Chronic vascular wounds

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Chronic Vascular Wounds

Submitted by

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DEDICATION

I dedicate this work to my loving family, my children K. Daniel Vandock, Bethany Vandock-Diaz, and Sarah M. K. Krieger, my husband Patrick, my father Charles L. Long and my friend, Leslie Van Ostran. My mother, Clarice L. Long, my aunt, Mary A. Layman, my mentor and my brother Cecil L. Long whom are deceased however live in my mind and soul Their love, support and understanding have encouraged me to complete this research and I am grateful for your words of kindness and belief that I would achieve my goal.
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CHAPTER I

INTRODUCTION

Chronic venous insufficiency is a widespread, debilitating disease and is estimated to affect 10 to 15 million Americans with the loss of two million work days annually (Motykie, Caprini, Arcelus, Reyna, Overrom, & Mokhtee, 1999). Frequent causes of this disease are an alteration in the elasticity of the venous walls or the dysfunction of the venous valves (Yuwono, 2000). Chronic venous insufficiency may result from venous hypertension or valvular incompetence (Popoola, 2003). Valves may be destroyed by a previous blood clot or hereditary disorder that causes a build up of venous blood and lymphatic fluid. Chronic venous insufficiency can lead to venous ulcerations or wounds of the lower legs that may result in the loss of limbs. It is imperative for healthcare professionals to promote healing with advanced wound care. Compression wraps are widely used for the treatment of chronic venous insufficiency. Also, silver impregnated wound dressings have proven valuable in the healing process. Limited research, however, has been completed on the combined use of these treatments.

This chapter will provide an overview of chronic venous insufficiency, the statement of the problem, purpose of this research, the conceptual framework of Kurt Lewin’s change theory (1938), and four research questions. In addition, the conceptual and operational definitions of key terms, and anticipated findings are presented. The final sections of this chapter will explore the significance of the research to nursing, the assumptions, and the limitations.

Statement of Problem

Chronic venous insufficiency, or CVI, is estimated to affect 1% of the general
population and has enormous, psychological consequences for each person with this
disease (Goldman, Franklin, Brewley, & Salcido, 2003). Affects of CVI include loss of
earnings, discomfort, limited mobility, social isolation, embarrassment, negative self
image and depression (Charles, Callicot, Mathurin, Ballard, & Hart, 2002). In the United
States it is estimated that 6 to 7 million people have skin changes and 500,000 persons
have active ulcerations as a result of CVI (Hall & Schumann, 2001). In the United States
it is estimated that chronic non-healing wounds caused by inadequate blood flow account
for 80% to 90% of all extremity wounds (Hall & Schumann). Medicare claims represent
a patient per wound cost of more than $20 thousand per single episode with an estimated
$5 billion to $7 billion annual cost for chronic wounds in the United States (Hall &
Schumann). Chronic venous insufficiency can be as simple as telangiectasis or spider
veins and extend to skin changes that result in pain, ulceration and non-healing venous
wounds.

Chronic venous insufficiency (CVI), or the obstruction of the return of venous
blood from the lower extremities, causes edema, discoloration of the skin or changes in
pigmentation and lipidermatosclerosis, or the hardening of the skin (Goldman et al.,
2003). This hardening of the skin will lead to further staining or discoloration of the skin
(Allen, 1990). The progression of this disease often will lead to venous stasis ulceration
that requires intensive treatments to promote healing. If the lack of circulation to an
extremity is not reversed, ulcerations may occur and a repetition of non-healing venous
ulcers may occur (Allen).

One theory states that CVI is caused by the reduction of oxygen delivery to the
tissues and the return of venous circulation to the general system. The oxygen and blood
supply pool in the extremity not allowing a revitalized oxygen and blood to recirculate. Bowman and Hogan (1999) found in their research that when edema occurs in an extremity, there is an increase in the oxygen level and circulation in that extremity. Venous insufficiency is caused by this increase in venous outflow obstruction, thrombosis or incompetent valves of perforating or deep veins. When oxygen is unable to return through the venous system it pools and causes increased venous pressure causing hypertension in that extremity. Bowman and Hogan states that this accounts for 80 to 90% of leg ulcers.

The pathophysiologic process of CVI or venous hypertension results when the calf muscle stops acting as a pump. The calf muscle pump functions by contracting around the outside of the vein causing the blood to remain within the vein wall (Motykie et al., 1999). The calf muscle pump does not control the flow of the blood but supports the valves in this function. Valves control the flow of the blood. These valves are one way within healthy veins; however, incompetence of these valves may occur from venous hypertension. When incompetence of the valves occurs, the calf muscle pumps can no longer function. The incompetence of the vein causes leg swelling and can lead to open ulceration (Motykie et al.).

Chronic venous ulcers may be of varying depth. However, the general description is usually shallow with irregular borders and extensive granulation (Bowman & Hogan, 1999). These ulcers have a reddish brown appearance due to the accumulation of erythrocytes, hemosiderin and melanin in soft tissues. Induration results from the fibrosis of the dermis and subcutaneous tissue or lipodermatosclerosis. The induration is a sign of
venous insufficiency and results in the lower leg having “an inverted champagne bottle appearance” (Bowman & Hogan, p. 50).

Major contributing factors that may slow healing of CVI wounds include the patient’s general medical condition, additional disease processes, environmental factors, and the treatment of the wounds (Hall & Schumann, 2001). Research has been completed using multiple types of dressings with variable healing rates. Fukuoka, Okada, & Sugimoto, (1999); Goldman et al., (2003) and Popoola (2003) have reported on compression dressings and the benefits of this type of dressing. Demling & DeSanti (2003) and Singer, Berrutti, & McClain (1999) have reported on the use of silver impregnated dressings for healing of CVI ulcers. Little research was located comparing various factors such as length of time for wound healing, age, and gender with the use of the combination of compression wraps and silver impregnated dressings.

Statement of Purpose

The purpose of this study was to compare the effect of using compression wraps alone against compression wraps combined with silver impregnated dressings on improving the healing time of chronic venous wounds of adults treated in an outpatient wound care clinic. The effect of age and gender on wound healing with CVI was examined.

Identification of Nursing Conceptual/Theoretical Framework

The Kurt Lewin change theory was the framework guiding this study (Lewin, 1938). The Lewin change theory describes driving and restraining forces (Smith, 2001). Driving forces can be defined as any force that causes a change in any direction due to the need for a change. This driving force maintains the momentum or keeps the force
going to produce change. Restraining forces are forces that restrain or hold back the
driving forces. The driving force in this study was the need for improved healing in CVI
while the restraining force is the type of wound dressing used by nurses and physicians.
The Lewin change theory addresses the desire for change with the use of a dressing
combination that may shorten the time of non-healing venous wounds (Lewin).

The Lewin change theory includes three steps (Lewin, 1938). The first step is
unfreezing. This step involves the assessing of the problem of which dressing to use
(compression wraps alone or compression wraps and silver impregnated dressings) based
on the degree of wound healing that has taken place. This would involve changing a
person’s (nurse’s) former belief system about which dressing is best. Unfreezing involves
changing previous beliefs which then encourages the desire for change to take place. The
present study will not measure belief system change but will measure the healing time of
both types of dressings. Previous chronic venous wound treatments or behaviors did not
yield satisfactory healing rates for the patients of the clinicians where the study took
place. The clinicians felt it was desirable to investigate what type of dressing promoted
more satisfactory healing rates, and based on that investigation, possibly change present
dressing practices (Figure 1).

The second stage of change is moving which involves planning and implementing
these changes. Data on wound change was not the focus and thus was not collected in the
present study. The focus of this study was on the healing time of the treatments. It was
anticipated that nurses would assume a new behavior, based on data collected, and use
the type of dressings that produced the shortest healing time of CVI wounds.
(Figure 1).
The third stage of change is refreezing and includes evaluating the change or results of the research. This involves changing nurse’s belief systems and accepting the new dressing procedure to reflecting the new wound healing based on results of the research. The outcome of the research, based on what the data reveal, may reflect that the use of compression wraps and silver impregnated dressings results in a faster healing time of chronic vascular wounds than the use of compression wraps alone.

Research Questions

Between August 1, 2002 and December 31, 2004:

1. Was the wound healing time longer among those who used compression wraps alone versus those who used the combination of compression wraps and silver impregnated dressings?

2. Is there a difference in initial wound healing time within seven to ten days or in the 14 to 20 day measurements among those who used compression wraps alone versus those who used the combination of compression wraps and silver impregnated dressings?

3. Was there a gender difference in wound healing time of patients who used compression wraps alone versus the combined use of compression wraps and silver impregnated dressings compared to those who did not?

4. Was there an age difference in wound healing time of patients who used compression wraps alone versus the combined use of compression wraps and silver impregnated dressing compared to those who did not?
Definition of Terms

Wound healing

Conceptual definition. Wound healing was conceptually defined as the four phases of repair that consist of homeostasis, inflammation, proliferation and remodeling (Clark, 2002). Each phase is required to promote wound healing and if a delay occurs in any of the phases, a delayed or prolonged healing will occur.

Operational definition. Wound healing was operationally defined as the length of time for wound repair, the wound size including length, and the width and depth of a wound that are documented on the patient’s chart. Wound healing involves that a wound is well approximated, not draining and no redness or signs of inflammation. Total length of treatment and wound healing was recorded in days.

Compression dressing

Conceptual definition. Compression wraps was conceptually defined as an ace wrap dressing or compression type wrap which is applied to an extremity to provide compression.

Operational definition. Compression wraps was operationally defined by each notation of compression wraps on the patient’s chart. The present study chart notations of seven patients in Group I that used the compression dressing only.

Silver Impregnated Dressing

Conceptual definition. Silver impregnated dressing was conceptually defined as the use of silver implanted particles on the matrix of the dressing. The mode of action for silver impregnated dressing is thought to be an antimicrobial effect of binding to DNA.
and causing a toxic effect to the replication of bacteria (Singer et al., 1999). The decrease in bacteria is believed to reduce the inflammation and this promotes healing.

Operational definition. Silver impregnated dressing was operationally defined by the use of Acticoat, SilvaSorb or a silver impregnated type dressing applied weekly and documented on the patient’s chart when the wound dressing is changed. The silver impregnated dressing was applied directly to the open wound but not covering healthy tissue and followed by the compression wrap. The present study of 20 patients in Group II used compression wraps and silver impregnated dressings.

