STRATEGIES TO PREVENT AND MANAGE PERI WOUND SKIN COMPLICATIONS ASSOCIATED WITH COMPRESSION BANDAGES APPLICATION IN PATIENTS WITH VENOUS LEG ULCERS: AN INTEGRATIVE LITERATURE REVIEW

Submitted to the

Faculty of Liberty University

In partial fulfillment of

The requirements of the degree

Of Doctor Nursing Practice

By

Judith Plummer-Morgan

Liberty University

Lynchburg, VA

June 2023

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Scholarly Project Chair Approval:

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Cynthia Goodrich, EdD, MSN, RN, CNE June 23, 2023

ABSTRACT

Skin maceration, pressure injury, skin-stripping, as well as less common dermatological problems, are frequently noted in patients treated for venous ulcers with compression bandages. Ongoing issues with infection can lead to unwanted effects, including hospitalization and unexpected expenses. This integrative review was synthesized using Whittemore and Knafl's five-stage methodological framework. A systematic search was conducted through the following online databases: CINAHL, MEDLINE, PubMed, and ScienceDirect for articles available in English and available in full text. This integrative review aims to review, synthesize, and critique the current literature to determine what strategies have been implemented to prevent or manage dermatological problems of compression therapy in patients treated for venous ulcers with compression bandages at the wound care clinic. Compression therapy is the primary treatment for venous leg ulcers, but management will require a multidisciplinary approach. Intervention varies in reports but acknowledges several skin reactions occurring in venous insufficiency. The integrative review suggests there are implications for future research; new research should focus on recommendations for policy initiatives and the development of standardized assessment forms.

Keywords: Dermatologic difficulties, venous insufficiency, adverse events, skin barrier preparation, peri-ulcer skin, compression therapy complications.

Dedication

I would like to dedicate this degree to my husband Romie, whose encouragement has carried me through the last 32 years. I met Romie when I was 21 years old; he was 23 years old and already established and doing well in his career as an electrician. He's an entrepreneur at heart and welcomes any opportunity to experience an adventure. A year after we were married, I decided to go to nursing school, and to encourage me he bought me a new car to ensure I had no problems getting to and from school. Romie is a homebody and made sure our children had the attention of at least one parent. When I decided to go back to school to become a family nurse practitioner, he took every Thursday off from work to drive me two hours each way to and from school and sat in the lounge working on estimates until classes were dismissed. In 2019, he asked if I wasn't planning on completing my doctorate degree, and here, I am completing a dissertation. He tells everyone I am a doctor, so I have no option but to obtain this degree.

My mom and dad live across the street from me; however, Dad is no longer here. My mom ensured we had cooked meals at least six out of seven days weekly. She also helped care for my daughters and perform household chores.

My daughters Annistacia and Kianna, and Journi, my granddaughter, thanks for your love and understanding and for always assuring me that I will be okay because somehow, I always get through difficult times.

Acknowledgments

A big thank you to Dr. Cynthia Goodrich, mentor/chair, for her knowledge and guidance throughout the process of completing this Doctor of Nursing project.

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List of Abbreviations

CITI: The collaborative institutional training initiative

DNP: Doctor of Nursing Practice

PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analysis

RCT: Randomized controlled trial

VLUs: Venous leg ulcers

WCC: Wound care center

SECTION ONE: FORMULATING THE REVIEW QUESTION

Venus leg ulcers (VLUs) are common wound care conditions and account for more than half of the patients seen at the wound care center (WCC). Patients present for an evaluation of skin changes such as edema, weeping, and non-healing wounds on the leg between the knee and the ankle due to venous insufficiency and venous hypertension (Evans et al., 2019). VLUs are the most common type of lower extremity ulcers, diagnosed in 10 to 35% of adults with lower extremity skin changes, approximately 1% of the U.S. population. VLUs present a significant public health challenge, and they are prevalent among older persons and affect more females than males. VLUs complicates the care of patients with cardiovascular disease, diabetes mellitus, patients with deep vein thrombosis or phlebitis, obese patients, immobile patients, and those with congenital absence of veins. The pathophysiology of ulcers in the lower extremity is associated with sustained venous hypertension due to chronic venous insufficiency, including incompetent valves, failure of the calf muscle to pump, and reflux in the venous system. This condition prevents blood from returning efficiently from the leg to the heart, causing the pressure in the veins to rise. The prevalence of venous insufficiency increases with age, up to 3% in people older than 65 (Evans et al., 2019; Raffetto et al., 2020).

The prevalence and incidence of VLUs increase as the population ages; it is an ongoing medical condition that affects a large portion of the population and causes significant social and economic impact (Abbade et al., 2020). More than 6 million people in the United States develop edema and wounds requiring management in the health care system annually. VLU studies have reported the incidence and prevalence of the population in various settings ranging between 0.12% to 1.69% for prevalence, and 0.3% to 1.33% for incidents in at least three studies (Probst

et al., 2021). In the U.S., the estimated healthcare cost of treating persons with VLUs was 14.9 million at 2012 prices (Shi et al., 2021). Nonhealing venous leg ulcers remains a challenge, increasing morbidity and expenditure in therapeutic treatments (Evans et al., 2019). Cost and burden to the healthcare system are expected to rise dramatically due to an aging population (Kerr et al., 2020). Medical compression bandaging has been shown to be of great benefit in managing venous leg ulcers and is the primary management option for the non-invasive treatment of venous ulcers. Compression therapy helps to promote the closure of the ulcer. It is often a preferred therapeutic option by healthcare providers due to its relative ease of use, low cost, and effectiveness (Guest et al., 2017). However, there is increasing recognition of the significant number of complications and contraindications reported in the literature with compression bandage use. Peri-wound complications associated with compression bandage application can lead to delayed healing, pain, and increased cost.

The existing literature consistently confirms that the high incidence of VLUs and the frequency of care have placed a substantial financial burden on the patients and the U.S. healthcare system. Left untreated, VLUs can significantly negatively impact a person's quality of life and lead to amputation of the affected limb. The management of venous leg ulcers usually includes wearing compression bandages for weeks, and patients may experience a cycle of prolonged healing and recurrence (Dini et al., 2020; Lee et al., 2015). Compression bandages are an effective treatment for VLUs, as they reduce edema, increase venous return, and control inflammation around the wound. Although compression therapy is a central component of healing VLUs, skin problems such as irritation, infection, pressure ulcers, and discomfort frequently develop. A relationship between the use of compression application and adverse skin reactions has been confirmed in multiple studies. Compression therapy is accepted as an essential

factor in successfully managing a patient with VLUs and other conditions. The relationship between the development of surrounding skin conditions and the use of compression must be considered and is the central component to determining the best practice for the clinical management of the patient population (Andriessen et al., 2017, Rabe et al., 2020). This integrative review aims to review evidence from the literature on the various dermatological side effects associated with compression bandages when used for treating VLUs to determine what strategies have been implemented to prevent or manage surrounding skin dermatological problems with the application of compression therapy in patients treated for venous ulcers.

Essentials of the Doctoral Education for Advanced Nursing Practice

Zaccagnini & Pechacek (2021) discusses that the Doctor of Nursing Practice program focuses on preparing graduates to translate new science, its application, and its evaluation in practice. In meeting the essentials, this review used only scientific evidence which fulfills the requirements for Essentials I, Scientific underpinning for practice. This integrative review will focus on improving outcomes for patient with venous leg ulcers which satisfy the requirement for Essential II, Organization and systems leadership for quality improvement and system thinking. To meet Essential III, Clinical scholarship and analytical methods for evidence-based practice; this review utilized peer-reviewed evidence-based research. Essentials VII, Clinical prevention, and population health will be met in preventing adverse events in the treatment of venous leg ulcers while decreasing the financial burden on the healthcare system and improve outcomes for patients.

