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The Impact of Compression Stocking Education on Quality of Life (QoL) Among Patients with  
Chronic Venous Insufficiency Receiving Outpatient Care at a Nurse Practitioner-Led Clinic

A dissertation submitted in partial satisfaction of the  
requirements for the degree  
Doctor of Nursing Practice

by

Bernice Tan

2023

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## ABSTRACT OF THE DISSERTATION

The Impact of Compression Stocking Education on Quality of Life Among Patients with Chronic Venous Insufficiency Receiving Outpatient Care at a Nurse Practitioner-Led Clinic

by

Bernice Tan

Doctor of Nursing Practice

University of California, Los Angeles, 2023

Professor Wendie Robbins, Chair

**Background:** Chronic venous insufficiency (CVI) is prevalent in the United States. The negative impact of CVI on patient quality of life (QoL) has been established, and compression stocking therapy (CST) has been used as a treatment modality. Even though compression therapy has been shown to help, poor adherence is often caused by a lack of knowledge. Best practices include patient education to increase knowledge of CVI, including prevention, symptoms, awareness of compression therapy, and appropriate lifestyle habits. Studies have shown that compression stocking education can help patients learn more about CVI and CST, which can help ease the symptoms of CVI and improve patient QoL. **Objectives:** This quality improvement project sought to determine whether an intervention including a compression stocking education

brochure with in-person simulation affected QoL for patients with chronic venous insufficiency.

**Methods:** A pre-and post-test design over five weeks was used. A convenience sample of 24 patients aged 18 years or older with CVI was recruited from a vascular surgery outpatient clinic. The CIVIQ-20-item questionnaire was used to assess participants' QoL, and a CST questionnaire was used to assess CST knowledge before and after the intervention. **Results:** Participants experienced improvement in their CIVIQ-20 score after the intervention ( $M = 54.00$ ,  $SD = 14.24$  pre-intervention,  $M = 40.50$ ,  $SD = 10.39$  post-intervention, Wilcoxon signed rank test  $p < .001$ ). Lower CIVIQ-20 scores are more favorable. The perceived knowledge score increased after the intervention ( $M = 1.35$ ,  $SD = .62$  pre-intervention,  $M = 2.71$ ,  $SD = .55$  post-intervention, Wilcoxon signed rank  $p < .001$ ). The actual knowledge scores improved after the intervention ( $M = 4.38$ ,  $SD = 2.28$  pre-intervention,  $M = 6.58$ ,  $SD = .97$  post-intervention, Wilcoxon signed rank  $p < .001$ ). For the knowledge scores, higher scores are more favorable. **Conclusion:** The key findings of this study demonstrated a statistically significant increase in patients' QoL and CST knowledge following the implementation of a CST educational brochure and in-person simulation.

The dissertation of Bernice Tan is approved.

Theresa Brown

Emma Cuenca

Sophie Sokolow

Wendie Robbins, Committee Chair

University of California, Los Angeles

2023

This dissertation is dedicated to my family and husband, Kevin, who have been a constant source of support and inspiration throughout my nursing career.

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## VITA

### EDUCATION

#### **Loma Linda University School of Nursing, Loma Linda, California**

Bachelor of Science in Nursing, 2012

#### **La Sierra University, Riverside, California**

Master of Business Administration in Health Care Management, 2017

#### **Western University of Health Sciences, Pomona, California**

Master of Science in Nursing Family Nurse Practitioner Certificate, 2019

#### **University of California Los Angeles, Los Angeles, California**

Doctor of Nursing Practice, expected June 2023

### PROFESSIONAL AND POSTER PRESENTATIONS

*The Impact of Compression Stocking Education on Patients' Quality of Life.* Western Institution of Nursing (WIN) Communication Nursing Research Conference. Tucson, AZ. April 2023.

*A Quality Improvement Project: Does Patient Education Impact Quality of Life?* UCLA Nursing Science and Innovation (NSI) Conference. UCLA, Los Angeles, CA. May 2023.

## CHAPTER ONE: INTRODUCTION

Chronic venous insufficiency affects more than 25 million people in the United States and is estimated to cost more than \$3 billion annually (Kim et al., 2021). Healthcare providers frequently neglect chronic venous insufficiency (CVI) due to a lack of understanding of the problem's severity and effect and a failure to recognize the clinical manifestation of venous disease (Eberhardt & Raffetto, 2014). Risk factors for CVI include advancing age, family history, obesity, prolonged standing, prolonged sitting, smoking, sedentary lifestyle, lower extremity injuries, past venous thrombosis, and pregnancy (Ortega et al., 2021). Patients with CVI may suffer from pain, edema, and skin changes. Besides these symptoms, the patient may have decreased work productivity because of pain management, hygiene, mobility, and social contact difficulties, which have negatively impacted the patient's (QoL) (Patel & Surowiec, 2021; van Korlaar et al., 2003).

Chronic venous insufficiency is a well-defined and well-recognized disease that negatively affects health-related QoL (Launois, 2015). Many patients are diagnosed with CVI at an advanced stage (Branisteanu et al., 2019). There are many tools used to measure QoL in chronic venous disorders (CVDs) (Launois, 2015). The Venous Insufficiency Epidemiological and Economic Study on Quality of Life, Aberdeen Varicose Vein Questionnaire, and Chronic Venous Insufficiency Questionnaire scales are the most utilized. Without effective CVD therapy, patients may be unable to perform everyday tasks that contribute to QoL. Also, a higher Clinical, Etiology, Anatomic, and Pathophysiology classification can signal a greater socioeconomic issue for the patient (Branisteanu et al., 2019).

The Clinical, Etiology, Anatomic, and Pathophysiology (CEAP) classification system is utilized as a guide to classify CVI (Moscicka, 2019). Based on the existence or absence of

symptoms, the system consists of seven categories, numbered from 0 to 6, and further divided into seven subcategories. The pathophysiology of venous dysfunction is classified as either congenital, primary, or secondary, deep, superficial, and perforating veins distinguish the anatomical group. The pathophysiologic classification category includes the underlying cause of CVI, which may be related to reflux, venous obstruction, or both. The CEAP score quantifies the severity of chronic venous insufficiency: C0 is no palpable or visible signs of venous disease, C1 is reticular or telangiectasia veins, C2 is varicose veins, C3 is edema, C4 are changes in the subcutaneous tissue or skin secondary to chronic venous disease, C5 is a healed venous ulcer, and C6 is an active venous ulcer. The classification system has been helpful in standardizing the reporting and description of patients with chronic venous disorders (see Appendix A).

Eberhardt & Raffetto (2014) found that patients with untreated CVI may develop venous leg ulcers. Chronic venous leg ulcers are often difficult to treat due to the long-term therapy required for healing. Venous leg ulcers (VLU) are often recurrent and have been shown to negatively impact patients' QoL (Moscicka, 2019). Patients with VLU have been found to have significant more frequent depressive symptoms and pain (Patel & Surowiec, 2021; van Korlaar et al., 2003; Launois, 2015). Compression stockings in patients with CVI dramatically improved disease specific QoL (Özdemir et al., 2016).

Compression stockings are the most frequently used form of compression therapy (Lurie et al., 2019). Compression stockings apply compression at varying pressure levels, with the lowest pressure under the knee and the highest pressure at the ankle (Dahm et al., 2019; Shi et al., 2021). There are contraindications to compression therapy: active phlebitis, untreated deep vein thrombosis, acute skin infection, allergy to compression material (Berszakiewicz et al.,

2020), severe congestive heart failure, significant limb ischemia (Rabe et al., 2018), ankle-brachial index less than 0.5, or absolute ankle pressure less than 60 mm Hg (Lurie et al., 2018).

Compression stockings are a cornerstone of treatment and effectively decrease edema, pain, and lower extremity venous pressure while increasing lymph flow (Bar et al., 2021; Wittens et al., 2015). Compression stockings have been shown to increase muscle pump function, decrease venous reflux, and alleviate discomfort and lower leg symptoms (Wittens et al., 2015). Despite the proven benefits of compression therapy, adherence rates remain between 12 and 52 percent (Bar et al., 2021). Poor adherence is frequently associated with knowledge-related deficits (Bar et al., 2021; Gong et al., 2020; Behairy & Masry, 2022; Dahm et al., 2019).

### **Problem Statement**

In two outpatient vascular surgery clinics located in San Bernardino and Los Angeles, California, there is currently a lack of educational materials and resources related to compression stockings for patients diagnosed with CVI. Patients diagnosed with CVI rarely get hands-on simulation training for donning and doffing compression stockings. Lack of education has contributed to unresolved CVI symptoms, such as pain, edema, pruritus, heaviness, and fatigue, which adversely affect patients' QoL (Wittens et al., 2015). Patients frequently return to the clinic after appointments with repetitive questions concerning CVI symptoms and compression stocking therapy (CST). Patient education has been limited to verbal explanations, which provide patients with minimal assistance, resulting in dissatisfaction. A lack of education material for patients with CVI has contributed to a significant gap in treatment.

Patients currently receive verbal explanations about the importance and need to wear compression stockings. Many insurance companies do not cover the cost of compression stockings; therefore, patients are directed to purchase a pair of compression stockings on their

own that on average cost \$25 to \$35, every six months. Patients are further challenged by the complexities as to which stockings to purchase. Without proper education, patients may purchase the incorrect size. Furthermore, patients may be confused by the intricacy of different stockings. Stocking pressure measuring scales range from 5 mm Hg to above 60 mm Hg and may have a single or many layers (Dahm et al., 2019). Patients are not educated regarding the care of compression stockings, which may decrease effectiveness as compression stockings can stretch out and become ineffective over time.

### **Aims and Objective**

This Doctor of Nursing Practice (DNP) Scholarly Project aims to assess the effects of providing enhanced education about compression stocking use on quality of life (pain, physical, psychological, and social dimension) in patients prescribed CST compared with usual care. Instructions on compression stocking therapy with simulation on donning and doffing are provided at a clinic visit at the time the prescription is ordered. Participants with clinical symptoms of CEAP classification system II and above will be recruited. The intervention consists of education in the form of a brochure, hands-on simulation, and the provision of resources for implementing compression stocking usage. The intervention will include the provision of compression stockings. The purpose of this quality improvement (QI) project is to improve patient outcomes through a change in clinic education procedures for patients prescribed CST.

