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Venous Ulcer Wound Care Management

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Abstract

Problem: Venous ulcer wounds are commonly managed in outpatient clinics by providers in conjunction with nurses; however, lack of wound care knowledge and evidenced-based wound care management among nurses make providing effective care challenging and difficult. Known as stasis ulcer, venous ulcer accounts for 80 percent of lower extremity ulcerations and its incidence increases with age and recurrence is quite common. These wounds can be challenging to treat, often taking at least four to six weeks to heal, and often requiring long-term therapeutics for optimal healing and reoccurrence prevention. Venous ulcer wounds are an important medical problem with substantial economic effects that can adversely impact patients' quality of life and significantly increasing morbidity and financial burden. **Intervention:** Eligible primary care nurses viewed a venous ulcer wound care education video. The project focused on educating nurses on venous ulcer etiology and characteristics, wound care assessment, wound debridement and management, dressing selection and guidelines, and the critical principle of wound care. **Measures:** A pre- and posttest assessment measured any changes to knowledge and confidence in providing evidence-based venous ulcer wound care among primary care nurses. Data analysis was completed using a mean value, paired t-test, and ANOVA testing. **Results & Conclusion:** Overall, the mean value of all responses from the pre- to the posttest survey increased by 8.29%, indicating a positive impact of the intervention. Primary care nurse confidence in venous ulcer management had a paired t-test P-value of 0.0431. ANOVA tests were run to measure the correlation between years of nursing experience and average confidence level in providing venous ulcer wound care. The pretest analysis showed a statistically significant correlation between experience and confidence. However, this phenomenon disappeared upon analysis of posttest data. These results indicate that the education intervention was effective in increasing their overall confidence in providing venous ulcer wound care management, especially for nurses with fewer years of experience.

Venous Ulcer Wound Care Management Among Primary Care Nurses

Statement of Problem

Venous ulcer wounds are commonly managed in outpatient clinics by providers in conjunction with nurses; however, lack of wound care knowledge and evidenced-based wound care management among nurses make providing effective care challenging and difficult. Although Neighborcare Health (NCH) provides wound care training to all newly hired nursing staff, there are gaps in detailed knowledge related to specific types of wounds, particularly venous stasis ulcers. An estimated $31.7 billion is annually spent on the U.S. healthcare system for wound care and management (Nussbaum et al., 2018). It is essential for healthcare providers, especially nurses who manage day-to-day wound care duties, to be equipped with knowledge and skills to provide effective care. Although there is limited literature on nurses' knowledge on wound care management, a clear knowledge deficit on wound care (e.g., wound classification, dressing selection, awareness of clinical guidelines, etc.) has been well-identified among community nurses (Haram et al., 2003; Welsh, 2018). Accurate wound care assessment is crucial in determining an evidence-based treatment plan, which includes identifying adequate wound healing or complications, accurate medication administration, and proper dressing selection (Cox, 2019). Poor assessment and inadequate wound care management can increase the risk of chronic wounds and infections, create a financial burden, and negatively impact quality of life (Welsh, 2018). These factors highlight the need for evaluation of primary care nurses' knowledge and attitudes on wound care, effective wound care assessment skills, and continuous need-based training to develop and establish high quality practices (Greatrex-White & Moxey, 2015).

Literature Review

The true economic impacts of wound care in the US remain unknown due to limited existing research. A recent study by Naussbam et al. (2018), the first comprehensive wound care study in the US, reported that about 8.2 million Medicare beneficiaries had at least one acute or chronic wound, with costs for all wound care treatment ranging from an estimated $28.1 to $96.8 billion. Among various wound types, surgical wound infections had the highest prevalence rate of 4%, followed by diabetic wounds (3.4%), non-healing wounds (3%), and other wounds (0.1% to 2.7%) (Naussbam et al., 2018). Chronic venous ulcers burden economic productivity, resulting in the loss of 4.6 million workdays per year (Spentzouris & Labropoulous, 2009). Moreover, outpatient treatment costs ($35.8 billion) were higher than inpatient ($24.3 billion), due to increased outpatient wound care services, and that cost is expected to increase (Nussbaum et al., 2018; Sen, 2019). Not all this high-cost burden is related to poor assessment and inadequate care (Harris et al., 2010). Wounds are preventable and effective wound care management starts with a thorough assessment of the wound and peri-wound. A literature review which aimed to assess current evidence-based wound care management, utilization of evidence-based practices (EBP) by nurses, and nurses' knowledge and skills on wound care found these recurring themes: insufficient wound care knowledge amongst nurses; development of wound care practices based on ritualistic practices; and a disconnect between evidence and wound care practices (Frykberg & Banks, 2015; Welsh, 2018).

Wound care is complex due to varying etiologies and widely differing healthcare professionals' opinions and understandings of wound care, depending on prior experiences or limited knowledge (Moore & Clarke, 2011; Nagel et al., 2020). For instance, each nurse at an ostomy and burn clinic in a study had a different approach to managing wounds based on the respective specialized scope of practice and experiences (Nagel et al., 2020). Contrarily, the general principles of wound assessment and

the overall goal of wound healing remains common among all healthcare professionals (Nagel et al., 2020). Multiple factors affect wounds (e.g., diabetes, hypertension, smoking, nutrition, etc.) and there are multiple wound types (e.g., burns, surgical wounds, pressure ulcers, etc.) (Chamanga, 2016). However, for this paper, wound care discussion will be primarily focused on venous ulcers.

Understanding Venous Ulcer

Venous ulcers, also known as stasis ulcers, account for approximately 70% to 90% of all lower extremity ulcers (Alavi et al., 2016; Sen et al., 2009). About 2.2 million Americans are affected by venous ulcers annually and about one-third of treated patients experience four or more recurring ulcers. Furthermore, an estimated 10-year recurrence rate is as high as 50%; this high recurrent nature has a negative impact on an individual's quality of life, causing a loss of 2 million working days each year (Alavi et al., 2016; Collins & Seraj, 2010; Sen et al., 2009; O'Donnell et al., 2014). The exact pathophysiology of venous ulcers remains unclear; however, venous ulcers are linked to incompetent lower extremity valves, allowing reflux of blood into the superficial venous system, and causing edema. This often results in high venous pressure in the lower extremities and abnormal pooling of blood in the venous circulatory system causing capillary damage, activation of an inflammatory process, ulcer formation, and impaired wound healing (Collins & Seraj, 2010; Cox, 2019).

Insufficient Knowledge

Each year, outpatient nurses care for 1.45 million people with wounds (Nursing in Practice, 2016). Some nurses report that almost 70% of their work involves wound care management, yet inadequate training and education have been a well-identified issue among most nurses and other healthcare providers. Several studies have pointed out the lack of wound care education in the nursing school curriculum (Sachaarup et al., 2018). A review of undergraduate nursing school education reported that nursing curriculums only devoted a maximum of one day on wound care education in the

entire curriculum (Moore & Clarke, 2011). Timmons (2016) reported that some undergraduate schools only offered six hours of wound care education. Similarly, nurse practitioner programs, physician assistant programs, and medical schools do not require or include this education or include competencies related to wound care, resulting in an enormous knowledge deficit when providing care to the patient (American Association of Colleges of Nursing, 2020; National Organization of Nurse Practitioner Faculties, 2020; Accreditation Review Commission on Education for the Physician Assistant, 2020). Due to these knowledge gaps, according to the literature, nurses and providers are forced to rely on their experience-based evidence rather than evidence-based practices to treat and manage various wounds (Sachaarup et al., 2018).

Ritualism and Disconnect from Evidence

Current wound care practices are highly attributed and derived from historic and ritualistic practices; new nurses learn their wound care practices from the more experienced nurses and their habitual practices (Welsh, 2018). Identifying wound etiologies and accessing updated information pertaining to wounds can be challenging; thus, less experienced nurses often rely upon colleagues' knowledge and experiences for guidance and recommendations (Ferreira et al., 2014). Nursing programs and medical schools do not adequately prepare individuals to provide effective wound care services. Nurses and providers often acquire and develop their knowledge during on-the-job training, which is often guided by respected "wound care experts." Thus, when knowledge and practices are acquired on-the-job, they are often derived from ritualistic and habitual practices (Greatrexi-White & Moxey, 2013).

