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Medical Device-Related Pressure Injury (MDRPI) Prevention in the Intensive Care Unit (ICU): An Evidence Based Practice Quality Improvement Project

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**Medical Device-Related Pressure Injury (MDRPI) Prevention in the Intensive Care Unit
(ICU): An Evidence Based Practice Quality Improvement Project**

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A DNP project submitted in partial fulfillment of the requirements for
the degree of Doctor of Nursing Practice

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This is to certify that the DNP Project Final Report by

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has been approved by the DNP Project Team on

March 17, 2023

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Abstract

Introduction: All intensive care unit (ICU) patients utilize various medical devices for care and treatment, placing them at high-risk for medical device-related pressure injuries (MDRPIs), which can lead to life-threatening infections, wounds/scars, and consumption of additional time and products to rectify these issues. Lack of appropriate decompression measures and improper bedside handoff report was recognized in the ICU at a hospital in Connecticut (CT).

Method: A literature search using CINAHL, MEDLINE, and the Cochrane Database of Systematic Reviews was conducted, restricting the search to the period between 2018-2022. The keywords searched were: “pressure injuries,” “adult patients,” “intensive care unit,” “educational intervention,” “prevention,” and “identification.” From an initial library of eight articles, the selection resulted in four articles by adding the keywords “medical device-related pressure injuries.” The Plan-Do-Study-Act (PDSA) cycle was used to create/conduct an educational simulation training highlighting preventative and treatment measures carried out on three ICU competency days. The ICU nurses learned to take lead by understanding risk factors, tailored prevention to the device type, and collaborated with other team members to ensure continuity of care and brought these skills to their daily bedside routine.

Results: A review of literature validated that staff education led to a positive impact on MDRPI prevention, decreased ICU stays pertaining to MDRPIs, and reduced costs and resources to correct these issues. The pre-survey, post-survey, and post-intervention results showed an increased perception on continuous skin assessments leading to an accurate account of MDRPI risk, and a drastic decrease in the number of MDRPIs in the ICU setting.

Problem Identification, Development of Clinical Question, and Evidence Review

Background and Significance of Problem

Medical device-related pressure injuries (MDRPIs) pose a significant burden on healthcare, especially among critically ill patients due to their incapacitated and vulnerable state. According to the Joint Commission (2018), every patient with a medical device is at risk for pressure injuries due to impaired sensation, poor perfusion, altered tissue intolerance, poor nutrition, edema, and the tendency for moisture to develop under devices. A systematic literature search shows the most common medical devices causing MDRPIs are respiratory devices, cervical collars, tubes and catheters, splints, and intravenous catheters (Jackson et al., 2019). Proper educational tools are needed to train and educate the nursing staff to help identify and prevent MDRPIs.

Description of Local Problem

The increase of MDRPIs around endotracheal tubes (ETTs), nasal cannulas, bilevel positive airway pressure (BiPAP) masks, pulse oximeters, nasogastric/orogastric tubes (NGTs/OGTs), urinary/condom catheters, rectal tubes, restraints, sequential compression devices (SCDs), and other external devices has been identified by the Quality Improvement (QI) department through monthly audits in the intensive care unit (ICU) at a CT Hospital since 2019. Nurses have been failing to complete proper bedside skin handoff and lack removal/replacement of decompression measures per hospital protocol. MDRPIs increase the risk of potentially life-threatening infections (e.g., sepsis), cause pain or leave scars, increase the length of hospitalization, and consume additional resources such as time and products (Gefen et al., 2020). Therefore, the goal of this quality improvement project is to identify and reduce MDRPIs in the

ICU setting.

Organizational Priority

This project has the support of the hospital's Clinical Director of the ICU and ICU Nurse Manager. The ICU Nurse Educator and the Simulation Nurse Manager are also aiding in this project's completion. This project is going to measure the ICU staff perception in the reduction of MDRPIs before and after the delivery of bundled interventions, one of which includes the educational simulation training. The timeline of the project is depicted in Appendix A.

Focused Search Question

In adult ICU hospitalized patients (P), how do medical device-related pressure injury (MDRPI) identification and prevention simulations (I), compared to usual care (C), reduce MDRPI rates and identify the areas in need of improvement (O) over the period of three months (T)?

Evidence Appraisal, Summary, and Recommendations

A search of the following databases was conducted: CINAHL, MEDLINE, and the Cochrane Database of Systematic Reviews. The keywords searched were: pressure injuries, adult patients, intensive care unit, critical care, medical device-related pressure injuries, educational intervention, prevention, identification, areas of improvement. Adding the keywords 'medical device-related pressure injuries' narrowed initial searches. Limits/filters for all searches pertaining to medical device-related pressure injuries included, English language, adults (age 18 and over) and published between 2006-2022. Limits/filters for all searches pertaining to 'education simulation' included healthcare professionals, nurses, and respiratory therapists, English language and published between 2006-2021.

Evidence Search

External Evidence

The evidence from literature that supports the goal of MDRPI prevention includes several sources, including a non-blinded randomized controlled trial and open-label clinical design (Appendix B). The development of the SKINCARE bundle in a critical care setting led to a positive impact on MDRPI prevention (Tayyib et al., 2021). Another study utilized a protocol to secure and prevent MDRPIs related to endotracheal tubes and nasogastric tubes by using proper securement measures (Coyer et al., 2020). Patients in an ICU setting frequently depend on various medical devices. Nursing and respiratory professionals need to assess and intervene by implementing prevention measures for MDRPI in place. A culture of hypervigilance is necessary to prevent MDRPIs which can be achieved through proper education and training of the nursing and respiratory staff.