### **Patient, Intervention, Comparison, Outcome, and Time (PICOT) Question**

The PICOT question to be evaluated in this Scholarly Project is: In patients with CVI and CEAP classification system of II and above (P), how does education provided through the use of a brochure, hands-on simulation, and provision of resources for implementing compression

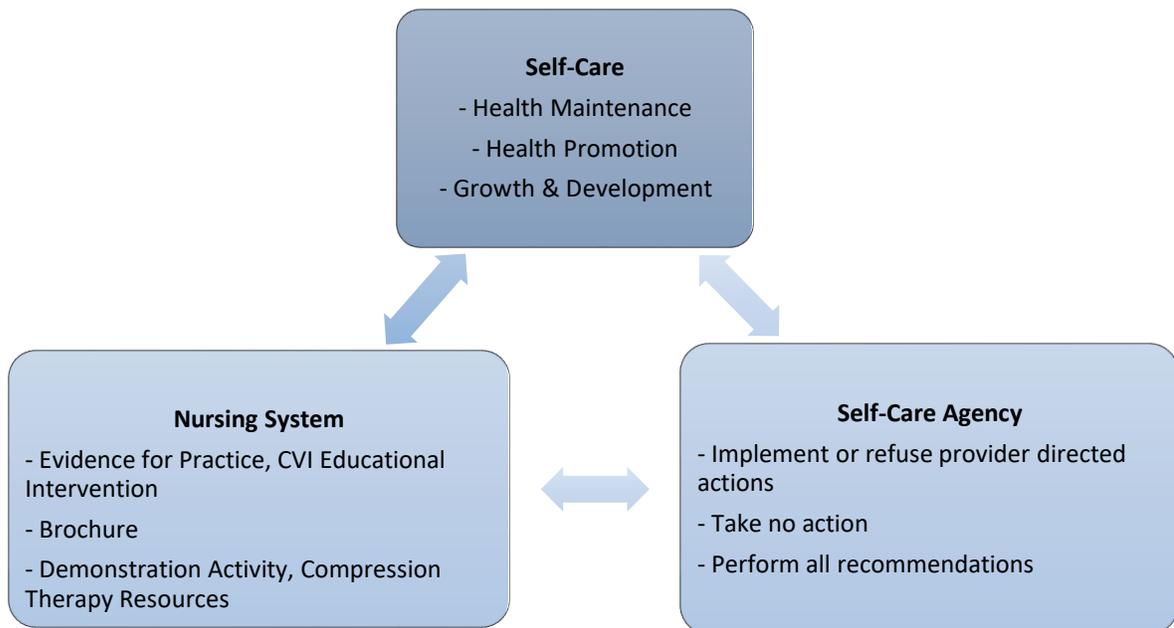
stocking usage (I), compared to the current practice of verbal instruction only (C), affect the quality of life (QoL) measured by the Chronic Venous Insufficiency Questionnaire- 20 (CIVIQ-20) over five weeks (T)?

## CHAPTER TWO: THEORETICAL FRAMEWORK

The implementation of compression stocking education for CVI patients aligns with Dorothea Orem's Self-Care Deficit Theory. Orem's Self-Care Deficit Theory provides the philosophical underpinnings and practical framework of three interconnected components: the theory of self-care, the theory of self-care deficiency, and the philosophy of the nursing system (Renpenning & Taylor, 2003). The Self-Care Deficit Theory focuses on the practices of individuals that initiate and perform self-care actions to achieve therapeutic goals. The concepts highlight that the patient must first comprehend what should be addressed and determine the best course of action (Hartweg, 1991). Healthcare providers must encourage patient education and participation by enhancing patients' capacity to seek, comprehend, and utilize health information (Paterick et al., 2017). Paterick states that interventions to improve self-care have been linked to increases in self-efficacy. Orem utilizes holistic care and the nursing process to determine self-care deficits, create a care plan based on a diagnosis, and implement and evaluate the goals set mutually by the healthcare provider and the patient. To participate in self-care, patients must possess the values and abilities to learn, decide, and govern themselves (Hartweg, 1991). By implementing compression stocking education in patients with CVI, patients can decide the appropriate course of treatment (see Figure 1). The focus of interventions is on the outcome of nursing, with the model providing both the structure and substance of nursing practice and the nursing function (Renpenning & Taylor, 2003). The DNP project-lead's educational intervention with the patient integrates the philosophy of the nursing system.

The application of Orem’s Self-Care Deficit Theory can help patients identify the self-care actions needed to achieve therapeutic goals. The application of Orem’s theory will provide a framework to help participants address and determine their best course of action. In addition, the healthcare provider will utilize the nursing process to create a plan of care based on CST education to improve the patient’s QoL. Orem’s self-care model enables patients to improve their self-care skills. Orem provides a structure for the nursing discipline to provide patients with knowledge and education to optimize their QoL.

**Figure 1:** *Dorothea Orem's Self-Care Deficit Simulation*



The model to guide the process improvement is the plan-do-study-act (PDSA) process. The PDSA process has been widely utilized in healthcare quality improvement projects (Taylor et al., 2014). The PDSA approach was derived from the process developed by Walter Shewhart and Edward Deming, which utilized four cyclical processes for continuous quality improvement. Improvements in healthcare necessitate the alteration of processes inside complex social systems that evolve through time in response to anticipated and unanticipated results. Effective

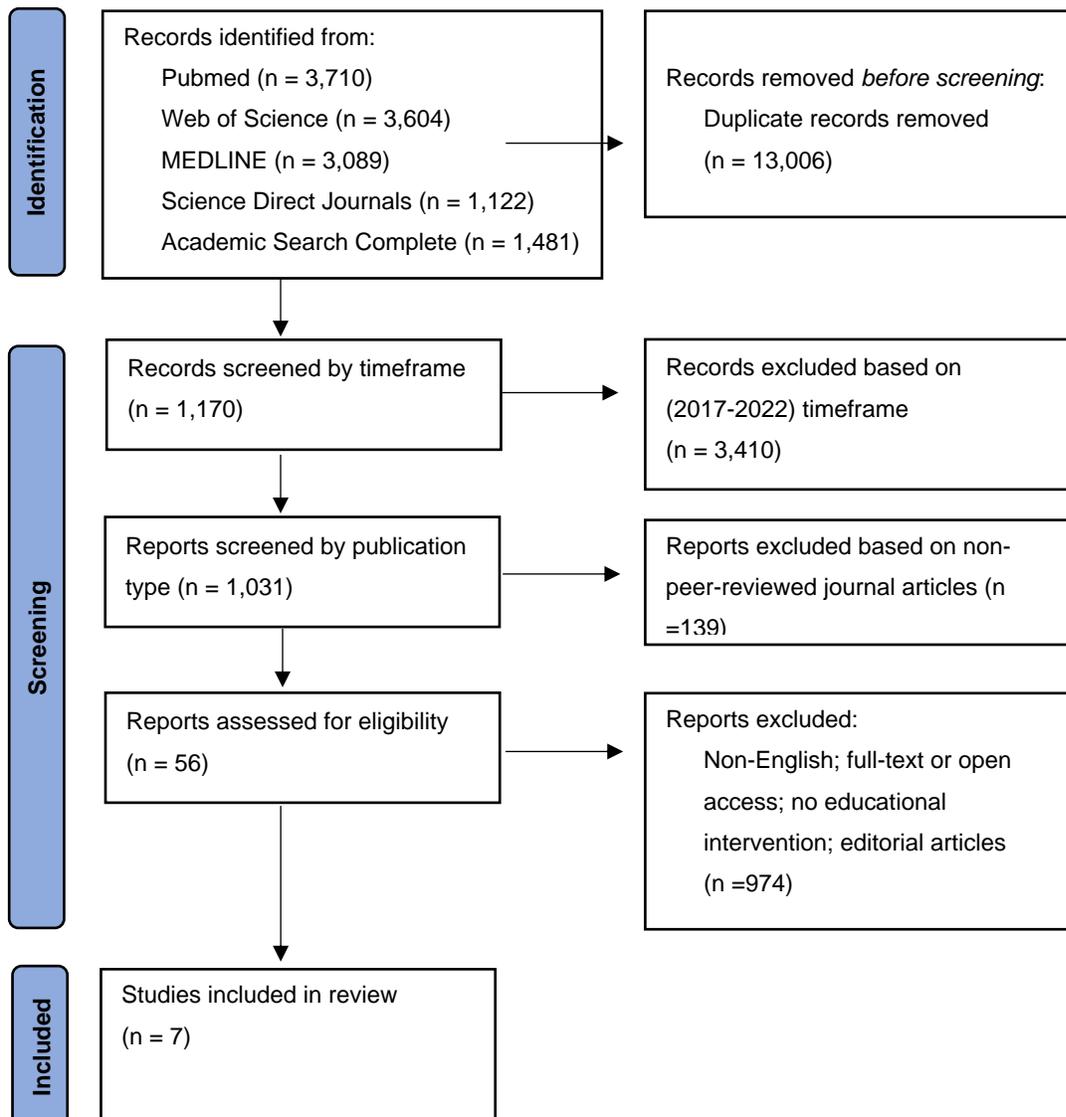
interventions must be adaptable to the local environment and ready to respond to unforeseen issues and unintended consequences. The "plan" will be the necessary preparation for the DNP Scholarly Project to analyze the impact of giving enhanced information regarding compression stocking use on quality of life (pain, physical, psychological, and social dimensions) in patients prescribed CST as compared to standard care. The "do" phase will consist of executing the plan and initiating data analysis. The "study" will consist of an analysis of the project's data and a summary of its findings. The "act" will consist of necessary improvements for future improvement, which could entail an additional PDSA cycle.

### CHAPTER THREE: REVIEW OF LITERATURE

A literature review was completed to identify the current state of the literature on the effects of CST on CVI and best practices for enhancing compression therapy education. The review evaluated provider expertise, patient education, and clinical recommendations contributing to compression therapy education. PubMed, Web of Science, Academic Search Complete, Medline Excerpta Medica database (EMBASE), and Academic Search Complete database were used to conduct a comprehensive and thorough literature review. Search terms or keywords included the following Boolean Operators and Medical Subject Headings (MeSH) terms: “venous insufficiency” AND “compression stocking” OR “compression therapy” AND “quality of life” AND “brochure” AND “patient education” AND “educational intervention.” The search resulted in 3,710 articles from PubMed, 3,604 articles from Web of Science, 1,481 articles from Academic Search Complete, 3,089 articles from Medline Excerpta Medica database (EMBASE), and 1,481 articles from Academic Search Complete (see Figure 2). Duplicate articles were removed from the screening. The search was limited to full-text, open access, and peer-reviewed articles with educational interventions in English and published within the last

five years (2017-2022), yielded 56 results. To maintain the current evidence-based practice, articles from the past five years were chosen. Articles that were irrelevant to the search topic were omitted based on title and abstract. Peer review articles were selected to ensure the integrity of the scientific literature to advance scientific knowledge. After screening the articles, seven articles addressed the clinical question, providing evidence that compression therapy education helps CVI and positively impacts QoL (Protz et al., 2019; Behairy & Masry, 2021; Zulec et al., 2022; Mahmoud et al., 2019; Gonzalez, 2017; Uhl et al., 2018; Berszakiewicz et al., 2021).

**Figure 2: PRISMA Diagram**



*Note.* The diagram depicts the literature search. A systematic review of peer-reviewed articles in English using PubMed, Web of Science, Academic Search Complete, Medline, and Academic Search Complete.

## **Literature Review**

Compression therapy has been shown to enhance patients' QoL (Berszakiewicz et al., 2021; Naci et al., 2020; Zulec et al., 2022; Özdemir et al., 2016; Bar et al., 2021). Patient education initiatives have demonstrated improvement in patient use of CST (Van Hecke et al., 2011; Gong et al., 2020; Chitambria, 2019). Patients' education is crucial to improving patient outcomes by inducing changes in patients' knowledge, attitudes, and abilities for preserving or enhancing health (Paterick et al., 2017). Poor uptake of CST has been attributed to a deficiency of patient knowledge about the benefits of CST (Yen & Leasure, 2019; Gong et al., 2020).

