevention, identification, and treatment of pressure injuries, was a need factor in reducing a patient's hospital stay which will help contain costs, prevent infections, decrease pain, and improve individual prognosis. The Hospital-Acquired Condition Reduction Program is a Medicare pay for performance program which supports the Centers for Medicare and Medicaid Services (CMS) effort to link Medicare payments to healthcare quality in inpatient hospital settings This program serves to optimize accrual of payments by incentivizing eligible hospitals to reduce hospital acquired conditions. In 2019, Hospital X was penalized for high rates of preventable complications and hospital acquired conditions by the Centers for Medicare/Medicaid Services, which included hospital acquired pressure injuries (Garza, 2020).

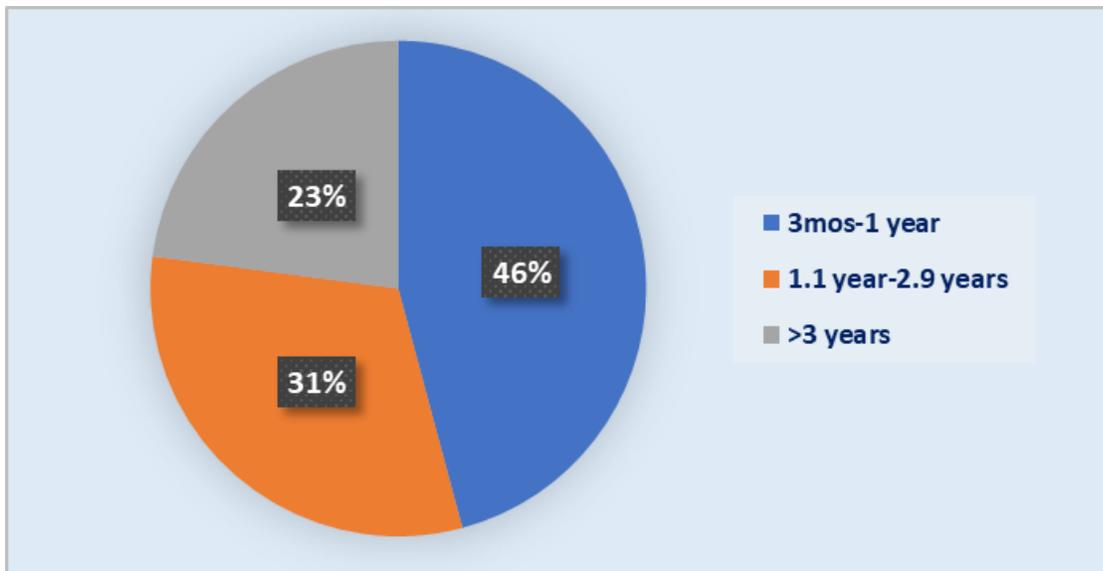
The penalties cost the hospital one percent of Medicare payments for admitted patients in the next fiscal year, causing the hospital to lose hundreds of thousands of dollars of revenue (Garza, 2020). This was based on a review of the 2019 internal database for the ICU which showed the largest payor source was Medicare at 56%, followed by commercial insurance at 29%, charity at 9%, and Medicaid at 6%.

Synopsis of Microsystem

The clinical setting for this quality improvement project is a 20-bed adult medical surgical ICU in a large metropolitan hospital in the southwestern United States. The ICU consists of 48 full time staff nurses who worked in a twin-unit environment. The composition of unit staff experience includes: 46% (*n* = 22) nurses with 3 months to 1 year; 31% (*n* = 15) nurses with 1.1 to 2.9 years and 23% (*n* = 11) with greater than 3 years (Figure 1). There are 5 nurses on leave of absence and an additional 17 nurses who are employed as contract labor to assist with vacancies.

Figure 1

Year 2021 RNs experience



The ICU at Hospital X serves a wide variety of critically ill adult patients, ages 18 and older. The top diagnostic related groups (DRGs) are kidney transplants, sepsis, disorders of the liver or respiratory system, alcohol/drug overdose and withdrawal, and acute renal failure. This facility is preferred nationwide as a destination for patients who need abdominal solid organ transplants for kidney and liver. The ICU also cares for complex surgical patients including hepato-biliary, vascular, urology, and bariatric cases.

Figure 2 data are from the Nursing Database of Nursing Quality Indicators (NDNQI). The NDNQI is the only national nursing database which provides quarterly and annual reporting of structure, process, and outcome indicators to evaluate nursing care at the unit level (Montalvo, 2007). The WOCN team at Hospital X has led the NDNQI prevalence survey. These data were collected from pressure injury prevalence surveys which are conducted quarterly in the facility utilizing a standardized pressure injury survey tool with two trained staff members. The amount of time it takes to complete varies by the number of patients on the unit at the time of the survey. Due to this time commitment, the ICU provided extra staff on the quarterly skin survey day to maintain the appropriate levels for patient care.

The NDNQI database evaluates and compares the unit-specific nurse-sensitive data from hospitals in the United States. This national data revealed that HAPIs in the ICU in Hospital X had some quarters which were significantly higher than national benchmark of zero incidence of HAPI for the years 2019 and 2020 (see Figure 2). Quarters 2 and 4 of 2019 met the benchmarks set forth by the NDNQI. Since this study is only a snapshot of one day out of the quarter, the unit's leader and WOCN team attributed the results as to census and composite of patients on each day of the respective studies.

Figure 3 data are characteristics of HAPIs in the ICU of Hospital X for 2019. These data

are from the wound care nurses' internal database from the clinical organization.

Figure 2

Year 2019-2020 NDNQI Quarterly Findings of Patients with HAPIs in the ICU



Figure 3

Year 2019 Characteristics of HAPIs in the ICU



Note. The number of HAPIS for year 2019 is $N = 83$.

Organization’s Readiness for Change

Hospital X already had in place a task force which met daily to assess the factors which