Defining Concepts and Variables

For this integrative review, venous leg ulcers are defined as open lesions that occur on the lower leg between the knee and ankle joint that transpire in the presence of venous disease. Compression applications include several types of short and long-stretch elastic, multi-layer lite, two-, three- and four-layer bandages, and high-elastic bandages such as ACE and cobans self-adhesive.

Rationale For Conducting the Review

Patients treating venous leg ulcers with compression often develop skin maceration, pressure injury, or skin stripping, as well as less common dermatological problems in the unaffected areas of the extremity, especially in long-term use of compression. Patients are usually asked not to get the compression dressing wet between treatments. Patients report the inability to clean the extremity between treatments appropriately, and changes to the skin are often seen. A literature review was done as it is a means of appraising and analyzing research (Hopia et al., 2016). The author reviewed the literature to determine if the dermatological problems are associated with chronic venous insufficiency, whether the issues are due to the consistent compression pressure on the skin, or whether it is an allergy from the materials used in dressing the wounds. Identifying and implementing strategies to prevent and manage these skin complications is essential. A relationship between the use of compression application and adverse skin reactions has been suggested in multiple studies. It is vital to explore the evidence on such strategies and their effectiveness. The research question will guide the review.

Review Question

What strategies have been implemented to prevent or manage surrounding skin dermatological problems with the use of compression therapy in patients treated for venous ulcers?

Inclusion and Exclusion Criteria

A comprehensive literature search was performed based on formulated inclusion and exclusion criteria for peer-reviewed articles about treatment guidelines and recommendations on dermatological issues occurring in the peri-wound areas related to the use of compression therapy in patients with venous ulcers. A search was conducted for qualitative and quantitative research studies, systematic reviews, cohorts, and case studies published within the last 10 years, from 2013 to 2023. In addition, articles had to be available in English and available in full text. Articles that were not available in full text, older than 10 years, ongoing clinical trials, and those that were not peer-reviewed were excluded from the review. The following online databases were used: CINAHL, MEDLINE, PubMed, and ScienceDirect. Table 1 depicts the inclusion and exclusion criteria for this review.

Table 1

Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Original qualitative and quantitative research studies, systematic reviews, cohort, and case studies published within the last 10 years	Published before 2013
Articles about treatment guidelines and recommendations on dermatological issues related to the use of compression therapy in a patient with venous ulcers	The title of the article and the abstract was used in exclusion criteria.
Literature that are available in full text	Abstract only articles
Published peer-reviewed articles	Ongoing clinical trials and other studies that have not been published.
Articles available in English	Publications written in a foreign language

Inclusion and exclusion criteria for literature search

Conceptual Framework

The integrative review was conducted using Whittemore and Knafl's five-stage methodological framework to guide the review design. The integrative review aims to summarize what is known about the topic and communicate the literature synthesis to a targeted audience. For a review to be considered rigorous, a comprehensive method must be followed and reported, allowing readers to evaluate the reviewer's attempt to mitigate bias and, if desired, replicate the review, drawing a similar conclusion. (Toronto & Remington, 2020). According to Whittemore and Knafl, their five-stage methodological approach can include diverse data sources in the integrative review by presenting the state of the science, thereby developing a holistic understanding of the topic of interest. The five stages of the Whittemore and Knafl method are: (1) problem formulation stage, in which a general purpose and review question is clearly stated; (2) literature search, where an understandable and replicable search strategy is used to collect the data; (3) data evaluation, when the relevance of selected literature and mythological quality is appraised; (4) data analysis, where data is abstracted, compared, and synthesized; and (5) presentation stage, when an interpretation of the findings and implications of the research, practice, policy, as well as limitations of the review, is presented (Toronto & Remington, 2020). Because the integrative method allows for a combination of diverse methods, it has the potential to play an essential role in evidence-based practice in nursing, as it is widely used in nursing research (Hopia et al., 2016).

SECTION TWO: COMPREHENSIVE AND SYSTEMATIC SEARCH

Ensuring patients are provided with the best care through updated evidence-based practice guidelines and keeping providers abreast of best practices when using medical compression, a systematic search was conducted to provide a cohesive synthesis of peer-

reviewed scholarly publications. Using Whitmore and Knafl methods for integrative review, a diverse sampling of theoretical or empirical literature was used, addressing the clinical question, related to treatment guidelines, and recommendations on dermatological-related issues in the peri-wound areas in the use of compression therapy in patients with venous ulcers.

Search Organization Reporting Strategies

The search was conducted for original qualitative and quantitative research studies, systematic reviews, cohorts, and case studies published within the last 10 years, from 2013 to 2023. Articles had to be available in English and available in full text. Articles that were not available in full text, older than 10 years, had ongoing clinical trials, and those that were not peer-reviewed were excluded from the review. The following online databases available from the Jerry Falwell Library at Liberty University were used: CINAHL, MEDLINE, PubMed, and ScienceDirect. All included databases followed the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines. The PRISMA reporting guidelines help minimize reporting bias while increasing quality and transparency in writing systemic reviews (Toronto & Remington, 2020).

Terminology

The search terms that were used for the database search included the following: dermatological difficulties, adverse events, side effects, contraindication, risk, and complications. The words were cross-matched or combined with venous insufficiency, venous ulcers, and compression therapy to guarantee diversity in the search. The initial search yielded more the 6,000 results related to venous insufficiency and medical compression bandages. Due to the enormity of articles found along with duplicates, the PRISMA flow diagram (see Appendix B) was used to narrow the search for articles to use in the integrative review. Of the

6,012 articles initially found, a hand search of 78 full-text articles was selected based on the article's title and abstract. Many of the articles focused primarily on the treatment of venous ulcers with compression. Several mentioned adverse effects seen with compression bandages; others discussed skin reactions related to allergies and responses related to the disease process. Articles were further excluded if the content had insufficient data, ongoing clinical trials, and other studies that had not resulted. Once the articles were narrowed down, 18 articles were retained for the integrative review.

SECTION THREE: MANAGING THE COLLECTED DATA

This integrative review was conducted to synthesize empirical research to determine the best practice for treating venous leg ulcers (VLUs) to improve care and outcomes in the wound care clinic. Whittemore and Knafl's five-stage methodological framework guided the review design and disseminated the findings. The five stages of Whittemore and Knafl's method were followed to conduct the review, as follows: (1) problem formulation stage, in which a general purpose and review question were clearly stated; (2) literature search, where an understandable and replicable search strategy was used to collect the data; (3) data evaluation, when the relevance of selected literature and mythological quality was appraised; (4) data analysis, where, data were abstracted, compared, and synthesized; and (5) presentation, when an interpretation of the findings and implications of the research, practice, policy as well as limitations of the review were presented (Toronto & Remington, 2020).

Liberty University's Institutional Review Board granted an exempt status for the integrative literature review, as human participants were not involved in the research. The collaborative institutional training initiative (CITI) training was completed to comply with

research ethics and human subjects for protection and ensure quality measures were adhered to during the process.

SECTION FOUR: QUALITY APPRAISAL

As previously discussed, Whitmore and Knafl's method for integrative review was utilized to conduct the literature review. Theoretical literature on treating venous leg ulcers and complications due to compression applications was compiled and evaluated through computerized database searches. The databases were selected using nursing and allied health publications and medical databases.

A comprehensive search on the topic was conducted, and each article included was organized into a literature matrix using Melnyk's Levels of Evidence (see Appendix D). Each article was reviewed for study purpose, demographics, methods, results, strengths, limitations, and whether the evidence supported a change in practice.

Source of Bias

Since bias can occur at any stage of the research process, identifying the potential source of bias is an important step that should be reproducible and transparent (Toronto & Remington, 2020). Toronto and Remington listed common types of bias in studies to include the following: selection, measurement, attrition, performance, and publication bias.