The seven selected studies support the use of compression stocking education (Protz et al., 2019; Behairy & Masry, 2021; Zulec et al., 2022; Mahmoud et al., 2019; Gonzalez, 2017; Uhl et al., 2018; Berszakiewicz et al., 2021). One study was a single-blinded, randomized controlled design (Uhl et al., 2018), one study was a quasi-randomized controlled design (Protz et al., 2019), three studies used a quasi-experimental design (Behairy & Masry, 2021; Zulec et al., 2022; Mahmoud et al., 2019), one was a cohort study (Berszakiewicz et al., 2021), and one was a prospective and retrospective analysis study (Gonzalez, 2017) (see Appendix B). All the studies included patients with CVI. The studies were completed in the United States, Germany, Austria, Egypt, Croatia, Poland, and France, ranging from single to multi-center. These studies included countries that have universal health care. Universal health coverage indicates that everyone has access to health services and encompasses all necessary health services, including

health promotion, prevention, treatment, and rehabilitation (World Health Organization, n.d.). Having studies completed with universal health care may limit generalizability.

### ***Educational Intervention Research***

Protz et al. (2019) conducted a quasi-experimental randomized control trial with 136 participants (26.5% men; 73.5% women) over the course of six months in Germany and Austria. Half of the patients (n = 68) were assigned to the case group, while the remaining half (n = 68) were assigned to the control group. One group received an educational brochure, while the other received standard care. Participants had a mean age of 71 (median: 74; range: 38–94) years. Protz et al. (2019) designed the brochure for patients with CVI, venous stasis ulcers, and compression therapy to help patients appreciate the relationship between compression therapy and wound healing and therapy goals. The control group did not receive adequate information regarding compression therapy's effects (30.9%; case group, 7.4%), thought compression might cause pain (55.9%; case group, 1.5%), and didn't realize that CST aids wound healing or avoid recurrence (67.6%: case group, 19.1%). The brochure was effective in raising patients' awareness of the relationship between CST adherence and the alleviation of venous symptoms. Improper drying can degrade compression materials. Donning devices protect stockings, ease handling, and enhance patient self-management. Nearly all case group patients knew about wearing devices, whereas just half of the control group did. The control group had a longer duration of months of venous leg ulcer (VLU) occurrence with a mean of 18.3 (case group, 8.5), a median of 8 (case group, 6), and a standard deviation of 36.1 (case group, 12.5). The researchers indicated that education helps patients comprehend the relationship between necessary measures, in this case, CST therapy objectives, and CST care. The study provides evidence for this DNP scholarly

project because it indicates that education helps patients recognize the relationship between self-care, in this case, compression therapy, and improving venous leg ulcer (VLU) healing rates. Understanding that CST enhances VLU healing rates can improve adherence and thus, improve participants' QoL.

Behairy and Masry (2022) completed a quasi-experimental study with 80 participants to assess the outcome of an educational nursing intervention on compression therapy adherence and the recurrence of VLUs among patients with chronic venous ulcers. Participants were between 40-57 years old, with a mean age of 48.3. Most participants were male (61.3%), employed and working (75.1%), had diabetes (52.5%), were unmarried (92.5%), had a body mass index (BMI) ranging from 22.1 to 30.1, educated (70.1%), and wore below the knee compression stockings. The study was conducted at Menoufia University in Egypt from July 2018 to February 2020. Participants were assigned randomly to two groups. The control group received the usual leg ulcer and CVI information, and the study group received an educational intervention. The educational intervention included a brochure and a graphic board, including venous disease prevention, progression, and treatment adherence. Researchers reinforced information and redistributed the brochure every three months to the study group, with the same researcher leading all educational sessions and interviewing each study participant for 45 minutes. The brochure was designed with information on the venous ulcer and how to use compression stockings. Measures consisted of knowledge and adherence scores taken pre- and post-intervention, at 3 months, 6 months, and 12 months. The researchers found that the control and study groups had inadequate knowledge before and after the pretest. Scores were divided into three categories: poor, fair, and good. The study group showed a difference in scores at 3 months (poor n = 31, fair n = 8, good n = 1), 6 months (poor n = 1, fair n = 36, good n = 3), and 12

months (poor n = 0, fair n = 32, good n = 8), whereas the control group showed no change with all participants scoring poor throughout the duration of the study. The study also showed a strong association between the knowledge score and compression therapy adherence after attending the educational intervention compared to the pretest after 1 and 3 months ( $r = 0.885, 0.774,$  and  $0.477, p = 0.002$ ). After the intervention at 12 months, the new incidence in the same leg was 5% in the study group and 15% in the control group. In addition, the incidence of a new ulcer at the same site as the previous ulcer was 2.5% in the study group and 12.5% in the control group. The evidence from this study supports the current proposed DNP scholarly project by demonstrating that an educational intervention that included a brochure and a pictorial board improved knowledge, compression treatment adherence, and lowered the recurrent rate of VLU. Future high-quality research is suggested to compare compression treatment recurrence rates.

Berszakiewicz et al. (2021) assessed the QoL in patients diagnosed with CVI at different stages based on CEAP classification. The study enrolled 180 participants and divided them into six subgroups based on CEAP classification (C1 to C6). There were 71.1% female and 28.9% male participants, ranging from 31 to 69 years old. The study was completed in Poland, and the authors utilized two measures to calculate QoL: the Medical Outcomes Study 36-Items Short-Form Health Survey version 2 (SF-36v2), the Chronic Venous Insufficiency Questionnaire- 20 (CIVIQ- 20), and the Venous Clinical Severity Score (VCSS). The authors used the SF-36v2 to assess general and non-specific QoL and the VCSS to assess chronic venous disease (CVD) symptoms in the specific treatment groups over longitudinal comparison. The participants were educated to wear their prescribed compression stockings for no less than eight hours per day and to remove them at night. The patients were followed over six months to have their CEAP classification, VCSS, SF-36V2, and CIVIQ-20 re-assessed after the intervention. The QoL

assessment of CVD patients revealed a considerable decline in QoL, which decreases gradually with disease progression. The study found that edema and pain were the most common symptoms that affected QoL. In 64-82% of participants diagnosed with the C6 subgroup reported the highest pain reduction after compression therapy (CT). The demographics and CEAP classification between the groups were determined using the Mann-Whitney U-test or the T-test. Parametric and non-parametric quantitative variables were analyzed using the Wilcoxon signed-rank test and the paired T-test. The chi-square test was used to analyze the qualitative variables to assess the maximum likelihood estimation (MLE). After six months, this study demonstrated how CT use and education had improved QoL across all individual and composite domains. The evidence from this study supports the current proposed DNP scholarly project by demonstrating that an educational intervention and in-depth recommendation of CST can improve clinical outcomes and QoL.

Žulec et al. (2022) completed an experimental pre- and post-test intervention study involving administering an educational brochure to increase knowledge of recurrence prevention, awareness of compression therapy, appropriate lifestyle habits, and symptoms related to venous leg ulcers. The patients consisted of 308 participants with a venous leg ulcer (112 females and 96 males) who were randomly selected for the control and the experimental groups based on systematic random sampling. The study occurred in three hospitals in central Croatia over four months in 2019. The instrument was a survey comprised of standardized and non-standardized questions designed to determine: VLU length and recurrence, attitude toward compression therapy, frequency and type of compression therapy utilized, and understanding of wound care and wound management. The brochure included an overview of the factors that cause VLUs, wound characteristics, wound dressing instructions with photographs, and the benefits of

compression therapy. Participants in the experimental group were given the brochure to briefly explain its contents. Participants in the control group did not receive the brochure and were informed that the survey would be repeated after 3 months. The educational brochure was shown to improve knowledge (Wilks Lambda = 0.88,  $F(1,11) = 15.38$ ,  $p < 0.001$ ). After completing the educational intervention with the brochure, the number of participants ( $Z = 6.35$ ) who replied stated there were not aware of what treatments were beneficial for VLU was significantly reduced ( $p < 0.001$ ). Study limitations included the family doctor's requirement to refer patients for a specialist examination.

Gonzalez (2017) utilized a prospective and retrospective study design to assess the effectiveness of a patient education program on self-care knowledge, disease, and ulcer recurrence rates. The sample included 3 groups of patients: Group A ( $n = 28$ ), Group B patients ( $n = 22$ ), and Group C for the control group ( $n = 45$ ). Group A ( $n = 28$ ) was recruited to engage in a 36-week follow-up after receiving the educational intervention and evaluations as part of an earlier study. Patients from Group B ( $n = 22$ ) participated in the prospective portion of the trial and were evaluated at 2, 9, and 36 weeks. Patients in Group C were treated for 41 weeks, have a favorable wound healing trajectory through week 5, and do not receive extra instruction. Over 50% of participants were between 65 to 74 years old and female. Participants in Groups A and B had healing VLU for a minimum of five weeks prior to the educational intervention. Group C participants had been treated for their VLU; did not have any additional education. The study was completed in participants' homes in South Florida. Group A had received the educational intervention of assessments in an earlier trial and participated in a 36-week follow-up. Group B patients were evaluated after 2, 9, and 36 weeks. A retrospective chart review was performed for group C. The intervention consisted of a one-on-one presentation that lasted 45 minutes. The

presentation included a brochure, visual aids, and activities in the participant's home. A patient questionnaire was used to test pre- and post-intervention knowledge on self-care activities to prevent recurrence and disease processes. More knowledge was indicated by higher scores. Wound healing and recurrence were also assessed. Data analysis included descriptive statistics and unpaired t-tests. In groups A and B, 36-week knowledge scores were higher than baseline ( $4.13 \pm 0.437$  and  $10.7 \pm 0.421$ , respectively, for group A and  $4.22 \pm 0.231$  and  $10.9 \pm 0.871$ , respectively, for group B). Groups A and B had similar knowledge scores at the 36-week assessment ( $P = 0.687$ ). Groups A and B (50% and 45%, respectively) had lower venous ulcer recurrence rates than the control group (69%). This study supports the current proposed DNP project because the results showed that patient education improves disease and self-care knowledge scores and may reduce venous ulcer recurrence rates. Further studies are warranted, including larger patient cohorts and longer follow-up times.

Mahmoud et al. (2019) performed a quasi-experimental pre- and post-intervention design to assess the result of nursing instructions on patients' knowledge and VLU healing. The study used a convenient sample of 30 adult male and 30 adult female patients with first-time VLUs divided evenly into the control ( $n = 30$ ) and intervention groups ( $n = 30$ ). The study was conducted at an inpatient ward at Kaser El-Aini Hospital and an outpatient vascular clinic. The intervention consisted of patient education in an illustrative booklet created by the author with information regarding compression therapy, leg exercises, and leg elevation. Mahmoud et al. (2019) used three tools were used: a medical and demographic form, the Bates-Jensen Wound Assessment tool, and the patient's knowledge assessment tool of VLU management. All study group patients had satisfactory knowledge levels ( $\geq 75\%$  at the second and fourth weeks after nursing instructions). At four weeks, 83.3% of the study group had minimal wound regeneration

compared to 53.4% of the control group. The study showed a positive correlation between the total knowledge score and the healing of VLUs in the study sample ( $r = 0.09$  at  $p = 0.0001$ ). This study demonstrated highly significant differences between VLU patients' knowledge and healing. This study supports the current DNP scholarly project proposal because it found that effective nursing instructions are crucial to enhancing patients' knowledge of VLU management and wound healing. A limitation of this study was that more than two-thirds of the studied subjects were smokers, and one-third suffered from chronic diseases such as diabetes and hypertension.