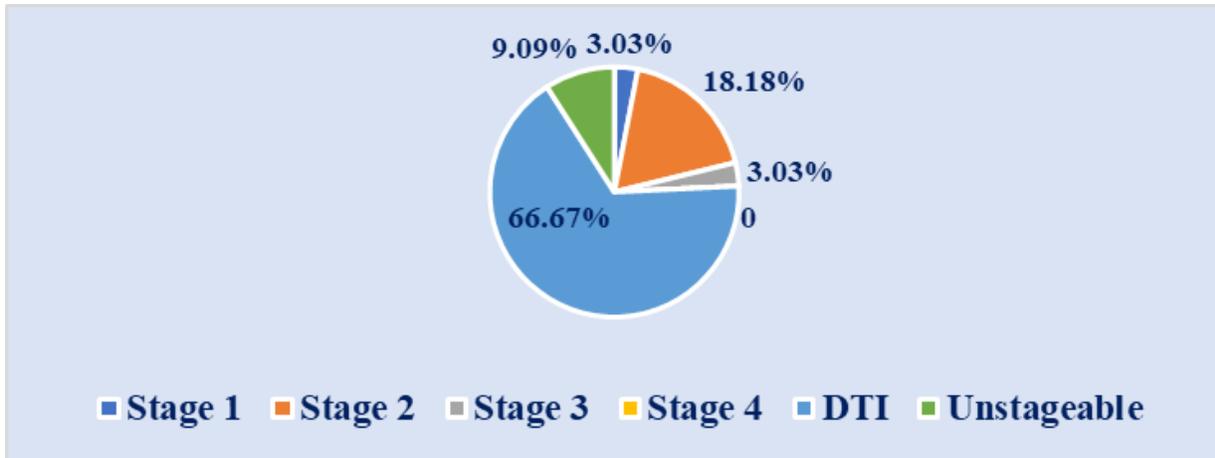
place patients at risk for infection and hospital acquired conditions. The bedside nurses, interdisciplinary members, unit leadership, and facility leadership all verbalized a desire to improve quality measures in this ICU. Initially, a meeting between the chief nurse officer and I occurred in the fall 2019, prior to the beginning of this DNP program. The topic of HAPIs in the ICU was discussed as this continued to be the one hospital quality indicator which the ICU was struggling to demonstrate lasting improvement.

The organization has demonstrated a readiness and willingness to embrace change to improve the quality of care for the patient population in the ICU and the objectives of this project by allowing for productive hours to be charged to the administrative cost center for a collaborative interdisciplinary committee to meet monthly, known as the HAPI Tiger Team. In addition to myself, the team members consisted of the WOCN, nutritionist, two bedside ICU nurses, and informatics. The team was meeting once a month for an hour from February-May 2020, discussing barriers and opportunities regarding HAPIs in the ICU.

I assessed the current situation, identified the problem of HAPIs, and collaborated with leadership prior to the start of the program. Hospital X is also in the process of applying for Pathways to Excellence recognition. The Pathways to Excellence recognition is a precursor to pursuing Magnet status. These prestigious awards were developed by the American Nurses Credentialing Center to recognize health care organizations which demonstrate nursing excellence. In addition, Magnet also recognizes quality patient care and innovations in professional nursing practice. As mentioned earlier regarding the quality indicators, improvement regarding HAPI would increase the nursing excellence at hospital X as well as decrease the loss of revenue.

Figure 4

Year 2020 Characteristics of HAPIs in the ICU



Note. The number of HAPIS for year 2020 is $N = 66$.

Table 1

Percentage and Number of Cases for HAPIs in the ICU for Year 2019 and Year 2020

Year	Stage 1	Stage 2	Stage 3	Stage 4	DTI	Unstageable
2019	6.02%	7.23%	6.02%	2.41%	61.45%	16.87%
	$N = 5$	$N = 6$	$N = 5$	$N = 2$	$N = 51$	$N = 14$
2020	3.03%	18.18%	3.03%	0%	66.77%	9.09%
	$N = 2$	$N = 12$	$N = 2$	$N = 0$	$N = 44$	$N = 6$

Note. Overall, there was a 17% decrease in the incidence of HAPIs from 2019 to 2020. Even with the decrease in overall percentage, there was an increase in 2020 noted in the categories of stage 2 and DTI.

Statement of the Problem

Nurses need to have sufficient knowledge, skills, and critical thinking ability on a variety of health issues to provide qualified and effective care. Undergraduate nursing programs are

challenged with competing demands from governing and regulatory bodies (Gunowa, et al, 2020). Therefore, it is understandable that both patient safety and diversity details regarding specialty areas such as vulnerability of HAPI in the ICU may not be allocated a substantive amount of time in nursing curricula in an undergraduate nursing program.

Most nurses new to clinical practice are novice in integumentary assessments (Rush, et al., 2019). Evidence-based practice requires nurses to be informed and up to date with research. Learning which was simply conducted “on the job” and not in a structured way was only likely to have perpetuated practices based on ritual and basic preference (Greatrex-White, S. et al., 2015). In 2019, the overall turnover rate of nursing was 6.2%, which is less than the national average RN turnover rate of 17.2% and the corporate benchmark of <16%. There was an increase during the months of April-October 2019. This was in part due to some personnel completing their advanced practice degrees and moving to different settings. There were also nurses who are the spouses of military members and transferred when their spouses received orders to move.

The turnover rate for the 3rd quarter of 2020 was 25% and this number has continued to increase. The turnover rate for the 1st quarter of 2021 was 35%, well over the national and organizational benchmarks. The reasons for the recent spike in turnover are due to nurses wanting to live closer to family, change in career path, and/or taking travel assignments. Hospital X, like many hospitals in the nation, are not able to compete with the lucrative travel wages and incentives being offered by the global pandemic. As a result of high turnover there was an inconsistent and oftentimes, inexperienced nursing staff. One consequence was that care of complex patients compounded by the pandemic made it very challenging for nurses to prioritize the need to attend to skin care.

In conducting the needs assessment of the clinical area, knowledge gaps in the documentation and identification of pressure injuries during chart audits and interviews with the bedside staff were noted. There were also disparities noted between the WOCN notes and the bedside nursing notes. In addition, when auditing 100 charts, reviewing the documentation of the WOCN and the documentation of the bedside nurse shift assessment, it was noted there was not a standardized integumentary risk assessment tool. Further examination with informatics, WOCN, and the facility revealed there was no existing evidence based integumentary risk assessment tool utilized.

The bedside nurses verbalized they were aware of the wound care policy which stated patients with identified pressure injuries were required to have a wound care photo of the pressure injury taken when it is first assessed and then every Wednesday (Wound Care Wednesday). The WOCNs estimated the ICU nurses complied with this policy on 50% of patients despite the availability of cameras. An audit of 50 charts validated the WOCNs estimate.

Needs Assessment Related to Achievement of Objectives

The following needs assessment was conducted to determine the clinical issues present in the unit(s) of interest. As a disclaimer, I had been aware of the challenge of HAPIs in the ICU as it is also a part of the facility in which I am employed. I was aware of the role in which the HAPI rate in the ICU contributed to decreased quality of care and penalties from Medicare/Medicaid related to quality indicators as mentioned earlier.

A discussion between the chief nurse officer, unit leadership, and I occurred to get their perspective on existing clinical issues. The topic of decreasing HAPIs in the ICU was formed and had the full support of senior administration from the onset. This led to further discussion with members of the interdisciplinary team to include bedside nurses, unit leadership, WOCN,

nutritionists, pharmacists, physical therapists, and physicians to reduce mechanisms which promote skin failure. Due to the experience of the bedside nurses in the ICU previously cited, there was concern the nurses may not have full knowledge of how to perform an integumentary assessment.

I met with quality and WOCN personnel, reviewing the quality data prior to being invited to facility wide meetings in which HAPIs and other quality indicators were discussed. The ICU leadership invited me to attend critical care integration meetings via webex which also discussed quality indicators across the division. In addition, I also attended the ICU unit-based council meetings as a guest and the bedside nurses brought up the concern about HAPIs. In addition, a continuous review of the literature also lent itself to identifying HAPIs are not only a problem in the ICU at Hospital X but also a global problem.

