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# The Effect of a Certified Wound Ostomy Nurse Educational Bundle on Hospital Acquired Pressure Injuries in the Intensive Care Unit: A Quality Improvement Project

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**Abstract:** *Purpose:* Patients in critical care units are considered high risk for pressure injury (PI) development with reported rates in the United States topping 40% in some cases. Multiple factors contribute to the risk of this population including a knowledge deficit among nurses which often leads to a lack of assessment and prevention measures needed to reduce pressure injuries. This project was launched after data collected by the Wound, Ostomy and Continence Nurse (WOCN) team showed an increase in hospital acquired pressure injuries (HAPI) in the intensive care unit (ICU) in the first quarter of 2016. The rate was 11.56 per 1000 patient days. This data was collected as part of our quarterly prevalence study reported to the National Database of Nursing Quality Indicators (NDNQI). Although this rate is lower than the national average, our patients deserve process improvement to achieve 0% incidence. *Participants and Setting:* The setting was a 16-bed ICU at a tertiary care hospital in the Southeastern United States. Monthly data was collected over the span of a year to evaluate incidence rates of hospital acquired pressure injuries (HAPI) from Q1 2016 to Q 4 2017. *Approach:* The cornerstone of this project was to focus on nursing education surrounding pressure injury prevention (PIP) intervention selections. The overall goal was to heighten the quality of patient care by implementing an innovative PIP bundle that was supported by Certified Wound, Ostomy Nurse (CWON) education and knowledge sharing throughout the ICU. The Plan, Do, Study, Act (PDSA) methodology was used to monitor interventions and outcomes. *Outcomes:* The measurable goal of this project was to decrease the quarterly rate of hospital acquired pressure injuries in the ICU by 50% by 4Q 2017, as compared to a rate of 11.54 per 1000 patient days 1Q 2016. Subsequent quarters demonstrated incremental decreased HAPI rates of 0.9, 1.8, 1.7, 5.2, 4.3, 0.9 and 0 by 4Q 2017. This was a total reduction rate greater than 50% which was our goal. The PIP bundle highlighted by WOC nurse education resulted in significant and clinically relevant reductions in incidence of HAPI in the ICU. Our future goal is to continue with an ongoing PIP bundle and WOC nurse rounding as part of our best practice within this hospital setting. In addition, we continue to share knowledge gained by this QI project with our extended WOCN team working at our surrounding facilities.

**Keywords:** Pressure, Injury, Prevention, Ulcer, HAPI, PIP, NDNQI

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## 1. Introduction

Critical care patients are among some of the highest risk for developing pressure injuries (PI) with reported rates in the United States ranging from 14-42%. [1] Multiple factors contribute to the high risk of this population including a

knowledge deficit among nurses which often leads to lack of assessment and prevention measures needed to reduce pressure injuries.

A pressure injury is a localized area of pressure damage to the skin and underlying soft tissue usually over a bony prominence or related to a medical or other device. The

injury occurs because of intense and/or prolonged pressure or pressure in combination with shear. [2]

Development of pressure injuries is complex and multifactorial. In critical care patients, pressure injuries are an additional comorbid threat in patients who are already physiologically compromised. Contributing or confounding risk factors in the population include: age, low blood pressure, temperature, immobility, urinary and fecal incontinence, poor nutrition, cardiovascular disease and diabetes. Research suggests that pressure injuries are one of the most underrated medical problems in critical care patients. [3]

Hospital acquired pressure injuries (HAPI) are costly and can be deadly to critically ill patients. The estimated cost ranges from \$500 to \$150,000 per case, which costs the healthcare system \$11 billion annually in the United States. Moreover, full thickness pressure injuries cause 60,000 deaths per year in the United States. [4]

## 2. Method-Background and Rationale

This project was launched after data collected by the Certified Wound, Ostomy, and Continence (WOCN) team showed an increase in hospital acquired pressure injuries in the intensive care unit (ICU) in the first quarter of 2016. The rate was 11.56 per 1000 patient days. Although this rate is lower than the national average, our quality standards demanded that our patients deserve process improvement measures to achieve 0% incidence. The setting for this quality improvement (QI) project was a 16 bed ICU at tertiary hospital in the Southeastern U.S.