Uhl et al. (2018) conducted a study to assess the effect of compression stocking patient education and weekly short message service (SMS) by measuring patient adherence using a thermal sensor. This study used a randomized-control design, including 44 females enrolled from November 2015 to January 2016 at a physician's office in France who were symptomatic and were CEAP classification II. The investigators used a thermal sensor attached to the compression stocking to record the temperature every 20 minutes to measure compression stocking use. Participants were required to carry a smartphone and were enrolled and tracked for four weeks by the same practitioner. The patients were then randomly divided into two groups of 20 participants each: group 1 received minimal suggestions from the physician regarding CS use in the office, and group 2 received in-depth suggestions from the physician with further recommendations via SMS messages sent weekly for four weeks commencing on day 1. The investigators found that patients who received in-depth recommendations by a practitioner and additional weekly messages demonstrated improved compression therapy adherence ( $p < 0.001$ ). In addition, the authors found a significant difference between the recommendation/text message groups and the control group, which contributed to a greater percentage of patients adhering to compression therapy. Limitations of this study include the short duration of four weeks and that

the research was conducted at a single institution. The incidence of leg complaints was also examined using a questionnaire that graded symptoms and attributed them to venous disease. The disease-specific CIVIQ-14 questionnaire was used to assess patient-reported QoL. The days the CST was worn by participants during the four-week study rose by 33% with suggestions (group 2), and the wearing time affects psychological and social QoL. This study demonstrated that enhanced and frequent practitioner recommendations led to a 33% increase in CST adherence and increased QoL.

### **Synthesis of Literature Review**

The reviewed literature suggests that patient education is beneficial in therapies involving compression stocking use (Protz et al., 2019; Behairy & Masry, 2021; Berszakiewicz et al., 2021; Zulec et al., 2022; Mahmoud et al., 2019; Gonzalez, 2017; Uhl et al., 2018). Compression therapy in CVI has been associated with improved QoL (Uhl et al., 2018; Berszakiewicz et al., 2021). Health professionals should educate patients on the precautions and necessity of using compression therapy.

Compression stocking education interventions utilize a variety of modalities. The studies reviewed indicate that compression stocking education can increase patient knowledge of CVI and CST to improve CVI symptoms (Protz et al., 2019; Behairy & Masry, 2021; Zulec et al., 2022; Mahmoud et al., 2019; Gonzalez, 2017), which has been shown to improve QoL (Uhl et al., 2018; Berszakiewicz et al., 2021). Protz et al. (2019; Behairy & Masry (2021; Zulec et al. (2022); Gonzalez (2017) utilized a brochure with information regarding compression stockings to improve knowledge, whereas Mahmoud et al. developed an illustrative booklet consisting of compression bandage techniques, leg exercises, diet, and leg elevation. Protz et al. (2019) and

Zulec et al. (2022) had given participants only a brochure to review; however, Gonzalez's (2017) intervention also consisted of a brochure and was incorporated with a 45-minute one-on-one presentation with a handout and visual aids. Berszakiewicz et al. (2021) reported that they educated patients to wear prescribed compression therapy. However, the authors did not mention if it was only completed verbally or if there was an additional form of education.

The sample size and settings of the research studies varied. Three studies were conducted at an outpatient clinic (Behairy & Masry, 2021; Uhl et al., 2018; Gonzales, 2017), two studies were completed at an outpatient clinic and a hospital (Mahmoud et al., 2019; Protz et al., 2019), and one study was conducted at three different hospitals (Zulec et al., 2022). The largest sample size consisted of 308 patients with venous leg ulcers (Zulec et al., 2022) and the smallest sample size consisted of a total of 44 female patients (Uhl et al., 2018).

Evidence from the literature demonstrates that compression therapy education intervention can improve patient knowledge, use of CST (Protz et al., 2019; Behairy & Masry, 2021; Zulec et al., 2022; Mahmoud et al., 2019; Gonzalez, 2017), and improve QoL (Uhl et al., 2018; Berszakiewicz et al., 2021). Many patients with CVI do not utilize CST and have decreased QoL (Patel & Surowiec, 2021; van Korlaar et al., 2003). As a result, the literature supports additional education using a brochure and reviewing education with participants to improve knowledge and QoL in patients with CVI.

## CHAPTER FOUR: METHODS

This DNP scholarly project was a QI project that aimed to assess the effects on CVI patients' quality of life by providing enhanced education versus usual care education about compression stocking use. Ethical considerations for this quality improvement (QI) project included conducting a project following the Declaration of Helsinki and the Good Clinical

Practice guidelines or other applicable federal and state laws (Vijayanathan & Nawawi, 2008). The DNP Scholarly Project did not meet the definition of human subject research requiring Institutional Review Board (IRB) review and was certified as exempt by both the University of California, Los Angeles IRB and the practice site IRB. To ensure participant confidentiality, the data collected was de-identified and coded with a study identification because of the sensitive nature of the data. All data was handled according to the Health Insurance Portability and Accountability Act of 1996 (HIPAA) standards.

### **Project Design**

This QI project employed a one-group pre-intervention and post-intervention design. The project design was chosen because of ease of administration and analysis of results, and appropriateness for a QI project.

### **Sample and Setting**

The QI project was implemented in two private practice clinics in Southern California, specializing in vascular surgery. The participants were referred by the patient's primary care provider from the clinic where they were receiving CVI treatment. Participants were recruited between December 8, 2022 and February 15, 2023. All participants referred to the clinic for treatment of CVI who met the study inclusion criteria were recruited for the project. Inclusion criteria are: (a) age of 18 or older; (b) confirmed CVI via a venous ultrasound report; (c) CEAP score II and above (d) read and speak English. The following were exclusion criteria: (a) lower extremity vasculopathy (such as mixed venous-arterial disease, lymphedema, heart failure, or chronic kidney disease); (b) use of diuretic medications; (c) presence of any conditions that prevent participants from wearing compression stockings; (d) presence of any other condition

affecting QoL (such as chronic obstructive pulmonary disease, respiratory failure, rheumatoid arthritis, disease making participant non-ambulant).

## **Intervention**

The intervention was an educational brochure (see Appendix C) developed by the DNP project-lead, followed by a hands-on simulation of compression stocking application and removal. The provision of resources consists of providing the participant a compression stocking with the pressure of 20-30 millimeters of mercury (mmHg) based on the participants' calf and ankle size. Participants' calf and ankle sizes are measured, and compression stockings are given to the participants prior to the intervention. The DNP project-lead conducted the intervention one-on-one with each patient. The sessions lasted for 25 minutes: 20 minutes spent on the participant screening form, the brochure presentation, donning and doffing the compression stockings, and 5 minutes for questions and answers. The patients completed the CIVIQ-20 questionnaire (see Appendix D) and CST knowledge questionnaire (see Appendix E) individually without supervision after the education session. The questionnaires were submitted to the staff located at the front desk. The DNP-project lead informed participants to return to submit the follow-up questionnaire in 5 weeks.

The educational brochure was part of the intervention to provide CST and CVI education, which included the pathophysiology of CVI and the identification of the benefits of CST. A patient brochure has demonstrated effectiveness in helping patients appreciate the relationship between CST, wound healing, and therapy goals (Protz et al., 2019; Zulec et al., 2022). The use of a brochure demonstrated increased patient awareness, reinforced adherence to CST, and improved the patient's sense of autonomy. The use of patient education also increased patients' understanding and adherence to CST (Behairy & Masry, 2022). The brochure had been reviewed

for content validity by two vascular surgeons who refer patients to the clinic and are part of the vascular therapy team. The patient brochure is at a 5<sup>th</sup> grade level readability index.

## **Instruments**

Three instruments were utilized in this study. The first instrument was the participant screening form that collected demographic information about participants, such as age, weight, height, gender, the highest level of education, race/ethnicity, employment status, self-rated health, and CEAP classification (see Appendix F). Obesity and increasing age are established risk factors for the onset and progression of chronic venous diseases (Deol et al., 2020). The DNP project-lead developed the participant screening form, and the form was completed by each participant at the baseline visit.

The second instrument was the CST questionnaire (see Appendix E), developed by the DNP project-lead. The participants completed the questionnaires prior to the intervention and 5 weeks after the intervention. The 10-item questionnaire utilized common themes found in the literature to guide content, including (a) subjective knowledge of venous disease and effects and care of CST, (b) knowledge of venous disease, beliefs about CST use, and CST care. This questionnaire was reviewed for content validity by two vascular surgeons at the vascular surgery therapy team at the clinic.

The third instrument was the CIVIQ -20 in English (see Appendix D). The CIVIQ-20 is a validated measure consisting of 20 items that were developed in the 1990s to assess QoL by Dr. Robert Launois (Launois, 2015). The CIVIQ-20 uses a Likert scale to assess the perceived quality of life impact of CVI. The CIVIQ-20 consists of four (pain, physical, psychological, and social) dimensions calculated by summing each component item's scores and the global index

will be obtained by adding the scores of the 20 items. The lowest and maximum values of the scales depend on the number of items used in each dimension and the number of categories or levels for each item; the greater the quality of life, the lower the score in each domain and global index score (GIS). The absolute scores were converted into an index to compare the mean scores across dimensions or scales. Dr. Robert Launois provided consent to use the CIVIQ-20 for this QI project (see Appendix E).

### **Data Collection**

All participant visits were performed by the DNP project-lead. The DNP project-lead screened for eligibility and, if eligible, obtained informed consent. The DNP project-lead completed the participant screening form with the participant. Participants were instructed to complete both the CST questionnaire and the CIVIQ-20 before the education session. All participants were prescribed and provided with compression stockings. Each participant received verbal instructions to wear their compression stockings for a minimum of 8 hours per day and to remove stockings when the participant was in bed. Participants were also provided an enhanced educational intervention, which included the brochure for compression stockings. Additionally, the brochure was reviewed and given to the participants. A simulation including the donning and doffing of compression was reviewed. A follow-up visit to the clinic was scheduled for five weeks after the intervention. At the follow-up visit, the QoL and CST questionnaires were re-administered. All participants were given a \$10 Visa or \$10 Starbucks card after submission of the post-intervention survey.

### **Data Analysis**

The primary outcome of interest was the change in QoL from baseline pre-intervention to the post-intervention visit at five weeks. A secondary outcome of interest was the change in CST

knowledge Score. Distributions of participant characteristics were calculated. For continuous measures such as age, calculations of central location (means and medians), variation (standard deviation, kurtosis), percentiles, and range were reported. For non-continuous variables, such as race/ethnicity, frequency distributions and modes were reported. Differences between the pre-intervention at baseline to post-intervention at the five-week follow-up visit were evaluated using the Wilcoxon signed-rank test. Tests were 2-sided with an alpha-level set at 0.05.

### **Implications for Future Research**

This project assessed if providing participants with enhanced education about compression stocking use would increase knowledge and improve participants' overall QoL compared to standard care. Clinical guidelines are available for CVI; however, there is no standardization of patient education. Future research is needed to identify best practices, treatment methods, and procedures to improve patients' knowledge of CVI and CST, as well as improve CST adherence outcomes to improve patients' QoL.