Although multiple wound care guidelines are available, challenges and barriers continue to exist due to their complexity and challenging nature (Frykberg & Banks, 2015). As mentioned, due to inadequate education and training, nurses often lack the knowledge to provide quality wound care. Wounds can be challenging, especially for a less experienced, novice nurse. While some nurses have

good theoretical knowledge about wound care, they continue to lack proper application of wound techniques, which negatively impacts their practice (McCluskey & McCarthy, 2012).

Theoretical Framework

Evidence-based practices (EBP) improve the quality of care. It involves integrating evidence practices with clinical knowledge and expertise while considering individualized needs and preferences (Wilson & Austria, 2019). The ACE Star Model of Knowledge Transformation is one of many EBP models available to assist healthcare workers to integrate evidence into clinical practice. This model describes five major stages of knowledge transformation into practice: 1) discovery research; 2) evidence summary; 3) translation to guidelines; 4) practice integration; and 5) process, outcome evaluation (Stevens, 2019). These five major stages guided and evaluated this DNP project.

The first stage, discovery research, is a knowledge gathering stage, where information regarding current NCH's wound care practices, and nurses' knowledge and attitudes about wounds was collected through pretest surveys. Information on wound etiologies and evidence-based wound care practices was thoroughly researched using credible databases. During the evidence summary, second stage, all information gathered from participant surveys was synthesized to identify project findings such as: establish generalizability across participants, settings, and treatment variations; integrate existing information for decisions about clinical care; identify and reduce biases among participants to provide a true reflection of reality; and identify meaningful statement of evidence from the project (Stevens, 2019). The goal of the translation stage, third stage, is to provide useful clinical practice guidelines which are summarized and derived from the synthesis; thus, an evidence-based wound care guidelines on wound care and its auxiliary responsibilities was provided to NCH nurses to improve patient care (Stevens, 2019). The integration stage, the fourth stage, guided to change individual wound care practices from experience-based to evidence-based and, at the organizational level, which guided in

developing an improved onboarding wound care training among new nurses and foster continuous hands-on wound care training based on individual needs. Lastly, the evaluation stage evaluated the impacts of EBP on nurse's knowledge on venous ulcer wound care practices and training quality.

Project Design

Purpose and Aim

Although NCH provides wound care training to all newly hired nursing staff, there are gaps in detailed knowledge related to specific types of wounds, particularly venous stasis ulcers. The goal of this project was to assess, evaluate, and educate NCH primary care nurses on evidence-based venous ulcer wound care management. Upon evaluation of the baseline levels of NCH nurses' knowledge on venous ulcer wound care management, a training curriculum was developed. The training curriculum aims to teach NCH nurses how to effectively 1) assess venous ulcer wounds effectively; 2) prepare a good wound bed and perform debridement; 3) identify and apply appropriate dressing materials; and 4) provide standardized documentation.

A wound care education intervention with a pre- and posttest was implemented among registered nurses working at NCH. No patient and chart information were accessed for this project. The pre- and posttest survey examined nurses' knowledge on accurate assessment and management in venous ulcer wounds and identify gaps and barriers in current practice. For tracking purposes, participants were assigned a unique identifier (last initial and birth year) when completing the pre- and post-education surveys. No names and date of births were collected for this project. All research materials and consent forms were stored in a password protected secure laptop and only the researcher had access to project data. When the research study ends, any identifying information was removed from the data, or it was destroyed. All the information provided was kept confidential.

IRB Review and Informed Consent

Seattle University's Institution Review Board (IRB) identified this quality improvement project as "Not Human Participant Research (NHPR)." Thus, it did not require an IRB approval for the protection of human subjects (Appendix B). All survey information was gathered anonymously. To reduce direct identifiers, oral consent was obtained. The survey information sheet explained to participants that their choice to complete the surveys represented their consent (Appendix A). No patient or chart information was accessed for this project. No names, date of birth or any direct identifiers were collected for this project. Only information regarding participants' years of nursing experience, years of employment at NCH, and years of wound care experience were obtained for research purposes. For tracking purposes, participants were assigned a unique identifier (last initial and birth year) when completing the pre- and posttest surveys.

Setting

A venous ulcer wound care education intervention with a pre- and posttest was implemented at eight NCH clinics that provide primary care in all Seattle and King County areas. NCH is a federally qualified health care center that provides care for the marginalized and underserved community members. In 2020, NCH estimated about 41% of its patient population were insured under Medicaid, 30% were uninsured, 18% had private insurance, and the remaining 11% were covered through Medicare (Neighborcare, 2020).

Participants and Recruitment

Individuals were invited to participate in the project via NCH's primary care distribution email. All participants were recruited from NCH clinics where they currently work as primary care registered nurses. All active nurses regardless of their nursing experiences and backgrounds were recruited from all eight clinic locations. Inclusion criteria were as follows: current and active primary care nurses at NCH;

clinic and/or float nurses; nurses who provide direct patient care; and any nurse with previous nursing experience. The exclusion criteria included inactive float nurses (nurses who are current employees but haven't worked in 2 months); new hires with less than 2 months of NCH work experience; and remote nurses with no direct patient contact.

To increase participants' interest in the project, three raffle gift cards were offered upon project completion. Participants who completed the pre- and posttest surveys were eligible for the raffle drawing. The gift cards, valued at $25, $15, and $10, were randomly raffled to three eligible participants. Raffle winners were given the option to decline this offer if they did not wish to provide their personal information. All participants were randomly ranked one to nine on Qualtrics. Google's random number generator (1 to 9) was utilized to select gift card winners. The three winning numbers were matched with the participant number on Qualtrics which identified their unique identifiers from the posttest survey. A final email was sent to all participants with the winner's unique identifier number and an option to claim their award. The three individuals were contacted regarding their prize and consent to share their personal information to claim their electronic gift cards.

Intervention

Nurses completed a pretest survey to examine their confidences and attitudes regarding venous ulcer wound care management prior to receiving venous ulcer wound care education. An audio recorded 45-minute educational video, developed by the project administrator, was disseminated to all eligible participants (Appendix C). The video included venous ulcer etiology and characteristics, wound care assessment, wound debridement, and management, dressing selection and guidelines, and the critical principles of wound care. The intervention aimed to improve NCH's current wound care training by providing a specialized educational program with an emphasis on venous ulcer management. Posttest results were compared with pretest results to assess for changes in attitudes and wound care

approaches. The effectiveness of the education intervention was measured with four follow up questions after completing the posttest survey. Additionally, a one-page wound care cheat sheet (Appendix D) was provided for all participants as a reference for future practice.

Data Collection and Analysis

The pre- and posttest survey data was collected through Qualtrics software and imported into an Excel spreadsheet. All information was saved in a secure laptop that is only accessible to the project administrator. All data collected was stored on Excel spreadsheets with respective timestamps. Data was analyzed using paired T-tests which compared pre- and posttest results. Additionally, the T-test analysis identified if there are significant differences between the two groups and determined the effectiveness of the intervention. While the T-test measured the statistical significance of the two pre- and posttest responses, the project administrator also assessed its practical significance and relevance. An additional ANOVA test analysis was conducted to measure correlation between years of nursing experience and average confidence level in providing venous ulcer wound care. Participants were given three weeks to respond to each survey they received. Each week, the project administrator sent email reminders to complete the surveys.