### 2.1. Method- Clinical Goal

The measurable goal of this project was to decrease the quarterly rate of hospital acquired pressure injuries in the ICU by 50% by 4 Q 2017, as compared to a rate of 11.54 per 1000 patient days 1 Q 2016. The Plan, Do, Study, Act (PDSA) methodology was used to monitor interventions and outcomes.

### 2.2. Method- Quality Improvement (QI)

Research done in the late 20<sup>th</sup> century supported the PI prevention strategy of pressure relief through two-hour turning, or q2h turning. This quickly became the gold standard of pressure injury prevention standards (PIPS) and remains an emblem of quality care today. [5] This project harnessed the basic interventions of pressure relief and prevention, but formatted a bundle project that would cater to the additional pressure risks that proliferate in a modern-day ICU. The bundle had two simple, but effective goals:

1. Focus on the sixty-plus PIPS interventions and select the seven most effective to implement for every patient.
2. Reinforce the bundle with Certified Wound, Ostomy Nurse (CWON) educational rounding.

The first goal helped the ICU nurses focus on evidence-based practice interventions instead of feeling so overwhelmed at the amount of PIP interventions to choose

from. To help assess knowledge of the key evidence-based interventions to reduce pressure injuries, a flow sheet was used by nursing to collect base line data regarding consistent implementation of prevention measures. This data led to a process change adding key products in patient rooms for quick access for use by nursing staff. The second goal of CWON presence during interdisciplinary rounding, became the cornerstone of our project. It encouraged on-the-spot education whenever the CWON was flagged for a question, consult, or wound assessment during rounds. This in turn, allowed us to leverage the bundle as a means of knowledge sharing and teamwork. As one nurse asked for the CWON to evaluate an evolving PI, their ICU teammates also gained from hearing the CWON's insight and guidance. Various creative education products were created to reinforce learning through, flyers, story boards, and self-study packets.

In relation to the educational piece of our project, we discovered a PIP knowledge deficit among new graduate nurses working in the ICU. This led to an extension of our knowledge sharing mission as we created a special course for our system's Journey program which is designed to support new nurse graduates with focused ICU training. We called this course "PUPS in the ICU" (the National Pressure Ulcer Advisory Panel (NPUAP) had changed the official terminology from pressure ulcer to pressure injury thus changing their name to the National Pressure Injury Advisory Panel (NPIAP) during our project-- which is why we used the term PUPS, and now PIP). [6]

Another key improvement strategy included the support of the ICU Nurse Manager who led huddles and helped to disseminate the project information and NDNQI data to nursing staff. The leadership team was also instrumental in revising the Interdisciplinary Rounding sheet to include "Skin" to be discussed on every patient during rounds. The nurse educator was instrumental in ongoing educational support. For example, when a specific knowledge gap was identified regarding features on the support surface ICU beds, additional education was brought into the ICU provided by the bed vendor. The nurse educator also arranged for new ICU nursing staff to round with the CWON for a day. Further spread occurred with the involvement of the Respiratory Therapy staff as they became involved in reducing medical device related pressure injuries associated with ventilation devices. Finally, an innovative strategy that the ICU nurses implemented was "turning buddy teams". They understood that they could rely on each other and hold each other accountable for the turning schedules.

As stated, this project focused on the basic interventions of *Pressure Injury Prevention (PIP)* which became a PIP bundle. The following evidence-based nursing interventions became the standard of care in the ICU to reduce pressure injuries:

#### *Process Indicators for PIP Bundle*

1. Skin assessments each shift and with condition change.
2. Repositioning.
3. Early mobility.
4. Preventative dressings [7].

5. Positioning and off-loading devices.
6. Moisture management.
7. WOC rounding with team.

*Action Strategies:*

1. To determine nursing knowledge of PIP guidelines.
2. Flow sheets utilized by staff to establish consistent prevention measures.
3. Bundle intervention products placed within easy access for use.
4. Creative and widespread education which included informational flyers, self-study, huddles, story boards, journal article sharing, and the support of the ICU educator.
5. Nurse manager led huddles.
6. QI Cornerstone: CWON presence with interdisciplinary rounding.
7. Class developed and taught by the CWON to new ICU staff entitled: “PUPs in the ICU” (pressure injuries were formerly called pressure ulcers and pressure ulcer prevention strategies were referred to as “PUPs”) as knowledge deficit was uncovered among new graduate ICU nurses.
8. “Turning buddies” program started by nursing staff. [8]
9. Respiratory Therapist involvement to guide reduction of device related PI. [8]
10. Education by ICU bed vendor.