Gender

Conceptual definition. Gender was conceptually defined as, “A grammatical category used in the analysis of nouns, pronouns, adjectives, and, in some languages, verbs that may be arbitrary or based on characteristics such as sex or animacy that determines agreement with or selection of modifiers, referents, or grammatical forms” (The American Heritage College Dictionary, 1997, p. 566).

Operational definition. Gender was operationally defined as male or female as documented on the patient’s chart.

Age

Conceptual definition. Age was conceptually defined as, “The length of time that one has existed, duration of life” (The American Heritage College Dictionary 1997, p.24-25). “Age related skin changes and functional immunity are recognized as influences on wound healing” (Clark, 2002).
Operational definition. Age was operationally defined as the stated number of years recorded on the patient’s chart. Patients used for this study was between the ages of 50 to 70 years.

Chronic venous insufficiency (CVI)

Conceptual definition. CVI was defined as a complex set of symptoms which result in poor venous return in the lower extremities. Clinical examples include tortuous engorged leg veins, hemosiderian or staining of the skin and edematous draining wounds (Mulder & Reis, 1990).

Operational definition. CVI was defined as the diagnosis noted or documented on the patient’s chart and that is based on a venous doppler diagnostic test or diagnosed by the physician as the patient having venous insufficiency.

Non-healing wounds

Conceptual definition. A non-healing wound was defined as a stage III or stage IV ulcer according to the National Pressure Ulcer Advisory Panel (NPAUP) in 1989. Stage III was defined as a full thickness skin loss extending to the underlying tissues but not involving muscle or bone. A stage IV ulcer extends to include a full thickness skin loss that involves muscle or bone (Clark, 2002).

Operational definition. A non-healing ulcer was defined operationally per documentation on the patient’s chart, as an open wound, that may be a draining, full thickness ulcer of the lower extremities. Each wound was present for four weeks or longer and received treatment at the wound center for four weeks or longer.
Significance

The use of compression dressings for chronic venous wounds is quoted as the gold standard by Fukuoka et al. (1999) and Popoola (2003) and the hallmark of treatment by Goldman et al. (2003). Compression wraps have a consistent pattern of healing the ulcerations and preventing the progression of CVI. The goal of elastic stockings, ace wraps or compression wraps is to provide a graduated compression, exerting the most pressure at the ankle, a decreased pressure at the calf and the least pressure at the thigh (Whitley, 1988). Most elastic stockings are made from nylon or cotton to provide durability. This fabric must provide a one or two-way stretch to provide compression for the extremity preventing the cumulative effect of edema. Wright, Lam, Buret, Olson & Barrell (2002) revealed that CVI is prevented from progressing to a more severe condition and preventing additional pain with the use of compression wraps. Motykie et al. (1999) estimates that for one year in the United States alone, a cost savings of one billion dollars could be achieved if compression wraps were used in CVI. The average percent of venous ulcer healing at 3 months is 20-70% and at 6 months is 40-80%. The average CVI wound heals with the use of a compression wrap in 4 to 6 months (Hafner, Luthi, Hanssle, Kammerlander, & Burg, 2000).

Another kind of dressing for CVI, silver impregnated dressing, exhibits an antimicrobial effect on an ulcer that reduces inflammation and facilitates a possible decrease in the wound healing time (Wright et al., 2002). The normal inflammatory response process assists the body in cleansing tissue debris and attacking invading microorganisms or bacteria. Wright et al. stated that a prolonged inflammatory response in wound healing may result in the destruction of tissue that would normally promote
This destruction of tissue delays wound healing by promoting a granulation process that further slows wound healing. O’Meara, Cullum, Majid & Sheldon (2001) state the relationship between wound healing and bacteria colonization remains somewhat unclear. O’Meara et al. also state their research indicates that higher bacteria counts of four or more bacteria groups may be the cause of delayed wound healing.

Similarly, Medline (2002) defines silver as an antimicrobial chemical which metabolizes quickly and is cytotoxic. Medline’s SilvaSorb, which is a silver impregnated dressing, has a controlled release of silver over seven days. SilvaSorb dressing offers protection over broad spectrum microbial bacteria and fungi which include methicillin resistant staphylococcus aureus (MRSA) and vancomycin resistant enterococcus (VRE).

Demling and DeSanti (2002) utilized a moistened silver dressing or an Acticoat dressing moistened with a 0.01% neomycin and polymyxin solution. Their study was completed on burn patients with 15% total body involvement. Demling and DeSanti’s study stated there was a 40% increase of re-epithelialization of tissue using a moistened silver dressing. This research supported the effectiveness of silver impregnated dressings.

However, there are limited studies examining the combination of compression wraps and silver impregnated dressings. The goal of the present retrospective chart review was compare the two treatments and to compare the effect of the two treatments on the healing of wounds caused by CVI. Also, a purpose is to determine if gender and age would provide a documented difference in wound healing time.

The significance of this retrospective chart review is that the results may provide evidence of shorter healing time of wound healing for the patient with CVI. The
information gained from the study may help decrease clinic visits, lower costs of
treatment and promote increased mobility and self esteem of the patient.

Assumptions

Documentation will be complete and accurate on each of the patient’s charts. All
measurements of wounds will be at seven to ten days and repeated at 14 to 20 day
intervals and at time of wound healing. There will be enough patient charts present to
complete this study.

Based on Lewin’s (1938) theory, resistance is common when implementing
changes. The moving and acceptance of new behaviors may be difficult for staff to accept
even when documented wound healing is presented. The improved wound healing will
provide the evidence and support new behaviors that will support the repetition of the use
of faster wound healing methods.

Limitations

The limitations of the present study have been that using data gathered through a
retrospective chart review did not include the measurements and recordings of multiple
nurses. These data may be inconsistently collected and recorded due to different
techniques used by those individuals or that patients have been noncompliant in
completing wound care at the wound care center on seven to ten day intervals. Also, the
patients whose charts were reviewed may not represent the entire community of patients
with chronic venous ulcers. Chronic venous ulcers may vary in size, and patient’s
compliance to the physician’s orders may also be a factor in chronic vascular wound
healing. A limited age range of 50 to 70 years of patients has been represented within this
study and can not be applied to other patients that are younger or older.
This study was a retrospective chart review of 80 charts. An increase in the number of charts reviewed may provide a different outcome. Time and money constraints of the researcher should be acknowledged as a limitation of the study as well as the level of expertise of the researcher.

Summary

The chapter explained the need for the study of the combined use of compression wraps and silver impregnated dressings. The statement of the problem, purpose of the research, theoretical framework, research questions, conceptual and operational definitions of key terms, hypotheses, significance of the research to nursing, and assumptions and limitations were stated. The importance of this study was to review healing rates by researching the use of a combination of compression wraps and silver impregnated dressing for promoting decreased CVI healing time. Also, the researcher reviewed the effect that age and gender on the CVI wound healing process.
CHAPTER II

LITERATURE

The primary goal of this research was to determine if compression wraps or compression wraps with silver impregnated dressings promoted increased wound healing of CVI. The effect of age and gender on wound healing with CVI was also examined.

This chapter describes the Kurt Lewin change model (Lewin, 1938) which is the conceptual model that was used in this research. A literature review is summarized for CVI utilizing compression, silver impregnated dressings and other dressing treatments for chronic vascular wounds. Variables of age and gender will be discussed in relationship to chronic vascular wound healing. A review of sample size, sampling technique, the instruments used in the research and the methodology will also be presented.

Conceptual Framework

The Lewin model (Lewin, 1938) assumes that in any change process, driving and restraining forces occur which promote and discourage change. Driving forces are forces that encourage change to occur; this promotes the continued change. Restraining forces withhold the change and decrease the driving force momentum. Equilibrium occurs when the driving and restraining forces are equal; this allows the implementation of the change to occur. The driving force in this research is the need for improvement in CVI healing while the restraining force is the type of wound dressing used.

Lewin’s change model defines unfreezing, moving and refreezing as important factors to promote change. Each step requires the researcher to evaluate the need for change, define the practice, and provide a possible option for change and documentation that may change treatment of CVI thus benefiting future CVI patients.
Unfreezing or stage 1 requires assessing the problem (wound healing) of which dressing to use that provides the shortest time span for wound healing. This unfreezing may provide options to the routine management of a standard practice. The CVI standard of practice is the use of compression wraps. The present study compared the healing time with compression wraps alone and the combined use of compression wraps and silver impregnated dressings for the individuals with CVI. A change in nurse’s behavior may need to occur based on what data indicate about the healing time for the dressings. Behavior change won’t be measured but variables of age and gender was collected to determine if these variables are a factor in chronic vascular wound healing.

Moving or stage 2 is planning and implementing these new options and obtaining the documentation outcomes of this practice. Moving occurs when the benefit or improved outcome of vascular wound healing is discovered and changes in chronic vascular wound treatments are considered. The center for wound care is very progressive and demands that the latest techniques for chronic vascular healing be implemented. If there is evidence from research that supports a change in the present treatment, it is anticipated that these changes will most likely be implemented.

Refreezing or stage 3 may occur if the outcome of a new practice provides an improved outcome or benefit to the patient and the researcher can successfully measure and provide documentation that encourages practitioners to begin a change in standard practice which is using the type of dressing that provides the shortest amount of healing time. Refreezing occurs when the new practice is implemented and believed to become the standard of practice. This practice requires a consistent reproofing of the original treatment with a positive outcome for the patient.
Stage 1  Unfreezing
Assessment of the problem, Chronic vascular wound healing

Stage 2  Moving
Planning and implementing change. Compression dressing and compression and silver impregnated dressings

Stage 3  Refreezing
Evaluating the change in wound healing with compression dressing alone and compression and silver impregnated dressing.

Successful change occurs when all three stages of change are implemented.

Goal: Improved Chronic Vascular Wound Healing

Driving
Forces driving to reach goal, Improved wound healing.

Restraining
Forces restraining from reaching goal, type of dressing used in CVI.

Restraining forces were not being measured in the present study. The restraining forces may occur when a change of practice is supported by research, but for unknown reasons, the original treatment of CVI is continued instead of a proven new method that promotes faster wound healing. The continued use of a slower healing dressing choice at the wound care center would be considered a restraining force.