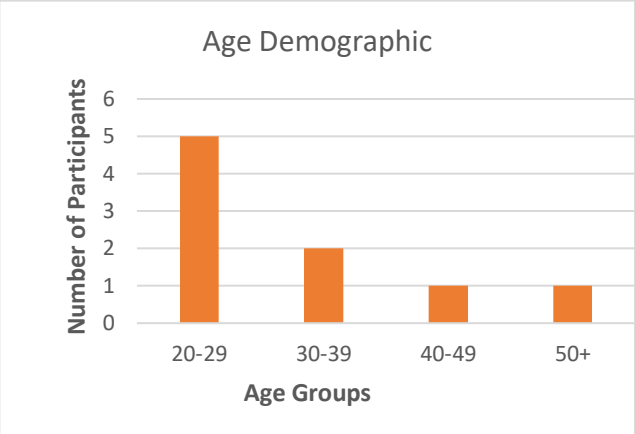
Results

The pretest resulted in 24 participant responses whereas the posttest included only 10 responses. Only the submissions with completed pre- and posttest surveys were eligible to be included in the data analysis. From the 10 paired submissions, one was excluded due to an incomplete survey. Thus, only 9 eligible primary care nurses were included in data analysis for the project. The demographics of participants are displayed in Figures 1, 2, 3, and 4.

Figure 1

Demographics

A



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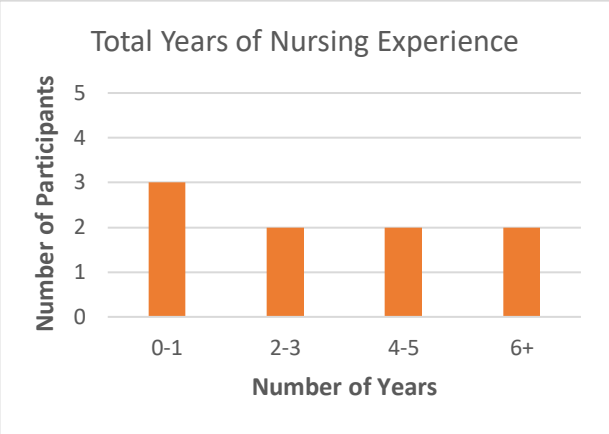

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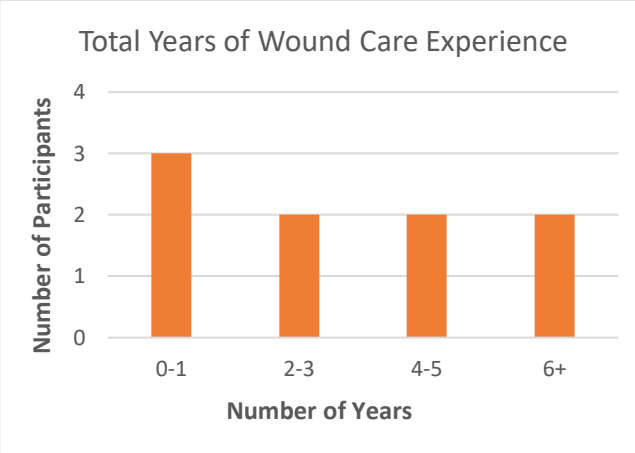

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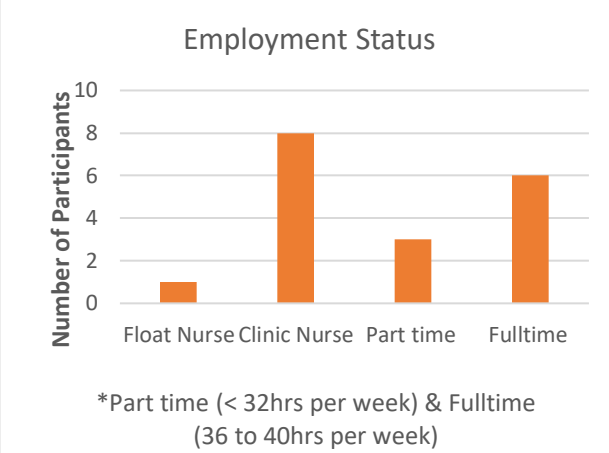


Note. N = 9. Panel A: Participants' age group. Panel B: Participants' nursing experience. Panel C: Participants' wound care experience. Panel D: Participants' employment status.

Participants were asked questions that evaluate nurses' comfortability on venous ulcer knowledge and evidence-based wound care management practices. Each response was equally weighted on a 5-point Likert scale (Scoring Key: 5= Strongly Agree, 4= Agree, 3= Neutral, 2 = Disagree, 1=

Strongly Disagree). Tables 1 and 2 provide the calculated results for the pre- and posttest surveys. Table 3 summarizes the results from the pre- and posttest surveys.

Table 1

Pretest Survey Results

Questions	Mean	ST Dev
1. I feel confident in my venous ulcer wound management skills.	3.56	1.51
2. I received adequate/proper training about wound care management at Neighborcare to provide care for patients.	4.11	1.05
3. I am able to identify venous ulcers from other wounds such as arterial ulcers, pressure ulcers, and diabetic ulcers.	3.56	1.33
4. The volume of exudate is the primary consideration when selecting a dressing.	3.67	1.41
5. I am able to identify proper wound bed preparation and the type of wound debridement needed for proper wound healing	4.44	0.73
6. I know how to accurately measure wound dimensions.	4.56	0.53
7. I am confident in how to effectively select the type of wound treatment and dressing needed for venous ulcers.	4.11	1.00

Note. Mean and standard deviations are presented for each pretest survey question.

Table 2

Posttest Survey Results

Questions	Mean	ST Dev
1. I feel confident in my venous ulcer wound management skills.	4.33	1.00
2. I received adequate/proper training about wound care management at Neighborcare to provide care for patients.	4.00	1.12
3. I am able to identify venous ulcers from other wounds such as arterial ulcers, pressure ulcers, and diabetic ulcers.	4.11	0.60
4. The volume of exudate is the primary consideration when selecting a dressing.	4.44	0.73
5. I am able to identify proper wound bed preparation and the type of wound debridement needed for proper wound healing	4.22	0.97
6. I know how to accurately measure wound dimensions.	4.89	0.33
7. I am confident in how to effectively select the type of wound treatment and dressing needed for venous ulcers.	4.33	1.00

Note. Mean and standard deviations are presented for each posttest survey question.

Table 3

Pre- and Posttest Survey Results Comparison

	Pretest		**Posttest**	
Questions	Mean	ST Dev	Mean	ST Dev
1	3.56	1.51	4.33	1.00
2	4.11	1.05	4.00	1.12
3	3.56	1.33	4.11	0.60
4	3.67	1.41	4.44	0.73
5	4.44	0.73	4.22	0.97
6	4.56	0.53	4.89	0.33
7	4.11	1.00	4.33	1.00

Note. Mean and standard deviation results comparison of pre and posttest survey.

On the pretest survey, the nurses' mean scores on several questions ranged in the 3's, which indicates that they felt neutral in their knowledge and skills on providing venous ulcer wound care. However, all mean scores on the posttest survey are above a threshold of 4, which implies greater confidence in their abilities. Table 4 provides a summary analysis of each question and their statistical significance of pre and posttest responses.

Using the paired t-test, the scores from the pre- and posttest surveys were compared to evaluate each question and their statistical significance for every response. Question 1, which assessed nurses' confidence level on providing venous ulcer wound management, resulted in a P-value of 0.0431, which is statistically significant. This indicates that the education intervention was effective in increasing their overall confidence. The p-value for questions 2 through 7 were higher than 0.05, thus failing to reject the null hypothesis. However, it is important to note the p-value for question 4 (0.0881) and 6 (0.0805), which assessed nurses' knowledge on wound exudate management and accurately measuring wound dimensions was very close to being statically significant at 95% confidence level. Although the statistical significance threshold of 0.05 wasn't achieved, from a practical standpoint this data still indicates increased in nurses' knowledge improved post intervention.