Internal Evidence

Current policies at the CT hospital are implemented towards pressure ulcer prevention, but none are specific to MDRPIs. There are no studies available/conducted on evidence from the industry. In the ICU at this facility, there has been a rise in MDRPIs from a baseline obtained from December 2020 to December 2021. Between this period, there have been MDRPIs related to restraints (6), ETTs (5), NGTs (2), rectal tube (1), simple mask (1), BiPAP (1), and condom catheters (3) resulting in use of additional time and resources to correct the PIs. It was expected that implementation of an educational simulation training for identification of MDRPI and prevention strategies that involved nursing staff and respiratory therapists would help evaluate the current MDRPI prevention nursing process and establish a baseline. Additionally, this allowed the investigative team to identify the crucial areas for re-education, pertaining to skin

breakdown and MDRPIs. After an educational intervention, areas in need of improvement were identified and initiated the process of culture change to promote a more thoughtful approach to preventing MDRPIs in the critical care setting.

Project Plan

Project Goals

The specific, measurable, achievable, relevant, and time-bound (SMART) criteria was utilized to reduce the number of MDRPIs by 1 to 2 incidences each month over a 90-day period. The ultimate goal is to have 0 incidences by the end of the study period. The desired outcome was measured through data collected from the QI department and from pre and post surveys. Initially, a pre-survey was conducted to obtain the perception of ICU nurses in regards to the importance of skin breakdown issues. This pre-survey portrayed the nursing staff's understanding, mechanisms/reasons for, importance of relation to patient morbidity/mortality, quality of life (QoL), and healthcare costs. Nursing staff were provided with a list of medical devices and the proper interventions needed to prevent these breakdown issues. Secondly, the ICU nurses attended a Peer-to-Peer Feedback class to learn the proper mechanisms of providing feedback to fellow nurses during nursing report, holding everyone accountable for skin injury prevention. The ICU nurses also attended a mandatory educational simulation day in which they could identify and apply the knowledge learned about medical device-related pressure injuries on real-life mannequins. There was a post-survey distributed to obtain feedback from ICU nurses, which determined the implementation of further improvement measures.

Context

The project setting is an ICU at a hospital in the state of CT. Participants are the project leader, mentor, ICU manager, ICU RNs, and patients on this unit.

Project Team Members and Roles

The Clinical Operations Director of ED, ICC, ICU, IMCU, Respiratory, and Pulmonology fulfills the Principal Investigator role for the overall project. The writer of this paper is the Principal Investigator for the MDRPI education simulation training. The ICU Nurse Manager assisted with the implementation and the championing of the project. The ICU Clinical Nurse Educator arranged weekly meetings and helped to formulate important implementation dates. The Simulation Manager assisted as a mentor and coordinated and provided materials (i.e., mannequins and medical devices) for the simulation training (Appendix C). The Director of QI reviewed the project plan to ensure it met QI standards. The writer of this paper formulated MDRPI prevention and treatment scenarios through an education simulation training and presented it to ICU nurses. Constance H. Glenn, DNP, MSN, APRN, FNP-BC, CNE is the academic partner, DNP project faculty advisor, and evidence-based practice expert.

Key Stakeholders and Buy-in

The key stakeholders include two ICU RNs and a respiratory therapist (RT) at the CT hospital. The writer of this paper is one of the ICU RNs involved in creatively educating these staff members through an educational simulation training. Buy-in was established from the Director of Clinical Resources, ICU Nurse Manager, ICU Clinical Educator, and Simulation Manager since data on MDRPI rates in the ICU reflected a change was necessary. All the above-mentioned individuals were involved, and weekly meetings were held to discuss progress.

Framework

The Institute for Healthcare Improvement's (IHI) Model for Improvement was used to guide the implementation of this project, since it emphasizes accelerating improvement, which coincides with the goal of MDRPI elimination in the critical care setting (AHRQ, 2020). The

Model for Improvement's PDSA framework utilizes four steps: breaking down the task into steps and then evaluating the outcome, improving on it, and testing it again (AHRQ, 2020). This method aided in accomplishing the goal of MDRPI prevention and identification. Whether a change will be an improvement is determined after the intervention's implementation. This led to determine what changes can be made that will result in improvement.

Plan phase. This DNP student met with the MDRPI team (key stakeholders) and planned and formulated ideas on how to prevent and identify MDRPIs in the ICU through an education simulation training. The perception of ICU RNs pertaining to MDRPIs was measured through an online pre-survey. The educational simulation training was then implemented, followed by a post-survey in which the perception of ICU RNs was again measured.

Do phase. In this phase, the educational simulation training, which lasted approximately 45 minutes, was executed on three mandatory ICU competency days for ICU RNs. This allowed for all ICU RNs to participate in the MDRPI prevention/identification training. During this implementation, ICU RNs learned and applied methods of MDRPI prevention on real-life mannequins. The knowledge they gained was applied to ICU patients. Modifications necessary after competency day one were incorporated in the next encounter, such as the use of a new BiPAP/CPAP protection device encountered after the first simulation training date.

Study phase. This DNP student, along with the ICU Clinical Educator distributed electronic post-surveys through HealthStream, a web-based learning management platform, to obtain insight from ICU RNs post attending the simulation training. This allowed the DNP student to obtain feedback pertaining to how the ICU RNs benefited or not from the simulation training. The intervention was highly favorable, which was reflected in the goal of reducing and preventing MDRPIs.

Act phase. The DNP student revised the process as needed based upon what was learned in the first PDSA cycle. There was only one MDRPI encountered during the implementation phase, which was corrected with a new CPAP/BiPAP barrier device. Monthly audits will continue to occur, while MDRPI reduction/prevention learning will be delivered innovatively during future mandatory competency days.