Driving forces include these forces that “drive” faster or improved chronic vascular wound healing. This occurs when positive or improved wound healing has been supported by the research results. Marquis & Huston (1992) have stated the process of change requires three to six months before it is adopted in any system.

Review of Research

The literature review examines research on the effect of chronic vascular insufficiency on the veins in the lower legs. Research findings were compared from studies that used compression wraps alone or used the combination of compression wraps and silver impregnated dressings. Additional combinations of dressing treatments and their effect on healing will be presented. Findings reported in the articles include sample size, age, gender, and setting, sampling technique, results, purpose of the study, instrument identified and methodology. Much of the nursing research is descriptive, however, and there is little evidence of validity and reliability provided to evaluate the designs and tools the authors used.

Chronic vascular insufficiency (CVI) is often defined by the CEAP classification. The CEAP classification was developed during the 1994 American Venous Forum and includes the following: clinical manifestations (C), etiologic factors (E), anatomic
distribution of involvement (A), and the underlying pathophysiology (P). Clinical manifestations include no visible signs, telangiectasis, varicose veins, edema, pigmentation, healed or active leg ulcer (Motykie et al., 1999). Etiologic factors include congenital, primary or secondary causes. Anatomic distribution includes the level of involvement of CVI. It may be superficial, deep veins or perforating veins. The final factor is pathophysiologic classification which describes CVI by reflux, obstructive or both. Using this classification, CVI can be described more clearly to determine improvements or a worsening in the disease process.

Antignani (2001) further defined CVI using the CEAP classification: C: clinical; E: etiology; A: anatomy; P: pathophysiology. Antignani’s classification is designed to accurately compare the extremities for medical and surgical trials. Clinical classification is then subdivided into seven categories that include the following: 0) no visible or palpable signs of venous disease; 1) telangiectasis or reticular veins; 2) varicose veins; 3) edema; 4) skin changes ascribed to venous disease such as pigmentation, venous eczema, lipodermatosclerosis; 5) skin changes defined as previous healed ulceration; 6) skin changes defined as previous with active ulceration. Etiology is the defined cause of the venous extremity change such as peripheral vascular disease, injury or trauma. Anatomy is subdivided into superficial veins, deep veins and perforating veins. Pathophysiology is defined as reflux, obstruction or both. Most of the research studies that are discussed in this chapter have not listed their CEAP classification. Therefore, one study can not be compared with another study to determine if the wounds were equal because different classifications were used. Information will be presented from each study. Sample sizes
the research articles reviewed ranged from 1 to 257 participants and were generally between the ages of 19 to 93 years of age.

Singer et al. (1999) and Wright et al. (2002) provided studies completed on 20 to 30 kg. pigs. Settings ranged from a wound care clinic, two hospitals in Illinois, an ambulatory clinic in an acute care hospital, a long term care facility, a controlled animal facility. Several studies did not include the setting. Dressings used included multiple types of compression wraps, SilvaSorb or Acticoat, which are silver impregnated dressings, vacutex dressings and combinations silver impregnated dressings. The Singer et al. study described a significant difference \((p<0.001)\) between dry gauze and silver impregnated dressings. The same wounds were measured at 14 days with a significant difference \((p=0.034)\) between the healing times and the two dressings. The use of silver impregnated dressings produced a quicker healing time when utilized on many chronic wounds. At 30 days there were no significant differences in wound healing. Overall healing time remained the same.

Fukuoka et al. (1999) described how compression readings were obtained in their research to determine chronic vascular insufficiency. The researchers used volunteers and examined 257 legs in 196 consecutive patients to complete the testing. The number of patients in this study included 70 males and 126 females that ranged in age from 19 to 80 years of age with a mean of 57 years. A phlebography was performed using a 21 gauge butterfly needle. The needle was inserted into the medial digital vein and then a catheter was inserted to provide contrast so the vein could be viewed. The foot pressure was measured in each patient as the leg was compressed. Patients with severe chronic vascular insufficiency were excluded from Fukuoka et al.’s study due to the lack of
visualization of their veins. Veins that were visualized were then compressed to determine the ability of vein adjustments with increased pressure and the recovery time after the compression was discontinued. There was a 50% recovery of the vein pressure after the release of the vein compression. A correlation of increased skin changes are caused by continued venous stasis. Greater changes in the skin remained in those patients with chronic vascular insufficiency after compression was discontinued.

Results in the Fukuoka et al. (1999) study are supported by the study completed by Palfreyman, Lochiel, & Michaels, (1998) that states compression wraps for venous legs ulcers have been used in various forms over the past 300 years. The Palfreyman, Lochiel & Michaels research stated that a greater portion healed with less pain ($p=0.03$) with elastic versus non-elastic dressings ($p=0.010$). The use of compression dressings is quoted as the gold standard and considered the hallmark of CVI ulcer treatment (Fukuoka et al., Goldman et al., 2003 and Popoola, 2003). Compression wraps have a consistent pattern of healing the ulcerations and preventing the progression of CVI.

The goal of compression wraps or elastic stockings is to provide a graduated compression, exerting the most pressure at the ankle, a decreased pressure at the calf and the least pressure at the thigh (Whitley, 1988). The elastic stockings must provide a one or two way stretch to provide compression for the extremity and prevent the cumulative effect of edema. Wright et al. (2002) revealed that CVI is prevented from progressing to a more severe condition with additional pain with the use of compression wraps. Similarly, VanGeest, Veraart, Nelemans, & Neumann (2000) described their research on 29 legs of 25 patients, 12 males and 13 females, with a mean age of 66.0 years. This study discussed three classes of compression stockings and the implications for use. VanGeest et al.’s
research stated that prevention of edema is the most important factor for CVI patients and
the patients with more advanced CVI may require a stronger or an increased stocking
compression. Wright et al’s research has stated that the continued use of compression
wraps after wound healing may prevent further chronic skin breakdown.

Compression wraps were broken down into types of compression dressings by
Popoola (2003) who provided information on four types of compression dressings and the
benefits of these dressings. The dressings described in Popoola’s research included ace
bandage wraps, Tubigrip, Profore and custom made stockings such as Jobst stockings.
All dressings provide elastic support to the lower extremity to prevent and treat venous
stasis insufficiency. The differences in the dressings include how the dressings are
applied and the degree of compression of the extremity. The ace bandage, Tubigrip and
Profore are bandages that are wrapped around the extremity. The amount of compression
equals 10-20 mmHg to 20-40 mmHg. The Jobst stocking is slipped on the leg as a
stocking or pantyhose and provides 10-40 mmHg support. Ace wraps may provide
different compression rates with each application while Jobst provides a consistent
compression. Jobst stockings may be difficult for an elderly patient to apply. Costs range
from $9.00 for wraps to $100.00 for a single pair of Jobst. Palfreyman et al. (1998)
further state that equal compression may be obtained by the use an inflatable boot and
other pressure inducing systems but did not discuss compression rates, cost or ease of
application.

Additional information was obtained by Motykie et al. (1999) who provided
research on two different types of compression dressing that were called MEDI-Ven and
MediUSA. Motykie et al. described a study of 112 patients which included 17 males and
95 females, aged 27 to 85 years with a mean age of 46.5 years. Using these classifications, patients were given compression stockings modified to meet the severity of their CVI. Any patients already wearing compression stockings previous to the Motykie et al. research were excluded from this study. Motykie et al. research occurred within two hospitals in Illinois. The patients were first divided by the use of Venous Doppler studies and the CEAP classification were utilized previous to stocking application before chronic vascular insufficiency was determined. The use of the compression stockings called MEDI-Ven and MediUSA applied 30-40 mmHg pressure. This pressure is equal to the Jobst stocking.

Motykie et al. (1999) provided a questionnaire to the patients in the study at one month and 16 month intervals to rank their outcome after the application and continuous use of MEDI-Ven and MediUSA stockings. The questionnaire results were analyzed using the Wilcoxon Signed Rank test. Patients’ reported a significant reduction \((p<0.001)\) in severity scores for swelling, pain, skin discoloration, depression, sleeping problems, and cosmetic problems at 30 days. After 16 months of treatment, a further significant reduction of \((p<0.001)\) occurred in the same symptoms just described.

Additional types of dressings used for CVI ulcers included silver impregnated dressings which prevent infection by exhibiting an antimicrobial effect on a vascular wound, thus reducing inflammation. The decrease in wound inflammation facilitates a decrease in the wound healing time (Wright et al., 2002). Gibbins, Nametka & Hopman (2000) added that “silver has long been recognized for its broad spectrum activity against bacteria, viruses and fungi” (p. 1). The normal inflammatory response process assists the body to cleanse tissue debris and attack invading microorganisms or bacteria. Wright et
al. stated that a prolonged inflammatory response in wound healing may result in the
destruction of tissue that would normally promote healing. The destruction of tissue
delays wound healing by increasing the granulation process. When the body’s resources
are devoted to fighting infection, fewer resources can be used to heal the wound. The
effort to heal the wound is referred to as bioburden. The silver impregnated dressings’
goal is to reduce bioburden so that the body may have increased ability to heal the wound
(Wright et al.).

Included within the literature review are articles that provided detailed research
and supported the use of silver impregnated dressings. Gibbins et al. (2002), Nametka
(2000), Nametka (2001) and Nametka (2002) have reported on the use of silver
impregnated dressings for wound healing. The Gibbins et al. and multiple Nametka
studies included patients with burns, venous leg ulcers, and chronic non-healing wounds
and supported the effectiveness of silver impregnated dressings. In contrast Singer et al.
(1999) and Wright et al. (2002) studied use of a silver impregnated dressing with a
control dressing to determine the effectiveness of healing using silver impregnated
dressing in comparison to a control dressing. Wright et al.’s study differed from the other
studies that used silver impregnated dressing by using a dressing called Acticoat.
Demling and DeSanti (2003) and Goldman et al. (2003) used silver impregnated
dressings in combination with other dressings. In contrast, Nametka & Gibbins (2001)
provided a study of the combined use of compression wraps and silver impregnated
dressings.