Table 4

Statistical Significance Pre- and Posttest

Participant No.	Question 1 Pre	Question 1 Post	Question 2 Pre	Question 2 Post	Question 3 Pre	Question 3 Post	Question 4 Pre	Question 4 Post	Question 5 Pre	Question 5 Post	Question 6 Pre	Question 6 Post	Question 7 Pre	Question 7 Post
1	1	4	2	2	1	4	2	5	1	4	4	5	2	4
2	4	5	4	5	4	4	3	3	4	5	5	5	4	5
3	4	4	4	4	2	4	4	5	4	4	4	4	4	4
4	5	5	5	5	5	5	5	5	5	5	5	5	5	5
5	4	5	5	5	3	3	4	4	5	4	4	5	5	5
6	4	5	4	5	4	4	5	5	3	5	5	5	4	5
7	1	2	3	3	1	4	2	4	1	2	4	5	1	2
8	5	5	5	3	2	4	4	4	5	5	5	5	5	5
9	4	4	5	4	2	4	2	4	4	4	5	5	3	4
Mean	3.56	4.33	4.11	4.00	3.56	4.11	3.67	4.44	4.44	4.22	4.56	4.89	4.11	4.33
STDEV	1.51	1.00	1.05	1.12	1.33	0.60	1.41	0.73	0.73	0.97	0.53	0.33	1.05	1.00
T-test, p-value	0.0431		0.7287		0.2755		0.0881		0.6454		0.0805		0.6454	

Note. Paired T-test analysis on pre and post survey questions. Scoring Key: 5= Strongly Agree, 4= Agree, 3= Neutral, 2 = Disagree, 1= Strongly Disagree. Questions 1-7 are of equal weight on 5-point Likert scale

During the pretest survey analysis using an ANOVA test, a correlation was found between total years of nursing experience and the average confidence in providing wound care. Generally, more years of nursing experience leads to higher confidence in providing wound care. This difference was statistically significant at a 95% confidence level (p-value was 0.0448). The same statistical analysis was run on posttest data to determine if the same phenomenon would appear. The posttest statistical test was not statistically significant (p-value was 0.2274), indicating that the intervention was effective in increasing nurses' wound care confidence level, regardless of their total years of nursing experience.

Post Intervention Follow up Survey for Overall Improvement

Following the posttest survey, four additional questions were asked to measure the overall impact of the education intervention regarding venous ulcer wound care management. Figures 2

through 5 demonstrate participants' response on intervention effectiveness. Overall, participants reported positive impacts of the intervention. Post-intervention, about 55% of participants reported significant increase in knowledge and confidence in identifying and applying appropriate dressing materials and overall venous ulcer wound care management (Figure 2 and 7). About 33% of the participants reported slight knowledge and confidence increase on preparing a good wound bed and performing debridement (Figure 3). Lastly, about 44% of the participants reported significant knowledge and confidence increase on documenting wound care, whereas 33% reported neither increased nor decreased impact (Figure 5).

Figure 2

Responses for the question, "Do you feel the training increased your knowledge and confidence in assessing venous ulcer wound care?"

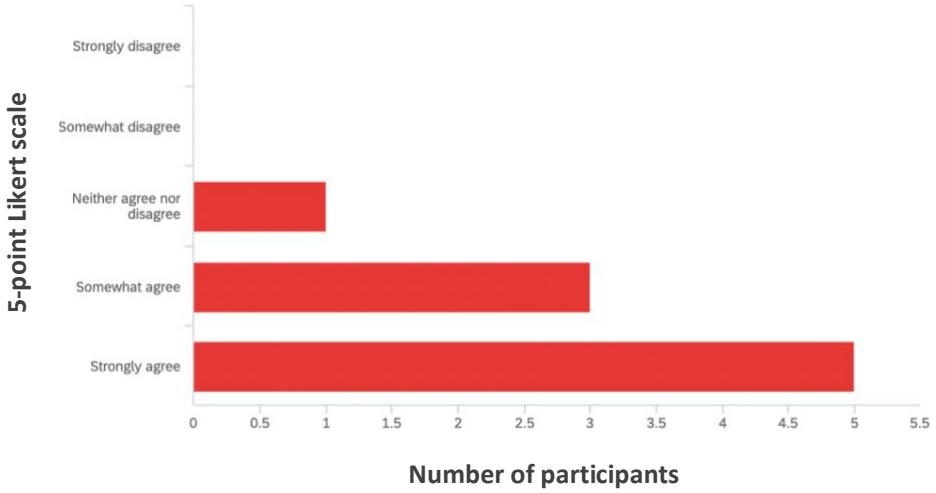


Figure 3

Responses for the question, "Do you think the training increased your knowledge and confidence on effectively preparing a good wound bed and performing debridement?"

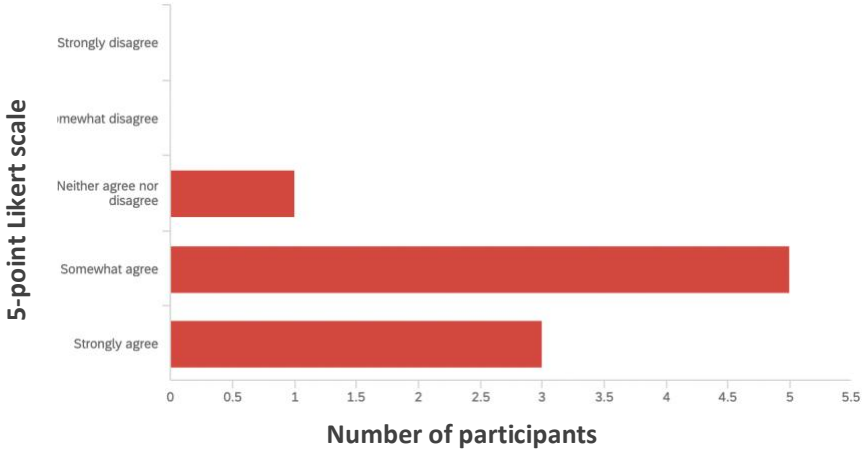


Figure 4

Responses for the question, "Do you think training increased your knowledge and confidence to identify and apply appropriate dressing materials for venous ulcers?"

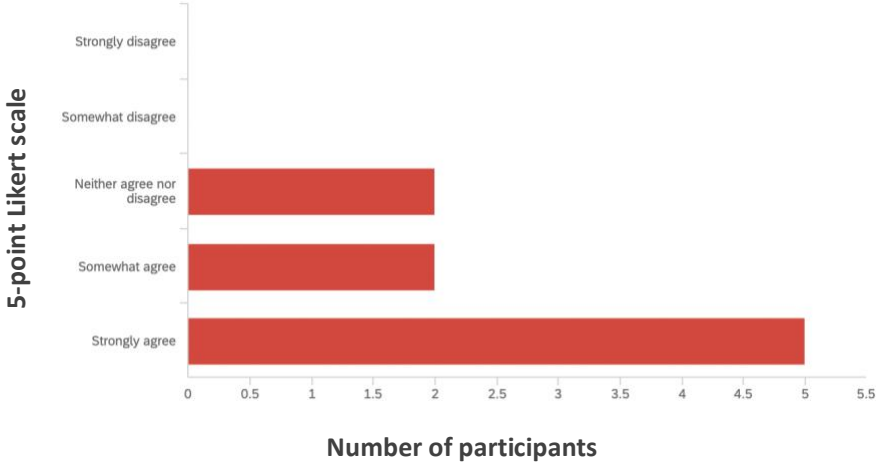
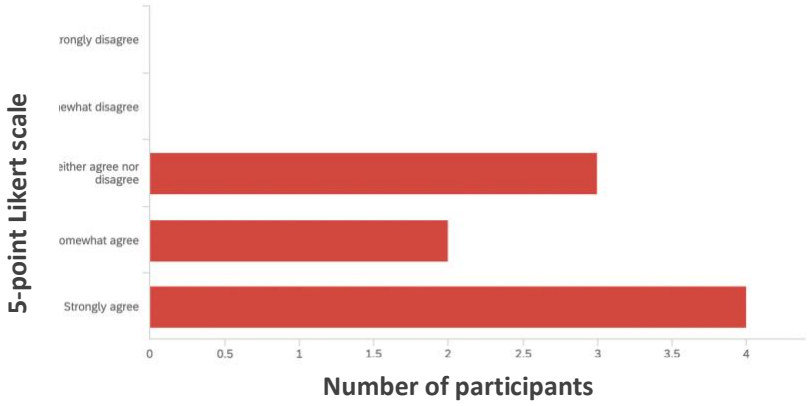


Figure 5

Responses for the question, "Do you think training increased your knowledge and confidence on documenting wound care visits?"