Project Implementation

After leadership readiness assessment was completed to gain support for the MDRPI project, ICU RNs were alerted to the increase in recurrent skin issues. ICU RNs completed a pre-survey on Survey Monkey with 22 questions about staff perception of preventative strategies for MDRPI reduction (Appendix D). Based on the results, Peer-to-Peer Feedback classes were assigned to empower nurses and increase effectiveness of shift reports. The in-person class was taught by the CT hospital's Professional Development department and discussed content that would aid nurses to be tactful in conducting shift reports and be able to question the practice gaps at that time. The class provided education on accepting compassionate feedback and helped to incorporate it into their clinical practice.

ICU RNs have an incredible responsibility to provide safe care in a complex environment which requires trust, teamwork, and communication. Clinical assistants (CAs) play a critical role in working with ICU RNs to meet these growing demands of inpatient care (Campbell et al., 2021). Therefore, CAs were also utilized to assist in minimizing MDRPI occurrence. ICU CAs were given the responsibility to rotate pulse oximeter sites once a shift (every 12 hours) to a different digit and document the location in the electronic medical record (EMR). The ICU RNs are responsible for changing the pulse oximeter sites at the beginning of their shifts –8am and 8pm. Therefore, the pulse oximeter sites are to be changed every 6 hours to prevent any MDRPIs. CAs are to assess the tubing location on mechanical intermittent leg compression

devices and to avoid pressure and direct contact with bare skin from the sleeves or tubings. Nasal cannulas should also be assessed by the CAs to ensure padding at the ears and cheeks to help prevent any MDRPIs.

The DNP project implementation phase began between June-August 2022 which consisted of simulation training for MDRPI identification and prevention strategies. The three skin simulation days took place on the 2022 ICU Competency Days: June 22nd, July 21st, & August 24th. MDRPI simulation training comprised of two patient care rooms set up to create an immersive learning opportunity for the critical care nurses. The first of the two rooms had a preventative focus, where the mannequin patient was simulated to have multiple devices in place – resulting in the patient being at an increased risk for MDRPIs. The ICU RNs were given the opportunity to assess the patient and determine the at-risk areas for skin breakdown. The second room was set up with a focus on wound “treatment.” The simulation was constructed so that the nurses identified the areas of skin breakdown and worked with the wound team to identify appropriate treatment options. This collaboration and simulation exercise helped to evaluate the current MDRPI prevention nursing process and established a baseline. Additionally, this simulation training allowed the investigative team to identify crucial areas for re-education, pertaining to skin breakdown and MDRPIs. Furthermore, this educational intervention was the beginning of the process of culture change to promote a more thoughtful approach to preventing MDRPIs in the ICU setting. A poster with pictures was then created that listed all the devices and preventative strategies with the best practices and placed in each patient room as a guide for ICU RNs (Appendix E). The ICU handoff report sheet was also revised to have a dedicated section for the type of dressing in place and the date changed for proper communication. The back of the sheet included images of the front and back of the human body to mark the

appropriate medical devices that need appropriate nursing care. This worked as a checklist for frequently used medical devices and preventative/therapeutic interventions (Appendix F).

Additionally, weekly nurse leader skin rounding with the clinical staff takes place every Wednesday. The ICU nursing director, ICU nurse manager, ICU nurse educator, wound care team, and the primary ICU RN round on patients and perform a head-to-toe assessment with the devices in place, provide appropriate education/intervention measures, and review the documentation related to pressure injury for these patients. Opportunities are then discussed with the primary RN and CA in real-time. New RNs are also required to shadow wound care nurses for two hours for an enlightened perspective of pressure injury prevention measures and to deliver high-quality care for patients when considering the utilization of a medical device. All of these implementation strategies combined will help to improve patient outcomes and increase knowledge of best evidence-based practice in the prevention of skin breakdown.

Barriers to Implementation

Barriers to implementation of the educational simulation included COVID-19 surges in the ICU setting, which placed an extra strain on ICU nursing staff – causing a delay in educational training. Additionally, being inadequately staffed also led to burnout among ICU RNs, which caused a negative attitude towards spending any more time at work other than one's assigned shifts. The three key elements of the work environment that are significant predictors of burnout are centered around staffing, meaningful recognition, and effective decision-making (Kelly et al., 2021). Another barrier included ICU RNs not participating in the educational simulation training day, which is why it was incorporated into mandatory annual ICU competency days. There was an option between three days over the course of three months that ICU RNs chose to attend and complete their yearly requirement, which included the MDRPI

simulation training.

A deviation that was encountered during the pre-survey/post-survey and educational simulation day was the involvement of RTs in the pre-survey. While the ICU RNs took part in all aspects of the implementation, one RT (key stakeholder) was present on all of the required days. This RT was in charge of educating all the RTs on MDRPIs pertaining to respiratory devices during a separate encounter. RTs also did not take part in the pre-survey due to the increased concentration of educating the ICU RNs only. However, RTs were mandated to take the post-survey as an assigned learning module. The RTs feedback was to have been included in the pre-survey for more accurate results. RTs were satisfied in having a separate learning encounter than the nurses due to the education of additional MDRPIs that were involved on simulation training day (i.e., rectal tube, foley catheters, restraints, etc.). Additionally, ICU RNs were requested to take the pre-survey by scanning a barcode present in every ICU nursing pod. This led to not all ICU RNs completing the pre-survey, since it wasn't mandatory. The post-survey was a required HealthStream that needed to be completed by the ICU RNs and RTs with a deadline of January 15th, 2023. The pre and post survey data was compared and reflected completion by 22 ICU RNs and 54 ICU RNs, respectively. The post-survey failed to reflect an option for the RTs to check off, so they selected the RN option – leading to altering results. The results reflected that the highest level of nursing education was a BSN, with ICU RNs of 6-10 years of experience. Fifty ICU RNs & RTs (post-survey) agreed that all patients are at a potential risk of developing MDRPIs compared to 18 ICU RNs (pre-survey) prior to the educational simulation training implementation. As reflected in the pre-survey, 27 ICU RNs (87.1%) felt that continuous assessment of patients will give an accurate account of their pressure ulcer risk, while 73 ICU RNs & RTs (92.4%) agreed to this statement in the post-survey (Appendix G). Even though the

post-survey results reflected that the ICU RNs emphasize the importance of MDRPIs and prevention, the comparison of the pre & post surveys was inaccurate. This is because of the inconsistency of ICU RNs & RTs to take both surveys – the post survey was taken by almost double the number of staff compared to the pre-survey.