Gibbins et al.’s (2001) research included patients with a variety of wounds. The
wounds included venous stasis leg ulcer wounds that healed in (<1-8) weeks with the use
of SilvaSorb antimicrobial dressings. SilvaSorb is a silver antimicrobial dressing believed to inactivate or kill microorganisms that delay wound healing. Gibbins et al. found that dressings were effective for eight days and noted that a decrease in bioburden occurred in 10 of 11 patients. A similar study was completed by Nametka (2000) on 13 patients with venous leg ulcers. The differences between Gibbins et al. and Nametka’s findings were that the patients used SilvaSorb prior to and after graft application in Nametka’s study. Nametka found that wound healing occurred in 11 of the 13 grafts and the grafts survived at 10 and 30 day intervals. Gibbins et al. and the Nametka study did not reveal age, gender, setting, dressing changes, wound size and location of the wounds.

Medline (2002) presented a different approach for the use of SilvaSorb dressings in four case studies. The wounds described in the Medline study included a sacral pressure ulcer of a 40 year old female, a chronic trochanteric pressure ulcer of a 93 year old male, lower extremity of a 94 year old female and severe lymphedema of the leg in a 42 year old female. Settings were not defined. Results of the Medline study revealed that the 93 year old female’s wound healed in four weeks and the other three wounds healed in eight weeks. Medline’s study appeared to imply all wounds were of chronic origin and previous other treatments had been utilized without healing. Medline’s research supported the use of the SilvaSorb dressing in one lower extremity wound but not the other chronic wounds. However, the Medline study did not provide sufficient information to compare to the other presented studies, but did document versatility of the dressing use.

Similarly, SilvaSorb was used in the Nametka (2001) study of seven patients that included three males and four females between the ages of 42 and 74 years with chronic
wounds. The wound locations included one hip ulcer, a venous leg ulcer, a diabetic leg wound, lymphedema of the lower extremities, post laminectomy and a chest wall surgical incision following metastatic cancer. Nametka’s study occurred in an ambulatory clinic in an acute care hospital. Descriptions of the seven individual patients were given that defined the wound size, location and time and number of dressing changes. The final outcome reported in Nametka’s study included a decline in bioburden and improved chronic wound healing. No specific nominal data were supplied.

With the use of the SilvaSorb results, Nametka (2001) developed a clinical protocol as a decision making tool for the use of silver microbial dressings for the treatment of chronic wounds. Case studies were presented. However, evidence of patient treatment numbers or healing rates were not provided in relationship to age and gender of the patients. Without this information, a comparison could not be formulated by the writer.

The decision making tool developed by Nametka (2001) was used as the protocol and tested by Nametka (2002) on 12 long term care patients with recurrent non-healing wounds. The patients were between the ages of 67 to 93 with four males and eight females participating. Recurrent infection rates in 8 of the 12 patients occurred previous to the application of SilvaSorb dressings. When SilvaSorb was started, zero infection rates occurred in the eight week study. The frequency of dressing changes and wound location was discussed only in the two case studies presented by Nametka, (2002).

Decreased infection rates and positive healing rates with the use of silver impregnated dressings were also supported by Wunderlich & Orfanos (1991). Wunderlich & Orfanos completed their research on 40 patients with venous leg ulcers.
Age, gender and settings were not included within the study. A silver impregnated activated charcoal dressing was used. No discussion related to infection or wound cultures was provided. However, all wounds were debrided prior to application of the dressings. Wounds were examined at two, four and six weeks with a significance in healing of $p<0.05$ at two weeks, $p<0.05$ at four weeks and not significant difference in healing rates at six weeks. Wonderlich and Orfanos’s study supported the initial use of a silver impregnated dressing because it provided a faster healing rate than the control group. However, there was not a significant difference in all wound healing at the six weeks interval.

Animal studies by Singer et al. (1999) and Wright et al. (2002) were completed on 20 to 30 kg pigs using a control group to compare healing rates. Singer et al.’s study was conducted on three sets of wounds using dry gauze dressings on a third of the participants, moistened sterile water dressings on a third of the participants and on the final third silver impregnated dressings. The silver impregnated dressings were not defined by brand or trade name. The Singer et al. research was conducted on three pigs with 126 full thickness wounds 4 mm in size that were created by the researcher. In contrast, Wright et al.’s research was conducted on nine pigs with 20 full thickness wounds created by the researcher that were two cm in size. In the Wright et al. study, wounds were covered with cultures of pseudomonas aeruginosa, fusobacterium and coagulase-negative dressings for 15 minutes before the application of any dressings. Wright et al. used Acticoat on one group and Acticoat without the silver impregnated factor on the other group. Singer et al.’s and Wright et al.’s studies concluded that wound healing progressed at a quicker rate with the use of silver impregnated dressings than
When the dry or moistened gauze dressings were used. The researchers provided information that supported previous studies that have stated when increased infection occurs, the bioburden is increased and this slows healing.

A different combination of dressings was utilized by Demling & DeSanti (2002) in their research on twenty burn patients with 15 % total body surface involvement. The Demling and DeSanti study included use of Acticoat instead of the SilvaSorb. Acticoat was compared to the outcome of an antibiotic dressing that was moistened with a 0.01% neomycin and polymyxin solution. The research by Demling and DeSanti is dissimilar to other research studies described because the researchers applied a mesh graft at three days. The Demling & DeSanti’s study stated there was a 40% increase of re-epithelialization of tissue that occurred using the Acticoat dressing. Details such as age, gender, setting and wound were not provided.

The Goldman et al. (2003) research is also different from the previous cases described. Goldman et al. used a case study approach and reported on one 29 year old, female with bilateral leg wounds in which amputation was being considered due to the extensive, long term, non-healing wounds. The combined use of silver impregnated dressings, debridement, compression wrap and Vacutex was used in treatment. Vacutex is a non-invasive dressing made of cotton and polyester fibers. Vacutex’s function is to absorb wound drainage which decreases bioburden and encourages faster wound healing. Leg wounds were described as healed 30 days after the application of Vacutex. Unfortunately, the patient became noncompliant with the continued treatment and did not attend the clinic appointments and further treatment was declined by the patient.
In contrast to all of the research previously presented, Nametka & Gibbins (2001) completed a retrospective study on the use of multilayer compression wraps and SilvaSorb dressings on 15 patients with 19 venous leg ulcers. The mean age was 68.3 years with nine males and six females participating in the study. This research described the outcome of the combined use of compression wraps and silver impregnated dressings. Exact wound locations were not identified. However, dressings were changed weekly with 81% wound healing occurring within four to ten weeks. The setting of this study and gender differences was not defined.

Additional research was completed using the silver impregnated dressing, compression dressings and a control dressing. The studies used silver impregnated dressings and another kind of dressing. A control was used in both studies and completed on only venous leg wounds. The Bishop, Phillips, Muster, Vander Zee, Wiersema & Roach (1992) study was completed on 90 patients. Blair, Backhouse, Wright, Riddle, & McCollum (1988) study was completed on 60 patients using silver impregnated dressings and another type of dressing. Gender, age or settings of the patients were not included in either of the studies.

The Bishop et al.’s (1988) study divided the patients into three groups in which one group used silver sulphadiazine 1%, another group used tripeptide-copper 0.4% complex and the final group used a placebo. Each of the dressings was secured with an elastic bandage. Wounds were only assessed at four weeks. Complete healing occurred in group one, or the sulphadiazine group, in 6 of 28 participants. In group two or the tripeptide-copper group, zero healing occurred in 29 patients. Group three was the placebo and in this group only 1 of 29 showed healing. In contrast, Blair et al.’s (1988)
study divided the patients between those who had dressings of silver sulphadiazine and those who had non-adherent dressings. Both groups were cleansed with saline previous to dressing application and then compression bandages were applied over the dressings. The silver sulphadiazine presented complete healings in 19 of 30 wounds while the non-adhesive dressing showed complete healing in 24 of the 30 wounds. No significant differences in healing occurred between all types of dressings at 12 weeks. All wounds were 95% healed at the end of the study.

Summary

The Lewin change model (Lewin, 1938) was discussed and explained within this chapter. The review of research provided a basis for the treatment of CVI with the use of compression wraps, compression wraps and silver impregnated dressings and other multiple dressing combinations. Additional research is required to validate or promote a change of the standard used in the treatment of CVI using compression wraps alone or the use of compression wraps and silver impregnated dressings. Age and gender provided limited consideration in previous studies.

The effects of various kinds of treatments for the chronic vascular wounds were presented. The results of compression dressings, the combined use of compression wraps and silver impregnated dressings and additional dressing choices were described. Sample size, with a delineation of gender and age considerations, was acknowledged when provided in the research articles. No clear evidence of age or gender was delineated in the literature review to determine if a difference occurred in healing rates. Sampling techniques and methodology were very limited in the studies reviewed.
Additional studies are needed to validate the use of chronic wound healing treatments presented within this literature review. The use of the combined treatment of compression wraps and silver impregnated dressings along with other dressing combinations require a greater number of participants and greater detail in the methodology of the research so studies can be replicated to determine the validity of the researchers’ stated outcomes. Researchers, Nametka (2000), (2001), (2002) and Nametka and Gibbins (2001) have completed two independent studies and two in association with other researchers using the SilvaSorb dressing. Additional research will be required to determine if a change in practice might improve the healing rates of chronic vascular wounds.

Limited research studies were presented that described the results of the combination of compression wraps and silver impregnated dressings using gender and age as considerations. The goal of the present retrospective chart review was to examine the use of compression wraps alone and the combined use of compression wraps and silver impregnated dressing treatments to determine the effect on the healing of wounds caused by CVI. In additional the goal includes examining additional variables of age and gender in relation to wound healing and use of compression wraps or compression wraps and silver impregnated dressings.
CHAPTER III

METHOD

The purpose of the research was to compare the effect of compression wraps alone and compression wraps and silver impregnated dressings in the healing process of chronic vascular wounds. The contents of this chapter include the research design utilized to complete the study. The setting and target participants are described. Sample size, inclusion and exclusion criteria are specified in relationship to this research. The materials, purpose, scoring information, and the validity and reliability are also discussed. Data collection procedures, including protection of human subjects are presented. Additional information described and included the recording of data, what controls were used to insure internal and external validity, assumptions and limitations, and the rationale for the appropriateness for this research tool. Finally, steps in data analysis are specified and the rationale for the choice of statistics and assumptions underlying statistical procedures are stated.