Publication bias is the most significant source of potential bias in this study. It is estimated that 50% of all completed clinical trials are not published, significantly altering what is published. Professional journals often do not publish studies that are not significant based on the direction or strength of the outcome of interest. Likewise, authors may not want to devote time and resources to preparing manuscripts with adverse outcomes. Important data that may be included in grey literature is not included in computerized bibliographic databases, making

potentially important data challenging to find, which results in publication bias (Jull & Biggs, 2020). Compression therapy is the primary treatment for venous insufficiency for this integrative review, and contradiction in treatment may prevent patient compliance issues.

Internal Validity

Bias can compromise the validity of an integrative review. Internal Validity is enhanced when the results of studies are obtained using the appropriate scientific method (Toronto & Remington, 2020). Despite obtaining evidence using the appropriate scientific method, there is a risk of bias in the integrative review due to the selection of articles included in the review. This integrative review, however, provides various evidence-based practice strategies and recommendations to prevent and manage skin complications associated with compression therapy in patients with VLUs.

Appraisal Tools

The Melnyk Levels of Evidence appraisal tool (see Appendix D) was used in the literature matrix to assist the author with the articles' appraisal. This tool also supported the internal validity process used in this integrative review. The matrix required the author to identify and evaluate essential aspects of select studies to determine the following: study purpose, sample characteristics and demographics, methods, study results, levels of evidence, study limitations, and whether the evidence supported a change in practice. This integrative review included seven systematic reviews of Level I evidence, two Level II prospective studies, two cohort studies scored as Level IV evidence and eight qualitative studies scored as Level V evidence (Melnyk, 2016).

Applicability of Results

The Melnyk Levels of Evidence were used for this integrative review to evaluate the strength of the studies. The pyramid helps categorize and rank study methodologies from Level I to Level VII. Level I studies rank the highest on the pyramid and are more likely to be accurate and produce similar results if replicated. As stated previously, from the matrix, the reader can determine the following: study purpose, sample characteristics and demographics, methods, study results, levels of evidence, study limitations, and whether the evidence supports a change in practice (Melnyk, 2016).

Reporting Guidelines

The PRISMA reporting guidelines were created to minimize bias in reporting while increasing quality and transparency in reporting systemic reviews. It helps the reviewer to describe a minimum set of characteristics to report in a systemic review (Toronto & Remington, 2020).

SECTION FIVE: DATA ANALYSIS AND SYNTHESIS

Data Analysis Method

Toronto and Remington (2020) noted that the synthesis and data analysis portion would be challenging in an integrated review. The process and methods used to guide reviewers through the data analysis stage are underdeveloped. However, it is crucial to understand that the primary goal of the integrative review is to better understand the topic of interest through synthesizing diverse sources. For this integrative review, the author wanted to have a better understanding of what is causing the dermatological issues to the surrounding skin seen in a patient after applying compression bandages and what strategies are available to prevent or manage the problems.

"Adherence to the systemic approaches during the data analysis stage of the integrative review process was essential to mitigating potential bias or error in interpretation" (Toronto &Remington, 2020). During the data analysis stage of the integrative review, the four-phase constant comparison method was used as follows: data reduction, data display, data comparison, and conclusion drawing and verification. Data reduction refers to the process of selecting and organizing data from primary sources. Data display involves compressing extracted data from individual sources into a display format to facilitate conclusion drawing. Data comparison allows for the examination of the display data to identify patterns, relationships, or themes in the literature. The conclusion displays the results of the review, and verification may help confirm the truthfulness of the conclusion. It may also confirm identifying patterns, relationships, and themes (Toronto & Remington, 2020).

Descriptive Results

Articles selected for this integrative review represent current treatments and interventions in managing dermatological issues from the use of medical compression applications in patients with venous insufficiency. The study includes 18 articles, which are summarized in Appendix A. The literature review represents multiple levels of evidence. Seven articles were from systematic reviews, Level I evidence; two were Level II prospective studies; two were from cohort studies, Level IV evidence; and eight were qualitative studies, Level V evidence (Melnyk, 2016).

Synthesis

The key findings of this integrative review regarding VLUs captured the depth and breadth of the current intervention and best practice for the appropriate use of medical compression therapy in patients presenting with ulcers. The themes noted in the review suggest there are implications for future research, recommendations for policy initiatives, and

methodological limitations. The type of intervention varies in the studies reviewed; however, each acknowledges several skin reactions occurring in the treatment of venous insufficiency.

Skin Irritants

Alavi et al. (2021) conducted a systematic review on contact dermatitis, a type of skin inflammation that occurs from exposure to irritants and allergens. Allergic contact dermatitis and irritant contact dermatitis are not often acknowledged. Still, they should be an important consideration in the treatment of leg wounds, as constant exposure of skin to substances, including chemicals or physical irritants, can damage the skin barrier (Price et al., 2018). Dini et al. (2020) and Rai et al. (2018) noted wound exudate contains indigenous protein degrading enzymes that can damage intact skin, and repetitive wound care changes of adhesive material may strip away the peri-wound stratum corneum causing additional skin damage. With over 5,000 wound care products on the market, people with contact dermatitis need to be careful when choosing wound care products, as they may be composed of several potentially sensitizing allergens. Rabe et al. (2020) noted that allergic reactions to the material used in compression bandages are rare, as allergic components are usually avoided.

Contraindication for the Use of Compression

There is an absolute contraindication for the use of compression bandages in patients with pulmonary edema and peripheral arterial occlusive disease. There are conflicting recommendations on the relative contraindications for patients with conditions such as congestive heart failure and deep vein thrombosis being treated with compression (Andriessen et al., 2017).

Complementary Evaluation in the Treatment of VLUs

- Ankle-brachial index (ABI) is usually performed on the initial exam to rule out arterial disease. An ABI of less than 0.9 indicates arterial insufficiency, which may be influencing the onset of the ulcer; the patient should be referred to a vein specialist for further evaluation (Abbade et al., 2020).
- Ultrasonography is routinely used to evaluate VLUs for patterns and locations of limb vessel disorders. It identifies whether the venous disease is due to obstruction, reflux, or both (Abbade et al., 2020).
- Although minimally invasive, a skin biopsy can provide a differential diagnosis and guide a more precise wound treatment plan.

Prevention Strategies

Several studies have investigated the effectiveness of various interventions to prevent skin complications associated with compression therapy. One of the primary prevention strategies is selecting appropriate compression therapy materials that reduce the risk of skin complications (Darwin et al., 2021). In a systematic literature review conducted by Kankam et al. (2018), patients were assigned to either a two-layer or four-layer compression bandage. The authors found that the two-layer dressing was associated with significantly fewer skin complications like pressure injuries. Moreover, proper, and regular evaluations are essential to prevent skin damage. A systematic review conducted by Weller et al. (2016) noted that custom-made stockings were associated with a lower incidence of skin complications than standard-size stockings.

Another prevention strategy is to use protection agents, such as skin protectants and moisture barriers. In a prospective study, Westphal et al. (2019) evaluated the effectiveness of using a moisture barrier cream to protect the skin from the compression bandage's moist

environment. The results showed that the skin barrier function was better maintained in the intervention group than in the control group.

Management Strategies

If skin complications occur despite preventive measures, it is essential to identify effective management strategies. Patch testing is the gold standard to confirm suspected contact dermatitis. Other management strategies include the use of wound dressings, such as hydrocolloids, foam dressings, and alginates. An RCT conducted by Chamorro et al. (2019) evaluated the effectiveness of a hydrocolloid dressing in managing skin complications associated with compression therapy. The authors found that using hydrocolloids was associated with a quicker resolution of skin complications than standard wound dressings.