Discussion

Findings from the project were summarized on one page, addressing crucial highlights. Initially, results were disseminated to all nurses with an open invitation for feedback and questions regarding the project and the results. These results were also disseminated to NCH clinical supervisor and all stakeholders. One of the aims of this DNP project was to create an educational module targeted towards NCH's primary care nurses to assess their awareness, attitudes, and confidence in managing venous ulcer wounds. The goal was to educate nurses on how to assess venous ulcer wounds effectively, prepare good wound beds, identify, and apply appropriate dressing materials, and provide standard documentation. Based on the posttest surveys, most nurses reported increased confidence in and knowledge of venous ulcer management. However, it would be interesting to know the project's full impact had all 24 participants completed both surveys. Some of the pretest survey participants did report lack of knowledge and confidence in venous ulcer wound care management; however, without an accompanying posttest survey for comparison, the full impacts of the project remain unknown. Most of the participants who completed both pre- and posttest surveys were nurses with multiple years of nursing and wound care experience. A potential expansion on this project could emphasize participation

from newer and novice nurses in order to assess the intervention's impact on their knowledge of and confidence in venous wound management.

A future consideration to increase participation from nurses would be to conduct an in-person education training and ask nurses to complete the survey immediately after the training. Alternatively, the project administrator could coordinate with NCH nursing leadership and ask to implement the intervention during their monthly meeting to increase response rate.

Additionally, existence of high-quality evidence based wound care management research and wound care guidelines are limited. Moreover, all participants reported limited or lack of wound care education and evidence-based wound care practices during their nursing education. This highlights additional challenge for primary care nurses who are held accountable for managing wounds effectively. It also recognizes the need for further research on wound care practices, inclusion of wound care in nursing school curriculum, and outpatient clinics to invest in high-quality wound care training for nurses to carry out their duties without compromising patient safety.

Limitations

Sustained survey engagement was a limitation. Eliciting the same amount of participant engagement in the posttest survey was a challenge. Out of the 24 responses, only 3 participants responded to the survey in the first week. After several email reminders, a total of 10 participants responded to the survey. Moreover, some survey responses did not have complete answers, meeting exclusion criteria, which further decreased the total number of participants in the project. Another possible reason for the low response rate may be due to multiple nurse absences, which reduced the likelihood of being reminded to participate. Consequently, increased nurse absence increased the workload of the nurses on-site, which may have deterred from participation. Participants did not have

protected times to watch the video and they were asked to watch this on their own time, which may have decreased participation.

Another limitation is the lack of quantitative research and evidence-based wound care guidelines available. Studies pertaining to wound care management and information on wound dressing and treatment are limited as well. Although many publications acknowledge the need to conduct more research and establish evidence-based practices, this research and studies have yet to be implemented.

Conclusion

This project aimed to educate primary care nurses to effectively identify and treat venous ulcer wounds. The educational tool developed will serve as a resource to manage wound care visits. Ultimately, the tool will transition into a resource for all new hire nurses at NCH. The post-survey reported a 55% increase in knowledge and confidence to identify and apply appropriate dressing materials and provide overall venous ulcer wound care management. Based on this success rate, it is strongly recommended to develop wound care training into subsets (e.g., pressure ulcer, diabetic wounds, arterial ulcers, etc.). The ANOVA test demonstrated similar increase in confidence among nurses providing venous ulcer wound care post intervention. The need for robust wound care education and training in school and/or work environment is increasing as wound care becomes a routine part of nurses' responsibilities. Providing high quality wound care is a complex challenge due to limited high-quality evidence based wound care management and wound care guidelines because of insufficient wound care education in nursing education. Thus, this project highlights gaps in wound care knowledge and the need for organization to bridge these gaps in providing annual wound care training and utilizing experienced nurses as wound experts in developing resources for the organization. The project intends to become a catalyst that provides specialized wound care training for primary care nurses, with the hope of influencing similar training programs.

Acknowledgements

I would like to express my sincere gratitude to Dr. Therry Eparwa, DNP, MSN, RN, FNP-BC for her countless support and encouragement throughout my DNP project. Her valued insight and objective constructive criticism with every review session was essential to the development and completion of the DNP Project. Thank you for your efforts at each step of the project and helping it move forward with tremendous patience and kindness. I'm appreciative and thankful to all Neighborcare nurses who participated in my DNP Project without any hesitation. Special thank you to Dr. Yolanda Grandjean, DNP, RN for providing thoughtful feedback and support to implement my DNP project at Neighborcare.

I would like to thank Dr. Maura Carroll, DNP for becoming my reader. Lastly, thank you to my fiancé, Austin Childs, for advising me on the data analysis and interpretation. Thank you for continuously supporting me through my nursing journey.

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Appendix A

Informed Consent

TITLE: Venous Ulcer Wound Care Management Among Primary Care Nurses

INVESTIGATOR: Sonam Dolkar, School of Nursing, Seattle University, 510-374-9941

ADVISOR: Therry Eparwa, DNP, RN, FNP-BC, School of Nursing, Seattle University

PURPOSE: You are being asked to participate in a research project that seeks to investigate primary care nurses' awareness, confidence, and attitudes on venous ulcer wound care management. The project will provide you with education with aims that you will be able to effectively assess a venous ulcer wound; prepare a good wound bed and perform debridement; apply appropriate dressing materials; and provide standardized documentation. You will be asked to complete a pre-education survey in March 2022, watch an educational video in April 2022, and complete a post-education survey in April 2022.

SOURCE OF SUPPORT: This study is being performed as partial fulfillment of the requirements for the doctoral degree in nursing at Seattle University.

RISKS: There are no known risks associated with this study.

BENEFITS: Improve primary care's knowledge on venous ulcer wound care practices. Learn evidenced-based wound care practices: perform effective wound care assessment; identify wound bed preparation and how to effectively debride a venous ulcer wound; learn types of wound dressing available; and how to select appropriate wound dressing. Improve patient outcomes and decrease financial burden.

INCENTIVES: Upon project completion, three gift cards will be randomly raffled to three eligible participants. Each random winner will win $25, $15, and $10 respectively. Participants who complete the pre-education and post-education surveys will be eligible for the raffle drawing. Participation in the project will require no monetary cost to you.

CONFIDENTIALITY: For tracking purposes, you will be assigned a unique identifier (last initial and birth year) when you complete the pre- and post-test surveys. The three individuals will be contacted regarding their prize and consent to share their personal information to claim their gift cards. Winners can decline this offer if they do not wish to provide their personal information. All research materials and consent forms will be stored in a password-protected secure laptop and only the researcher will have access to project data. Human subjects research regulations require that data be kept for a minimum of three (3) years. When the research study ends, any identifying information will be removed from the data, or it will be destroyed. All of the information you provide will be kept confidential. However, if we learn you intend to harm yourself or others, we must notify the authorities.

RIGHT TO WITHDRAW: Your participation in this study is voluntary. You may withdraw your consent to participate at any time without penalty. Your withdrawal will not influence any other services to which you may be otherwise entitled.

SUMMARY OF RESULTS: A summary of the results of this research will be supplied to you, at no cost, upon request. Contact information: 510-374-991 and Sdolkar99@gmail.com.

Summary will be available by June 2022.

VOLUNTARY CONSENT: I have read the above statements and understand what is being asked of me. I also understand that my participation is voluntary and that I am free to withdraw my consent at any time, for any reason, without penalty. On these terms, I certify that I am willing to participate in this research project. My choice to complete the surveys represents my consent to participate in this project. I understand that should I have any concerns about my participation in this study, I may call Sonam Dolkar, who is asking me to participate, at (510)-374-9941. If I have any concerns that my rights are being violated, I may contact Dr. Michael Spinetta, Chair of the Seattle University Institutional Review Board at (206) 296-2585.