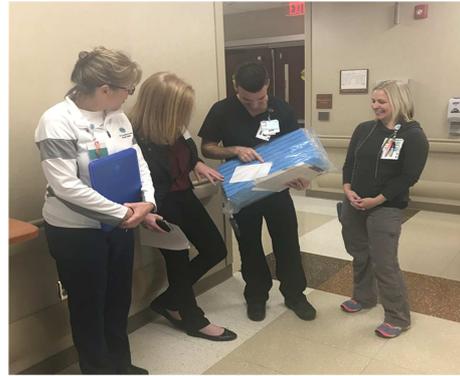
**Figure 1.** WOC Rounding ignited on-the-spot educational sessions and encouraged the rapid spread of knowledge sharing.

*Stakeholders & Team Composition*

1. WOCN Team
2. ICU nursing staff
3. ICU Nurse Manager
4. Nurse Educators
5. Nurse Administrator
6. Respiratory Therapy
7. Dieticians
8. Pharmacists
9. ICU Intensivists/Providers
10. Hospital Chief Executive Officer
11. Patients and families

It's crucial we identify a complete list of stakeholders, all of whom had an interest in the success of this multidisciplinary project to reduce hospital acquired pressure injuries. Their buy-in, influence and lessons learned helped to determine the success of this QI project. Their hard work

helped to decrease HAPI and outperform internal and external benchmarks.



**Figure 2.** Nursing staff sharing prevention strategies during interdisciplinary rounding.

*WOCN Team* - their interest was in outperforming benchmarks and improving quality care for all ICU patients who are all deemed at risk. The CWONs oversaw and established PIPS protocol. The CWON's expertise led PIPS in its' entirety. If nurses are taught well and the data for HAPIs reflect that—then the CWONs continue to be regarded as highly valued team members. The CWON power and influence was the pivotal piece that ran the process of discovering the problem, using their expertise to find solutions, communicating with stakeholders, program development and serving as the point person for the QI Team.

*ICU nursing staff*—they held power and influence to carry out PIPS interventions and make sure each teammate followed the guidelines while communicating effectively as a team. They also had an interest in taking pride that the unit outperformed NDNQI benchmarks. A lesson learned by the nursing staff was that the smallest interventions can lead to the greatest prevention measures and it takes teamwork as evidenced by the development of “turning buddy teams.” [8]

*ICU Nurse Manager*- had the interest of decreasing unit HAPIs and outperforming internal and external benchmarks. The nurse manager influenced the project positively by showing “buy-in” openly as a nurse leader by making the PIPS Bundle a priority discussion during change-of-shift huddles and meetings. The nurse manager had the power to influence whether the project was continued, modified or scrapped.

*Educator/Director of Journey Program* (6-month new grad ICU training program) - the educator's interest was in making sure that the Journey Program produced the most qualified and skilled new ICU nurses possible. The educator had the power and influence to help guide the design of the initial *PUPS in the ICU* course as well as determine if the course will be continued, modified or nixed.

*Nurse Administrator, Director of Professional Practice*- had the interest of outperforming NDNQI and organizational benchmarks to sustain the prestige of leading a nursing team that upholds the highest standards of quality care. The nurse administrator had the power and influence to approve or deny this project and helped steer the project to a successful completion.

*Respiratory Therapists (RT)*- had the interest of improving the quality of care for RT patients especially those undergoing prolonged pronation therapy. RTs had the power to show team support in coaching new grads intervention implementation such as how to properly place foam dressings on the RT patients. Lessons learned through RT leadership led to developing a new policy that addressed pressure injury prevention measures to be utilized when a patient is placed in a prone position for respiratory failure.

*Dieticians*- had the interest to coordinate nutritional needs to support healthy tissue and healing.

*Pharmacists*- had the interest to coordinate accessibility to medications affecting vascular flow, edema, skin conditions, debridement, and pain control.

*ICU Intensivists/Providers* - had the interest of preventing complications through a newly launched early mobility program which coincided with the PIPS bundle. Physicians had the power and influence to show support of the project by including the CWON in interdisciplinary rounding.