Another management strategy is to use topical treatments, such as corticosteroids and topical antibiotics, to manage skin infections and allergies. A systematic review conducted by Shi et al. (2021) evaluated the effectiveness of topical antibiotics in managing skin complications associated with compression therapy. The authors found that topical antibiotics were associated with a lower risk of skin infections.

In some cases, compression therapy may need to be temporarily or permanently discontinued to manage skin complications. A meta-review conducted by Patton et al. (2022) evaluated the effectiveness of temporary discontinuation of compression therapy in managing skin complications. The study found that temporary discontinuation of compression therapy was associated with a quicker resolution of skin complications than continued compression therapy.

The management will also require a multidisciplinary approach which may include appropriate diagnostic tests, patch testing to evaluate allergy to treatment material, close monitoring when implementing treatment, and referral to a specialist if healing is to occur.

Compression therapy is the primary treatment for venous ulcers, and providers must understand the pathophysiology of the disease. The patient must be screened for risk factors that would place them at risk for complications. Almost no data shows how compression influences peri-wound skin care, and one article suggested that removing compression bandages after noting dermatological changes and treating the wound would solve the issue (Rabe et al., 2020).

Ethical Consideration

Integrative reviews do not involve human participants; thus, the Institutional Review Board has authorized exempt status at Liberty University, and no approval was required. The researcher and the project chair completed the collaborative institutional training initiative (CITI) to comply with research ethics and ensure quality measures were adhered to during the process.

Timeline

Fall 2022/ NURS 947

Scholarly project planning

Met with a project chair as needed to discuss the project, the goals, and meeting deadlines.

Spring A 2023/NURS 948

Complete scholarly project proposal

Defend the proposal and obtain IRB approval for the project.

Met with a project chair as needed to discuss the project, the goals, and meeting deadlines.

Spring B 2023/NURS 949

Continue to work on expanding scholarly project.

Met with a project chair as needed to discuss the project and the goals.

Submit project to the editor.

Summer A 2023/NURS 950

Defend scholarly project.

Apply to Scholarly Crossing.

SECTION SIX: DISCUSSION

The findings of this integrative review provide evidence for various strategies to prevent and manage skin complications associated with compression therapy in patients with VLUs. The prevention strategies include selecting appropriate compression therapy materials, proper fitting, regular evaluations, and using protective agents. On the other hand, the management strategies include using wound dressings, topical treatments, and, in some cases, temporary or permanent discontinuation of compression therapy. However, further research is needed to determine the optimal combination of these strategies and to evaluate their effectiveness and feasibility in clinical practice.

Implication for Practice/Future Work

Intervention varies in reports but acknowledges several skin reactions occurring in venous insufficiency. The findings of this integrative review have several implications for clinical practice. Compression therapy is the primary treatment for venous ulcers, and providers must understand the pathophysiology of the disease. The patient must be screened for risk factors that would place them at risk for complications. Healthcare professionals need to ensure that compression therapy is appropriately selected, applied, fitted, and evaluated to reduce the risk of skin complications in patients with VLUs. They also need to implement preventive measures, such as using skin protection agents, and be aware of potential allergic reactions and other adverse effects. Moreover, clinicians must be mindful of the various management strategies, such as wound dressings and topical treatments, and use them appropriately to manage skin complications effectively. Finally, healthcare professionals need to balance the benefits and risks

of compression therapy and adjust the treatment plan as appropriate to achieve optimal outcomes.

VLU management often requires a multidisciplinary approach, including diagnostic tests, patch testing to evaluate allergy to treatment material, close monitoring when implementing treatment, and referral to a vascular specialist if healing is to occur.

There are almost no data available showing how compression influences peri-wound skin care. The review found similarities in the complications noted with the use of compression bandages and similar recommendations for skin care with the use of compression bandages. The reviewed studies also showed that with or without compression bandages, healing occurs in a large population sector.

This integrative review suggests there are implications for future research. New research should focus on recommendations for policy initiatives and the development of standardized assessment forms. Findings from the review provide essential insight for managing patients in practice.

Conclusion

This integrative review provides evidence for various strategies to prevent and manage skin complications associated with compression therapy in patients with VLUs. These strategies include a multidisciplinary approach, such as selecting appropriate compression therapy materials, proper fitting, regular evaluations, using protective agents, wound dressings, topical treatments, and temporary or permanent discontinuation of compression therapy. Implementing these strategies in clinical practice can reduce the risk of skin complications and improve patients' quality of life with VLUs. However, further research is needed to determine

the optimal combination of these strategies and evaluate their effectiveness and feasibility in clinical practice.

Dissemination

The finding of this integrative review will be published for evidence-based practice use for future scholarly projects. The information will be disseminated using a PowerPoint presentation applicable to patients treating VLUs in wound management facilities. The findings will also be reported to the author's place of work for implementation in practice, supporting improved outcomes in patients with VLUs.

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Kankam, H. K., Lim, C. S., Fiorentino, F., Davies, A. H., & Gohel, M. S. (2018). A summation analysis of compliance and complications of compression hosiery for patients with chronic venous disease or post-thrombotic syndrome. *European Journal of Vascular and Endovascular Surgery*, *55*(3), 406–416. https://doi.org/10.1016/j.ejvs.2017.11.025

Kerr, J., Devane, D., Ivory, J., Weller, C., & Gethin, G. (2020). Effectiveness of implementation strategies for venous leg ulcer guidelines: A systematic review. *Journal of Tissue Viability, 29*(3), 161–168. https://doi.org/10.1016/j.jtv.2020.03.002

Lee, A. J., Robertson, L. A., Boghossian, S. M., Allan, P. L., Ruckley, C., Fowkes, F. R., & Evans, C. J. (2015). The Edinburgh vein study showed the general population's progression of varicose veins and chronic venous insufficiency. *Journal of Vascular Surgery: Venous and Lymphatic Disorders*, *3*(1), 18–26. https://doi.org/10.1016/j.jvsv.2014.09.008

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Rai, R., Shenoy, M. M., Viswanath, V., Sarma, N., Majid, I., & Dogra, S. (2018). Contact sensitivity in patients with venous leg ulcer: A multi-centric Indian study. *International Wound Journal*, *15*(4), 618–622. https://doi.org/10.1111/iwj.12905

Shi, C., Dumville, J. C., Cullum, N., Connaughton, E., & Norman, G. (2021). Compression bandages or stockings versus no compression for treating venous leg ulcers. *Cochrane Database of Systematic Reviews*, *2021*(7). https://doi.org/10.1002/14651858.cd013397.pub2

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Westphal, T., Konschake, W., Haase, H., Vollmer, M., Jünger, M., & Riebe, H. (2019). Medical compression stockings on the skin moisture in patients with chronic venous disease. *Vasa*, *48*(6), 502–508. https://doi.org/10.1024/0301-1526/a000812

Appendix A

Evidence Table

Name: Judith Plummer-Morgan

Clinical Question: What strategies have been implemented to prevent or manage surrounding skin dermatological problems with the use of compression therapy in patients treated for venous ulcers?

Article Title, Author, etc. (Current APA Format)	**Study Purpose**	**Sample (Characteristics of the Sample: Demographics, etc.)**	**Methods**	**Study Results**	**Level of Evidence (Use Melnyk Framework)**	**Study Limitations**	**Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.**
Article 1 Abbade, L., Frade, M., Pegas, J., Dadalti-Granja, P., Garcia, L., Bueno Filho, R., & Parenti, C. (2020). Consensus on diagnosing and managing chronic leg ulcers. *Brazilian Dermatology Society. Anais Brasileiros de Dermatologia, 95*, 1–	Experts were gathered to review the specialized literature to prepare the recommendation for a diagnosis and treatment of the main types of chronic leg ulcer	The Brazilian dermatology society selected seven experts from six university centers with extensive experience in treating chronic leg ulcers to reach a consensus on diagnosing and	Systematic literature review	The consensus addressed the diagnostic and therapeutic management of the most common causes of chronic leg ulcers based on scientific evidence and experience	Level 1: Systematic review	Limitations were not addressed. The consensus was defined as approved by at least 70% of the members	Yes, understanding how to diagnose and manage chronic venous ulcers is essential.