My choice to complete the surveys represents my consent to participate in this project.

If you'd like to participate in the raffle at the end of this project, please enter your first initial, last initial, and year of birth below

Appendix B

Institutional Review Board (IRB) Approval

SEATTLEU
INSTITUTIONAL REVIEW BOARD

Admin 201 | 206-296-2585
irb@seattleu.edu

January 20, 2022

Sonam Dolkar
College of Nursing
Seattle University

Dear Sonam,

Your application for the project Venous Ulcer Wound Care Management Among Primary Care Nurses indicates that activities will involve

- **An educational intervention with pre-/post-surveys for nursing staff at Neighborcare Health regarding venous ulcer wound care management.**

Given the nature of these activities, this project does not meet the federal regulatory definition of human participant research, and your project does not need further IRB review. (This determination does not indicate IRB "approval." *Do not include statements for publication or otherwise that the SU IRB has "reviewed and approved" this study*; rather, say the SU IRB has identified the study as "Not Human Participant Research (NHPR).")

If your project alters in nature or scope, please contact the IRB right away. If you have any questions, I'm happy to assist.

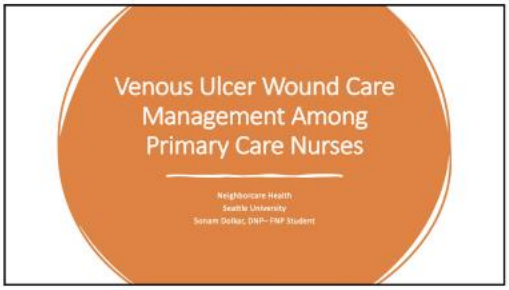
Best wishes,

Andrea McDowell, PhD
IRB Administrator

cc: Dr. Therry Eparwa, Faculty Mentor

Appendix C

Venous Ulcer Wound Care Management: Educational Intervention



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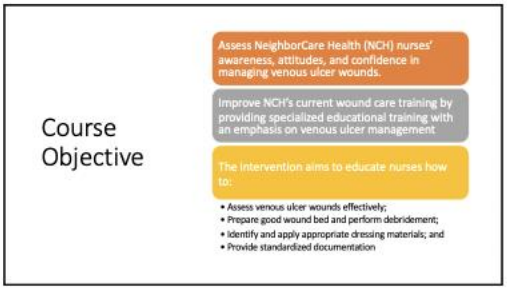

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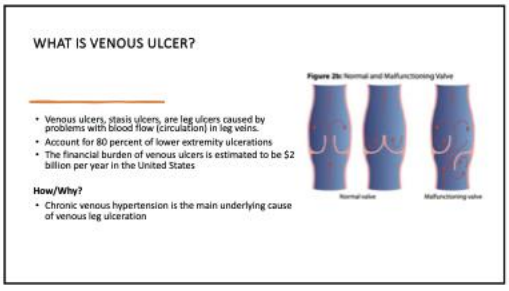

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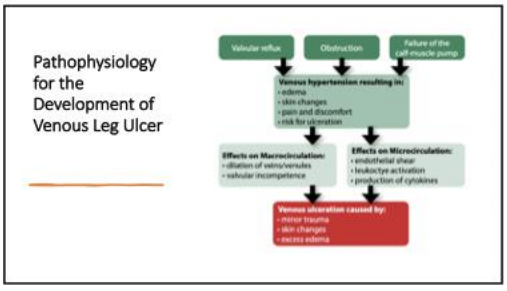

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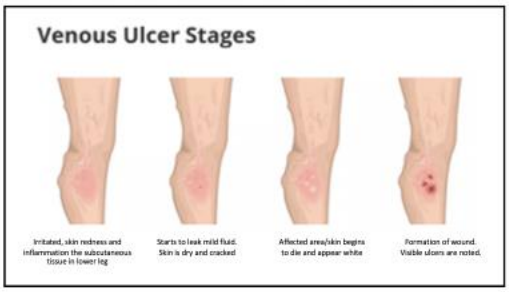

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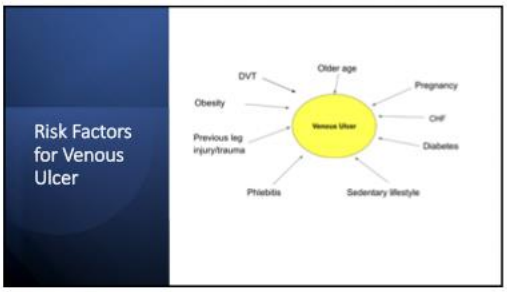


6

Difference Between Venous and Arterial Ulcer

Ulcer Type	Pathophysiology	Clinical Features	Associated Findings
Venous	Venous hypertension	Shallow, painful ulcer located over bony prominences, particularly the gaiter area (over medial malleolus) Irregular shape with flat margins, larger in size. Often presents with slough at the base with granulation tissue	Edema, venous dermatitis, varicosities, and lipodermatosclerosis Pedal pulse are present; exudate are moderate to large amount Throbbing, aching, heavy feeling in legs. Pain improves with elevation and rest
Arterial	Tissue ischemia	Commonly deep, located over bony prominences, round or punched out with sharply demarcated borders Punched out, occasionally deep, smaller in size Yellow base or necrosis; exposure of tendons	Abnormal pedal pulses, cool limbs, femoral bruit and prolonged venous filling time Pedal pulses are weak or absent; none to minimal exudate intermittent claudication; pain can be worse at night and at rest but improves with dependency

7

Characteristics of Venous Ulcer

8

Wound Assessment:

- **Onset:** Length of time
- **Classification:** partial thickness vs full thickness; depth of injury
- **Location:** Be specific (Eg: LLE, RUE); use the avatar on Epic
- **Margin/Borders:** Irregular, regular, circular, attached, closed, undermining, rolled
- **Measurement:** Always measure in centimeters (cm) the longest measure for each axis.
  - L x W x D (cm) **OR** L x W for wounds without depth
  - Length (head to feet) = 12 to 6 o'clock
  - Width = 9 to 3 o'clock
- **Exudate/Drainage:** Color, amount (mild, moderate, severe)
- **Wound bed:** Presence of fibrin, slough, eschar, necrosis, granulation tissue
- **Odor:** Yes/no; Faint, moderate, strong.
- **Pain:** Severity (1-10 pain scale); characteristic
- **Periwound:** Color, redness, warmth, swelling, induration
- **Infection:** Erythema, edema, warm, purulent discharge, worsening pain, fever, chills, etc.
- **Other:** Pulses? Any exposed structures such as bones?

9

Describe this wound!

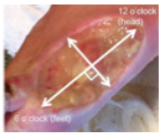
10

- **Onset**
- **Classification**
- **Location**
- **Margin/Borders**
- **Measurement**
- **Exudate/Drainage**
- **Wound bed**
- **Odor**
- **Pain**
- **Peri-wound**
- **Infection**
- **Other**

Onset 1 week ago. Partial thickness, square and irregular boarder wound located on the LLE, gaiter area. Measurement of 3cm x 4cm x 0cm (or no depth). Wound bed is covered with 95% slough and 5% healthy granulation tissue with mild sanguineous drainage without any malodor. Pain level 5/10m, pain is dull and achy pain. Peri-wound is erythematous and irritated. Mild localized swelling on medial ankle and skin discoloration on foot noted. No s/sx of fever, chills, and other infection symptoms. Pulse 2+ and varicosities noted on LLE.

11

Wound Measurement



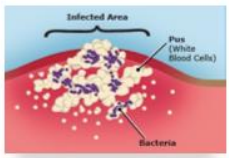
- **Length: 12–6 o'clock measure in cm**
- **Width: 9–3 o'clock measure in cm**
- **Depth: deepest point in cm**
  - If no depth, document "0 cm or no depth."

12

Red flags

RED FLAGS

- Acute infection of leg or foot (e.g. increasing unilateral redness, swelling, pain, pus, heat).
- Symptoms of sepsis[14].
- Acute or chronic limb threatening ischaemia[13,14].
- Suspected acute deep vein thrombosis (DVT).
- Suspected skin cancer.