*Hospital Chief Executive Officer*- The CEO had the power and influence to evaluate the cost-effectiveness of the program. In other words, comparing the overall dollar amount retained in CMS reimbursement dollars versus the cost of interventions, dressings, time and training.

*Patient & Family*—have the interest of receiving the best quality of care and prevention of added co-morbidities, decreased length of stay as well as knowledge sharing among clinicians and family members to assist in life-long PIPS.

**2.3. Method - Analysis**

We called on hospital analytics to help track the quarterly internal data based on our NDNQI PI prevalence studies. From there, the CWON enlisted the help of the Patient Safety Officer to plot graphs, review HAPIs and develop charts to

build an ICU data base. The Information Technology (IT) department helped us review the integumentary section in the electronic medical record (EMR) to advise on changes which later were incorporated system wide. We shared these graphs and results with our stakeholders.

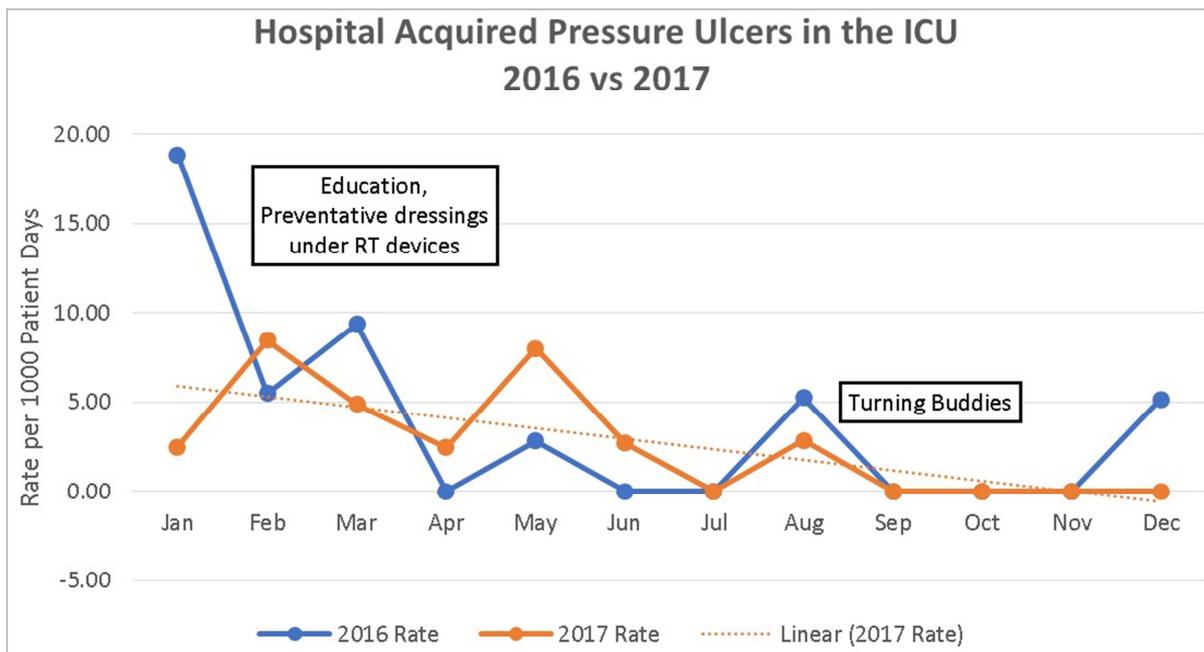
**2.4. Method - Evaluation Process**

The evaluation process used in conjunction with this process was through various team meetings that were designed for extended knowledge sharing and brainstorming sessions. The WOCN team held meetings with the PUP team, hospital leaders, RT, the ICU nurse manager and educator, and nursing staff. The CWONs were the main communicators in relaying information, results and ideas for change and implementation. The WOCN team made a special effort to meet with the PUP Team after each quarterly prevalence studies to reflect on the data and come up with ideas to keep heading toward our goal and to share the lessons learned in the ICU.