Article Title, Author, etc. **(Current APA Format)**	**Study Purpose**	**Sample (Characteristics of the Sample: Demographics, etc.)**	**Methods**	**Study Results**	**Level of Evidence (Use Melnyk Framework)**	**Study Limitations**	**Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.**
18. https://doi.org/10.1016/j.abd.2020.06.002		therapeutic managing chronic ulcers.					
Article 2 Alavi, A., Goldenberg, A., Jacob, S., Shelley, A., & Kirsner, R. S. (2021). Contact dermatitis: An important consideration in leg ulcers. International Journal of Women's Dermatology, 7(3), 298–303. https://doi.org/10.1016/j.ijwd.2020.12.010	The paper reviewed contact dermatitis caused by standard wound care products, how to differentiate allergic contact dermatitis from irritant contact dermatitis, and how to identify the specific allergen through patch testing.	A systematic review of the literature was performed using ScienceDirect, Scopus, PubMed, and Cochrane library	A systemic literature review	Even with sensitization testing providing wound carefree of identified allergens can still be challenging because some care products lack detailed information on their actual components	Level 1: Systematic review	A full review of various treatment options was beyond the paper's scope.	Yes, a general treatment algorithm for contact dermatitis was provided.

Article Title, Author, etc. **(Current APA Format)**	**Study Purpose**	**Sample (Characteristics of the Sample: Demographics, etc.)**	**Methods**	**Study Results**	**Level of Evidence (Use Melnyk Framework)**	**Study Limitations**	**Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.**
Article 3 Andriessen, A., Apelqvist, J., Mosti, G., Partsch, H., Gonska, C., & Abel, M. (2017). Compression therapy for venous leg ulcers: Risk factors for adverse events and complications, contraindications - A review of present guidelines. Journal of the European Academy of Dermatology and Venereology, 31(9), 1562–1568. https://doi.org/10.1111/jdv.1439	To identify and optimize prevention, treatment, and maintenance approach to compression application recognizing risk factors and contraindications when applying compression therapy.	A systematic review of randomized controlled studies, meta-analyses, systematic reviews, and well-designed cohort studies was carried out on the current venous leg ulcer prevention, maintenance, and management guidelines.	Systematic literature review.	The review suggests management of venous ulcers is a complex evidence-based guideline needed to inform clinicians on risk factors and adverse effects; complications can almost always be prevented when adequate assessment is performed.	Level 1: Systematic review	The literature notes a lack of clarity on risk factors, adverse events, contraindications, and complications when applying compression therapy for venous ulcers.	Yes, the reviews suggest the complications of compression may be prevented when adequate assessment is performed.

Article Title, Author, etc. **(Current APA Format)**	**Study Purpose**	**Sample (Characteristics of the Sample: Demographics, etc.)**	**Methods**	**Study Results**	**Level of Evidence (Use Melnyk Framework)**	**Study Limitations**	**Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.**
Article 4 Darwin, E., Liu, G., Kirsner, R. S., & Lev-Tov, H. (2021). Examining risk factors and preventive treatments for first venous leg ulceration: A cohort study. *Journal of the American Academy of Dermatology*, *84*(1), 76–85. https://doi.org/10.1016/j.jaad.2019.12.046	This study's objective is to investigate factors associated with the development of venous ulceration	Longitudinal data from a previously validated commercial database. The study compares comorbidities in patients with venous insufficiency who developed their first ulceration episode versus those who did not. The study population included 657,837 patients aged 64 years or younger who had been in the	Retrospective cohort study.	Despite the prevalence of venous insufficiency, only a minority of the patient with venous insufficiency develop venous leg ulcers	Level 4: a cohort study	The risks of misclassification due to the international classification of disease codes and the possibility of non-inclusion in the data sets of a patient with mild cases of venous insufficiency.	Yes, it is crucial to understand the risk factor for developing venous insufficiency

Article Title, Author, etc. **(Current APA Format)**	**Study Purpose**	**Sample (Characteristics of the Sample: Demographics, etc.)**	**Methods**	**Study Results**	**Level of Evidence (Use Melnyk Framework)**	**Study Limitations**	**Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.**
		system for at least three months before the venous insufficiency diagnosis.					
Article 5 Dini, V., Janowska, A., Oranges, T., De Pascalis, A., Iannone, M., & Romanelli, M. (2020). Surrounding skin management in venous leg ulcers: A systematic review. *Journal of Tissue Viability*, *29*(3), 169–175. https://doi.org/10.1016/j.jtv.2020.02.004	The study examines the surrounding skin management in patients treating venous ulcers.	Forty-eight articles were used to perform a systematic review of the literature. The search included the Scopus database, PubMed database, and Cochrane Library for studies on the surrounding skin in a	Systematic literature review	The study found that assessing and carefully monitoring the skin's health status surrounding the wound will be necessary during the treatment.	Level 5: a qualitative study.	Although there is an emphasis on treating the surrounding skin and managing moisture balance, no data is available regarding the influence of peri-ulcer skin care on wound healing.	Yes, the review found a correlation between essential moisture balance in promoting wound healing.

Article Title, Author, etc. **(Current APA Format)**	**Study Purpose**	**Sample (Characteristics of the Sample: Demographics, etc.)**	**Methods**	**Study Results**	**Level of Evidence (Use Melnyk Framework)**	**Study Limitations**	**Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.**
		patient with a venous ulcer.					
Article 6 Guest, J. F., Fuller, G. W., & Vowden, P. (2017). Venous leg ulcer management in clinical practice in the UK: Costs and outcomes. *International Wound Journal*, *15*(1), 29–37. https://doi.org/10.1111/iwj.12814	The study aims to estimate the pattern of care and annual levels of healthcare resources used by managers in venous ulcer care in the U.K. National Health Services	Five hundred-five patient records were analyzed from the health improvement network database. Characteristics of the patient wound-related health outcomes and healthcare resources were quantified. The total cost of the U.K. National Health Services for managing the wounds was estimated at	A Retrospective cohort study	The study provided important information for managing venous ulcers in clinical practice and the best estimate to inform policy and budgetary decisions.	Level 4: a cohort study	There were advantages and disadvantages of using patient records for health economics studies in wound care. From the records found in the thin database, they were uncertainty in the wound sizes and the inconsistencies between wounds treated with and without compression systems	The study provided significant insight into numerous aspects of managing venous leg ulcers. It also provided estimates of the cost of managing venous leg ulcers, which will be helpful in policy and budgetary decisions.

Article Title, Author, etc. **(Current APA Format)**	**Study Purpose**	**Sample (Characteristics of the Sample: Demographics, etc.)**	**Methods**	**Study Results**	**Level of Evidence (Use Melnyk Framework)**	**Study Limitations**	**Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.**
		2015/2016 prices					
Article 7 Jull, A., & Biggs, R. (2020). Adverse event reporting and trial registration in venous leg ulcer trials published since the 2001 consort statement revision: A systematic review. *Journal of Tissue Viability*, *29*(3), 155–160. https://doi.org/10.1016/j.jtv.2019.09.005	The study aims to quantify and explore compliance with adverse event reporting and trial registration in randomized control trials that report interventions for treating venous leg ulceration.	A literature search of Embase, Medline, CINAHL, and Cochran Control Trials registers for studies between 2001 and 2017 evaluating interventions in the venous leg ulcer population.	A systematic review of 204 trials	Adverse event reporting in venous leg ulcer trials is variable; approximately one-third of clinical trials do not report adverse events.	Level 5: a qualitative study	Only English language reports were included. They did not search the trial register to determine registration but relied on inclusion in the public journal as required by the consort statement.	Yes, the review shows the extent to which venous leg ulcer randomized control trials and journal publishing fails to comply with a call for registration of trials.