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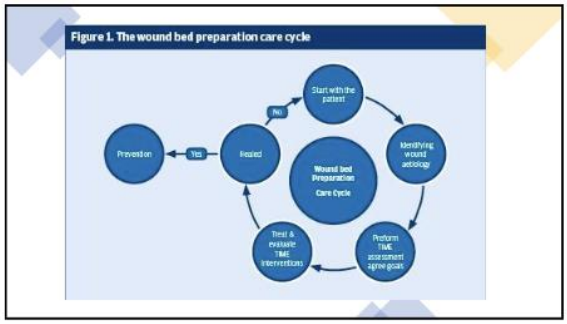


14

WOUND BED

Wound and peri-wound must be cleaned during every wound care visit!

Composition of the wound bed:

- If healthy, red granulation tissue → proceed with cleaning the wound
- If non-viable tissue is present such as fibrin, slough, eschar —> Debride
  - *If eschar is intact on on a heel or questionable arterial status, do not debride.*

Necrotic material or slough within a wound margin acts as a medium for bacterial proliferation and therefore should be removed by debridement for effective wound healing.

15

Non-viable tissue types

- **Fibrin**
  - Debride
- **Slough**
  - Debride
- **Eschar**
  - Leave intact if on a heel, or questionable arterial status
  - If you are comfortable, apply moist dressing until able to debride

16

Exudate Management:

One of the most critical principle of wound care

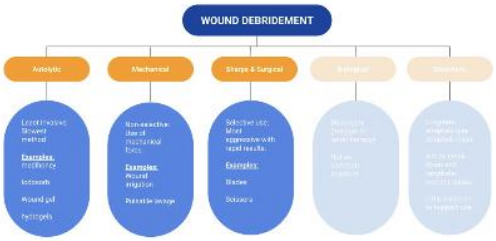
Why?

Slows down or even prevents cell proliferation

Interferes with growth factor availability

Contains elevated levels of inflammatory mediators impeding wound healing.

17



18

WOUND CLEANING AGENTS

19

Saf-Clens

- Nonirritating, effective cleaning action
- No rinse required after use

Hibiclens

- Kills microorganisms immediately, and it bonds with the skin and keeps on killing microorganisms, even after washing, to provide extended protection against a wide range of bacteria.
- Fast acting – begins killing germs on contact.
- Gentle for daily use
- Use: wash the affected area with water/NS, apply a minimum amount of Hibiclens needed to cover the wound area and wash gently, then apply dressing as needed.

20

WOUND DRESSING CHOICES

21

Dressing Choices: How Does One Select?

22

Primary Dressings

Medihoney

- Indicated for dry to moderately exuding wounds
- Helps to liquefy non-viable tissue
- Can be used safely in tunneled wounds or wounds with undermining
- Medihoney dressing can be worn up to 7 days, depending on the level of exudate

23

Iodosorb

- Release free iodine, which is thought to act as a wound antiseptic when exposed to wound exudate
- Provides broad-spectrum antimicrobial activity up to 72 hours
- Removes exudate and debris, leading to effective wound bed preparation/de-sloughing
- Color change from brown to yellow/gray indicates the dressing should be changed
- Do not use continuously for more than three months; If needed, recommended to consult with PCP.

Contraindication:

- Iodine allergy/sensitivity
- In patients with Hashimoto's Thyroiditis or patients with a history of Grave's Disease or non-toxic nodular goiter due to alteration in thyroid metabolism with long term use.
- Do not use during pregnancy or lactating women as iodine is absorbed systemically which can affect fetal thyroid level and increase risk of developmental delay.

24

Calcium Alginate

- The calcium ions in the dressing interact with the sodium ions in the fluid of the wound. This reaction makes the fiber in the dressing to swell and partially dissolve into a gel which maintains a moist environment for optimal wound healing
- Prevent the wound from drying out; helps maintain a moist environment
- Designed to manage moderate to high volumes of exudate
- Change the bandage once every 5-7 days or when exudate leaks from the edges or into the secondary bandage
- When removing the alginate dressing, use saline to dampen it first and avoid damage to the wound bed/granulation tissue
- Do not use on dry wounds

25

Cutimed Sorbact

- Effective in the cleansing of unclean, colonized and infected wounds
- Irreversibly binds and inactivates wound pathogens, creates optimum conditions for the natural wound healing process
- It does not contain antiseptic agents
- **Do not use** in combination with ointments and creams
- Disinfectants and antiseptic sprays/wash can reduce the efficacy of the dressing. Use water or normal saline instead.
- Dressing change every 2 to 5 days

Indication Use:

- Postoperative wounds and dehisced wounds
- Traumatic wounds
- Chronic wounds such as venous, arterial, diabetic, pressure ulcers
- Wounds following excision of abscesses
- Fungal infections.

26

PolyMem

- Indication for any wound type.
- Designed to facilitate healing, relieve pain during dressing change, control inflammation.
- Built-in cleansing capabilities minimize the need for manual wound bed cleansing during dressing changes. Promotes wound cleaning & autolytic debridement. Contains glycerin to soothe traumatized tissues, reducing wound pain.
- Built-in visual indication of when dressings need to be changed.
- For effective wound healing, use the dressing to cover the wound area and peri wound area.
- Note that – significant increase in wound fluid on the dressing can be observed during first few days. Indication that the dressing is working.
- Can remain in place for **7 days**; unless fluid reaches the dressing margins.
- To easily remove dressing, use pull and stretch technique.

27

Xeroform Petrolatum Gauze Dressing

- Non adherent petrolatum; often used for skin grafts sites, treatment of first-degree burns, and abrasions.
- Can be used in dry superficial venous ulcer.
- Impregnated gauze will allow the hydration in the wound
- The bismuth component is bacteriostatic - prevents the growth of bacteria but doesn't kill it.
- Daily dressing change recommended

Duoderm Dressing

- Promotes granulation and facilitates autolytic debridement
- An outer film provides a waterproof barrier over the dressing. Foam layer is designed to provide both thermal and mechanical protection. A honeycomb matrix of hydrocolloid particles absorbs exudate to form a soft, moist gel which promotes wound healing.
- Use only on minor to moderate wounds
- Can be easily and gently molded into place
- Dressing change every 3 - 4 days but can be worn for up to 7 days unless leaking or signs of infection are present.

28

DO NOT USE TRIPLE ANTIBIOTIC FOR VENOUS ULCERS!

Triple Antibiotic

- Use only for superficial cuts
- Helps prevent infection in minor cuts, burns, and abrasions

29

Silver Nitrate Applicators

- Used for cauterization of skin and mucous membrane and for the removal of hypergranulation tissue, warts, rolled wound borders.
- Treats hypergranulation and maintains homeostasis
- Drip the stick into water to activate silver nitrate and roll/press the applicator on the affected area to burn the tissue.