During the discussions with the WOCN and bedside nurses, there was noted frustration regarding the electronic medical records. Auditing of the charts and sitting elbow to elbow with the bedside nurses, it was evident there was no evidenced based tool utilized to assist the nurse in being able to assess the risk factors for promoting skin failure. Many of the bedside nurses who work in the ICU have recently graduated school or are currently enrolled in advanced schooling, and are aware of evidenced based research and integumentary risk assessment tools such as Braden. Many of the nurses who have worked in other areas, even during clinical rotations, have verbalized being exposed to a charting system which had an evidence-based risk integumentary risk assessment tool embedded in the electronic health record. There was no standardized approach in alerting the clinician to clinical decision making and allowing the selective targeting of preventive interventions. This lacked standardized assessment led to a deficit in care and communication amongst caregivers.

The wound care policy includes wound care photography. Prior to project intervention the patients at hospital X, to include those in the ICU, were required by policy to have photographs of skin assessment of identified pressure injuries taken upon admission and every occurrence. For those patients who had a pressure injury, photos of the injury were taken every Wednesday (Wound Care Wednesday). The nurses were aware of the policy related to the wound care photography as per policy. There was a place to annotate in the EHR by utilizing a check mark by the description of the wound to annotate a photography was taken. Then, the photograph was placed in the chart with the specified tool.

An identified need by the interdisciplinary team, was to further refine the visual documentation of high-risk anatomy by having a photo taken of high-risk areas (hips, sacrum, and heels) within 24 hours of admission and on Wednesdays (Wound care Wednesdays) and Saturdays (Skin Saturdays) while in the ICU setting. These photos were to be taken of all patients, whether they had an existing pressure injury or not. The rationale being the changes in the patient's integumentary system could be caught at an earlier time, thereby taking a proactive, rather than reactive stance. The educational suite provided the additional instructions for the period of the quality improvement project.

Organization's Strategic Plan

Part of the organization's strategic plan was "To be World Class" and a leader in healthcare, which includes zero harm. Zero harm events also encompass decreasing or eliminating HAPIs. Another part of the organization's strategic plan is to achieve Magnet status. Since the Magnet Recognition Program was established in 1990, exceptional healthcare organizations have worked to achieve and maintain this honor. Magnet recognized organizations embody a collaborative culture, with a focus on mutual respect, autonomy, and shared values,

leading to patient's safe passage through their healthcare experiences. One aspect considered when reviewing readiness for Magnet status is patient outcomes such as rates of patient mortality, falls, hospital acquired infections, and pressure injuries as these are also lower in magnet facilities (Rodriguez-Garcia et al., 2020). An initiative to decrease HAPIs fits well in the plan toward Magnet recognition.

Stakeholder Involvement

Pressure injury care is complex, and efforts which improve pressure injury prevention require a system's approach involving organizational change. Beyond the support of organizational leaders, improvement and change projects require strong advocates, members of the organization who are committed to the project's goals and who influence others to get involved. Individuals from various disciplines include physicians, unit managers, wound care nurses, nutritionists, and staff members with a particular interest in this area all help to ensure success in the long term (Al-Mansour et al., 2020).

ICU hospital acquired pressure injuries had been a concern from senior leadership, unit leadership, bedside ICU staff nurses, physicians, and ancillary services for the past two years. These individuals collectively represent hospital X as well as representing their professions. As an interdisciplinary team, they share the common goal of improving the quality of care for patients by increasing the nurse's knowledge about HAPIs.

The intensivists are specialized practice physicians who are assigned to the ICU area and oversee the care of all the patients in the ICU. There are two rotating physicians assigned to day shift (2 weeks/month) and two rotating physicians assigned to night shift (2 weeks/month). These individuals take a proactive stance regarding consulting nutrition, wound care, and other services at the earliest opportunity.

The nutritionist rounds daily in the ICU and collaborates with the physician regarding the best options to address the caloric needs of the patients. The patient's current physical state, comorbidities, skin care status, and other factors are discussed daily. The WOCN makes daily rounds Monday-Friday and assesses the new patients who have been admitted to the ICU, as well as follow up with any identified patients they were currently following. In addition, there is also a facility informaticist who is also willing to address any concerns regarding the process of documentation of HAPI.

Review of the Literature

Pressure injuries affect 2.5 million patients per year, for an estimated cost of \$9.1 billion to \$11.6 billion per year in the United States. The cost of individual patient care ranges from \$20,900 to \$151,700 per pressure injury. This has been the second most common claim after wrongful death and greater than falls or emotional distress (AHRQ, 2017). The development of pressure injuries can interfere with the patient's overall recovery. Registered nurses are poised to assess and initiate interventions aimed at reducing pressure injuries in patients admitted to the ICU. However, because of their generalist education with a variety of patient populations, nurses often require additional, specialty education to augment their understanding of risk factors, skin hallmarks, and actions mitigating skin failure, especially when caring for a patient of high acuity.

After graduation from a nursing program, nurses are challenged to translate their acquired knowledge and skills into everyday practice (Ayello et al., 2017). Education in the ICU is vital in developing and maintaining competency and is essential to providing the nurse with the knowledge to make the best-informed evidence-based practice decisions for the care of the patients (Porter-Armstrong et al., 2018). Despite prevention strategies, HAPIs continue to occur, especially in critical care (Pittman et al., 2019). Since ICU patients are at high risk for the

development of pressure injuries, there is an impetus for nurses to have a robust knowledge of pressure injuries to promulgate prevention strategies in their practice (Alderden et al., 2019; Bueno de Camargo, 2018).

Quality of care increases, and duration of hospitalization decreases with the increase in the level of nurses' knowledge about prevention of pressure injury (Ipek, 2016). In contrast, insufficient knowledge of nurses or failure to reflect their knowledge in practice may cause the existing pressure injuries to worsen or to pressure injury development (Ipek, 2016). Education offered on a regular basis for nurses to improve their understanding of the pressure injury risk assessment tool enhanced measurement reliability and reproducibility. A recent systematic review (Alshahrani et al., 2021) identified the importance of an evidence-based educational program for pressure injury prevention and management to strengthen nurses' knowledge, enhance clinical skills and ultimately decrease the prevalence of hospital acquired pressure injuries in the ICU setting.

The treatment and prevention of a pressure injury, an important quality and care indicator, requires a multidisciplinary team approach (Mallah et al., 2015). Nurses as team members have important roles in the protection of skin integrity and the prevention of complications. Patient evaluation in terms of risk factors and evidence-based nursing interventions applied in the early onset of a patient's admission have great importance in the prevention of HAPIs. The WOCN Association recommends the use of a valid measure to determine risk factors for the development of HAPIs (Schmitt et al., 2017). Since ICU patients undergo constant body and consciousness changes related to illness progression and medication use, the pressure injury risk assessment warrants monitoring every shift during the entire hospitalization period to be captured whenever the patient status changes during their

hospitalization (Han et al., 2018).