Article Title, Author, etc. **(Current APA Format)**	**Study Purpose**	**Sample (Characteristics of the Sample: Demographics, etc.)**	**Methods**	**Study Results**	**Level of Evidence (Use Melnyk Framework)**	**Study Limitations**	**Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.**
Article 8 Kankam, H. K., Lim, C. S., Fiorentino, F., Davies, A. H., & Gohel, M. S. (2018). A summation analysis of compliance and complications of compression hosiery for patients with chronic venous disease or post-thrombotic syndrome. *European Journal of Vascular and Endovascular Surgery*, *55*(3), 406–416. https://doi.org/10.1016/j.ejvs.2017.11.025	The study aims to investigate compliance and complication of compression therapy in patients with chronic venous and post-thrombotic syndrome	A literature search of Medline, EMBASE, and CINAHL for Studies evaluating compression stocking use in patients with chronic venous disease or prevention or treatment of the post-thrombotic syndrome. 4303 articles were retrieved, and 58 were included in the review	Systematic literature review	A study found clinical benefits for compression stockings in both groups. Compliance is only reported in 2/3 of patients with chronic vascular disease or post-thrombotic syndrome. Treatment with what lower degree of compression had greater compliance rates	Level 1: Systematic review	The study was limited to English language articles and human studies.	Yes, findings have important implications for clinical practices, as compression therapy is the most common treatment for venous disease patients.

Article Title, Author, etc. **(Current APA Format)**	**Study Purpose**	**Sample (Characteristics of the Sample: Demographics, etc.)**	**Methods**	**Study Results**	**Level of Evidence (Use Melnyk Framework)**	**Study Limitations**	**Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.**
Article 9 Kerr, J., Devane, D., Ivory, J., Weller, C., & Gethin, G. (2020). Effectiveness of implementation strategies for venous leg ulcer guidelines: A systematic review. *Journal of Tissue Viability*, *29*(3), 161–168. https://doi.org/10.1016/j.jtv.2020.03.002	This study aims to identify the most effective strategies to implement the clinical practice guidelines for managing venous leg ulcers by healthcare professionals in the hospital and outpatient settings.	The PICO framework was used to develop a well-formulated clinical question that examined the implementation of clinical guideline practice to influence clinicians.	A systematic review of 142 Studies	The study did not identify one implementation strategy that is better than the other to facilitate venous leg ulcer clinical practice guidelines in healthcare settings.	Level 5: a qualitative study	Inclusion criteria for the study were restricted to RCT, non-RCT, and interrupted time series control before and after the study, limiting their study design.	Yes, the finding will be helpful in the outpatient community setting

Article Title, Author, etc. **(Current APA Format)**	**Study Purpose**	**Sample (Characteristics of the Sample: Demographics, etc.)**	**Methods**	**Study Results**	**Level of Evidence (Use Melnyk Framework)**	**Study Limitations**	**Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.**
Article 10 Lee, A. J., Robertson, L. A., Boghossian, S. M., Allan, P. L., Ruckley, C., Fowkes, F. R., & Evans, C. J. (2015). The Edinburgh vein study showed the general population's progression of varicose veins and chronic venous insufficiency. *Journal of Vascular Surgery: Venous and Lymphatic Disorders*, *3*(1), 18–26. https://doi.org/10.1016/j.jvsv.2014.09.008	The study aimed to describe the progression of varicose veins and chronic venous insufficiency in the general population to identify important lifestyle and clinical prognostic factors that will determine the relationship between venous reflux and disease progression	The Edinburgh vein study is a population-based cohort study; 1566 adults aged 18 to 64 were randomly selected from the public and examined. Questionnaire of lifestyle and clinical factors, assessment, and duplex scan to detect venous reflux in eight leg segments. Follow-up was done 13 years later to ascertain progression	A cohort study	The study showed that more than half of patients with chronic venous disease progressed over the 13 years longitudinal study. Almost one-third of the patient with varicose veins develops chronic venous insufficiency skin changes, putting them at risk for ulceration.	Level 4a: cohort study	At baseline, participants were more likely to be female, older, and from affluent areas than nonparticipants, which caused a bias. Analysis was restricted to the clinical observe progression	Yes, conditions such as varicose veins and a history of deep vein thrombosis are conditions that should alert clinicians in decision-making about preventative measures

Article Title, Author, etc. **(Current APA Format)**	**Study Purpose**	**Sample (Characteristics of the Sample: Demographics, etc.)**	**Methods**	**Study Results**	**Level of Evidence (Use Melnyk Framework)**	**Study Limitations**	**Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.**
		and reclassify the disease					
Article 11 Patton, D., Avsar, P., Sayeh, A., Budri, A., O'Connor, T., Walsh, S., Nugent, L., Harkin, D., O'Brien, N., Cayce, J., Corcoran, M., Gaztambide, M., & Moore, Z. (2022). A meta-review of the impact of compression therapy on venous leg ulcer healing. *International Wound Journal*. https://doi.org/10.1111/iwj.1389	The study aimed to appraise and synthesize findings from an existing systematic review that measures the impact of compression therapy on venous leg ulcer healing	Five databases were researched to identify potential papers; three authors extracted data, and a fort author adjudicated the findings. 12 systematic public reviews were included, and the type of therapy was reviewed	Systematic review.	The study found a statistically significant difference in healing rates of venous ulcers when compression is used compared to no compression. The study did not conclude which compression system represents the most effective for healing venous leg ulcers	Level 1: Systematic review	Evidence from the primary outcome of the meta-review was downgraded due to the high risk of bias because of performance and detection bias.	Yes, the meta-review showed that there was moderate certainty evidence of the effect of compression therapy used to treat venous ulcers

Article Title, Author, etc. **(Current APA Format)**	**Study Purpose**	**Sample (Characteristics of the Sample: Demographics, etc.)**	**Methods**	**Study Results**	**Level of Evidence (Use Melnyk Framework)**	**Study Limitations**	**Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.**
Article 12 Price, A., Stone, N. M., & Harding, K. G. (2018). An unusual presentation of a common condition: Allergic contact dermatitis. *International Wound Journal*, *15*(4), 645–648. https://doi.org/10.1111/iwj.12908	The study aims to raise awareness of unusual presentations of allergic contact dermatitis in patients with venous leg ulcers as a possible contributor to non-healing.	This is a case study of a 50-year-old woman with a 15-year history of non-healing venous ulcers.	Case study	The case demonstrated the importance of regular reassessment and ensuring the correct underlying diagnosis and contributing factors.	Level 5: a case study	Non-listed, but this is a case study limited to one person.	Yes, patients do not always have the typical features of allergic contact dermatitis.