Design

The design of this study was a descriptive, retrospective, non-experimental design using a chart review. A retrospective chart review was used to collect data about the chronic vascular wound healing with the use of compression wraps alone and compression wraps in combination with silver impregnated dressings. A convenience sample of chronic venous wound patient’s charts who received wound care at a wound care facility was included in this study. Patients’ charts were divided into two groups: (a) Group I using the compression wrap alone and (b) Group II using a compression wrap and a silver impregnated dressing.
Subjects

Setting: The data collection occurred in a northwest Ohio independent outpatient wound care program that is part of an urban, 600 bed hospital system. The program cares for a combination of urban and rural patients. The subjects are treated by a number of nurses and physicians which specialize in chronic wound treatments.

Target population: The target population included the wound care clinic’s medical records of males and females 50 to 70 years. The records are of those patients who were at the wound care center between August 1, 2002 and December 31, 2004 being treated for CVI ulcers.

Sample size: The wound clinic manager provided to the researcher a convenience sample of patients’ charts. The sample size was a total of 80 patients as determined by a power analysis. An adequate sample needed to detect a moderate effect size with a .80 power. This study included the charts of seven patients with compression wraps in Group I and 20 patients with compression wraps and silver impregnated dressings in Group II.

Inclusion criteria

Eligible medical records were patients who:

1. Were 50 to 70 years of age;
2. Were admitted to a wound care clinic in northwest Ohio between August 1, 2002 and December 31, 2004;
3. Were enrolled in treatment for at least a four week period during August 1, 2002 and December 31, 2004;
4. Had a chronic vascular wound documented by the physician using venous doppler testing or diagnosed by physician with venous insufficiency;
5. Were able to speak and understand English to provide understanding of the CVI ulcer treatment required by the wound care program;
6. Had either a compression wrap alone or a compression wrap and silver impregnated dressing;
7. Had accurately recorded data on the initial assessment and sequential assessments; and
8. Had wound measurements completed by the wound care center at seven to ten and 10 to 14 day intervals documented in the medical record.

Exclusion criteria

Ineligible medical records included charts of patients that:
1. Were younger than 50 years or older than 70 years;
2. Were not admitted to the wound care clinic of this research site;
3. Were enrolled in treatment at the wound care center less than a four week period;
4. Had a chronic vascular wound or a wound that was not documented by a physician using a doppler venous testing or diagnosed by a physician;
5. Were unable to speak or understand English and dressing treatment could not be completed as prescribed by the wound care center;
6. Had not used a compression wrap alone or the combined use of a compression wrap and silver impregnated dressing; and
7. Records were not complete or had wound measurements that were measured further apart than seven to ten days.
Material

The Chart Audit Forms utilized for the present study included forms created by the researcher. The Chart Audit Form was designed strictly for extracting nursing documentation of wound healing from the patient’s medical record. The data obtained from Group I and Group II was used to address the research questions. Only data needed for the present study was collected from the charts and recorded on the Chart Audit Form. The purpose of the Chart Audit Form was to organize the data to facilitate computer entry to determine the effectiveness of compression wraps and the combined use of compression wraps and silver impregnated dressings used on chronic vascular wounds.

Source: The source of the data was the patients’ charts from a wound care center in northwest Ohio that has a patient attendance of approximately 600 patients a month. The charts represented a mix of urban and rural patients’ charts. All charts were provided by the wound care manager.

Data Collection

Sampling: Data collection occurred in the records department of the wound care center for the patients seen between the dates of August 1, 2002 and December 31, 2004. The manager of the wound care center provided the charts. The first charts meeting the inclusion criteria used for Group 1; compression wraps alone, were used. The first charts meeting the inclusion criteria for Group 2; compression wraps and silver impregnated dressings, were used. All data was recorded by the researcher on the Chart Audit Form. Group I was recorded on blue colored paper and Group II were recorded on yellow colored paper.
Protection of human subjects: Prior to conducting the study, approval was obtained from the Institutional Review Boards (IRB) of The Toledo Hospital and the Medical University of Ohio (IRB) (Appendix C and D) prior to the researcher’s contact with the records of the patients used in this study. An expedited review application was completed by the researcher following the protocol of the IRB committees. The hospital’s IRBs served as the representative agents acting on behalf of the patients, staff and or the hospital. All data collection materials became the property of the primary researcher who has turned all data and forms over to the Center for Research and Evaluation. The data forms are stored in a fireproof, locked file with access only to the researcher and advisory committee. Medical information not required for this research has not been collected or disclosed. All data forms will be destroyed within six years of completion of the study by the Center for Research and Evaluation at the Medical University of Ohio.

Once final approval was granted by the IRBs at Toledo Hospital and Medical University of Ohio, the data collection and recording procedures began. Time factors might have been a limitation in this study because of the researcher’s lack of ability to access data within the wound care center within the approved designated time. The cost factors involved with this study included the copying of materials for Chart Audit Form, the time required of the researcher for data collection and the computation of the results.

Procedures for comparing groups: All charts from August 1, 2002 to December 31, 2004 were selected by the manager of the wound care clinic. Charts were randomly chosen by the manager that included patients that received wound care treatments within the defined time period. Each group was selected and defined by the inclusion data and were the first charts that met Group I compression wraps alone criteria and the first charts
that met Group II compression wraps and silver impregnated dressing criteria. The retrospective chart review involved no direct patient contact but did contain the results of previously collected data from the patients’ charts.

Data collection and recording: The Chart Audit Forms included; age, gender, dates of treatment, length, width and depth of the wound and total length of healing as defined in days for the patients within this research study when stated within the patient record. Wound healing was defined as wound edges that are were approximated, not draining and with no redness or signs of inflammation. The researcher was the only collector of information. Charts were reviewed and given a number of 1 thru 7 for Group I and a number of 1 thru 20 for Group II. Only the researcher has a copy of data with corresponding patient numbers. Each chart was reviewed once for four different measurements which included the initial measurement plus three additional measurements at least 7 to 10 days and 14 to 20 days and the final measurement at wound healing when stated within the patient’s record. Age and gender of the patients was also recorded.

Group I included those patients with compression wraps alone and Group II (see Appendix A & B) included those patients with compression wraps and silver impregnated dressings. The data obtained from each group was recorded on forms (blue for Group I and yellow for Group II) that contained areas for the researcher to record the following information from patients’ charts: independent variables including age, gender, initial day of treatment, between 7 to 10 days, between 14 to 20 days and total length of treatment when provided in the patient’s chart. The dependent variable which is the difference in the wound size (length, width and depth) observed from initial wound measurement, at 7
to 10 days, at 14 to 20 days and the total number of days required until the wound was healed if recorded (Appendix A & B). The Chart Audit Form was used to determine if the wound documentation was complete or incomplete. Wound healing involved a wound that was well approximated, not draining and had no redness or signs of inflammation. In order for the nursing documentation of wound treatment and healing to be completed, the record required that all areas of wound management recorded on the Chart Audit Form. The initial date of treatment was be labeled as day one and further days numbers corresponded to the day of treatment and was recorded on the chart audit. Any information not noted on the charts as required by the study, was deemed an incomplete nursing record and any chart deemed incomplete was not utilized for this study. All data collected contained an initial day of treatment and additional days of wound treatment at 7 to 10 day and 14 to 20 day intervals of wound measurements to be considered valid. These data was collected from the charts of patients who attended the wound care clinic from August 1, 2002 through December 31, 2004. Age ranges for participants was from 50 to 70 years of age. The data forms were in the researcher’s possession and locked in a secure place with only the primary researcher having access. After data was compiled and analyzed, all forms and data forms were turned over to the primary investor who turned the data and forms over to the Center for Nursing Research and Evaluation. All data forms will be destroyed within six years by the Center for Nursing Research and Evaluation.

*Controls to insure internal/external validity:* External consistency was maintained by the researcher by assuring that all patients’ charts met the criteria demanded by the study and that all information met the inclusion and exclusion criteria. Internal and
external validity was related to the correctness of the nurse’s documentation on the patient’s chart and the researcher correctly recording this information on the chart audit form.

Assumptions clarified: Assumptions of this researcher included all patients who were 50 to 70 years of age who attended the wound clinic. CVI was be diagnosed by the doctor prescribing treatment using venous doppler testing or the physician had diagnosed the patient with vascular disease. All patients received wound care at the wound care center for four weeks or longer. Patient records reviewed with dates of treatment between August 1, 2002 and December 31, 2004. The researcher correctly transposed patient chart data onto the Chart Audit Form.

The researcher assumed that improved wound healing would occur in fewer days with improved dressing treatments. Also, it is assumed that the change in chronic vascular wound treatments would encourage staff members to use the new treatments. In Lewin’s (1938) theory a normal resistance is common in staff when encouraged to change wound treatment methods. The writer assumed, for purposes of this research, that staff resistance would occur but the results of the study related to type of dressing that resulted in a shorter amount of time for wound healing to occur would encourage staff acceptance of that dressing.

Limitations clarified: Limitations of the present study were that data gathered through a retrospective chart review would include measurements and recordings by multiple nurses. These data may have been inconsistently collected and recorded differently by the Registered Nurses. The cluster of patients within this chart review may not have represented the entire community of patients with chronic venous ulcers.
Chronic venous ulcers have varied in size and the patient’s compliance to the physician’s orders may also be varied. The present study was a convenience sample with the charts chosen by the wound care manager. The size of the study sample was small and was a homogenous mixture of urban and rural patients from the midwest. The data collection from the reviewed charts might not apply to other urban or rural populations.

Data Analysis

The researchers’ aim in this study was to answer the following questions:

1. Was the wound healing time longer among those patients who used compression wraps alone versus those who used the combination of compression wraps and silver impregnated dressings between August 1, 2002 and December 31, 2004?

2. Was there an initial difference in wound healing after 7 to 10 days and at 14 to 20 days among those patients who used compression wraps alone versus those who used the combination of compression wraps and silver impregnated dressings between August 1, 2002 and December 31, 2004?

3. Was there a gender difference in wound healing time of patients who used compression wraps versus the combined use of compression wraps alone and silver impregnated dressings compared to those who did not between August 1, 2002 and December 31, 2004?

4. Was there an age difference in wound healing time of patients who used compression wraps versus the combined use of compression wraps and silver impregnated dressings compared to those who did not between August 1, 2002 and December 31, 2004?
Demographic data included the patient’s age and gender and day of wound treatments. Three days of treatment were also recorded. These days of treatment included the initial day that treatment began and the day of treatment two and treatment three. The final total of days for wound healing was recorded when provided within the patient’s chart.