The Braden Scale had been used for integumentary risk assessments in a variety of patient populations (Brown, 2004). The Braden Scale for Predicting Pressure Ulcer Risk is a useful risk prediction tool utilized in conjunction with clinical nursing judgment as part of the overall assessment and plan of care (Brown, 2004). In a recent systematic review (Alshahrani et al., 2021), multiple risk assessment tools were used in the 14 included studies. The Braden scale was the risk assessment tool most used.

Nancy Braden and Barbara Bergstron developed the Braden Scale in 1988 for predicting pressure injuries is an evidence-based tool, utilizing measures separated into six sub scales (sensory perception, activity, mobility, moisture, nutrition, and friction/shear) (Wei et al., 2020). Each subscale is rated from 1 to 4, except friction and shear which is scored 1 to 3 with total possible points ranging from 6 to 23. The lower the score, the greater the risk of pressure injury (Brown, 2004). Considering it is not possible to account for all complications or additional risk factors using a single instrument, the nurses' clinical judgment is also essential to be utilized in conjunction with this tool. A score of 18 or less generally indicates at-risk status.

A recent literature review cites the Braden Scale was a widely used tool to assess the risk of HAPI, but its use was controversial in the ICU setting (Wei et al., 2020). This literature review consisted of 11 full text articles totaling 10,044 patients with 1,058 patients with HAPIs. The pooled sensitivity and specificity of the Braden Scale for predicting HAPIs in ICU adults showed a moderate predictive validity with good sensitivity and low specificity in the adult ICU patient. The predictive ability of the Braden Scale varies in the studies because of the variations in subjects, sample sizes, and cut off values, and validity of the assessment tool (Han et al., 2018).

Pressure injury risk assessment is a standardized and ongoing process with the goal of identifying patients at risk for the development of a pressure injury so plans for targeted preventive care to address the identified risk can be implemented. This process is multifaceted and includes many components, one of which is a validated risk assessment tool or scale. A risk assessment does not identify absolutely who will develop a pressure injury. Instead, it identifies which patients are more likely to develop a pressure injury, particularly if no special preventive interventions are introduced. The utilization of a tool, like the Braden Risk Assessment prompts proactive nursing care with evidence-based measures to institute more intensive interventions for those patients deemed as greater risk of HAPIs.

Another method of assessment and communication is photographs of patient wounds as a useful adjunct to the written record. They provide an excellent tool for interdisciplinary communication, and help to monitor wound healing (Langemo et al., 2006). One of the most powerful clinical tools when managing patients with wounds is visual observation (Saiko et al., 2020). The photographing of images provides clinicians with a powerful, informative, and non-invasive means to examine, quantify, and document wounds. Wound measurement is also an essential part of wound assessment and was a key measurement used to monitor wound healing (Saiko et al., 2020). The consistent use of the same measurement tool with the same process helps to facilitate the communication between multiple caregivers across the patient's wound care journey.

Significant improvement in practice had been identified within organizations that have introduced hands-on skill development sessions for staff and provided local champion and manager support (Porter-Armstrong et al., 2018). After the pressure injury risk assessment, a comprehensive skin examination is the next step in pressure injury prevention. The

comprehensive skin assessment is a separate process for the largest organ of the body (AHRQ, 2017). In a recent published quality improvement project, skin assessments with a second RN were performed on every patient who was admitted or transferred to the unit (Amon et al., 2019). This article further described how this practice helped to improve accuracy of the skin assessments and was a component of this unit reaching 1,000 days without an episode of HAPIs (Amon et al., 2019).

Amon et al. (2019) described an adopted practice of performing thorough skin assessments with a second RN to improve the accuracy for patients on admission or transfer to the unit. Results of this program conducted in a hospital-based medical surgical telemetry setting were effective in achieving zero pressure injuries for over 2 years . The accuracy of the integumentary assessment, in particular the identification of HAPI on admission to this unit increased (Amon et al., 2019). Many successful improvement efforts have relied on unit champions (AHRQ, 2017) as critical members of the unit-based team who served as subject matter experts during the implementation process. These individuals were familiar with the program goals, specific elements, and outcomes. They assisted with conducting in tandem integumentary assessments as well as providing the encouragement for others in the ICU.

The terminology of skin failure or unavoidable pressure injury is considered subjective and is based on clinical judgment, considering the acuity of the patient, and presenting disease state (Schmitt et al., 2017). Unavoidable pressure injury is a term which is used to describe the HAPI which the patient develops even though the facility had evaluated the individual's clinical condition and risk factors, defined, and implemented interventions, monitored, and evaluated the impact of the interventions, and revised the approaches as appropriate (Schmitt et al., 2017).

A synthesis of the literature (Ayello et al., 2019), discussed a group of 18 international

key opinion leaders who met in 2008 to review the evidence, literature, and expert clinical experiences . A retrospective, descriptive, and comparative study (Carlsson and Gunninberg, 2017), reported the predictability for the development of pressure injuries in end-of-life care. This study was not able to prove causation, but it did show the importance of reporting possible correlations between background variables such as end of life and pressure injury prevalence.

Individuals who were at increased risk of developing an unavoidable pressure injury are those who are dealing with cachexia or anorexia. Cachexia is a wasting syndrome with symptoms which include unintentional weight loss, muscular atrophy, loss of appetite, and is often the result of a chronic disease or severity of an illness. It is a cytokine-associated wasting of protein reserves and energy stores caused by diseases such as cardiac cachexia, end stage renal disease, COPD, cystic fibrosis, cancer, and rheumatoid arthritis (Schmitt et al., 2017). Anorexia is related to oral eating problems, declining nutrition status, weight loss, low body weight, undernutrition, and malnutrition.

Multifactorial and comprehensive programs which are aimed to reduce HAPIs in hospitalized patients and have been the most successful include: teamwork approaches; education of health staff; nutritional assessment; utilization of risk-assessment tools; visual skin assessment; use of support surfaces; offloading heels; repositioning mainly with the use of sliders; disposable soaker pads to manage moisture and incontinence; skin care; application of medical devices related to HAPI assessment; use of prophylactic dressings; smartphone applications, involvement of patient and family; and semi-weekly WOCN rounds (Akhkand et al., 2020). These multiple interventions also increase staff knowledge, patient, and family involvement, support clinical decision making, and improve health outcomes.

Objectives

Based on the needs assessment and the evidence cited the following objectives for this quality improvement project included:

1. Creation of an evidence based educational suite for the ICU nurses on prevention of HAPI.
2. Incorporation of the Braden Scale to stratify risk factors promoting skin failure in at least 80% of ICU admissions.
3. Reformation of visual documentation of high-risk anatomy using the unit's designated wound care camera in 80% of ICU admissions.
4. Validation of an integumentary system assessments by designated skin care champions with 80% of ICU patients.