Article Title, Author, etc. **(Current APA Format)**	**Study Purpose**	**Sample (Characteristics of the Sample: Demographics, etc.)**	**Methods**	**Study Results**	**Level of Evidence (Use Melnyk Framework)**	**Study Limitations**	**Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.**
Article 13 Rabe, E., Partsch, H., Morrison, N., Meissner, M. H., Mosti, G., Lattimer, C. R., Carpentier, P. H., Gaillard, S., Jünger, M., Urbanek, T., Hafner, J., Patel, M., Wu, S., Caprini, J., Lurie, F., & Hirsch, T. (2020). Risks and contraindications of medical compression treatment – A critical reappraisal. An international consensus statement. Phlebology: The Journal of Venous Disease, 35(7), 447–460. https://doi.org/10.	The consensus aimed to review the available literature, critically appraise reported side effects associated with compression therapy, and provide recommendations on the risk of medical compression and any contraindications.	A consensus panel of 15 international experts with experience in compression therapy performed a critical review of publications on medical compression therapy reporting adverse events and formulated their recommendations.	Systematic literature review.	The consensus found dry skin and itching are the most frequently reported adverse event related to compression use. Compression therapy-associated adverse events are rare when compression is used correctly and contraindications are considered.	Level 5: a qualitative study.	The paper only reviewed minor complications associated with the use of compression bandages	Yes, multiple recommendations were provided for treating several common conditions related to compression use.

Article Title, Author, etc. **(Current APA Format)**	**Study Purpose**	**Sample (Characteristics of the Sample: Demographics, etc.)**	**Methods**	**Study Results**	**Level of Evidence (Use Melnyk Framework)**	**Study Limitations**	**Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.**
1177/0268355520909066							
Article 14 Raffetto, J. D., Ligi, D., Maniscalco, R., Khalil, R. A., & Mannello, F. (2020). Why venous leg ulcers have difficulty healing: Overview on pathophysiology, clinical consequences, and treatment. *Journal of Clinical Medicine*, *10*(1), 29. https://doi.org/10.3390/jcm10010029	The study explores the progression of a chronic venous leg ulcer into an actual venous leg ulcer from a patient perspective.	The study uses semi-structured interviews among male and female patients with venous leg ulcers. Patients include primary and secondary care patients with first and recurrent leg ulcers. Patients were of all ages. 13 patients enrolled, and 11 completed the study	A Quantitative study	Before developing a venous leg ulcer, the patient had a reduction in mobility because of comorbidity and work and lifestyle. The patient did not recognize symptoms or realize the chronicity of venous leg ulcers	Level 5: a qualitative study	None listed	Yes, healthcare providers should be aware of the reduction in mobility and knowledge deficit and patients with chronic venous ulcer

Article Title, Author, etc. **(Current APA Format)**	**Study Purpose**	**Sample (Characteristics of the Sample: Demographics, etc.)**	**Methods**	**Study Results**	**Level of Evidence (Use Melnyk Framework)**	**Study Limitations**	**Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.**
Article 15 Rai, R., Shenoy, M. M., Viswanath, V., Sarma, N., Majid, I., & Dogra, S. (2018). Contact sensitivity in patients with venous leg ulcer: A multi-centric Indian study. *International Wound Journal*, *15*(4), 618–622. https://doi.org/10.1111/iwj.12905	To study the pattern of contacts sensitization in a patient with chronic venous leg using a series of special patch test	A prospective multicenter cross-sectional study was conducted on 172 subjects in six centers across India. One hundred forty-two males and 30 females.	A Prospective multicenter cross-sectional study	The study found a high frequency of allergic sensitization to various ingredients of topical therapies used to manage venous ulcers, which may interfere with wound healing.	Level 2: a prospective study	A control group of healthy volunteers was not considered to avoid patch-testing discomfort.	Yes, 83 of the 172 participants have relayed allergic reactions to the product that are used to treat

Article Title, Author, etc. **(Current APA Format)**	**Study Purpose**	**Sample (Characteristics of the Sample: Demographics, etc.)**	**Methods**	**Study Results**	**Level of Evidence (Use Melnyk Framework)**	**Study Limitations**	**Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.**
Article 16 Shi, C., Dumville, J. C., Cullum, N., Connaughton, E., & Norman, G. (2021). Compression bandages or stockings versus no compression for treating venous leg ulcers. *Cochrane Database of Systematic Reviews*, *2021*(7). https://doi.org/10.1002/14651858.cd013397.pub2	To assess the effect of compression stockings or bandages compared with no compression on the healing of venous ulcers.	Fourteen studies with a total of 1391 participants. Most of the studies were a small-medium sample size of 51 participants recruited from acute care, outpatient, and community settings with confirmed history or clinical evidence of venous disease.	Systematic literature review.	Compression bandages and stockings in patients with venous ulcer experience complete wound healing faster, but there is uncertainty about the adverse effects, but the devices did help with pain	Level 1: Evidence from a systematic review	Most of the studies were small and had sub-optimal RCT designs	Yes, the study reviewed the findings from the 14 studies, with valuable treatment guidelines

Article Title, Author, etc. **(Current APA Format)**	**Study Purpose**	**Sample (Characteristics of the Sample: Demographics, etc.)**	**Methods**	**Study Results**	**Level of Evidence (Use Melnyk Framework)**	**Study Limitations**	**Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.**
Article 17 Weller, C. D., Buchbinder, R., & Johnston, R. V. (2016). Interventions for helping people adhere to compression treatments for venous leg ulceration. *Cochrane Database of Systematic Reviews*, *2016*(3). https://doi.org/10.1002/14651858.cd008378.pub3	The study assesses the benefits and harm of intervention designed to help people adhere to compression therapy to treat venous ulcers to improve healing and prevent reoccurrence.	Standard databases and trial registries were searched. The literature review included randomized controlled trials of intervention to help people with venous leg ulcer adherence	A systematic review	The authors did not find any studies that investigated interventions to promote adherence to compression therapy	Level 1: Systematic review	The study was at risk for performance, selection, detection, and attrition biases due to poor reporting.	Yes, there's a lack of clinical trials or intervention That promotes adherence to compression therapy in treating venous ulcers.

Article Title, Author, etc. **(Current APA Format)**	**Study Purpose**	**Sample (Characteristics of the Sample: Demographics, etc.)**	**Methods**	**Study Results**	**Level of Evidence (Use Melnyk Framework)**	**Study Limitations**	**Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.**
Article 18 Westphal, T., Konschake, W., Haase, H., Vollmer, M., Jünger, M., & Riebe, H. (2019). Medical compression stockings on the skin moisture in patients with chronic venous disease. *Vasa*, *48*(6), 502–508. https://doi.org/10.1024/0301-1526/a000812	The study was carried out to examine if skin desiccation can be avoided with medical compression system with integrated skin care and patient with chronic venous insufficiency.	The study was conducted at the Department of Dermatology at the University of Medicine Greifswald, Germany. Fifty subjects with chronic venous insufficiency were included in the study. Half of the recruited patients receive conventional medical compression stockings, and the other half receive medical	Prospective, Randomized, controlled trial	In male patients with dry skin and patients with higher stages of chronic venous insufficiency such as edema and varices would benefit from medical compression stocking with skincare fiber extracted from cotton, cellulose, lipid skincare complex	Level 2 Prospective study	The sample size was small. Trans epidermal water loss, increase in air temperature leads to sweating and increase in surface tension temperature	Yes, impairments of skin hydration by wearing conventional compression stockings impair quality of life and decrease compliance.

Article Title, Author, etc. **(Current APA Format)**	**Study Purpose**	**Sample (Characteristics of the Sample: Demographics, etc.)**	**Methods**	**Study Results**	**Level of Evidence (Use Melnyk Framework)**	**Study Limitations**	**Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.**
		compression stockings with integrative skin care to compare parallel groups.					