**3. Quantifiable Results and Outcomes**

The measurable goal of this project was to decrease the quarterly rate of hospital acquired pressure injuries by 50% by 4Q 2017 as compared to a rate of 11.54 per 1213 patient days 1Q 2016. Subsequent quarters demonstrated incremental decreased rates of 0.9, 1.8, 1.7, 5.2, 4.3, 0.9 and 0 by 4Q 2017. This was a total reduction rate greater than 50% which was our goal. Please note the data and results illustrated in the graph and run chart below. The PIPS bundle highlighted by CWON education resulted in significant and clinically relevant reductions in incidence of HAPI in the ICU.

*Results Data*



**Figure 3.** Month by month comparison chart with key impact interventions.

**Table 1.** Results per 8 consecutive quarters.

	Q1 2016	Q2 2016	Q3 2016	Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017
# of PI	14	1	2	2	6	5	1	0
# of Pt days in ICU	1213	1074	1059	1151	1160	1149	1043	1168
Rate per 1000 Pt days	11.54	0.9	1.8	1.7	5.1	4.3	0.9	0

## 4. Discussion

This PIP bundle as a QI project brings up the discussion of PIP as a longstanding barometer of quality patient care. PIP has been around since the days of Florence Nightingale. In 1859, Nightingale wrote, “If he has a bedsore, it’s generally not the fault of the disease, but of the nursing” [9]. In reading further into Nightingale’s book, it’s evident she wasn’t placing blame as a lack of willingness of nurses to provide care, but rather the shortage of nurses at the time. A similar issue and belief is evident today as pressure injuries are in fact one of the benchmarks for NDNQI. NDNQI tabulates and disseminates evidence that bolsters the importance of quality nursing care and its’ relationship to patient experiences and outcomes. This NDNQI designation means that the prevention and prevalence of pressure injuries directly relates to nursing care. NDNQI studies are conducted quarterly and annually at U.S. hospitals in which evidence can be measured and compared unit by unit across the city, state, region and nation. Our PIP bundle aimed at putting our hospital in the upper ranks of quality nursing care by outperforming these national benchmarks. In laymen’s terms, the responsibility of PIP lies squarely on the shoulders of every bedside nurse making the ICU nurse even more pivotal as most (if not all) ICU patients are considered high risk for pressure injury development. In addition, much of the ICU population relies solely on nursing care for pressure relief [10]. Within our ICU setting, teamwork became the backbone of our sustainability. Once we reached our goal, nurses and nurse educators lobbied to make additions to our project based on evidence-based practice. This not only helped sustain our goal but has resulted in plans for future success. We will continue with an on-going PIP bundle and WOCN team rounding as part of our best practice at this facility. In addition, we continue to share the knowledge gained by this PIP bundle with our extended WOCN team working at other hospitals under the umbrella of our larger healthcare system.

## 5. Conclusions

This project led to a total reduction rate of hospital acquired pressure injuries greater than 50% which was the goal. The PIP bundle, which was highlighted and reinforced with educational support from the WOCN team, resulted in a clinically relevant reduction in the overall incidence of HAPI in the ICU. Through teamwork and consistent use of evidence-based nursing interventions-- our goal was met. As we strive to sustain our outcome, more work will be done to make improvements to our practice. Our future goal is to

continue with this ongoing PIP bundle and WOC nurse rounding as part of our best practice.

## 6. Recommendations

This QI project provides important and effective strategies in pressure injury prevention. Since clinical settings vary greatly in their pressure injury challenges, our recommendation is to first engage a team of nurse leaders who can harness the PI data specific to your facility. The next step would involve looking at your facility’s current strategies and chart their success or failure as compared to outcomes. This will launch your team into the research and selection phase to determine which key interventions will best prevent PI within your patient population. From there, the team can form a bundle customized to needs and gaps. We found that the implementation phase is easier when rolling the project out on a single unit. We advise selecting a specific unit where PIs are most prevalent or where patients are at high risk for PI. Tracking the numbers and using a checklist is crucial to both showing results and encouraging nurses to suggest improvements. Again, the pivotal piece for our team came through nurse education led by the WOCN team. As nurses implemented the PIP bundle, it provided learning opportunities and discussions that resulted in a widespread knowledge growth across the unit. Ultimately, nurses with vast knowledge about PI— from how they form,... to who is at risk,... and how to prevent— they are the key players in protecting patients and providing quality outcomes.

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