Methodology

Significant improvement in practice has been identified within organizations that have introduced hands-on skill development sessions for staff and provided local champion and manager support (Porter-Armstrong, et al., 2017). The scope of this project included education to the bedside ICU staff member about the current wound care and wound photography policies. The validation of understanding regarding the integumentary assessments and risk factors were conducted by the four trained skin care champions and I. Efforts were made to include these duties during the scheduled working hours.

Intervention Plan/Implementation/Setting

The quality improvement project utilized the Plan Do Study Act Cycle to carry out the interventions and implementation. The setting for the evidence based educational teaching was in a classroom near the ICU to provide for dedicated and focused teaching. The other activities

described were performed in the ICU with the nurse. The Plan Do Study Act (PDSA) Cycle is a four-step cycle which allows for implementing change, solving problems, and continuously improving processes (Christoff, 2018). The PDSA method of evaluation helped me to focus on building the fundamental knowledge which is necessary to enable improvement. This was an appropriate methodology to utilize for this quality improvement project. The acronym PDSA is further detailed below:

1. Plan means developing a plan with identified tasks and assigning task owners as well as identifying when, how, and where the plan will be implemented. An educational session was created in collaboration with the interdisciplinary team members including: WOCN, nutritionists, pharmacists, and physical therapists to reduce mechanisms which promote skin failure. The components of the custom-made, evidence based educational suite focused on: anatomical irregularities and diagnoses (cachexia, anorexia nervosa, etc.) heralding HAPI; staging of a pressure injury; reinforcement of integumentary assessment techniques; review of hospital policy on HAPI prevention; education regarding the Braden Scale; and review of visual documentation of high-risk anatomy (sacrum, coccyx, and heels) using the unit's designated wound care camera.
2. Do means carrying out the plan and document relevant data which identifies successes, problems, or unexpected outcomes. During the month of March, I was able to educate four skin care champions regarding the educational suite and the tandem integumentary assessment. The 45-minute educational suite was provided in person to all the remainder of the full-time nurses assigned to the ICU during the month of April. There was a delay in having the educational suite being taught

sooner due to other educational requirements taking precedence during the months of January-March. In addition, since this quality improvement project was occurring during the pandemic known as COVID-19, some of the usual operations which could normally occur were delayed due to educators and leadership needing to be in bedside staffing and working for extended hours.

3. Study means evaluate the documented data to determine if the plan is working. The data was reviewed from April-May and discussions with staff were made accordingly. At the present time, there is not a prompt in the EHR for results of the Braden Score. However, staff members were able to speak to the score and this score was recorded in a separate location . If the Braden Score was <18, this prompted the nurse to approach the physician for a wound care consult.
4. Act means the intervention being tested is adopted, adapted, or abandoned based on the evaluation of the data in the prior phase (AHRQ, 2017). There are complications with the wound care camera which will be discussed in limitations. However, the staff embraced the project and were eager to assist with the process.

Evaluation plan

Attendance rosters for the educational suite, and verification checklists for the verification of tandem skin assessments was utilized. The Braden scale was laminated and placed in each patient room. The calculation of the Braden Scale was audited in the patient record for each shift (am and pm) for their length of stay in the ICU. A running tally was kept with the date/time of the Braden scale assessment, RN identifier, and the Braden Scale number assigned to the patient identifier. Instances when these measures were not met, it was identified if the RN had already received training regarding HAPI. The photography of the patients in high-risk areas

were conducted on admission, Wednesdays, and Saturdays. I conducted visual chart audits as a method to verify the wound photography was occurring. When deficits were noted, the individual nurse was provided with in time coaching, also allowing for discussion of barriers encountered.

Timeline

As mentioned earlier in the paper, I am also an employee of the same facility. During the months of October 2020-February 2021, this facility was experiencing an influx of patients with COVID-19. Multiple nurses, to include myself, were working extra hours to assist with the pandemic. Discussion with my program advisor during the fall of 2020, it was decided the best avenue would be to take an in progress. As anticipated, this did cause delay in being able to execute the project in a timely fashion.

The executive summary was approved by the Institutional Review Board at University of the Incarnate Word on 2/1/2021. Hospital X Institutional Review Board approval was on 3/08/2021 and the project was approved and supported by the CNO at Hospital X on 3/10/2021. In addition, the implementation of the interventions was further to the end of March due to staff turnover and other needs regarding staff education. Unit leadership verbalized concerns regarding starting a quality improvement initiative during the transition of onboarding new staff members. This quality improvement project spanned a total of 14 weeks. See Table 2 for further information regarding the timeline.

Protection of Human Subjects Address Ethical Considerations

Necessary approval was sought from the Institutional Review Boards at University of the Incarnate Word and Hospital X. A waiver for this quality improvement project was obtained from each organization for completion of this project since the intervention planned is already a

policy in place and represents best practices related to the identification and prevention of HAPIs. The CNO of Hospital X also provided a letter of support for this project (appendix D).

Table 2

Project Timeline

Month	Activity
January-June	Face to face interaction with employees
March	Collaborate with informatics to enable documentation in EHR
March	Educate designated super users regarding verification of in tandem integumentary assessments
March-April	45-minute evidence based educational session presented in person in classroom format
March-June	Data collection
April-June	Data analysis
June	Dissemination of findings

Results and Findings

Figure 5 are the results based on the objectives of the quality improvement project. The first objective of creating an evidence based educational suite for the ICU nurses on the prevention of HAPI and having at least 80% attendance was met. The overall attendance was 90% as evidenced by 43 nurses attending out of 48. The five nurses who were unable to attend during the quality improvement project period were on leave of absence. See Figure 3 for further explanation of RN attendance over a 6-week period.

The second objective addressed the incorporation of the Braden Scale in every scheduled integumentary assessment. The expectation was for this to be performed by the bedside nurse

once a shift. This objective showed continuous improvement as education was still in progress as this was beginning to be tracked. The goal of 80% was met as the average of the weeks came to 83% (See Figure 6).

The third objective was to refine the visual documentation of high-risk anatomy using the unit's designated wound care camera in 80% of ICU patients. ICU bedside staff made a concerted effort to comply with photographing HAPI high risk areas of the hips, sacrum, and heels of every new admission with 24 hours and every Wednesday and Saturday. As a work around since the wound care camera would sporadically work, the ICU staff and I collaborated with the WOCN and IT representative. Instead of utilizing the wound care camera, there were occurrences when the staff member utilized the same process of taking photos with the secure smart phone which is provided to each staff member at the beginning of their shift. Photos were sent to me through this secure application. Over the course of the quality improvement project, the numbers did increase due to this effort. However, this goal was not met. A 65% compliance with wound care photography was ultimately reached. See Figure 7.

The fourth objective was to have the integumentary assessments validated by designated skin care champions with 80% of the ICU bedside staff. There were two skin care champions during the day shift and two skin care champions during the night shift. This was performed with 90% of the bedside staff. The goal was met.