Appendix B

Prisma Flow Diagram

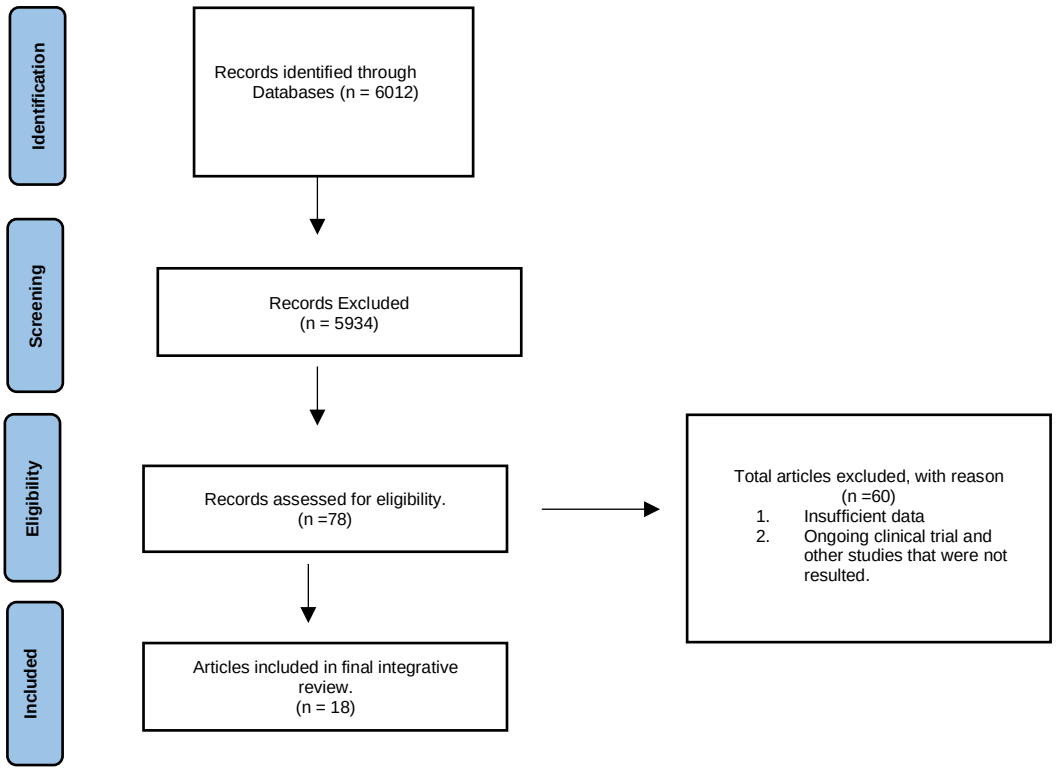
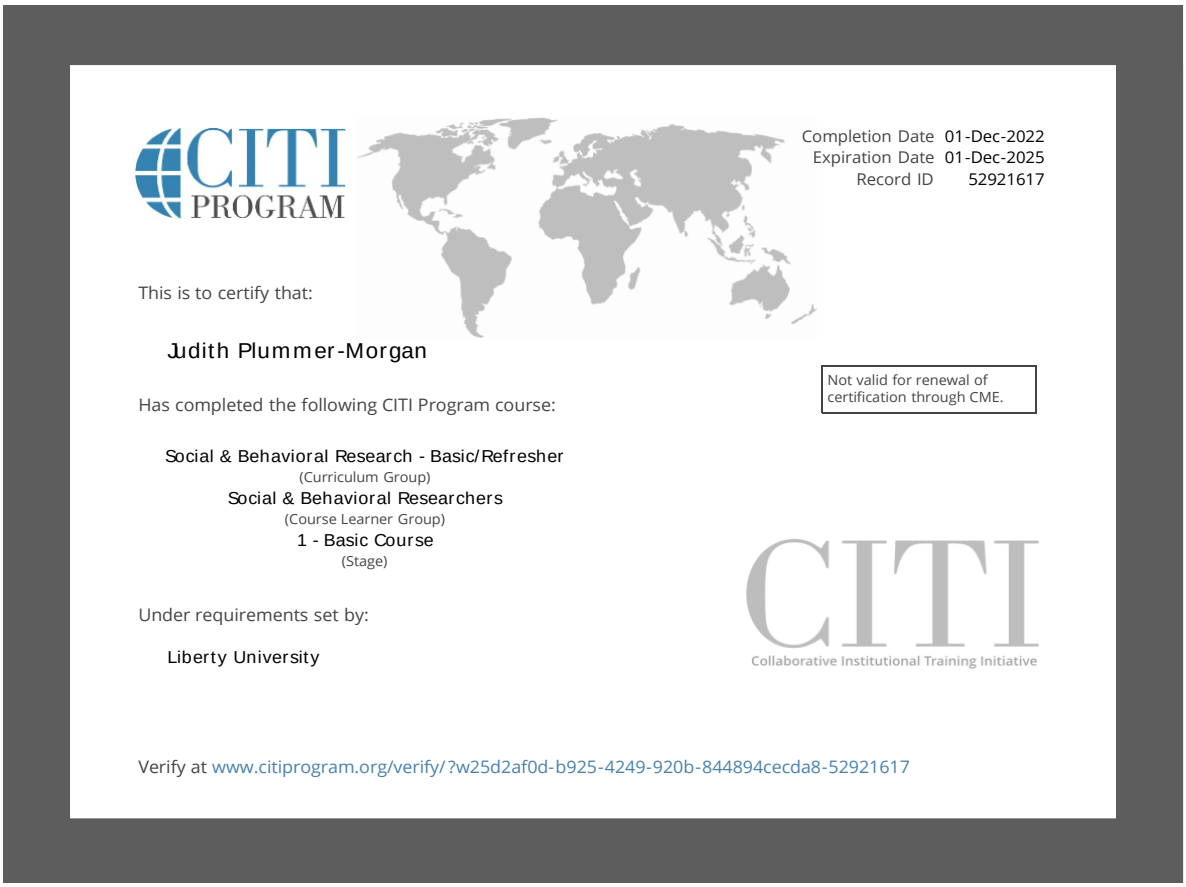


Figure 1. Prisma Flow Diagram

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., et al. The prisma 2020 statement: An updated guideline for reporting systematic reviews. *BMJ, 372:n*71. https://doi.org/10.1136/bmj.n71

Appendix C

CITI Training



Appendix D

Table 2

Essentials of the Doctoral Education for Advanced Nursing Practice

DNP Essentials	**Definition of Essential**	**Description of how essential was applied**
Essentials I	Scientific underpinning for practice	This review used only scientific evidence
Essentials II	Organizational and systems leadership for quality improvement and system thinking	This integrative review focused on improving outcomes for patient with venous leg ulcers
Essentials III	Clinical scholarship an analytical method for evidence-based practice	This review utilized peer-reviewed evidence base research
Essentials VII	Clinical prevention and population health for improving health	Preventing adverse events in the treatment of venous leg ulcers will decrease financial burden on the healthcare system and improve outcomes for patient

Appendix E: IRB Exempt Status

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

February 24, 2023

Judith Plummer-Morgan
Cynthia Goodrich

Re: IRB Application - IRB-FY22-23-1160 STRATEGIES TO PREVENT AND MANAGE SKIN COMPLICATIONS ASSOCIATED WITH COMPRESSION BANDAGES APPLICATION IN PATIENTS WITH VENOUS LEG ULCERS: AN INTEGRATIVE LITERATURE REVIEW

Dear Judith Plummer-Morgan and Cynthia Goodrich,

The Liberty University Institutional Review Board (IRB) has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds that your study does not meet the definition of human subjects research. This means you may begin your project with the data safeguarding methods mentioned in your IRB application.

Decision: No Human Subjects Research

Explanation: Your study is not considered human subjects research because it will not involve the collection of identifiable, private information from or about living individuals (45 CFR 46.102).

Please note that this decision only applies to your current application. Any modifications to your protocol must be reported to the Liberty University IRB for verification of continued non-human subjects research status. You may report these changes by completing a modification submission through your Cayuse IRB account.

If you have any questions about this determination or need assistance in determining whether possible modifications to your protocol would change your application's status, please email us at irb@liberty.edu.

Sincerely,

G. Michele Baker, MA, CIP
Administrative Chair of Institutional Research
Research Ethics Office