The healthcare system must also address the issues in long-term management, with issues contributing to patient non-adherence (Lurie et al., 2019). Future research can incorporate subgoals to include CST adherence. Clinical guidelines identify the gap between evidence and practice (Zuiderent-Jerak, 2009). Though there is evidence supporting the efficacy of patient education, the preponderance of studies measuring compression stocking treatment adherence is limited. This project aimed to connect patients' improved knowledge-base and measure data for treatment adherence. This model may be generalized to other outpatient settings to expand this sector of research. Furthermore, the significant burden of CVI among racial and ethnic populations demonstrates that CST education can successfully modify risk factors, resulting in fewer venous ulcers, and improvement in quality of life, particularly for the most vulnerable

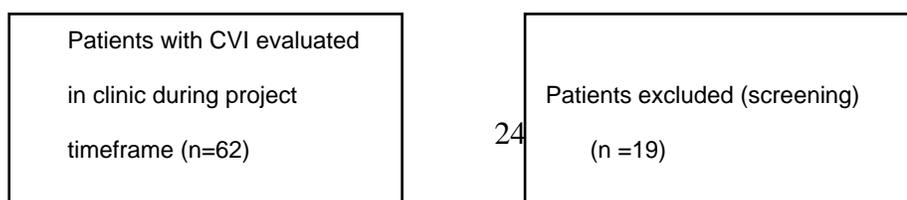
individuals (Protz et al., 2019). Knowledge gaps exist about the effect of education on the long-term utilization of CST, including CST cost and quality of life. The combination of patient education and innovative technological tools can present a great opportunity for enhancing access to care. As respected and highly capable professionals, Advanced Practice Registered Nurses are in a prime position to provide cost-effective patient education while delivering essential patient-care outcomes (Gonzalez, 2017).

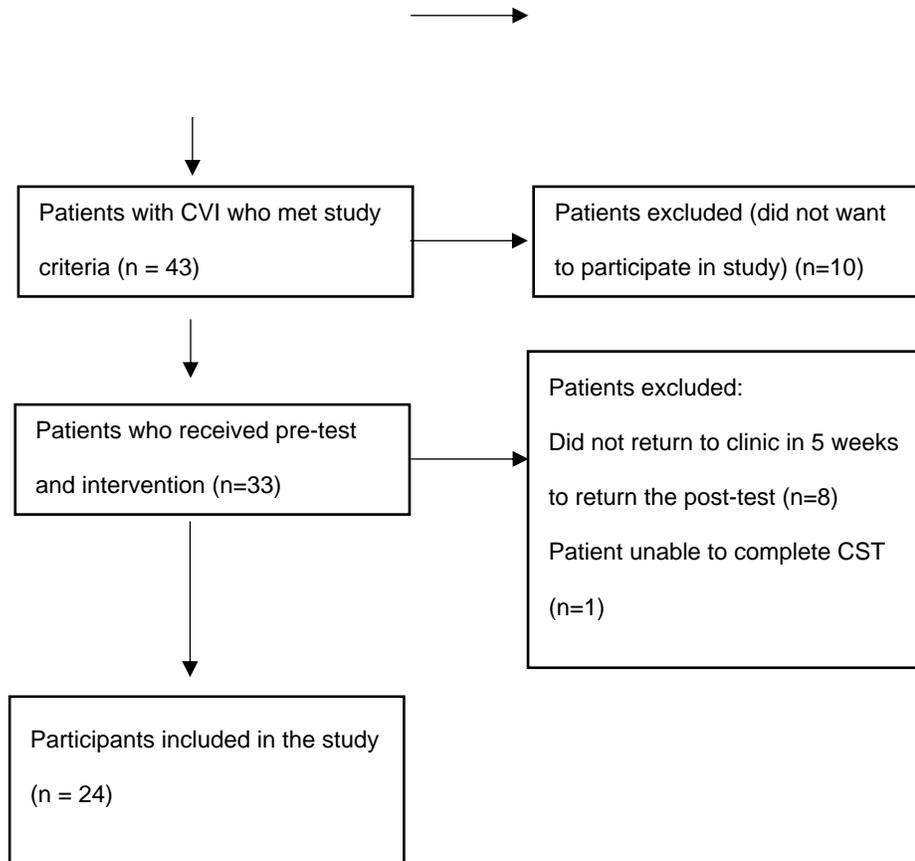
## CHAPTER FIVE: RESULTS

This QI study sought to determine whether a compression stocking education brochure and simulation demonstration affects patients' QoL with CVI using a pre-and post-test design with evaluation at five weeks post-intervention. The clinical question evaluated in this DNP Scholarly Project was: In patients with CVI and CEAP classification system of II and above (P), how does education provided through the use of a brochure, hands-on simulation, and provision of resources for implementing compression stocking usage (I), compared to the current practice of verbal instruction only (C), affect the quality of life (QoL) measured by the Chronic Venous Insufficiency Questionnaire- 20 (CIVIQ-20) over five weeks (T)? The results of the QI project suggest that compression stocking education provided through a brochure and hands-on simulation had a positive impact on the QoL of patients with CVI.

A total of 24 participants completed the study. Figure 3 illustrates the flow diagram of the participants selected. Eight patients did not return for the post-test. One patient was excluded from the study due to having to stop using CST and switching to Unna boot application.

**Figure 3:** *Flow Diagram of Process*





## Demographics

A total of 24 participants completed the study. Table 1 illustrates the demographics and clinical characteristics of the project participants and Table 2 displays Weight, Height, and BMI specifically. There were more women in the study (79.2%) than men (20.8%). Ages ranged from 25 to 34 (12.5%) to 75+ (8.3%) with the median age of  $Mdn = 49.50$  years. Seventy-five percent reported their health to be somewhere between “good” to “excellent.” Seventy-one percent were employed. The most common living arrangements were living with living with extended family (45.8%) or living with their children (20.8%). Education level ranged from 8<sup>th</sup> grade or less (20.8%) to 4-year college degree (4.2%), with the median amount of education to be  $Mdn =$  high school graduate or GED. Most (87.5%) were Hispanic. The most common body mass index

(BMI) categories were Class 1 Obesity (41.7%) or Class 2 Obesity (29.2%) ( $M = 34.79$ ,  $SD = 6.67$ ) (see Table 1). Table 2 displays the descriptive statistics for the selected variables. These variables were weight, height, and BMI. The mean weight was  $M = 199.5$  pounds. The mean height was  $M = 63.5$  inches. The mean BMI level was  $M = 34.79$  (see Table 2).

**Table 1:** *Participant Demographics*

Variable	Category	<i>n</i>	%
Gender	Male	5	20.8
	Female	19	79.2
Age Category <sup>a</sup>	25-34	3	12.5
	35-44	6	25.0
	45-54	5	20.8
	55-64	4	16.7
	65-74	4	16.7
	75+	2	8.3
Overall Health	Fair	6	25.0
	Good	13	54.2
	Very Good	3	12.5
	Excellent	2	8.3
Employment Status	Employed	17	70.8
	Retired	5	20.8
	Not employed	2	8.3
Living Arrangement	Lives alone	2	8.3
	Lives with a spouse	3	12.5
	Lives with their children	5	20.8
	Lives with a spouse and children	3	12.5
	Living with their extended family	11	45.8
	Education Level <sup>b</sup>		

8th grade or less	5	20.8
Some high school	4	16.7
High school grad or GED	9	37.5
Some college or 2-year college	5	20.8
4-year college degree	1	4.2

Note.  $N = 24$ .

<sup>a</sup> Age:  $Mdn = 49.50$  years old. <sup>b</sup> Education:  $Mdn =$  High school grad or GED

Variable	Category	$n$	%
Race/Ethnicity	Hispanic	22	88.0
	White	1	4.0
	Black	1	4.0
	Asian	1	4.0
BMI Range	Overweight (25.45 to 29.99)	4	16.0
	Class 1 Obesity (30.00 to 34.99)	10	40.0
	Class 2 Obesity (35.00 to 39.99)	8	32.0
	Class 3 Obesity (40.00 or higher)	3	12.0

Note.  $N = 24$ .

**Table 2:** *Descriptive Statistics for Selected Variables*

Variable	$M$	$SD$	Low	High
Weight	200.12	38.91	126.00	272.00
Height	63.44	3.77	58.00	76.00
BMI	34.97	6.59	25.45	54.33

Note.  $N = 24$ . BMI:  $M = 34.79$ ,  $SD = 6.67$ .

## Outcomes

At 5-weeks after receiving the CS education intervention, participants experienced greater improvement in their QoL based on the CIVIQ-20 scores as presented in Table 3. The total QoL score is the sum of the four domains: pain, physical, psychological, and social. The Total QoL and the four domains of QoL scores were lower following the intervention, Wilcoxon matched pairs test  $p < .001$ . For QoL, lower scores were more favorable.

Knowledge scores increased following the intervention. The perceived knowledge score experienced improved after the intervention from  $M = 1.35$   $SD = 0.62$  to  $M = 2.71$ ,  $SD = 0.55$ ,  $p < .001$ . The Psychological QoL score experienced improvement from  $M = 21.00$ ,  $SD = 7.01$  to  $M = 15.50$ ,  $SD = 4.99$ ,  $p < .001$ . The actual knowledge score experienced improvement from  $M = 4.38$ ,  $SD = 2.28$  to  $M = 6.58$ ,  $SD = 0.97$ ,  $p < .001$ . For knowledge scores, higher scores were more favorable. Inspection of the results showed all six outcomes to have more favorable posttest scores at  $p < .001$  (Table 3).

**Table 3:** Wilcoxon Matched Pairs Tests for Selected Scores

Score	Time	<i>M</i>	<i>SD</i>	<i>z</i>	<i>p</i>
Total Quality of Life (QoL) <sup>a</sup>	Pretest	54.00	14.24	- 4.25	<.001
	Posttest	40.50	10.39		
Pain QoL Score <sup>a</sup>	Pretest	13.00	3.63	-4.03	<.001
	Posttest	8.00	2.63		
Physical QoL Score <sup>a</sup>	Pretest	11.50	3.46	-3.71	<.001
	Posttest	9.50	2.83		
Psychological QoL Score <sup>a</sup>	Pretest	21.00	7.01	-4.04	<.001
	Posttest	15.50	4.99		

Social QOL Score <sup>a</sup>				-3.90	<.001
	Pretest	7.00	2.87		
	Posttest	5.50	2.25		
Perceived Knowledge Score <sup>b</sup>				-4.12	<.001
	Pretest	1.35	0.62		
	Posttest	2.71	0.55		
Actual Knowledge Score <sup>b</sup>				-3.86	<.001
	Pretest	4.38	2.28		
	Posttest	6.58	0.97		

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*Note.*  $N = 24$ .

<sup>a</sup> For the quality of life scores, lower scores are more favorable.

<sup>b</sup> For the knowledge scores, higher scores are more favorable.

## CHAPTER SIX: DISCUSSION

This QI study aimed to investigate the effects of a compression stocking education brochure and in-person simulation on the QoL of patients with CVI using a pre-and post-test design over five weeks. A total of 24 participants completed the study. The CIVIQ -20 was used to assess the impact of CVI on participants' QoL before and after the intervention.

Participants experienced improvement in their total QoL score after the compression stocking education brochure and the donning and doffing simulation intervention from  $M = 54.00$ ,  $SD = 14.24$  to  $M = 40.50$ ,  $SD = 10.39$ , Wilcoxon signed rank test  $p < .001$ . The lower QoL scores are more favorable. The CIVIQ-20 questionnaire is a reliable and valid instrument that provides an outline of four QoL measures: pain, physical, psychological, and social. The pain dimension addresses issues such as pain in the legs, impairment at work, sleeping poorly, and standing for long periods of time. Participants experienced improvement in their pain QoL score after the intervention from  $M = 13.00$ ,  $SD = 3.63$  to  $M = 8.00$ ,  $SD = 2.63$ , Wilcoxon signed rank

$p < .001$ . The improvement in the pain dimension suggests that the QI study reduced the symptoms of CVI and enhanced the patient's QoL.