Figure 8 data are characteristics of HAPIs in the ICU of Hospital X for January-May 2021. These data were from the wound care nurses' internal database from the clinical organization.

Discussion

The first objective was the foundation for this project. The creation of an evidence based

educational suite for the ICU nurses on prevention of HAPI was a collaborative effort including

Figure 5

Number of RN Attendance at Educational Suite by Week

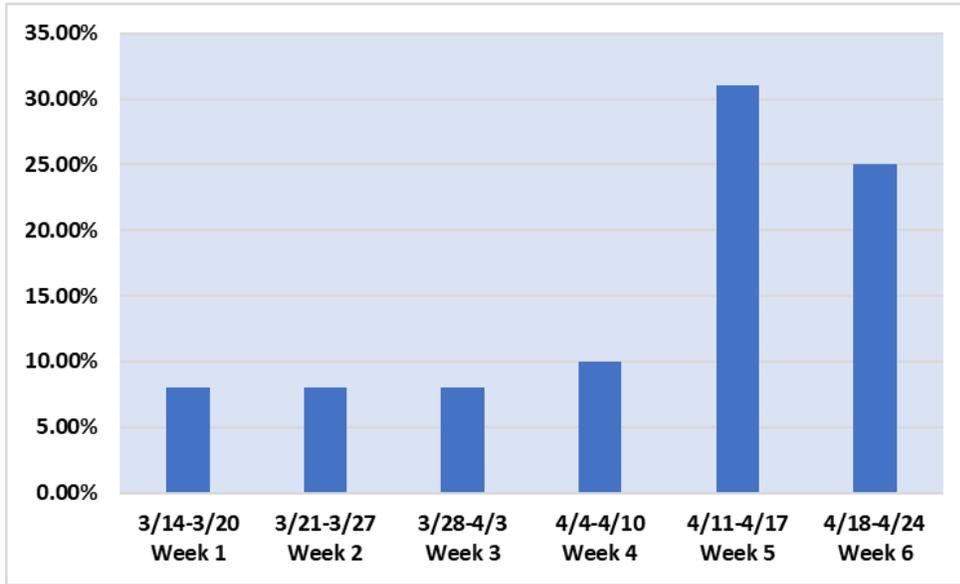


Figure 6

Rate of Utilization of Braden Scale to Assess Integumentary Risk

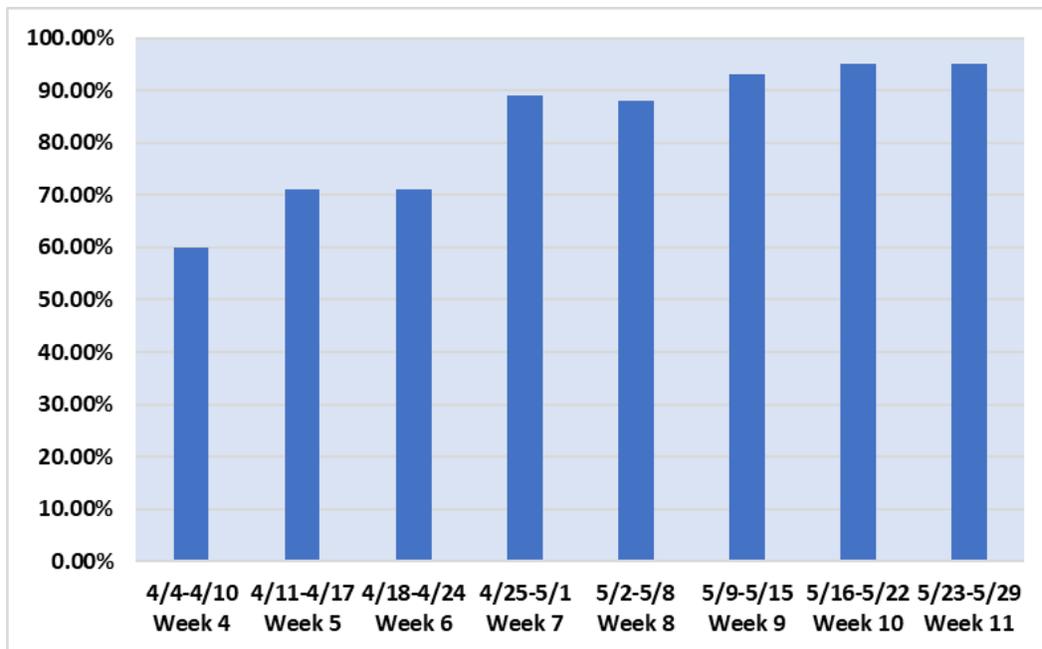


Figure 7

Visual Documentation of High-Risk Anatomy by ICU Staff

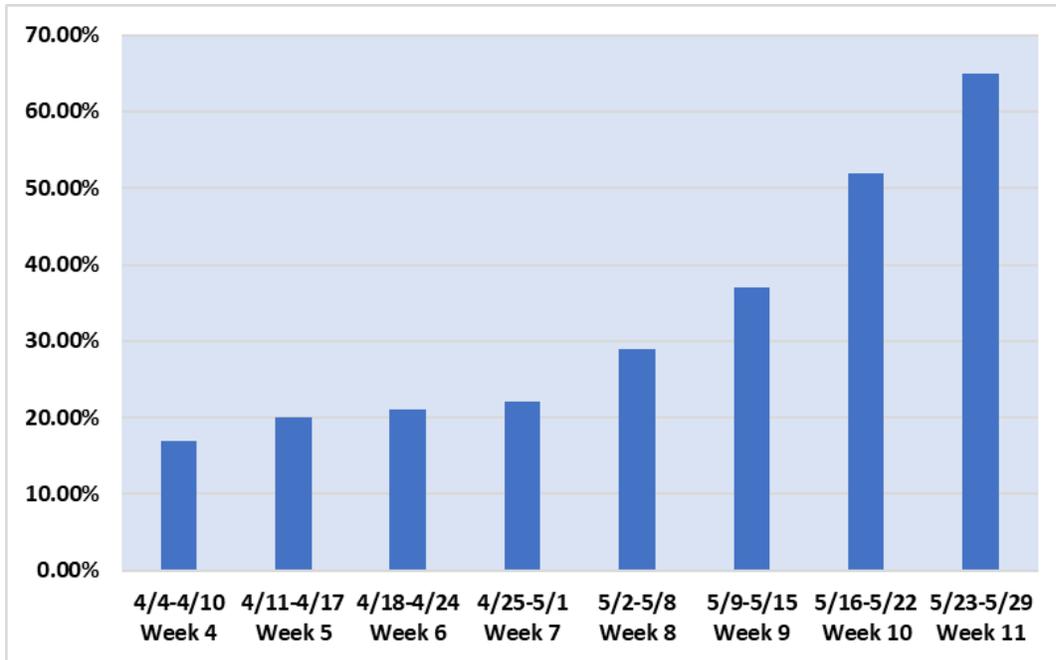
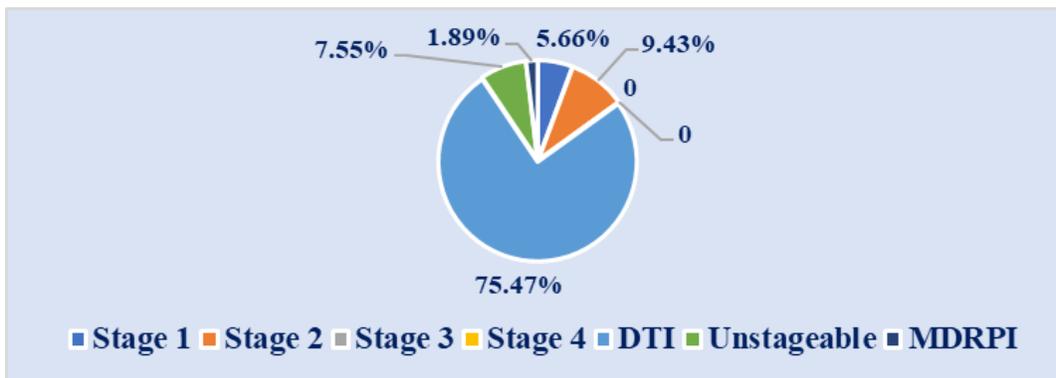