Sustainment

MDRPIs are a national nursing quality indicator (The Joint Commission, 2018). The regulatory agencies provide seven guiding principles to prevent MDRPI: assessment, teamwork, education, positioning, device care, documentation, communication, and continuous monitoring (The Joint Commission, 2018). According to the Joint Commission report, over 30% of total pressure injuries are caused by medical devices (2018). The most common medical devices causing MDRPIs are respiratory devices, cervical collars, tubes, and catheters, splints, and intravenous catheters – which accounted for the MDRPIs in the ICU (Jackson et al., 2019). Therefore, an MDRPI prevention educational simulation was necessary to improve the care of this vulnerable population and to constrain cost.

The MDRPI educational simulation training approach to care resulted in an increase in staff efficiency, reduction in MDRPIs, improved quality of life, and less complications to occur in ICU patients who are already in such vulnerable conditions.

An action plan for sustainability of MDRPI prevention included a MDRPI prevention & identification simulation training. This collaboration and simulation exercise allowed the investigative team to identify the crucial areas for re-education, pertaining to skin breakdown and MDRPIs. After an educational intervention, the simulation/content leader identified the areas in need of improvement and began the process of culture change to promote a more thoughtful approach to preventing MDRPIs in the critical care setting.

An important indicator of evaluation was the amount of MDRPIs that occurred three months post the educational simulation training. Additional data was collected on MDRPI rates in the ICU which consisted of the following from January 2022–June 2022: ETT (3), rectal tube (1), Blakemore drain (1), BiPAP mask (1), Purewick catheter (2), NGT (1), HFNC (1), and restraint (1). The first educational simulation training day took place in June 2022 (which had 1 restraint & 1 NGT MDRPIs). The additional two educational simulation days were in July and August. In July, there was one BiPAP-related MDRPI. Therefore, we revised the PDSA cycle and implemented the use of a gel protection device placed under CPAP/BiPAP masks that provided extra cushioning & targeted protection for the bridge of the nose and cheekbone areas. The education on this new protective device was implemented on the educational simulation days in July and August. For the months of August, September, October, & November 2022, there were no MDRPIs obtained. This data reflects that despite the inaccuracy in the pre-survey and post-survey results, the actual improvement in MDRPI reduction/elimination was observed. The educational simulation day training aided in bringing about culture change to the ICU setting (Appendix H).

Another sustainability tool that was used included utilizing proper nursing bedside handoff. Individualized data feedback on skin concerns should be addressed at shift change during bedside hand-off. Nursing staff should reposition the patient and medical devices involved during that time, along with every two hours. The knowledge gained from simulation day was also incorporated in the nursing staff's daily assessments and handoff.

The stakeholders, ICU Clinical Operations Director, ICU Nursing Manager, ICU Nursing Educator, along with two ICU staff nurses, one respiratory therapist, and one wound care specialist, make up the MDRPI Prevention Team. The simulation training was done by the writer

of this paper (ICU staff nurse) and the Simulation Nursing Manager. This team continuously met weekly for 12 weeks (November 2021-January 2022), followed by bimonthly (February-April 2022), and then monthly (May-August 2022). Relevant data pertaining to MDRPI occurrence after the simulation days was reviewed and proper nursing bedside hand-off have gone into effect. Any positive or negative feedback, barriers, and results were discussed and addressed at these meetings. The cost was also taken into consideration which included: posters for each room (\$55), QR code survey printouts for each nursing pod (10 x \$0.17=\$1.70), moulage kit (wounds for mannequins: \$925), and a celebratory breakfast (\$200), with a grand total of \$1,181.70 (Appendix I). These costs were covered by the ICU Clinical Operations Director.

Dissemination

To properly disseminate this project, a visual poster, music video of the MDRPI team, and weekly rounding with the wound care team was executed. The visual poster, consisting of medical devices and the proper decompression methods needed to prevent PIs, was made by the MDRPI prevention team and tailored for the nursing staff. There was a one-page version made, which was placed in every patient room. This helps the ICU nurses to make references while providing the proper supportive measures pertaining to medical devices. Since most individuals enjoy listening to music, the MDRPI team created a music video with costumes and captivating lyrics involving MDRPIs. The purpose of the video was to sing a tune that the nursing staff will find melodious and appealing – just as some commercials do. The stakeholders were also a part of this video, making it a team initiative to help eliminate MDRPIs in the ICU.

After the educational simulation was completed, the MDRPI team was able to audit the success of the training and the occurrence of any MDRPIs. Management, ICU nursing staff, and the wound care team now participate in weekly rounds assessing each ICU patient and

addressing any incorrect MDRPI situations. Nursing assistants were also educated on helping with changing sites for simple medical devices, such as pulse oximeter probes, to prevent breakdown issues.