Research question 1 was analyzed using an independent sample $t$-test to compare the mean time for wound healing between patients treated with compression wraps alone versus compression wraps and silver impregnated dressings. A $t$-test of wound measurements at baseline and two additional measurements was obtained to determine possible differences in wound healing. A final date of wound healing was also recorded when provided within the patient’s record. Levene’s Test of Equality of Variances was conducted to evaluate the effect of wound healing in days between the compression wraps and compression wraps and silver impregnated dressings.

Data related to question 2 was analyzed using a $t$-test with Paired Sample Correlation to compare the wound healing time 7 to 10 days and at 10 to 14 days for compression wraps and the combined use of compression wraps and silver impregnated dressings. A $t$-test for equality of means was also completed,

Data related to research question 3 was analyzed using an OneWay ANOVA to evaluate the effect of gender on wound healing on patients with compression wraps alone and those that used the compression wraps and silver impregnated dressings.

Data related to research question 4 was analyzed using an ANOVA which evaluated the effect of age on wound healing on patients who used compression wraps
alone and compression wraps and silver impregnated dressings. Only patients between the ages of 50 to 70 years and met the inclusion data were included in this research study.

Summary

This chapter defined the method, design, subjects, target population and sample size; and inclusion and exclusion criteria were clarified. The materials that were used, purpose, scoring information, validity and reliability of the statistical information and source have been or were explained. The data collection which involved, sampling, protection of human subjects, procedures for experimental and control groups, data collection and recording, controls to insure internal and external validity, assumptions and limitations were explained within this chapter. The data analysis was explained in relationship to the research questions and rationale for choice of statistics. Assumptions underlying statistical procedures were also stated.
CHAPTER IV

RESULTS

The purpose of this study was to determine whether the use of compression wraps alone versus the combined use of compression wraps with silver impregnated dressings had a quicker healing time. Gender and age were also considered. The data were obtained from 80 closed charts from the wound care clinic. Twenty-seven patient records met the criteria for this study. Seven patients who used compression wraps were compared to 20 patients who used compression wraps and silver impregnated dressings. This chapter will describe the findings of this research.

Sample

Eighty closed patient charts that met the criteria for the time line were reviewed for the present study. Of the 80 charts reviewed, 39 were male patients and 41 were female patients. Eighteen patients (22.5%) had used compression wraps that consisted of 41 vascular wounds. Sixty-two patients (77.5%) had used the combined compression wraps and silver impregnated dressings and 121 vascular wounds were treated. The researcher applied the research inclusion and exclusion criteria and a total of 27 patient charts of the 80 charts (33.8%) qualified for the present study. Additional decisions were made by the researcher on the remaining wound data. The researcher chose to use the largest wound from each patient, no toe wounds or wounds that were blocked nor multiple wounds measured as one wound were included in this study. Of the 27 patients’ charts used for this research study, seven patients (25.9%) used compression wraps and 20 patients (74.1%) used the combined compression wraps and silver impregnated
dressings (Table 1). The 27 patients were further divided by gender and included 11 males (40.7%) and 16 females (59.3%) (Table 2).

| Table 1.  
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<tr>
<td>Demographic data of individuals with compression wraps only and compression wraps and silver impregnated dressings.</td>
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</tr>
<tr>
<td>Type of Dressing</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Compression wraps only</td>
<td>7</td>
<td>25.9</td>
</tr>
<tr>
<td>Compression wraps and silver impregnated dressings</td>
<td>20</td>
<td>74.1</td>
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<tr>
<td>Total</td>
<td>27</td>
<td>100.0</td>
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| Table 2.  
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<tr>
<td>Demographic data of male versus female gender of patients</td>
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<td></td>
</tr>
<tr>
<td>Gender</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Male</td>
<td>11</td>
<td>40.7</td>
</tr>
<tr>
<td>Female</td>
<td>16</td>
<td>59.3</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>100.0</td>
</tr>
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</table>

The data obtained from the patient charts included male and female which was then divided by dressing type and age to determine mean wound healing time in days and S.D. (Table 3). One male used compression wraps in each of the age groups of 50-55 years and 61-65 years and no males aged 56-60 years. No mean or S.D. could be determined for each of these groups because the three males did not return to the wound care center to record the healing date of the wounds. One male who used compression wraps alone in the age 66-70 years with a mean of 168 days in wound healing S.D was
unable to be figured due to the limited number. Two males who used compression and silver impregnated wraps in the aged 50-55 years with a mean of 38 days in wound healing (S.D.=7.07). Three males who used the compression wrap and silver impregnated dressings in the age of 56-60 years with a mean of 35 days of wound healing (S.D. =14.00) and one male aged 61-65 years with a mean of 36 wound healing days S.D. unable to be completed because of the limited number within this group. One male, aged 66-70 years, wound healed in 21 days (S.D. = 21).

Two females who used compression wraps alone aged 50-55 years with a mean of 70.50 days of wound healing (S.D. =58.69) (Table 3). Female who used compression wraps were include one female aged 56-60 years, no females aged 61-65 years and one female aged 66-70 years. No mean for days wound healing or S.D. could be obtained for the females aged 56-60 years, 61-65 years or 66-70 years that used the compression wraps alone due to the limited number within each grouping. One female used the compression wraps alone aged 66-70 years with a wound healing mean of 35 days and S.D. could not be determined. Three females using the compression wraps with the silver impregnated dressings aged 50-55 years with a wound healing mean of 30 days (S.D.=8.66). The next female used the compression and silver impregnated dressings included ages 61-65 mean of 39.8 wound healing days (S.D. =10.23). Four females used the compression wraps and silver impregnated dressings aged 66-70 years with a mean 31.75 wound healing days (S.D. =26.99).

Patients that used compression wraps and silver impregnated dressings included eight patients (29.6%) that were between the ages of 50-55 years, four patients (14.8%) were between the ages of 56-60 years, seven patients (25.9%) were between the ages of
Table 3.
*Descriptive data compression wraps alone and compression wraps with silver impregnated dressing: Healing rate by age and gender.*

<table>
<thead>
<tr>
<th>Age</th>
<th>Median</th>
<th>Mean</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compression wraps</td>
<td>50-55</td>
<td>0</td>
<td>.00</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>56-60</td>
<td>0</td>
<td>.00</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>61-65</td>
<td>0</td>
<td>.00</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>66-70</td>
<td>168</td>
<td>168.00</td>
<td>1</td>
</tr>
<tr>
<td>Compression wraps and silver impregnated dressings</td>
<td>50-55</td>
<td>38</td>
<td>38.00</td>
<td>7.07</td>
</tr>
<tr>
<td></td>
<td>56-60</td>
<td>35</td>
<td>35.00</td>
<td>14.00</td>
</tr>
<tr>
<td></td>
<td>61-65</td>
<td>36</td>
<td>36.00</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>66-70</td>
<td>21</td>
<td>21.00</td>
<td>.00</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compression wraps</td>
<td>50-55</td>
<td>71</td>
<td>70.5</td>
<td>58.69</td>
</tr>
<tr>
<td></td>
<td>56-60</td>
<td>0</td>
<td>0</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>61-65</td>
<td>0</td>
<td>0</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>66-70</td>
<td>35</td>
<td>35.00</td>
<td>.</td>
</tr>
<tr>
<td>Compression wraps and silver impregnated dressings</td>
<td>50-55</td>
<td>35</td>
<td>30.00</td>
<td>8.66</td>
</tr>
<tr>
<td></td>
<td>56-60</td>
<td>0</td>
<td>0</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>61-65</td>
<td>35</td>
<td>39.80</td>
<td>10.23</td>
</tr>
<tr>
<td></td>
<td>66-70</td>
<td>32</td>
<td>31.75</td>
<td>26.99</td>
</tr>
<tr>
<td>Table total</td>
<td>35</td>
<td>37.74</td>
<td>34.51</td>
<td></td>
</tr>
</tbody>
</table>
61-65 years, and eight patients (29.6%) were between the ages of 66-70 years (Table 4). Twenty patients (74.1%) used compression wraps and silver impregnated dressing which included eight males (40%) and twelve females (60%) (Table 4).

<table>
<thead>
<tr>
<th>Age</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-55</td>
<td>8</td>
<td>29.6</td>
</tr>
<tr>
<td>56-60</td>
<td>4</td>
<td>14.8</td>
</tr>
<tr>
<td>61-65</td>
<td>7</td>
<td>25.9</td>
</tr>
<tr>
<td>66-70</td>
<td>8</td>
<td>29.6</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Findings

Research questions:

1. Was the wound healing time longer among those patients who used compression wraps alone versus those who used the combination of compression wraps and silver impregnated dressings?

To answer question one, an independent sample t-test was conducted to evaluate the research question that wound healing time would be greater for compression wraps alone versus compression wraps and silver impregnated dressings. The mean for wound healing time for the compression wraps was 49.14 days (S.D. =65.74) (Table 5) and compression with the silver impregnated dressings was 33.75 days (S.D. =14.16) (Table 5). Data indicate the compression wrap’s healing time was longer in comparison
to the compression wraps with silver impregnated dressing. The compression wrap with silver impregnated dressing yielded a faster wound healing of 15.39 days. Levene’s Test for Equality of Variances was conducted to evaluate the effect of wound healing in days between the compression wraps and the compression wraps and silver impregnated dressings. No statistically significant difference was noted between the compression wraps alone and compression wraps and silver impregnated dressings ($f=25.670$) and ($p=0.000$).

Table 5.

<table>
<thead>
<tr>
<th>Dressing Type</th>
<th>N</th>
<th>Mean Days</th>
<th>S. D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compression wraps only</td>
<td>7</td>
<td>49.14</td>
<td>65.74</td>
</tr>
<tr>
<td>Compression wraps and silver impregnated dressings</td>
<td>20</td>
<td>33.75</td>
<td>14.16</td>
</tr>
</tbody>
</table>

2. Was there an initial difference in wound healing after 7 to 10 days and at 14 to 20 days among those patients who used compression wraps alone versus those who used the combination of compression wraps and silver impregnated dressings between August 1, 2002 and December 31, 2004?

For question two, a $t$-test with Paired Samples Correlation was used to compare the wound healing time 7 to 10 days and at 14 to 20 days. No statistically significant
difference was noted in the two dressing comparisons. A correlation of 0.922 with a significance of 0.000 was calculated.