Figure 8

Year 2021 January-May Characteristics of HAPIs in the ICU



my academic advisor, faculty at UIW, facility preceptor, WOCN nurse, interdisciplinary team members, bedside staff, and I. The evidence base educational suite would not be successful without the input of all the disciplines.

The second objective regarding the incorporation of the Braden Scale to stratify risk

factors promoting skin failure in at least 80% of ICU admissions was met for the purpose of the quality improvement project and is a useful tool to bring awareness to the staff regarding risk factors for integumentary breakdown.

The third objective regarding visual documentation of high-risk anatomy using the unit's designated wound care camera in 80% of ICU admissions was not met. There were barriers encountered with the unit's wound care cameras and printers. At times, it would take up to 20 to 30 minutes to print a wound photo, which is not reasonable considering today's fast paced medical surgical ICU. The staff members would use work-arounds such as utilizing the secure smart phone and sending photos through the secure server to me for recording purposes. Informatics, wound care, and leadership are aware of these barriers. There have been discussions with leadership regarding the possibility of a skin integumentary photograph application via the issued smart phone device, which is being utilized at some facilities across the corporation.

The fourth objective addressing validation of an integumentary system assessments by designated skin care champions with 80% of ICU patients was met. In addition, the institution of having two nurses perform the integumentary assessment on admission to the ICU was embraced by the unit staff and leadership. The unit-based council with the WOCN have approached leadership about having a two-person verification for all patients who enter the ICU and upon discharge from the ICU. The concept of "four eyes are better than two" is also supported by literature.

In addition, unit leadership has instituted integumentary rounds as part of sustained improvement. They are auditing the patients charts to see if the integumentary system is being charted appropriately. The adopted practice of performing thorough skin assessments with a second RN to improve the accuracy for patients on admission or transfer to the unit is discussed

in a hospital-based quality improvement program which was effective in achieving zero pressure injuries for over 2 years on a medical surgical telemetry unit (Amon, et al., 2019).

Strengths

Most of the nurses appeared to embrace the project. They were amenable to the idea of capturing the high-risk areas through wound photography. They were also amenable to utilizing the Braden Scale as a risk assessment tool. The ICU Unit Based Council asked me for assistance in writing their smart goal for 2021 for decreasing HAPI.

Limitations

There was a delay with the start of the interventions related to the Braden Scale and application of wound care photography twice a week. Unit leadership requested a delay with the initiation of the HAPI interventions due to unforeseen staff loss, new onboarding of personnel, and additional initiatives which were also being instituted at the same time.

This quality improvement initiative was to be completed over 8-10 weeks, with baseline data of those patients with HAPI while in the ICU which was collected in 2019 and 2020. The data were collected from the NDNQI database as well as the WOCN internal database for HAPI. Those patients who had a pre-existing pressure injury prior to admission to the ICU were excluded. The barrier of the wound care camera process was identified by staff members, WOCN, and the I. The WOCN and I have approached the CNO regarding the practice barriers regarding the current technology and the available progressive technology which would make compliance much easier.

Sustainability

For a program to have sustainability, buy-in from all levels of leadership and staff must be achieved. The following steps to be used include building a small team, understanding the

baseline data, and setting a vision, mission, and goals (Ipek, et al., 2016). The team needs to decide on sustainable initiatives, a way to involve and engage others. This will lead to the program evolving and adapting (Braddock et al., 2015). One of the ways for this to occur is for the prevention of HAPIs to be part of yearly, regulatory training for all ICU nurses.

Every morning, during leadership huddle, quality indicators to include hospital acquired conditions are discussed at Hospital X led by the senior leadership team. This quality improvement project was just the start of something which is going to be an ongoing process. There are meetings that are held for an interdisciplinary collaboration between wound care, the trained integumentary system champions, clinical nurse leader, nutritionist, physical therapy, and education. These collaborative meetings were on hiatus due to the pandemic but due to restrictions being lifted, they are now able to resume to address the issue continuing to educate the bedside nurses regarding the best evidence-based care regarding the integumentary system.

DNP Essentials

The DNP program at UIW and the clinical experience at hospital X has assisted me to collaborate across various disciplines. This is evidenced by the relationships formed between the interdisciplinary team members consisting of bedside ICU nurses, ICU leadership, senior leadership, supply chain, nutrition, wound care nurses, physical therapy, and physicians. The following describe the essentials which have been met as outlined by the American Association of Colleges of Nursing (AACN).

Essential I: Scientific Underpinnings for Practice. This terminal academic preparation for nursing practice has been integral in this project. The scientific foundation of nursing practice has guided me to conduct a review of the literature, examining evidence-based practice to develop and evaluate new practice approaches to the reduction of HAPIs.

Essential II: Organizational and Systems Leadership for Quality Improvement and systems Thinking (AACN, 2006). The academic experience at University of Incarnate Word in conjunction with the clinical experience at hospital X allowed me to develop quality improvement strategies and create and sustain changes at the organizational and policy levels.

Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice (AACN , 2006). I have used analytic methods to critically appraise existing literature and other evidence to determine and implement the best evidence for practice. The dissemination of findings from evidence-based practice and research was shared during the interdisciplinary discussions as well as introduced in the educational suite. Further discussions with various staff members brought about excitement and interest as it encouraged bedside staff members to find evidence-based articles to share with colleagues and I regarding HAPIs.