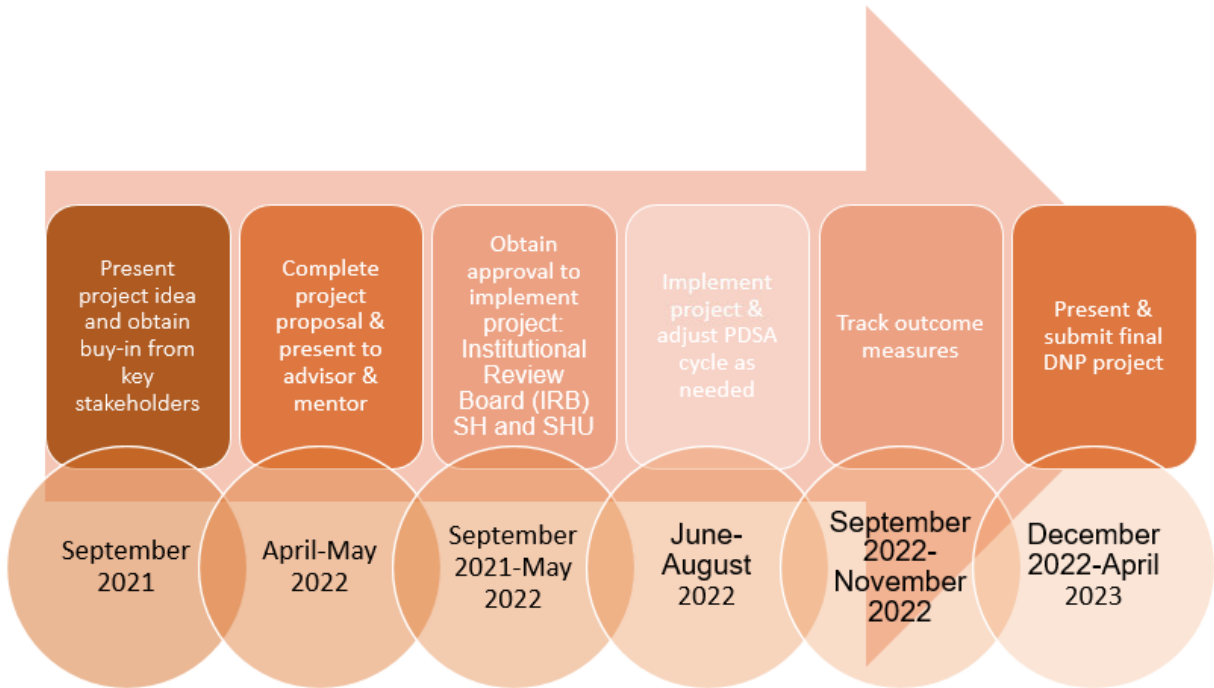
An IRB exemption form was submitted via SHU (Appendix K) since the project does not fall into research categories and is a QI simulation for clinical practice. The implementation of this evidence-based practice (EBP) was submitted to the Institutional Review Board (IRB) as an exemption proposal through the CT hospital for publication purposes and approved by WCG IRB (Appendix J). The plan is to publish the work that the MDRPI team accomplishes by the summer of 2023 to help make changes not only at the CT hospital, but for healthcare organizations nationwide.

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Appendix A

DNP Project Timeline



Appendix B

Outcome Synthesis Table

Article Number	1	2	3	4
Endotracheal tube	↓	↓	↓	NE
Nasogastric tube	ND	NE	↓	NE
CPAP/BiPAP	NE	NE	NE	↓
Extended ICU stay	NE	ND	NE	NE
Cost	NE	NE	NE	↓
Skin protection	↓	↓	↓	↓

NE, not evaluated; ND, no statistically significant difference

Appendix C

Simulation Training Days



Appendix D

Pre-Survey

RN Perception on Medical Device-Related Pressure Injury Prevention: Pre-Survey

1. I satisfy the above conditions (*consent to allow for the researchers to record, view, and analyze your responses to gain better understanding of the topic*).
2. Please list the day of the month of your birthday.
3. Please list the last 2 digits of your cell phone number.
4. What is your home unit?
5. Role in the healthcare team.
6. Please select your age range.
7. Please select your gender.
8. Please select your race/ethnicity.
9. Please select your highest level of education.
10. Please select your number of years of experience in a healthcare setting.
11. Please select the number of years working in Stamford Hospital's ICU.
























For the following questions, please select if you **Strongly agree, Agree, Neither agree nor disagree, Disagree, or Strongly disagree**:

12. All patients are at a potential risk of developing pressure ulcers.
13. Pressure ulcer prevention is time consuming for me to carry out.
14. In my opinion, patients tend not to get as many pressure ulcers nowadays.
15. I do not need to concern myself with pressure ulcer prevention in my practice.
16. Continuous assessment of patients will give an accurate account of their pressure ulcer risk.
17. Pressure ulcer treatment is a greater priority than pressure ulcer prevention.

-
18. Most pressure ulcers can be avoided.
 19. I am less interested in pressure ulcer prevention than other aspects of care.
 20. My clinical judgment is better than any pressure ulcer risk assessment tool available to me.
 21. In comparison with other areas of care, pressure ulcer prevention is a low priority for me.
 22. Pressure ulcer risk assessment should be regularly carried out on all patients during their stay in the hospital.