The physical dimension is the second dimension of the CIVIQ -20 questionnaire. Participants experienced improvement in their physical QoL score after the intervention from  $M = 11.50$ ,  $SD = 3.46$  to  $M = 9.50$   $SD = 2.83$ , Wilcoxon signed rank  $p < .001$ . The physical dimension addresses issues such as climbing several floors, squatting, kneeling, walking at a good pace, and doing housework. Improving the physical dimension can have a significant impact on the patients' QoL as it can increase mobility, independence, physical function, and overall fitness.

The psychological dimension is the third dimension of the CIVIQ-20 questionnaire. The psychological dimension addresses issues such as feeling nervous, feeling of being a burden, being embarrassed to show their legs, becoming irritable easily, feeling disabled, having no desire to go out, taking precautions, getting tired easily, and difficulty in getting going. Participants experienced improvement in their physical QoL score after the intervention from  $M = 21.00$ ,  $SD = 7.01$  to  $M = 15.50$ ,  $SD = 4.99$ , Wilcoxon signed rank  $p < .001$ . Improving the psychological dimension is beneficial as it can improve stress, anxiety, and depression, which can have a positive impact on the patients' overall QoL.

The social dimension is the fourth dimension of the CIVIQ-20 questionnaire. The social dimension addresses issues such as going to parties, performing athletic activities, and being able to travel by car, bus, or plane. Participants experienced improvement in their social QoL score after the intervention from  $M = 7.00$ ,  $SD = 2.87$  to  $M = 5.50$   $SD = 2.25$ , Wilcoxon signed rank  $p < .001$ . Improving the social dimension can increase participants' QoL as it can increase their

participation in social activities, which can lead to increased social support, self-esteem, and overall well-being.

A knowledge questionnaire consisting of a 10-item utilized common themes found in the literature to guide content, including subjective knowledge of venous disease and effects, care of CST, beliefs about CTS use, and CST care were completed before and after the intervention. The use of common themes found in the literature to guide the content of the questionnaire is a valid approach to ensure that questions are relevant. This approach can address the most crucial issues related to venous disease and CST. The perceived knowledge score showed improvement after the intervention from  $M = 1.35$ ,  $SD = .62$  to  $M = 2.71$ ,  $SD = .55$ , Wilcoxon signed rank  $p < .001$ . The actual knowledge score experience improvement after the intervention from  $M = 4.38$ ,  $SD = 2.28$  to  $M = 6.58$ ,  $SD = .97$ , Wilcoxon signed rank  $p < .001$ . The higher scores in the knowledge questionnaire after the intervention indicate that participants have gained a greater understanding of CST, which is a positive outcome of the intervention

The QI study suggests that compression therapy education intervention including the use of a compression stocking education brochure and in-person simulation can be helpful in improving patients' knowledge and use of CST, leading to better QoL for patients with CVI. Limitations of the study included a small sample size, and the generalizability of the findings may be limited as the study was conducted among only English-speaking participants in a private practice clinic in Southern California. Testing at baseline may have altered the post-test results since the participant may have gained knowledge, experience, or awareness during the pre-test. In addition, another limitation consists of the efficiency of this intervention long-term effects.

## CONCLUSION

Chronic venous insufficiency is a prevalent condition that medical professionals too often neglect. Untreated CVI can lead to morbidity and decreased QoL. Compression therapy is the evidence-based standard for treating CVI. The use of a compression stocking education brochure, along with a hands-on simulation and provision of resources for implementing compression stocking usage, was associated with improved QoL as measured by the CIVIQ-20. The findings suggest that education interventions can increase patient knowledge of CVI and compression therapy, which can improve adherence to compression stocking use and ultimately improve QoL for patients with CVI. Healthcare providers need to recognize the severity of CVI and the negative impact it can have on a patient's daily life. The results of this QI project suggest that providing education and resources to patients can improve outcomes and should be part of standard care for patients with CVI. Future studies with larger sample sizes and diverse populations are needed to confirm the results of this study and to identify factors that affect adherence to compression therapy.

## APPENDICES

Appendix A

CEAP CLASSIFICATION (Laurie et al., 2020)

CEAP Classification System and Reporting Standard Revision 2020	
C (Clinical Manifestations), E (Etiology), A (Anatomic Distribution), P (Pathophysiology)	
<b>C0</b>	No visible or palpable signs of venous disease
<b>C1</b>	Telangiectasias or reticular veins
<b>C2</b>	Varicose veins
C2r	Recurrent varicose veins
<b>C3</b>	Edema
<b>C4</b>	Changes in skin and subcutaneous tissue secondary to chronic venous disease
C4a	Pigmentation or eczema
C4b	Lipodermatosclerosis or atrophie blanche
C4c	Corona phlebectatica
<b>C5</b>	Healed
<b>C6</b>	Active venous ulcer
C6r	Recurrent active venous ulcer

Notes: CEAP Classification system and Reporting Standard Revision.

## Appendix B

### Synthesis Levels of Evidence

	Protz et al. (2019)	Behairy & Masry (2022)	Zulec et al. (2022)	Gonzalez (2017)	Mahmoud et al. (2019)	Uhl et al. (2018)	Berszakiewicz et al. (2021)
<b>Level I: Systematic review or meta-analysis</b>							
<b>Level II: Randomized controlled trial</b>						X	
<b>Level III: Controlled trial without randomization</b>	X	X	X		X		
<b>Level IV: Case-control or cohort study</b>				X			X
<b>Level V: Systematic review of qualitative or descriptive studies</b>							
<b>Level VI: Qualitative or descriptive study, CPG, Lit Review, QI or EBP project</b>							
<b>Level VII: Expert opinion</b>							

#### SYMBOL KEY

X= Article used in Level of Evidence

## Appendix C

### Compression Stocking Brochure

### Stocking Care

Compression stockings do wear out. Help them last:

- Handwash or machine wash in cold water.
- Air dry your stockings.
- Do not put it in the dryer.
- Replace your stockings every 3 to 6 months.
- Don't use fabric softener.
- Use soap or mild detergent.



## Compression Stockings

### Benefits, Size, and Care



### Good Habits

Some helpful videos applying compression stockings

Applying Below-knee compression stockings



Applying thigh-high compression stocking





### Chronic Venous Insufficiency (CVI)

The valves in healthy leg veins open and close to help blood flow back to the heart. Sometimes, the valves do not close because they are damaged. Blood can leak back through the valves and collect in the veins in the lower legs.

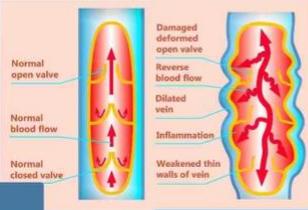
### Common Signs and Symptoms:

- Pain, aching, discomfort
- Feeling tired or fatigued
- Cramping, itching, skin color changes
- Swelling, open wounds



## What can you do?

### Wear your compression stockings



We often first recommend compression stockings if you have:

- Leg Vein Problems
- Leg Swelling

Compression stockings can help with:

- Swelling
- Feeling heavy or aching
- Pain or tired
- Restlessness
- Cramps

How do they work? By helping squeeze blood out of the leg:

- Help move blood from your legs to your heart
- Prevent blood clots
- Help treat and prevent venous wounds

Wear your compression stockings right before you get out of bed

Wear your compression stockings every day

Take them off when you are in bed

## Appendix D

### Chronic Venous Insufficiency Quality of Life Questionnaire – 20 (CIVIQ -20)

#### Questionnaire

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- C I V I Q 20 -

**SELF-QUESTIONNAIRE PATIENTS**

*English for the USA*

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Many people complain of leg pain. We would like to find out how often these leg problems occur and to what extent they affect the everyday life of those who have them.

Below is a list of symptoms, sensations and types of discomfort that you may or may not be experiencing and which might make everyday life hard to bear to a greater or lesser extent. **For each symptom, sensation or type of discomfort listed, we would like you to answer in the following way:**

Please consider whether you have experienced what is described in each sentence, and if the answer is 'yes', how **intense** it was. There are five response options. Please circle the one which best describes your situation.

Circle 1                      if the symptom, sensation of discomfort described does not apply to you

Circle 2, 3, 4 or 5        if you have felt it to a greater or lesser extent

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**- CIVIQ 20 -**  
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**QUALITY OF LIFE WITH VENOUS INSUFFICIENCY**

- 1)** During the past four weeks, have you had any **pain** in your **ankles** or **legs**, and how severe has this pain been?  
*Circle the number that applies to you.*

No pain	Slight pain	Moderate pain	Considerable pain	Severe pain
1	2	3	4	5

- 2)** During the past four weeks, how much trouble have you had at **work** or with your **usual daily activities because of your leg problems**?  
*Circle the number that applies to you.*

No trouble	Slight trouble	Moderate trouble	Considerable trouble	Severe trouble
1	2	3	4	5

- 3)** During the past four weeks, have you **slept poorly** because of your leg problems, and how often?  
*Circle the number that applies to you.*

Never	Rarely	Fairly often	Very often	Every night
1	2	3	4	5

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<b>During the past four weeks, how much <b>trouble</b> have you had <b>carrying out the actions and activities</b> listed below <b>because of your leg problems</b>?</b> <i>For each statement in the table below, indicate how much trouble you have had by circling the number that applies to you.</i>					
	No trouble	Slight trouble	Moderate trouble	Considerable trouble	Could not do it
<b>4)</b> Remaining standing for a long time	1	2	3	4	5
<b>5)</b> Climbing several flights of stairs	1	2	3	4	5
<b>6)</b> Crouching / Kneeling down	1	2	3	4	5
<b>7)</b> Walking at a brisk pace	1	2	3	4	5
<b>8)</b> Travelling by car, bus, or plane	1	2	3	4	5
<b>9)</b> Doing certain jobs at home (e.g. standing and moving around in the kitchen, carrying a child in your arms, ironing, cleaning the floor or dusting the furniture, house projects...)	1	2	3	4	5
<b>10)</b> Going out for the evening, going to a wedding, a party, a cocktail party...	1	2	3	4	5
<b>11)</b> Playing a sport, exerting yourself	1	2	3	4	5

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Leg problems can also affect your spirits. How closely do the following statements correspond to how you have felt during the past four weeks?  
*For each statement in the table below, circle the number that applies to you.*

	Not at all	A little	Moderately	A lot	Completely
<b>12)</b> I felt nervous/tense	1	2	3	4	5
<b>13)</b> I got tired quickly	1	2	3	4	5
<b>14)</b> I felt I was a burden	1	2	3	4	5
<b>15)</b> I always had to be cautious	1	2	3	4	5
<b>16)</b> I felt embarrassed about showing my legs	1	2	3	4	5
<b>17)</b> I got irritated easily	1	2	3	4	5
<b>18)</b> I felt as if I was handicapped	1	2	3	4	5
<b>19)</b> I found it hard to get going in the morning	1	2	3	4	5
<b>20)</b> I did not feel like going out	1	2	3	4	5