When looking at the difference in wound healing and types of dressings used, the compression wraps appeared to be used more frequently on the smaller wounds and the compression wraps and silver impregnated dressings were used more often on larger wounds (Figure 2). In comparing the size of the wound and the initial healing time between day 1 and days 7 to 10, data indicate initial wound sizes varied from approximately 300.00 mm for compression wraps to 1500.00 mm for the compression and silver impregnated dressings. It is difficult to compare the decrease in wound size and type of dressing used because of the greater number of patients that used the compression wraps and silver impregnated dressings. Data do indicate, however, that from day 7 to 10, wound size decreased approximately 250 mm for compression wraps and 700 mm for compression and silver impregnated wraps. A box graph defines the difference between the two dressings (Figure 3).

The comparison of the 7 to 10 days and the 14 to 20 days yielded an increase in wound size of approximately 25 mm while there was a decrease in wound size when for the compression and silver impregnated were used of approximately 350.00 mm. A $t$-test for equality of means was completed with $t (0.615)$, $df (6.196)$ and $p (2$-tailed) of (0.561) (Table 6). No significant difference was noted in the 7 to 10 days and 14 to 20 days healing rate between the compression and silver impregnated dressings.

A nonparametric equivalent of $t$-test was completed because the variables do not meet the assumption for the parametric test because the groups are unequal and also
due to the small size of the sample. A Mann-Whitney was conducted to evaluate the hypothesis that compression wraps and compression wraps and silver impregnated dressings that the combined wraps wound have a faster healing time. Results were that the Mann-Whitney test was not significant ($z=.61, p=.54$).

![Graph of Estimated Marginal Means of measure comparing size of wounds and healing time (in days) of the compression wraps alone and compression wraps and silver impregnated dressings at the initial measurement, 7-10 days and 14-20 days.]

Figure 2. Graph of Estimated Marginal Means of measure comparing size of wounds and healing time (in days) of the compression wraps alone and compression wraps and silver impregnated dressings at the initial measurement, 7-10 days and 14-20 days.
3. Was there a gender difference in wound healing time of patients who used compression wraps versus the combined use of compression wraps alone and silver impregnated dressings compared to those who did not between August 1, 2002 and December 31, 2004?

Figure 3. *Box Graph of Estimated Marginal Means of measure comparing size of wounds and healing time (in days) of the compression wraps alone and compression wraps and silver impregnated dressings at the initial measurement, 7-10 days and 14-20 days.*
Table 6.  
*t*-test for Equality of Means between the compression wraps (n=7) alone and the compression and silver impregnated dressings (n=20).

<table>
<thead>
<tr>
<th></th>
<th>( t )</th>
<th>( df )</th>
<th>( p ) (2-tailed)</th>
<th>M. D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal variances</td>
<td>1.016</td>
<td>25</td>
<td>0.319</td>
<td>15.393</td>
</tr>
<tr>
<td>assumed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal variances</td>
<td>0.615</td>
<td>6.196</td>
<td>0.561</td>
<td>15.393</td>
</tr>
<tr>
<td>not assumed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For question three, a oneway ANOVA was conducted to evaluate the effect of gender on wound healing time on patients who used the compression wraps alone and those that used the compression wraps and silver impregnated dressings (Table 7). Data indicate that no statistical significance was determined (\( f=0.327 \)) with (\( p=0.806 \)) among the variables.

Table 7.  
*Repeated measures of ANOVA of compression wraps (n=7) and compression wraps and silver impregnated dressing (n=20) related to age and gender.*

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>Mean Square</th>
<th>( f )</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>3</td>
<td>422.282</td>
<td>0.327</td>
<td>0.806</td>
</tr>
<tr>
<td>Within Groups</td>
<td>23</td>
<td>1291.232</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>30965.185</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Was there an age difference in wound healing time of patients who used compression wraps versus the combined use of compression wraps and silver impregnated dressings compared to those who did not between August 1, 2002 and December 31, 2004?
For question four an ANOVA was conducted to evaluate the effect of age on wound healing for patients who used compression wraps alone and compression wraps and silver impregnated dressings. Again data indicate no statistical significance ($f=0.327$) ($p=0.806$) among the variables (Table 7).

Patients within this study were divided into four age groups with dressing types defined without delineation to gender (Table 8). Limited comparisons could be obtained However, no statistically significant difference can be determined due to the small sample size and the inequality of the dressing types.

<table>
<thead>
<tr>
<th>Age</th>
<th>Mean Days</th>
<th>S.D</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compression wraps</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-55</td>
<td>47.00</td>
<td>58.13</td>
<td>3</td>
</tr>
<tr>
<td>56-60</td>
<td>.00</td>
<td>.00</td>
<td>1</td>
</tr>
<tr>
<td>61-65</td>
<td>.00</td>
<td>.00</td>
<td>1</td>
</tr>
<tr>
<td>66-70</td>
<td>101.50</td>
<td>94.05</td>
<td>2</td>
</tr>
<tr>
<td>Group total</td>
<td>49.14</td>
<td>65.74</td>
<td>7</td>
</tr>
<tr>
<td>Compression wraps and silver impregnated dressings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-55</td>
<td>33.20</td>
<td>8.32</td>
<td>5</td>
</tr>
<tr>
<td>56-60</td>
<td>35.00</td>
<td>14.00</td>
<td>3</td>
</tr>
<tr>
<td>61-65</td>
<td>39.17</td>
<td>9.28</td>
<td>6</td>
</tr>
<tr>
<td>66-70</td>
<td>28.17</td>
<td>21.63</td>
<td>6</td>
</tr>
<tr>
<td>Group total</td>
<td>33.75</td>
<td>14.16</td>
<td>20</td>
</tr>
<tr>
<td>Table total</td>
<td>37.74</td>
<td>34.51</td>
<td>27</td>
</tr>
</tbody>
</table>
between the compression wraps alone and the compression and silver impregnated dressings. Three patients who use compression wraps within the age group of 50-55 mean healing rate of 47 days (S.D. = 58.13). One person was in each age group of 56-60 years and 61-65 years and because of the small size, no mean or S.D. could be determined. Two patients were in the age group 66-70 years and a mean healing rate of 101.50 days (S.D. = 94.05).

The compression wraps and silver impregnated dressing patients were divided into the same age groupings (Table 8). In the present study five patients aged 50-55 years with a mean of wound healing of 33.20 days (S.D. = 8.32), three patients aged 56-60 with a mean healing rate of 35 days (S.D. = 14.00), six patients aged 61-65 years with a mean healing rate of 39.17 days (S.D. = 9.28) and six patients in the 66-70 years mean of wound healing of 28.17 days (S.D. = 21.63).

The overall healing rate of compression wraps in all age groups was 49.14 days (S.D. = 65.74) while the compression wraps and silver impregnated dressings averaged an overall healing rate of 33.75 days (S.D. = 14.16). The present study presents a faster healing rate with the use of compression wraps and silver impregnated dressings.

Summary

This chapter described the results that were obtained from the analysis of the data. The chart review for this study consisted of 27 patient charts that met the inclusion and exclusion criteria for this research. The 27 patients’ charts that qualified for this study included eleven males and sixteen females between the age of 50 and 70 years. Seven patients had used compression wraps and 20 patients had used compression and silver impregnated dressings. The results of the wound healing rate in days were described.
Patient age and gender were defined and outcome data were reported. Repeated measures were attempted. However, due to inequality of the sample size, no statistical significance was determined in healing time, gender or age. Conclusions, limitations and nursing implications along with suggestions for further research are presented in additional detail in chapter V.
CHAPTER V
DISCUSSION

This chapter will discuss the findings of the data collection and how it related to the present research. The organizing framework for the research was Lewin’s change model. Findings and how the results relate to current literature will be presented. Conclusions, limitations, implications and recommendations for further research will also be discussed.

Findings

Research Question 1. Was the wound healing time longer among those patients who used compression wraps alone versus those who used the combination of compression wraps and silver impregnated dressings?

The 27 patient charts that were used in the present research study contained seven compression wraps and twenty compression wraps with silver impregnated dressings. No statistical significance could be determined due to inequality of the group numbers. Compression wraps alone healed in a mean of 49.14 (S.D. = 65.74) days and compression wraps with silver impregnated dressings healed in a mean of 33.75 days (S.D. =14.16).

Hafner et al. stated that the average percent of venous ulcer healing at 3 months is 20-70% and at 6 months is 40-80% (2000). The average CVI wound heals with the use of a compression wrap in 4 to 6 months. The compression wrap alone wound healed range of 35 to 168 days and the present research was consistent with Hafner et al.’s research.

In contrast to all of the research previously presented, Nametka & Gibbins (2001) completed a retrospective study on the use of multilayer compression wraps and
SilvaSorb dressings on 15 patients with 19 venous leg ulcers. The mean age was 68.3 years with nine males and six females participating in the study. This research described the outcome of the combined use of compression wraps and silver impregnated dressings. Exact wound locations were not identified. However, dressings were changed weekly with 81% wound healing occurring within four to ten weeks. The gender of the study was not defined. The present study stated that compression and silver impregnated dressings healed in 30 to 38 days and wound healing appeared at a faster healing rate.

Research Question 2. Was there an initial difference in wound healing after 7 to 10 days and at 14 to 20 days among those patients who used compression wraps alone versus those who used the combination of compression wraps and silver impregnated dressings between August 1, 2002 and December 31, 2004?

No statistically significant difference could be determined due to inequality of the wound sizes. Even though wound size was not used in this study, this study compared seven wounds treated with compression wraps and twenty wounds treated with the combined use of compression wraps and silver impregnated dressings and comparisons could not be made.

The present study’s findings may also be compared with the Singer et al. (1999) and Wright et al. (2002) studies. The same wounds were measured at 14 days with a significant difference ($p=0.034$) between the healing times and the two dressings. The use of silver impregnated dressings produced a quicker healing time when utilized on many chronic wounds and was consistent with the literature findings.

Research Question 3. Was there a gender difference in wound healing time of patients who used compression wraps versus the combined use of compression wraps
alone and silver impregnated dressings compared to those who did not between August 1, 2002 and December 31, 2004?