Appendix E

MDRPI Prevention Poster

Medical Device Related Pressure Injury Preventions		
<p>ETT- General Patient</p> <p>Anchorfast (Hollister) preferred- if patient qualifies. Patient should be shaved and must have upper teeth</p> <p>Silk tape with cheek protection</p> <p>Use Skin Barrier</p>		<p>Chest Tube</p> <p>Foam dressing along the rib cage and abdomen where the tubing meets skin</p> 
<p>ETT- Prone Patient</p> <p>Dale ETT holder with additional foam padding to face</p> <p>Use Skin Barrier</p>		<p>Pulse Oximetry Sensor</p> <p>Change position of sensor at least twice a shift (rotate sites)</p> 
<p>NIPAP (non-invasive ventilation)</p> <p>Hydrocolloid to nasal bridge immediately upon initiation of NIPAP</p> <p>Hydrocolloid to other contact points on face as needed</p> <p>Use Skin Barrier</p>		<p>Mittens</p> <p>Consider soft wrist restraints as an option</p> <p>Foam dressing to both medial and lateral aspects of wrists</p> <p>Any signs of irritation or redness on knuckles- change to soft wrist restraints</p> 
<p>Vapotherm</p> <p>Trach ties to offload circuit weight from face and ears</p> <p>Hydrocolloid dressing to cheeks under Vapotherm tubing</p>		<p>Soft Wrist Restraints</p> <p>Foam dressing to both medial and lateral aspects of wrists</p> 
<p>Tracheostomy</p> <p>Foam dressing under trach flange</p> <p>Add hydrocolloid dressings at suture sites upon suture removal</p> <p>No pillow</p> <p>Sutures to be removed post- op day 7</p>		<p>Arterial lines</p> <p>Foam dressing along the tubing</p> 
<p>Nasal Cannula</p> <p>Grey foam protectors on cannula</p> <p>Hydrocolloid to ears if there are no gray foams</p>		<p>Peripheral IVs</p> <p>Cushion under the hub</p> 
<p>ETCO₂ Cannula</p> <p>Hydrocolloid behind ear</p> <p>Grey foam protectors on cannula behind the ears</p>		<p>PEG Tube</p> <p>Trach foam dressing under PEG flange</p> 
<p>Cervical Collar</p> <p>Foam dressing along the bony prominences and under the chin</p>		<p>Abdominal Drains</p> <p>Foam dressing to where the tubing meets skin</p> 
<p>Vasogastric Tube</p> <p>Nasal bridge preferred</p> <p>Hollister NGT clip</p>		<p>Abdominal Binder</p> <p>Foam dressing along the edges on the back</p> <p>Select appropriate size of the binder</p> 
<p>Orogastric Tube</p> <p>NGT secure to ETT only if ETT is taped or has a Dale holder</p> <p>Never tape on Anchorfast</p> <p>Reposition while ETT is being taped (q24 hours)</p>		<p>PrimoFit</p> <p>Foam dressing to where the tubing meets skin</p> <p>Secure the tubing with blue silicone tape</p> 
		<p>External Female Catheter</p> <p>Thorough genital physical exam at least once a shift</p> <p>Change catheter once a shift</p> <p>Consider foam dressings to medial thighs for larger body habitus</p> 
		<p>Foley Catheter</p> <p>Statlock</p> <p>Foam dressing under blue specimen port</p> 
		<p>Compression Stockings</p> <p>Remove at night- allow skin to rest</p>
		<p>SCDs</p> <p>Tubing away from skin foam dressing</p> <p>Tubing should go through opening of boots to offload</p>
		<p>Podus Boots</p> <p>Tubing away from skin</p> <p>Foam dressing on Achilles tendon</p> <p>Alternate with offloading boots/pillows every 2 hours</p> 

Appendix F

ICU Handoff Report Sheet

ICU SHIFT TO SHIFT HANDOFF FORM (SBAR)

Situation		Room #: _____ Patient Name: _____ Age: _____	
Admit Date: _____		Service <input type="checkbox"/> Medicine <input type="checkbox"/> Surgery <input type="checkbox"/>	
Chief Complaint: _____		Diagnosis: _____	
Background:			
Past Medical History: _____		Code Status: _____ Allergies: _____ Isolation Status: _____	
Assessment:			
Neuro: _____		Pulmonary: Vent Settings: _____ Pulse ox moved: Y <input type="checkbox"/> N <input type="checkbox"/>	
CardioVascular: _____		GI: Nutrition Consult: Y <input type="checkbox"/> N <input type="checkbox"/>	
GU: Foley <input type="checkbox"/> Condom <input type="checkbox"/> Pure wick <input type="checkbox"/> Insertion date: _____ Change Time: _____		Skin: Waffle boots: Y <input type="checkbox"/> N <input type="checkbox"/> Wound Consult: Y <input type="checkbox"/> N <input type="checkbox"/>	
Fingerstick: A1c: _____	Micro: _____	Drsg: _____	Type: _____ Date changed: _____
Central Access: _____		Peripheral Access: _____	
IV Fluids: _____		Drips: _____	
Bed: Stryker <input type="checkbox"/> Bari <input type="checkbox"/> Prone <input type="checkbox"/> Envella <input type="checkbox"/> Mobility: Previous Day Goal achieved <input type="checkbox"/> <input type="checkbox"/> Dangle <input type="checkbox"/> Chair <input type="checkbox"/> Ambulate <input type="checkbox"/> N/A Chair Cushion <input type="checkbox"/> (No More Than 2 hrs. at a time)		Labs: _____	
Tests & Procedures: _____		Notes: _____	

Reminders/Things to do	MEDICATIONS:										
											TIME
											FSG
											COV
											MEDS/ ABT
											IV
											IV
											PRNTF
											NOI
											UO
											BM
											TEMP
										BP	
										HR	
										RR	
										OX	

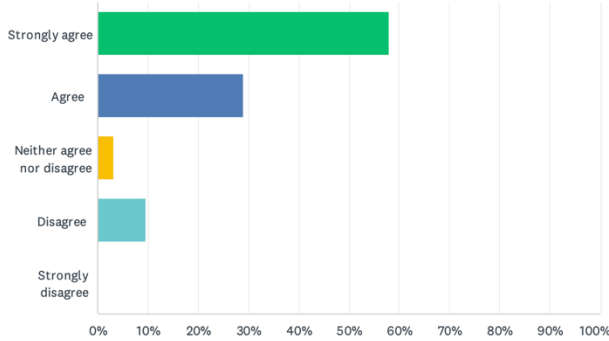
		PATIENT STICKER
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Appendix G