30

Other Dressings

Non-Sterile Elastic Gauze Bandage

- provides comfort and compression for control of edema or bleeding.
- Fits in areas with constant movement

ABD Pads (Abdominal pads)

- Designed to provide high absorbency of wound exudate and help keep wounds dry; reduces risks of infection
- Seal off the wound area and help prevent moisture leakage by absorbing discharge into an inner core.
- ABD pads may be used as a primary wound contact layer dressing or as a secondary dressing on top of a primary dressing, such as alginate dressing in cases of heavy exudate or when extra absorption is required.
- The blue indicator line is to help with placement away from the wound site/face up (Blue to the sky)

31

SofSorb Dressing

- Can use be used in partial and full thickness wounds, tunneling wounds, wounds with heavy drainage, surgical wounds, heavily draining ulcers.
- Highly absorbent, five-layered, with a stay dry liner to prevent maceration of the periwound skin
- Absorbs moisture away from wound
- Protects wound sites from further trauma

SOFSORB 5 Layer Construction

- Non-adherent wound contact layer
- Stay-Dry Liner that permits passage of wound drainage to keep periwound skin dry and prevent maceration at wound site
- Center layer that absorbs wound drainage
- Cellulose layer that wicks drainage horizontally along pad to increase dressing absorption capacity
- Air-permeable backing for strength and durability

32

Compression

Pressure and Level of Support

- < 15 mmHg
  minimal support (asymptomatic pt, as needed for comfort)
- 15 – 20 mmHg
  Mild support (tired, aching legs, minor swelling)
- 20 – 30 mmHg
  Moderate support (moderate swelling, varicosities)
- 30- 40mmHg
  Firm support (severe swelling, post surgery, severe varicosities)
- > 40mg
  Extra Firm (chronic venous insufficiency)

33

Wraps & Compression

- Compression therapy is considered the gold standard of care for treating venous hypertension and venous ulceration.
- **Coban compression:**
- Use only 4-inch rolls
- Spiral wrap:
  - 50% overlap with 50% stretch
  - Start wrap from toe towards the knee. Ensure foot is dorsiflexed when wrapping the ankle area for adequate movement and compression.
- If new onset of pain, numbness, tingling, discoloration or swelling of their toes, advice to promptly remove the wrap
- Recommended to change dressing once or twice a week, if possible

34

Unna Boots:

- An impregnated gauze wrap that is soaked with a zinc oxide paste. The zinc oxide paste helps ease skin irritation and keep the area moist.
- Provides high-pressure compression during muscle contraction and low-pressure compression at rest
- The wrap dries a few hours after application. Avoid long distances walk until the Unna Boot is dry (3-4 hours)
- 2 main functions that help wounds heal
  - The compression helps reduce swelling
  - Medicated cream helps prevents drying.
    - Zinc is good for moist wound vs calamine is good for non-ulcerated legs with pruritis
- Dressing must be changed every 3 to 7 days, depending on the amount of drainage present.

35

Compression Socks

- Pt's can get up to 2 free pairs a year at NCH
- Measure
  - the biggest part of the calf
  - the ankle circumference
  - Heel to the back of the knee (optional)
- Match the measurement on the compression sock box.
- Rest the sock edge on the upper calf level. Do not pull/rest the sock behind the knees.

36

Therapeutic Compression: "WRAP"

Working Pressure	Reliable Application	Adaptability	Comfort
• Literature recommends > 40 mmHg to positively impact venous hemodynamics for venous insufficiency	• stays up, gives constant pressure • multilayer compression is better than single layer • Short stretch and stiffness (inelastic) profile will provide greater compression • Stiff compression : with low resting and high working	• Ensure pt is able to walk with wrap/compression • Provide good leg coverage • Patient-Specific compliance	• Eg: if the patient says its too tight, make sure to adjust the compression)

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WOUND CARE ORDER

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Wound care order

The first wound care assessment MUST be with a provider!

Once assessed by a provider, RNs can provide future wound care independently.

Every wound care visit should be billed to patient's insurance, including RN visits.

RNs should always check for standing order and release orders per wound care visit.

If there aren't any active wound care orders, please place a standing wound care order (10 visits) on patient's chart.

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- As of April 2022, always release or place an order for each wound care visit.
- The Nursing Leadership is updating the process for documentation, please refer to the most recent Wound Care Epic Guide for details.

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- Always use the Avatar, as this allows care team to compare wound healing process
- Let's watch a step-by-step epic documentation video!

Please note that: This process for documentation is current as of April 2022.

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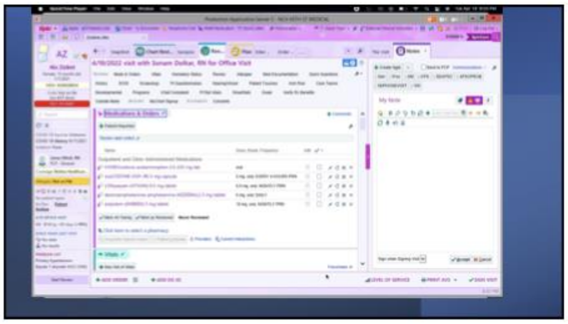

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When to refer?

- Non-healing wounds of over 30 days, with signs of poor response, with current topical treatment. Pt should be re-evaluated by their PCP and if needed, referred to a wound specialist.
- Non healing wounds with an underlying etiology of vascular compromise or diabetic neuropathy that may require further additional studies to uncover other contributing factors or means of correction. (Venous ultrasound/duplex, ankle brachial index etc.)
- Wounds that may be completely covered with brown or black necrotic tissue (eschar covered wound) that will require a surgical debridement to expose underlying damage and allow for extensive wound packing and treatment towards closure.
- Wounds requiring diagnostic procedures such as a deep tissue biopsy/culture to obtain additional diagnostic information to the cause of the wound (eg: malignancies, collagen/vascular).

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References

- [illegible]
- [illegible]
- https://www.racgp.org.au/clinical-resources/clinical-guidelines/handi/handi-interventions/procedures/compression-for-venous-leg-ulcers
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Appendix D

Wound Care Cheat Sheet

Wound Base Characteristic
- Necrotic or non-viable tissue
- Eschar (black dead scab tissue)
- Slough
- Fibrin
- Granulation tissue (red beefy appearance)
- Clean, non-granulating
- Epithelial
- Hypergranulation
- Crust (scab)

Exudate/Drainage
- Amount: scant, small, moderate, copious, thin etc.
- Type: serous, sanguineous, serosanguinous, purulent
- Color: yellow, tan, green etc.

Edges
- Attached or not
- Proliferative or not
- Closed or open
- Rolled (epibole)
- Regular or irregular

Measurement
- L x W x D (cm) OR L x W for wounds without depth
- Length (head to feet) = 12 to 6 o'clock
- Width = 9 to 3 o'clock
- Depth = deepest point in cm (document no depth if none)

Periwound Skin
- Moist or dry
- Warm or cool
- Erythematous or pale
- Any discoloration
- Scarring
- Lesions
- Hair distribution

Red Flags
- Acute infection: Increasing unilateral redness, swelling, pain, pus, heat, fever, chills
- Acute or chronic limb threatening ischemia
- Suspected DVT
- Suspected Skin cancer
- Suspected sepsis

Wound Cleaner:
- **Saf Cleans**: nonirritating, effective, no rinse required after use
- **Hibiclens**: wash the affected area with water/NS, apply a minimum amount of solution needed to cover the wound area and wash gently, then apply dressing as needed. Kills bacteria on contact and provides extended protection after use.

Dressing Choices:
- **Triple Abx:** Use only for superficial cuts. Do not use for venous ulcers
- **Medihoney:** Indicated for dry to moderately exuding wounds. Helps to liquefy non-viable. Dressing can be worn up to 7 days, depending on the level of exudate.
- **Iodosorb:** Not as effective on dry wounds. Provides antimicrobial activity for 72 hours. Contraindications: iodine allergy, thyroid disorders, pregnancy, or lactating women.
- **Calcium Alginate:** Do not use on dry wounds. Designed to manage moderate to high volume of exudate. Prevents wound from drying out & maintains a moist environment. Change dressing once every 5 -7 days or as needed. When removing the alginate dressing, use saline to dampen it first and avoid damage to the wound bed/granulation tissue.
- **Cutimed Sorbact:** Do not use in combination with ointments and creams. Disinfectants and antiseptic sprays/wash can reduce the efficacy of the dressing. Use water or normal saline instead. Dressing changes every 2 to 5 days.
- **PolyMem**: Indicated for any wound type. Designed to facilitates wound healing, controls inflammation, relieves pain during dressing change. Promotes autolytic debridement. Use dressing to cover the wound and peri-wound for optimal effectiveness. Dressing can remain in place for 7 days or as needed.
- **Xeroform Petrolatum**: Can be used in dry superficial venous ulcer. Provide hydration tot wound. Bacteriostatic - prevents new growth of bacteria but doesn't kill it. Daily dressing changes recommended.
- **Duoderm**: Use only on minor to moderate wound. Providers autolytic debridement. Recommended dressing changes every 3 – 4 days but can be used for7 days unless leaking or signs of infection is present.