## Appendix E

### Compression Stocking Knowledge Questionnaire

#### COMPRESSION STOCKING THERAPY QUESTIONNAIRE

1. How much do you know about venous disease?
  1. Inadequate
  2. Sufficient
  3. Good
  4. Very Good
  
2. How much do you know about the effects of compression therapy?
  1. Inadequate
  2. Sufficient
  3. Good
  4. Very Good
  
3. How much do you know about the care of compression stockings?
  1. Inadequate
  2. Sufficient
  3. Good
  4. Very Good
  
4. Which of the following may increase the risk of developing venous disease?  
(Circle all that apply)
  1. Exercise
  2. Prolonged standing or sitting
  3. Heredity
  4. Underweight
  
5. What are the effects of compression therapy? (Circle all that apply)
  1. Causes pain
  2. Improves pain
  3. Restricts blood flow
  4. Improves wound healing
  
6. How often should you wear compression stockings?
  1. Once a week
  2. Every other day
  3. Daily
  4. Occasionally

7. When should you use your compression stockings?
  1. I am to place the stocking right before getting up out of bed
  2. At the end of the day
  3. Throughout the night
  4. All day
  
8. How often should you wash your compression stockings?
  1. Once a week
  2. Every other day
  3. Daily
  4. Not at all
  
9. What type of detergent do you use to clean your compression stockings?
  1. Mild detergent
  2. Heavy-duty detergent
  3. Fabric softener
  4. None of the above
  
10. How do you dry your compression stockings?
  1. Dryer
  2. Hang dry
  3. In the sun
  4. None of the above

## Appendix F

### Participant Screening Form

PARTICIPANT SCREENING FORM	
<b>PARTICIPANT ID</b>	_____
<b>Gender at birth</b>	Male Female
<b>Weight</b>	_____ lbs
<b>Height</b>	_____ inches
<b>Age</b>	19 to 24 25 to 34 35 to 44 45 to 54 55 to 64 65 to 74 75 or older
<b>In general, how would you rate your overall health now?</b>	Poor Fair Good Very good Excellent
<b>Employment status</b>	Employed Retired Not employed
<b>Housing</b>	Lives alone Lives with a spouse Lives with their children Lives with a spouse and children Retirement home Living with extended family Living at a facility Unhoused
<b>Education level</b>	8 <sup>th</sup> grade or less Some high school, but did not graduate High school graduate or GED Some college or 2-year degree 4-year college degree More than 4-year college degree
<b>How would you describe your race?</b> (circle all that apply)	American Indian or Alaskan Native Asian Black or African American Native Hawaiian or Pacific Islander White Hispanic

**Health history**      Lymphedema  
                                  DVT  
                                  Hypertension  
                                  Congestive heart failure  
                                  Pericarditis  
                                  Kidney disease  
                                  Nephrotic syndrome  
                                  Cirrhosis  
                                  Diabetes  
                                  Obesity  
                                  Hypoproteinemia  
                                  Pulmonary hypertension  
                                  Emphysema  
                                  Other not listed \_\_\_\_\_

**Are you currently pregnant?**      Yes /  
                                  No

**Do you currently have any of the following?**      Cellulitis  
                                  Achilles tendon rupture  
                                  Anterior cruciate ligament (ACL) injury  
                                  Osteoarthritis  
                                  Rheumatoid arthritis  
                                  Knee bursitis  
                                  Sprained ankle

**CEAP Classification**      Clinical Classification  
                                  No visible signs  
                                  Telangiectasias  
                                  Varicose veins  
                                  Edema  
                                  Pigmentation  
                                  Healed ulcer  
                                  Active Ulcer

**Current Medication List**

## Appendix G

### Consent to use CIVIQ-20 Screening Tool

#### CIVIQ self-questionnaire for my patients

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launois.reesfrance@wanadoo.fr <launois.reesfrance@wanadoo.fr>  
To: bernice t <berniceztan@gmail.com>  
Cc: launois.reesfrance@wanadoo.fr

Sat, Sep 24, 2022 at 2:34 AM

Hi Bernice,

I would like to thank you for your interest in my work and I am pleased to accept your request to use the CIVIC 20 in your research. Please find attached a recent article that may help you in the writing of your work.

Best regards

Robert Launois

**Robert Launois PhD,**

**Professeur des Universités,**

**Agrégé des Facultés de Sciences Economiques,**

**Président-Fondateur REES France SAS,**

**Ancien Président de la Société Française d'Economie de la Santé**

**28 rue d'Assas, 75006 Paris.**

**Tel : +33 (0)1 44 39 16 90**

**Mob : +33 (0) 6 07 82 07 45**

**[Launois.reesfrance@wanadoo.fr](mailto:Launois.reesfrance@wanadoo.fr)**

TABLE OF EVIDENCE

Author, Year	Purpose	Sample & Setting	Methods, Design, Interventions, Measures	Results	Discussion, Interpretation, Limitation of Findings
<p><u>Protz, K., Dissemond, J., Seifert, M., Hintner, M., Temme, B., Verheyen-Cronau, I., Augustin, M., &amp; Otten, M. (2019). Education in people with venous leg ulcers based on a brochure about compression therapy: A quasi-randomised controlled trial. <i>Interna</i></u></p>	<p>To examine knowledge after implementation of a brochure.</p>	<p>Sample: 136 patients (26.5% men &amp; 73.5% women). Mean age: 71 years (median: 74 years; range: 38–94 years)</p> <p>Setting: Germany and Austria. 38.2% enrolled in clinical wound practice, 20.6% at medical practices, 36.8% enrolled in ambulatory care, and 4.4% at hospitals</p>	<p>Quasi-randomized controlled trial. Two groups: control (n = 68) and case (n = 68) groups.</p> <p>Instruments used a brochure and a questionnaire.</p> <p>Intervention: education on knowledge and self-care of venous leg ulcers (VLU) and related compression therapy.</p> <p>After reading a brochure regarding venous</p>	<p>Case and control groups exhibited significantly varied VLU durations (P =.009). Control had VLU: mean: 18.3 months; median: 8 months; range: 1–264 months. Case had VLU mean: 8.5 months; median: 6 months; range: 1–98</p> <p>Ordinal and nominal data used frequency distribution and percentages. Chi-square test; Fisher's exact test (FET) were applied when more than 20% of the cells had expected counts below five (significance level of <math>\alpha = 0.05</math>). Case group, all patients (n = 68) read</p>	<p>Effective brochure for enhancing patient satisfaction and adherence. Increased awareness and comprehension of VLU may enhance patient adherence and empowerment, hence promoting VLU recovery. Medical and nursing personnel could benefit from an instructive pamphlet that supplements individual education.</p> <p>The brochure population may not be transferrable to other brochures. The brochure is written in German and is dense with material. Participants were not allowed to ask inquiries</p>

<p><i>tional Wound Journal, 16(6), 1252–1262.</i>  <a href="https://doi.org/10.1111/ijwj.13172">https://doi.org/10.1111/ijwj.13172</a></p>		<p>Duration: October 2018 until March 2019</p>	<p>illness and compression therapy, the case group answered a questionnaire. Questions varied from VLU and compression treatment fundamentals to aspects of self-care.</p> <p>The control group answered the identical questions without reading the brochure beforehand.</p>	<p>the brochure 85.3% of occurrences. Case group (85.3%) read brochures were read within 1-13 days, (14.7%) read within 3 weeks (14 – 21 days). Case group was better informed about their conditions, compression therapy, and how to appropriately support the measures.</p>	<p>in order to minimize misunderstanding and, as a result, rejection. May not be generalizable to United States healthcare system.</p>
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<b>Author, Year</b>	<b>Purpose</b>	<b>Sample &amp; Setting</b>	<b>Methods, Design, Interventions, Measures</b>	<b>Results</b>	<b>Discussion, Interpretation, Limitation of Findings</b>
Behairy, A. S. & Masry, S. E. (2021). Impact of educational nursing	To assess the effect of an educational nursing intervention	Sample: 80 adult patients with healed venous leg ulcers (VLU), between 40-57	A quasi-experimental. Two groups design. Control group (received standard leg ulcer	Knowledge and adherence scores between pre and post-intervention 3, 6,12 months showed substantial difference	Participants receiving educational nursing interventions scored higher on knowledge tests than the control group receiving

<p>intervention on compression therapy adherence and recurrence of venous leg ulcers: A quasi-experimental study. <i>Ocular Oncology and Pathology</i>, 8 (2), 120-132.  <a href="https://doi.org/10.1159/000521054">https://doi.org/10.1159/000521054</a></p>	<p>on compression therapy adherence and recurrence of venous leg ulcers among patients with chronic leg ulcers.</p>	<p>years, with a mean of 48.3, and with more male participants</p> <p>Setting: Menoufia University in Egypt from July 2018 to the February 2020.</p>	<p>information) study group (received educational interventions).</p> <p>Brochure and pictorial board covered illness expansion-progression, preventive strategies to facilitate treatment adherence- reduce recurrences. One researcher led all educational sessions &amp; interviewed study participant for 45 minutes.</p> <p>Measures: #1 Total knowledge level scores for the pretest, study and control groups (baseline), 1 month after intervention, 3, 6,</p>	<p>between the two groups (<math>p</math> value 0.05).</p> <p>Study showed good association between total knowledge scores and adherence in chronic VLU patients in the intervention group. High significant statistical difference between the intervention groups during pretest, after 1 and 3 months (<math>r = 0.885</math> at <math>p = 0.0001</math>, <math>r = 0.774</math> at <math>p = 0.0001</math>, and <math>r = 0.477</math> at <math>p = 0.002</math>). <math>\chi^2</math> used to compare two or more categories; T-test compared two sets of parametric data from independent samples; Mann-Whitney test's <math>Z</math> value to compare nonparametric means from independent samples.; ANOVA <math>F</math>-value used to compare more than two parametric data means. Proportion testing compared proportions</p>	<p>conventional VLU treatment. Educational nursing interventions group showed higher compression treatment adherence compared to control group.</p> <p>Educational nursing interventions group had a lower VLU recurrence rate than the control group.</p> <p>Limitations: The educational intervention consisting of a pictorial board and written colored brochure was utilized and may not be transferable</p> <p>Setting in Egypt may not be generalizable to U.S.</p>
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			and 12 months of follow-up. #2 Compression therapy adherence scores at baseline, 1 month after intervention, 3, 6, and 12 months. #3 A new ulcer in the same area is a recurrence.	and percent change (Z test).	
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<b>Author, Year</b>	<b>Purpose</b>	<b>Sample &amp; Setting</b>	<b>Methods, Design, Interventions, Measures</b>	<b>Results</b>	<b>Discussion, Interpretation, Limitation of Findings</b>
Uhl, J. F., Benigni, J. P., Chahim, M., & Frédéric, D. (2018). Prospective randomized controlled study of patient compliance in using a compression stocking: Importance of	To assess patient compliance using a thermal sensor use.	Sample: 44 female participants; Four patients excluded from the study. Two groups are comparable in age, symptoms, and CS type.  Setting: physician office in France	A single, randomized, blinded, controlled experiment. two groups of 20 persons each. Group 1 received minimal advice from the physician regarding CS use in the office. Group 2: Receiving in-depth MD recommendations via SMS texts weekly for four	The t-test was used to compare the mean wearing durations/days with a significance level of p 0.05.  The thermal curve analysis demonstrated a 33% increase in the average daily wearing time for group 2: 8 h vs. 5.6 h, p = 0.01. As a direct result of physician advice, patient compliance increases from 48.5% to 70%, with the average number	The only study to examine compliance with compression therapy among CVD patients utilizing a thermal sensor. Reveals that enhanced and frequent practitioner recommendations lead to a 33% increase in compression use.  Implications for the future: The absence of a definition of compliance is problematic in these results. Increase in