Essential IV: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care (AACN , 2006). I have collaborated with the informaticist to review the current EHR availability for electronic prompts and improved documentation systems regarding the integumentary system. There are limitations to the current charting system which have been identified by the WOCN and I. IT is aware and searching for solutions. In addition, the WOCN and I have also met with the facility CNO regarding an application for wound care photography and he has asked for data from the quality improvement project, so he can facilitate a request for advanced technology for the nurses.

Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes (AACN, 2006). I have utilized a collaborative team approach to assist in overcoming barriers to interprofessional practice. There are multiple members of the team who have assisted with this project to include: bedside nurses, unit leadership, senior leadership,

WOCN, nutritionists, physical therapists, supply chain services, as well as administrative assistant support. The stakeholders include senior administration, unit leadership, members of the interdisciplinary team, and the patients and families.

Essential VII: Clinical Prevention and Population Health for Improving the Nation's Health (AACN, 2006). I, through the provision of the education to the bedside staff, discussed utilizing repositioning devices such as wedges and fluidized pillows to avoid the incident of HAPI occurrence. Unavoidable risk factors unique to the population of liver failure such as thrombocytopenia were also discussed.

Essential VIII: Advanced Nursing Practice (AACN, 2006). The DNP program has provided a structured method for the DNP student to conduct a comprehensive and systematic assessment of the ICU setting at hospital X in relation to the occurrence of HAPIs. The development and sustainment of therapeutic relationships with other professionals is key to facilitate improved patient outcomes. The ability to guide, mentor, and support other nurses to achieve excellence in nursing practice is also key (AACN, 2006).

Conclusions

As mentioned previously, there are a multitude of factors which contribute to pressure injuries. The staff in the ICU at Hospital X have demonstrated a desire to improve the quality of care they provide regarding the integumentary system. This quality improvement project is just the beginning for many more continuous processes to come

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Appendix A

Action Plan for DNP Proposal

Objective 1. Create an evidence based educational suite for the ICU nurses on prevention of HAPI		
Identify all interventions (tasks) which relate to this objective	Timeframe When will it occur; how much time will completion require.	Responsible individual Involved individuals
A. Develop educational session in collaboration with the interdisciplinary team members including.	January 15-February 1, 2021; 20 hours to develop.	Responsible individual-DNP student Involved individuals- WOCN RN, Nutritionist, Pharmacist,
B. The components of the custom-made, evidence based educational suite will focus on anatomical irregularities; staging; integumentary assessment techniques; and review of hospital policy on HAPI prevention.		
C. Present the education session as a 45 minute in person power point presentation. 1. Collaborate with education department regarding annual regulatory training.	March 14-April 24, 2021; 6 weeks to complete Pending	Physical Therapist, Education department

<p>Objective 2. Utilize the Braden Scale (See appendix) to assess risk factors promoting skin failure in 80% of ICU patients .</p>		
Identify all interventions (tasks) which relate to this objective	Timeframe When will it occur; how much time will completion require	Responsible individual. Involved individuals
<p>I. Display on the patient’s door the laminated six category Braden Scale on one side and the specific immobility scoring for Braden Scale on the other side for all caregivers to reference.</p>	<p>March 12, 2021-signs placed on each door-took total of 40 minutes.</p>	<p>Responsible individual-DNP student Involved individuals- ICU Director, Critical</p>
<p>II. Incorporate Braden Scale in every scheduled integumentary assessment, to be performed by the bedside nurse once a shift.</p>	<p>April 4, 2021-May 29, 2021; Documentation by bedside nurses took on average 10 minutes per patient</p>	<p>Care Services Educator, Bedside nurses</p>
<p>III. DNP student will develop a referral process for the wound care nurse dependent on Braden score.</p>	<p>April 4, 2021-May 29, 2021; Daily audits mentioned above in II helped to identify patients which needed to have referrals to wound care.</p>	

<p>Objective 3. Refine visual documentation of high-risk anatomy using the unit’s designated wound care camera in 80% of ICU patients</p>		
<p>Identify all interventions (tasks) which relate to this objective.</p>	<p>Timeframe When will it occur; how much time will completion require</p>	<p>Responsible individual. Involved individuals</p>
<p>I. Nurses will photograph HAPI high-risk areas (hips, sacrum, and heels) of every new admission within 24 hours.</p>	<p>April 4-May 29, 2021; It took nurses up to 20 minutes per patient episode</p>	<p>Responsible individual- DNP student;</p>
<p>II. Nurse will follow-up photos of the same areas to be conducted every Wednesday (Wound Wednesdays) and Saturdays (Skin Saturdays)</p>	<p>to take and print photos</p>	<p>Involved individuals- ICU Director, Critical Care</p>
<p>III. The DNP student will monitor the photos to ensure nurses photograph high-risk anatomy on admission and twice a week on Wednesdays and Saturdays.</p>	<p>Monitoring of photography by took 2 hours/twice a week.</p>	<p>Services Educator, staff nurses, unit champions,</p>
<p>IV. DNP student will establish mechanism to document photography completion in electronic health record.</p>	<p>March 1, 2021. verified with IT and WOCN. Total time: 1 hour.</p>	<p>WOCN.</p>

<p>Objective 4. Integumentary system assessments will be validated by designated skin care champions with 80% of the ICU bedside staff.</p>		
Identify all interventions (tasks) which relate to this objective	Timeframe When will it occur; how much time will completion require	Responsible individual. Involved individuals
<p>I. Develop training sessions to assign skin care champions.</p> <p>II. Work with scheduler to ensure a skin care champion is available every shift to validate other nurses' assessments.</p> <p>III. Every patient, upon admission to the ICU, will have an integumentary assessment performed by 2 RNS. In the EHR under integumentary assessments, the bedside nurse will document on admission "performed skin assessment with _____ RN".</p>	<p>February 1, 2021-February 8, 2021-10 hours to develop.</p> <p>February 10, 2021-2 hours</p> <p>March 14, 2021-May 30, 2021-took nurses about 10 minutes to perform integumentary assessment together per episode; included in DNP students 2-hour audit time daily to monitor if this was documented in the EHR.</p>	<p>Responsible individual-</p> <p>DNP student</p> <p>Involved individuals-</p> <p>Critical Care Services Educator, staff nurses, unit champions</p>

Appendix B

Program Expenses

Program Expenses		
Salaries/Wages		
	Monthly	Total
4 Bedside Nurses (Designated Skin Care Champions) who will assist with the validation of skin assessments	2-4 hours/week for total of 8-16 hours/month for 2 months	Average salary of \$30/hour x 16 hours x 2 months = \$960 x 4 nurses = \$3,840.00
43 Full Time Bedside Nurses to attend the 45-minute Inservice	N/A	Average salary of \$30/hour x .75 hours x 43 staff = \$967.50
Total Salary Costs	N/A	\$4,807.50
Startup Costs		
2 reams paper	N/A	\$20.00
Photo paper	N/A	\$40.00
Photo ink	N/A	\$40.00
Total Startup Costs	N/A	\$100.00
Total Costs		\$5,007.50