Pre-Survey Results

Q12 All patients are at potential risk of developing pressure ulcers

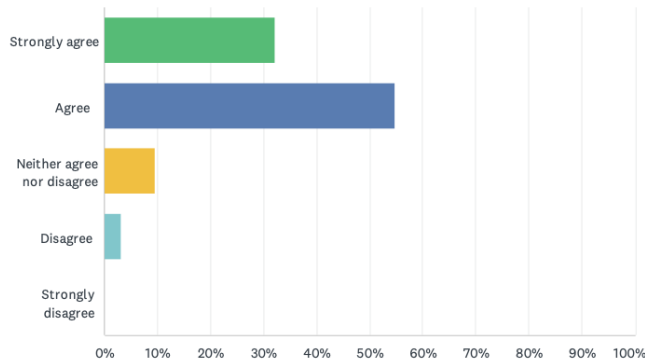
Answered: 31 Skipped: 0



ANSWER CHOICES	RESPONSES	
Strongly agree	58.06%	18
Agree	29.03%	9
Neither agree nor disagree	3.23%	1
Disagree	9.68%	3
Strongly disagree	0.00%	0
TOTAL		31

Q16 Continuous assessment of patients will give an accurate account of their pressure ulcer risk.

Answered: 31 Skipped: 0

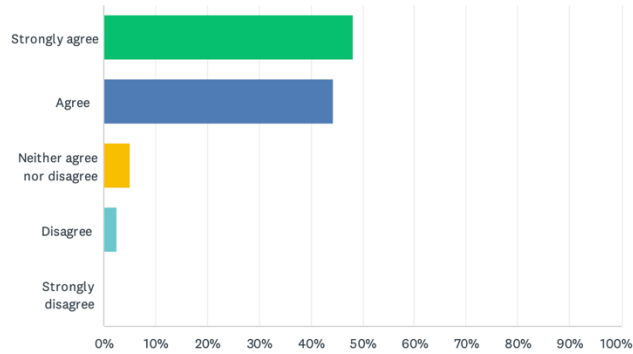


ANSWER CHOICES	RESPONSES	
Strongly agree	32.26%	10
Agree	54.84%	17
Neither agree nor disagree	9.68%	3
Disagree	3.23%	1
Strongly disagree	0.00%	0
TOTAL		31

Post-Survey Results

Q16 Continuous assessment of patients will give an accurate account of their pressure ulcer risk.

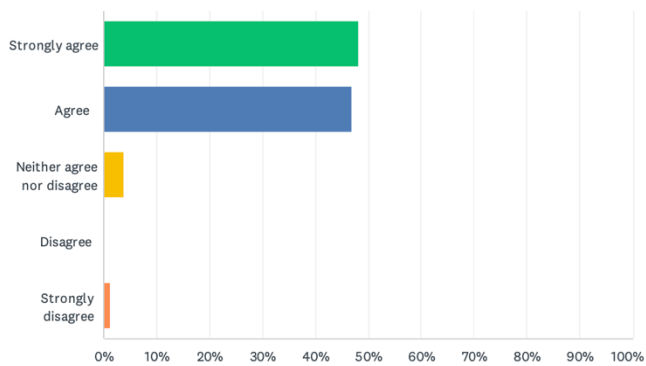
Answered: 79 Skipped: 0



ANSWER CHOICES	RESPONSES
Strongly agree	48.10% 38
Agree	44.30% 35
Neither agree nor disagree	5.06% 4
Disagree	2.53% 2
Strongly disagree	0.00% 0
TOTAL	79

Q22 Pressure ulcer risk assessment should be regularly carried out on all patients during their stay in hospital.

Answered: 79 Skipped: 0



ANSWER CHOICES	RESPONSES
Strongly agree	48.10% 38
Agree	46.84% 37
Neither agree nor disagree	3.80% 3
Disagree	0.00% 0
Strongly disagree	1.27% 1
TOTAL	79

Appendix I
Cost Analysis

ITEMS	COST
POSTERS (x20)	\$55.00
QR Code (x10)	\$1.70
Moulage Kit	\$925.00
Celebratory Breakfast	\$200.00
TOTAL	\$1,181.70

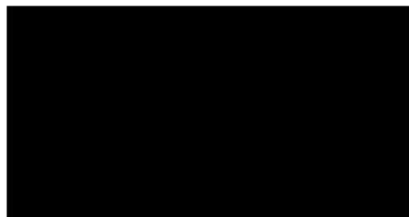
Appendix J

Connecticut Hospital IRB Exemption



1019 39th Ave SE / Suite 120
 Puyallup, WA 98374
 855-818-2289
 www.wcgirb.com

September 14, 2021



SUBJECT: REGULATORY OPINION: IRB EXEMPTION
 Investigator Contact: [REDACTED]
 Sponsor Protocol No. [REDACTED]
 Protocol Title: Implementing Evidence Based Practice: Effectiveness of
 Bundled Interventions to prevent Medical Device Related Pressure
 Injuries (MDRPI) Among Patients Admitted in ICU and IMCU

This letter is in response to your request for an opinion as to whether the above mentioned project would constitute human subject research requiring IRB review.

This opinion is based on federal regulation 45 CFR 46 and associated guidance.

Under 45 CFR 46.102(l), the definition of research includes "...a systematic investigation, including research development, testing, and evaluation, designed to develop or contribute to generalizable knowledge. Activities that meet this definition constitute research for purposes of this policy, whether or not they are conducted or supported under a program that is considered research for other purposes. For example, some demonstration and service programs may include research activities."