<p>recommendations of the practitioner as a factor for better compliance. <i>Phlebology</i>, 33(1), 36–43. <a href="https://doi.org/10.1177/0268355516682886">https://doi.org/10.1177/0268355516682886</a></p>			<p>weeks commencing day 1.</p> <p>MD provided in-depth instructions reinforced through SMS messages sent weekly x four weeks &amp; monitored by a sensor. The CIVIQ-14 was used to assess patient-reported QoL.</p>	<p>of days worn per week increasing from 3.4 (group 1) to 4.8 (group 2). (p 0.001).</p> <p>Substantial link between wearing time and two QoL parameters: psychological and social (p 0.001 for both). Observed no link with the two other CIVIQ-14 dimensions, physical and pain.</p>	<p>wearing days, and not the daily average wearing time, leads to an increase in wearing time.</p> <p>Limitations: Measurement instrument is 97% accurate with a 3% error range; Maximum inaccuracy per recording cycle is 19 min for 11 h of wear time (3%); Thermotrack should not exceed 23C; four-week short duration; investigation was limited to one location; failure to improve pain in CIVIQ-14 may be due to limited number of participants and final pain score wasn't recorded.</p>
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<b>Author, Year</b>	<b>Purpose</b>	<b>Sample &amp; Setting</b>	<b>Methods, Design, Interventions, Measures</b>	<b>Results</b>	<b>Discussion, Interpretation, Limitation of Findings</b>
Gonzalez A. (2017). The Effect of a Patient	To assess the effects of a home-based	Sample: 3 groups of patients. Group A (n =	Prospective study and retrospective analysis.	Descriptive statistic used for subscales and unpaired t test used to evaluate difference in	Results demonstrate patient education improves disease and

<p>Education Intervention on Knowledge and Venous Ulcer Recurrence: Results of a Prospective Intervention and Retrospective Analysis. <i>Wound Ostomy Management</i>, 63(6), 16–28.</p>	<p>patient education program on disease and self-care knowledge, as well as ulcer recurrence rates.</p>	<p>28), Group B patients (n = 22), control group patients (group C, n = 45). Greater than 50% were female and between 65- 74 years of age.</p> <p>Participants in Group A &amp; B had a healing venous leg ulcer (VLU) for at least 5 weeks before the education intervention. Group C did not receive additional education.</p> <p>Setting: Participant’s homes located in South Florida</p>	<p>Group A received education intervention/ assessments in an earlier trial and participated in a 36-week follow-up. Group B patients (n = 22) evaluated after 2, 9, and 36 weeks. A retrospective chart review was performed on group C.</p> <p>Intervention: A 45-minute, one-on-one presentation at participant’s home comprised visual aids, brochure, handout on care and activities.</p> <p>Patient Learning was used to test pre- and post-intervention knowledge about disease process (6 items, range 0-6) and self-care</p>	<p>disease knowledge and self-care knowledge. In groups A and B, 36-week knowledge scores were higher than baseline: Group A:4.13 ± 0.437 and 10.7 ± 0.421, respectively &amp; Group B: 4.22 ± 0.231 and 10.9 ± 0.871, respectively using unpaired t test.</p> <p>Groups A and B had similar 36-week scores (P =.687).</p> <p>Groups A and B (50% and 45%, respectively) had lower recurrence rates than the control group (69%).</p>	<p>self-care knowledge scores.</p> <p>Limitations: Studies including larger patient cohorts and longer follow-up times are necessary.</p>
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			<p>activities to prevent recurrence (7 items, range 0-7). Higher scores indicate more knowledge. Wound healing and recurrence also assessed.</p> <p>Data analysis included descriptive statistics and unpaired t-tests.</p>		
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<b>Author, Year</b>	<b>Purpose</b>	<b>Sample &amp; Setting</b>	<b>Methods, Design, Interventions, Measures</b>	<b>Results</b>	<b>Discussion, Interpretation, Limitation of Findings</b>
Žulec, M., Rotar Pavlič, D., & Žulec, A. (2022). The effect of an educational intervention on self-	An experimental pre-post intervention study involving administering an educational brochure to increase awareness	Sample: 308 participants with a venous leg ulcer that had scheduled an appointment at a vascular surgery outpatient clinic	Experimental pre-post intervention study. Two groups: control (n = 96) and experimental (n = 112).  All participants survey questions were repeated after 3 months.	308 patients with VLU were approached and 208 completed the study.  Knowledge improvement was seen in compression therapy: Wilks Lambda = 0.88, F(1.11) = 15.38, p < 0.001.  Knowledge improvement was seen in Hand	Recent research has focused on wound care education for acute wounds rather than patient education for chronic wounds.  Patient education on illness and self-care improves knowledge. This study educated patients using a brochure

<p>care in patients with venous leg ulcers—A randomized controlled trial. <i>International Journal of Environmental Research and Public Health</i> 2022, 19, 4657. <a href="https://doi.org/10.3390/ijerph19084657">https://doi.org/10.3390/ijerph19084657</a></p>	<p>of compression therapy, knowledge of recurrence prevention, appropriate lifestyle habits, and warning signs related to venous leg ulcers.</p>	<p>Setting: 3 hospitals in central Croatia—university hospital in Zagreb, general hospital in Bjelovar, general hospital in Koprivnic.</p> <p>Duration: Observational period of 4 months in 2019.</p>	<p>Participants in the experimental group received brochure, explanation of brochure, and the control group did not receive a brochure.</p> <p>All participants were informed they would be examined again after 3 months on their control exam.</p> <p>The instrument standardized &amp; non-standardized questions to assess “VLU duration and recurrence; attitude toward compression therapy, type, and frequency of compression therapy used; knowledge of wound</p>	<p>hygiene: one-way ANOVA Wilks Lambda 0.904, <math>F(1.11) = 11.729</math>, <math>p &lt; 0.05</math>.</p> <p>In experimental group, after education, knowledge increased in participants who responded and were able to identify what treatments were effective for VLU.</p>	<p>based on their educational needs. Compression therapy, skin care, nutrition, physical activity, warning signs, hand hygiene, and knowledge improved with education.</p> <p>Study strength: The study had a high level of participation and data completeness.</p> <p>Study limitation: The study was conducted at the level of secondary health care.</p>
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			<p>management and wound care.”</p> <p>The brochure contained an explanation of the causes of VLU, wound dressing, photos, types and benefits of compression therapy , with descriptions of the position of the body at rest, nutritional advice, activities for people with limited mobility.</p>		
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<b>Author, Year</b>	<b>Purpose</b>	<b>Sample &amp; Setting</b>	<b>Methods, Design, Interventions, Measures</b>	<b>Results</b>	<b>Discussion, Interpretation, Limitation of Findings</b>
<p>Mahmoud , S., El-Sayed, Z., Abodeif, H. (2019). Effect of nursing instructions on patient's knowledge and venous leg ulcer healing. <i>International Journal of Novel Research in Healthcare and Nursing</i>. Vol. 6, Issue 3 (1068-1076).</p>	<p>To assess the effect of nursing instructions on patient's knowledge and venous leg ulcers (VLU) healing.</p>	<p>Sample: convenient sample 30 adult male and 30 female patients with first time VLUs.</p> <p>Setting: Vascular Disease Outpatient Clinic and inpatient ward at Kaser El-Aini Hospital affiliated to Cairo University Hospital.</p>	<p>A quasi-experimental design (comparison group pre-post design).</p> <p>Two groups: control (n = 30) and experimental (n = 30).</p> <p>Intervention: Illustrative booklet that designed by the author consisting of CT, elevation/exercise/diet</p> <p>3 tools were used: 1) Demographic and medical data form. 2) Patient's knowledge assessment tool of VLUs management. 3) Bates-Jensen Wound Assessment tool.</p>	<p>All participants in study group had satisfactory level of knowledge <math>\geq 75\%</math> at the 2nd and 4th weeks after educational nursing instructions.</p> <p>At 4 weeks, 83.3% of the study group had minimal wound regeneration compared to 53.4% of the control group.</p> <p>Positive correlation demonstrated between the total knowledge score and the healing of VLUs in the study sample, <math>r=.09</math> at <math>p0.0001</math>.</p>	<p>The current study demonstrated that there are highly significant differences between VLU patient knowledge and healing.</p> <p>The current study concluded that effective nursing instructions are crucial for enhancing patients' knowledge of VLUs management and wound healing.</p> <p>Limitation: Study found one third suffered from chronic diseases such as diabetes and hypertension and two thirds of studied subjects were smokers. chronic diseases such as diabetes and hypertension</p>

<b>Author, Year</b>	<b>Purpose</b>	<b>Sample &amp; Setting</b>	<b>Methods, Design, Interventions, Measures</b>	<b>Results</b>	<b>Discussion, Interpretation, Limitation of Findings</b>
<p>Berszakiewicz, A., Kasperczyk, J., Sieroń, A., Krasinski, Z., Cholewka, A., &amp; Stanek, A. (2021). The effect of compression therapy on quality of life in patients with chronic venous disease: A comparative 6-month study. <i>Postępy Dermatologii i Alergologii</i>, 38(3), 389–395. <a href="https://doi.org/10.5114/ada.2020.92277">https://doi.org/10.5114/ada.2020.92277</a></p>	<p>To compare the QoL (quality of life) in patients with primary superficial venous insufficiency at different stages pre- and post-compression therapy (CT).</p>	<p>Sample: 180 subjects with primary CVD, never treated with CT, enrolled via survey-based study.</p> <p>Setting: Department of Internal Diseases, Angiology, and Physical Medicine in Bytom, Medical University of Silesia in Katowice, and Vascular Clinic in Koszęcin.</p>	<p>Quasi-experimental design. Compared the change in QoL metrics between baseline and the conclusion of 6 months of CT</p> <p>Subjects grouped into six subgroups by means of CEAP classes and evaluated by both CEAP and VCSS.</p> <p>Each patient instructed to wear compression for at least eight hours per day, with the night off. 24-hour ready-made CT for patients with venous leg ulcers. After 6 months of CT, participants' discomfort is reviewed and a questionnaire is administered.</p>	<p>CT lowered the estimated severity of CVD. All QL domains demonstrated significant improvement in quality of life six months after receiving CT. C2 grew from 30 to 49 individuals, C3 declined from 30 to 11 subjects, C5 climbed from 30 to 52, and C6 fell from 30 to 8 subjects, suggesting improvement.</p> <p>T-test or Mann-Whitney U-test was utilized to analyze differences between groups. For parametric and nonparametric quantitative variables, the Paired T-test and Wilcoxon signed-rank test are utilized. The c2 and maximum likelihood estimation (MLE) are used to qualitative variables. All comparisons were considered significant if <math>p &lt; 0.05</math>.</p>	<p>CT has a considerable impact on QoL in patients with all stages of CVD.</p> <p>Patients with CVD have the lowest QoL, which deteriorates significantly as the condition progresses.</p> <p>The selection of CT and adherence to therapy are prerequisites for CT efficacy. Optimal clinical effect and quality of life can be achieved by patient education on CT principles and specific suggestions.</p>

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