The Office of Human Research Protection has issued guidance indicating that quality improvement projects do not meet the definition of research. This guidance states:

Question 2: Do the HHS regulations for the protection of human subjects in research (45 CFR part 46) apply to quality improvement activities conducted by one or more institutions whose purposes are limited to: (a) implementing a practice to improve the quality of patient care, and (b) collecting patient or provider data regarding the implementation of the practice for clinical, practical, or administrative purposes?

Answer: No. Such activities do not satisfy the definition of "research" under 45 CFR 46.102(d), which is "...a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge..." Therefore, the HHS regulations for the protection of human subjects do not apply to such quality improvement activities, and there is no requirement under these regulations for such

Appendix K

Sacred Heart University IRB Exemption

Dear Applicant,
Thank you for your submission to the IRB requesting exempt review. Based on the application submitted, the IRB is pleased to approve your submission and we wish you great success in your research.

Sincerely,
Christopher Taber
Chair, IRB

Christopher B. Taber, PhD, CSCS, USAW2, EP-C, PES
Director, Exercise and Sport Science M.S. Program
Associate Professor
College of Health Professions
Sacred Heart University
(203) 396-6342

Appendix L

Executive Summary

Current Problem: The increase of MDRPIs around endotracheal tubes (ETTs), bilevel positive airway pressure (BiPAP) masks, pulse oximeters, nasogastric/orogastric tubes (NGTs/OGTs), urinary/condom catheters, rectal tubes, restraints, and other external devices has been identified by the Quality Improvement (QI) department through monthly audits in the intensive care unit (ICU) at a Connecticut (CT) hospital since 2019. Registered nurses (RNs) have been failing to complete proper bedside skin handoff and lack removal/replacement of decompression measures per SH protocol. MDRPIs increase the risk of potentially life-threatening infections (e.g., sepsis), cause pain or leave scars, increase the length of hospitalization, and consume additional resources such as time and products (Gefen et al., 2020).

Project Description: The goal of this QI project was to identify and explore the rising MDRPI issue and to decrease or eliminate MDRPIs in the critical care setting.

Implementation Process: A simulation educational training for MDRPI prevention and identification was delivered on three mandatory ICU competency days (June 22nd, July 21st, & August 24th, 2022) to ICU RNs. MDRPI simulation training comprised of two patient care rooms set up to create an immersive learning opportunity for the critical care nurses. The first of the two rooms had a “preventative” focus, where the mannequin patient was simulated to have multiple devices in place—resulting in the patient being at an increased risk for MDRPIs. The ICU RNs were given a clinical scenario and had the opportunity to assess the patient and determine the at-risk areas for skin breakdown. The second room was set up with a focus on wound “treatment.” The simulation was constructed in a manner that the nurses identified the areas of skin breakdown and worked with the wound specialist to identify the appropriate treatment options.

Evaluation Metrics: A pre-survey was conducted to obtain the perception of ICU RNs in regards to the importance of skin breakdown issues. After the educational simulation training, a post-survey was distributed to ICU nurses to gain their perception post intervention. Both survey results portrayed the nursing staff's understanding of MDRPIs and the importance of its relation to patient morbidity/mortality, quality of life, and healthcare costs. Additionally, the monthly audits post-intervention from September-November 2022 showed a total elimination in the number of MDRPIs.

Project Outcomes: As reflected in the pre-survey, 87.1% of the nursing staff felt that continuous assessment of patients will give an accurate account of their pressure ulcer risk, while 92.4% agreed to this statement in the post-survey. Unfortunately, not all ICU RNs participated in the pre-survey due to it not being mandatory. Additionally, ICU respiratory therapists (RTs) were not required to participate in the pre-survey or education simulation day training, but were mandated to participate in the post-survey. The project should have included RTs in the pre-survey and mandated it for all ICU RNs as well.

Return on Investment: According to the Agency for Healthcare Research and Quality's National Scorecard on Hospital-Acquired Conditions (2020), most MDRPIs cost healthcare organizations between \$20,900 and \$151,700 per MDRPI in the United States. It is a challenge to obtain the exact monetary amounts caused by MDRPIs, as they are not reliably coded in billing claims, leaving the epidemiology and economics of MDRPIs incomplete. These are costs that may not be reimbursable because MDRPIs are defined as Never Events (related to improper care) by the Centers for Medicare & Medicaid Services (AHRQ, 2020). Healthcare facilities may have to absorb the cost of these MDRPIs and lose money that could be used to improve patient services.

Sustainability Plan: The knowledge gained from the simulation training was incorporated in the ICU RNs and clinical assistants (CAs) daily assessments and handoff to prevent any MDRPIs. ICU RNs should reposition the patient and medical devices involved during bedside handoff, along with every two hours. New ICU RNs are required to shadow wound care nurses for two hours for an enlightened perspective of pressure injury prevention measures to deliver high-quality patient care when considering the utilization of a medical device. CAs are to assess the tubing location on SCDs, ensure foam padding behind the ears and on the cheeks for nasal cannulas, and change the pulse oximeter site every 12 hours. Weekly nurse-leader skin rounding allows for a head-to-toe assessment with the devices in place, provides appropriate education/intervention measures, and reviews the documentation related to pressure injury for these patients.

Implications: The MDRPI educational simulation training approach to care resulted in an increase in staff efficiency, reduction in MDRPIs, improved quality of life, and less complications to occur in ICU patients who are already in such vulnerable conditions. Through investment in such QI projects for preventative measures to avoid MDRPIs and for early detection, higher costs that would result from obtaining/treating an MDRPI can be avoided.