The present study included 11 males (40.7%) and 16 females (59.3%) met all qualifications. The compression wraps were used on 25.9% of the patients and compression with silver impregnated dressings were used on 74.1% of the patients. Wounds within this study healed in 21 to 168 days (Table 3). However, several wounds did not include a healing date on the patient’s chart. The fastest wound healing rates was 21 days occurred in the male group with the use of compression wraps and silver impregnated dressings. The fastest wound healing rate was 30 days (S.D. =8.66) in the female group with the use of the compress wraps and silver impregnated dressings. No statistically significant differences was validated by data for gender within this research.

Medline (2002) presented four case studies which included one male aged 93 years and three females aged 40 years, 42 years and, 94 years. Results of the Medline study revealed that the 93 year old female’s wound healed in four weeks and the other three wounds healed in eight weeks. The present study is consistent with the literature.

Similarly, SilvaSorb was used in the Nametka (2001) study of seven patients that included three males and four females between the ages of 42 and 74 years with chronic wounds. The final outcome reported in Nametka’s study included a decline in bioburden and improved chronic wound healing, however nominal data was not provided to compare wound healing days with the present study.

Research Question 4. Was there an age difference in wound healing time of patients who used compression wraps versus the combined use of compression wraps and
silver impregnated dressings compared to those who did not between August 1, 2002 and December 31, 2004?

The present study’s research involved eight patients between 50-55 years of age, four patients between 56-60 years of age, seven patients between 61-65 years of age and eight patients between 66-70 years of age. Mean wound healing days for the compression wraps alone was 49.14 days (S.D=65.74), and 33.75 days (S.D. =14.16) for the combined use of compression wraps and silver impregnated dressings. The wound healing rate was 15.39 days less for the compression wraps and silver impregnated dressings. No statistically significant difference was validated for age by data within this research.

Nametka & Gibbins (2001) completed a retrospective study on the use of multilayer compression wraps and SilvaSorb dressings on 15 patients with 19 venous leg ulcers. The mean age was 68.3 years with nine males and six females participating in the study. This research described the outcome of the combined use of compression wraps and silver impregnated dressings. Wound healing occurred in 81% of the wounds within four to ten weeks. The present study was consistent with the research.

Conclusions

The compression wraps were used on smaller wounds than were the compression and silver impregnated wraps resulting in a faster initial healing rate. The seven compression wraps alone wounds healed with a mean of 49.14 days (S.D. = 65.74) while the compression wraps with silver impregnated dressings wound healed in 33.75 days (S.D. =14.16). This wound healing rate however was not statistically significant.

The initial wound healing rates between the compression wraps alone and compression wraps and silver impregnated dressings documented that a minimum wound
healing time was 21 days and a maximum of 168 days. Four wounds did not have a healing time documented. The gender representation within the present study included 11 males and 16 females. The wound healing rate with the use of compression wraps used alone with gender considered represented male wound healing at 168 days (one male completed treatment) and females wound healing at 35-70 days. The wound healing rate for compression and silver impregnated dressings represented males at 35-38 days and females at 30-39.80 days. No significant wound healing rate with gender considered could be verified.

The age of the patients within this study was between the ages of 50-70 years of age. Patients were divided into four age categories. The four categories included ages 50-55, 56-60, 61-65, 66-70 years of age. Eight patients were between the ages of 50-55 years with a mean healing rate of 38.38 days (S.D. = 32.50). Four patients were between the ages of 56-60 years with a mean wound healing rate of 26.25 (S.D. = 20.90) days. Seven patients were between the ages of 61-65 years with a mean wound healing rate of 33.57 (S.D. = 17.06) days. Eight patients were between 66-70 years with a mean wound healing rate of 46.50 (S.D. =52.44) days. The patients between the ages of 56-60 years produced quicker wound healing rate than the other age groups, however, no statistical significance could be obtained when considering age.

Limitations

The study has a number of limitations. Eighty closed patient charts were reviewed and only 27 charts met the requirements of this research. This number of patient charts was further divided seven compression wraps and 20 compression and silver impregnated dressings. A comparison of these two groups reflects inequality between the groups and
not valid for equal comparisons. The wound care manager stated that previous to the start
date of this research, compression wraps alone were used more frequently. However, it
became evident to the wound care center, based on their own practice, that compression
wraps and silver impregnated dressings appeared to heal wounds quicker. Therefore, the
physicians prescribed the combined use of compression wraps and silver impregnated
dressings more frequently at the wound care center. Limitations in time prevented the
primary researcher from obtaining charts from the earlier time period. This is due to the
fact that it would have required additional time because the charts are stored off campus
and require a cost per chart to obtain. Also, a date change and revision of IRB protocol
would have been required before further research could be completed. Again, time
limitations of the primary researcher did not allow for the revision. However, reviewing
additional charts of patients who used compression wraps alone may have provided
enough additional statistically significant data to show a significant difference in the two
types of dressings.

Vascular wound healing treatments require the expertise of the doctors and nurses
at the wound care center where the research was conducted. These specialists often use a
combination of healing treatments that includes a debridement of the wound as necessary
and varying treatment methods and use of additional chemicals. Multiple treatments were
used on the wounds and many wounds could not be included within this study because of
the combined use of multiple treatments not measured in this study.

Finally, the wounds that compression wraps were used on were smaller in size
than compression and silver impregnated dressings. This also appeared to occur based on
evidence based practice that has been used by the wound care center. Compression wraps
alone were used rarely. The physicians have chosen to change their dressing practices based on their experience in wound healing and results of quicker wound healing.

Implications

Chronic venous insufficiency is a widespread, debilitating disease and is estimated to affect 10 to 15 million Americans with the loss of two million work days annually (Motykie et al., 1999). Chronic venous insufficiency can lead to venous ulcerations or wounds of the lower legs that may result in the loss of limbs. It is imperative for healthcare professionals to promote healing with advanced wound care. Compression wraps are widely used for the treatment of chronic venous insufficiency. Also, silver impregnated wound dressings have proven valuable in the healing process (Motykie et al.). In the present study no significant differences in healing time, gender and age were proven between the use of compression wraps and compression wraps and silver impregnated wraps. However there was a shorter number of healing days indicated with the use of compression wraps and silver impregnated dressings.

Lewin’s change theory was the theoretical framework used in this research. Implications of this research involve unfreezing, moving and refreezing. Unfreezing, or stage 1, required assessing the problem (wound healing) of which dressing to use that provided the shortest time span for wound healing. The present study compared the wound healing time with compression wraps alone and the combined use of compression wraps and silver impregnated dressings for the individuals with CVI. While no statistically significant differences were found in the wound healing time, age or gender of the patients who used compression wraps alone and the combined use of compression
wraps and silver impregnated dressings, a shorter wound healing time appeared with the combined use of these dressings.

Moving, or stage 2, was planned and implemented with the use of silver impregnated dressings. The documentation was obtained at the wound care center where the research took place. Moving occurs when the benefit or improved outcome of vascular wound healing is discovered and changes in chronic vascular wound treatments are considered. If there is evidence from research that supports a change in the present treatment, it is anticipated that these changes will most likely be implemented. This has occurred at the wound care center and the doctors have chosen to use the combination of compression wraps and silver impregnated dressings versus the compression wraps alone. Based on the present study, no statistically significant differences in types of wound dressings could be documented, however, change has occurred at the wound care center. This change has reflected the physician’s choice to use the combined dressings in greater numbers than using the compression wraps alone. The physicians and nurses appear to believe that CVI will have a quicker wound healing time with the use of compression wraps and silver impregnated dressings. Moving has occurred at the wound care center previous to the research of this study.

Refreezing, or stage 3, may occur if the outcome of a new practice provides an improved outcome or benefit to the patient and the researcher can successfully measure and provide documentation that encourages practitioners to begin a change in standard practice. This change involves using the type of dressing that provides the shortest amount of wound healing time. Refreezing occurs when the new practice is implemented and believed to become the standard of practice. This practice requires a consistent
reproving of the original treatment with a positive outcome for the patient. The present research did not provide evidence to support this change but did provide clinically significant evidence because the combination of compression wraps and silver impregnated dressings provided faster wound healing. Therefore, the practice of using the compression wraps and silver impregnated dressings has begun at the wound care center based on the present research and possible previous research. This is evidence based practice and it has encouraged the physicians to use the combined dressings at the wound care center. Overall, refreezing appears to be successful at the wound care center previous to the research of this study.

Recommendations for Further Research

Limited nursing research has been conducted in comparing compression wraps alone and compression wraps and silver impregnated wraps. Additional research should be conducted comparing these two dressings using a larger sample. A prospective study could equalize the patient dressings and provide an equal comparison in numbers. Ethical considerations should also be considered so that delayed wound healing does not occur for the patients.

Additional considerations in CVI research to be explored could include comparison of smokers or non-smokers. Smoking status may contribute to the non-healing wounds of CVI. Additional chronic medical conditions, ulcer size and location could be researched to determine possible connections to the non-healing status of wounds.
Summary

Literature has proven compression wraps are considered the gold standard in wound healing. The purpose of this study was to compare the compression wraps alone with compression wraps and silver impregnated dressings. Data obtained in this research has not supported the benefit of one type of dressing versus the combined dressing use. In the present research, the compression wraps and the combined use of compression wraps and silver impregnated dressings did not provide numerical significance for the dressings, healing time, gender or age.

The findings of this research have been discussed in relationship to the research questions. Conclusions, limitations and implications of this research have also been defined. Lewin’s change theory has been compared to the present study and recommendations for further research have been presented.
References


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Chart Audit Form
# Chart Audit Form

IRB 105003

Group 1-Compression wraps and silver impregnated di
Yellow Form

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**Approved by Medical University of Ohio at Toledo IRB**
Appendix C

Medical University of Ohio at Toledo
INSTITUTIONAL REVIEW BOARD
Department for Human Research Protections
Center for Creative Education Building – Room 0106
3025 Arlington Avenue, Toledo, Ohio 43614-2570
Phone: 419-383-6796   Fax: 419-383-3248
(FWA 00007382)

TO:        Dianne Smolen, Ph.D., R.N.
           MUOT Department of College of Nursing

FROM:      Roland Skoel, M.D., Chair
           Gregory Siegel, R.Ph., J.D., Chair Designee
           MUOT Institutional Review Board

DATE:      June 23, 2005

SUBJECT:   IRB #105003- Chronic Vascular Wounds

The above project was reviewed and approved by the Chair and Chair Designee of the Medical University of Ohio at Toledo Institutional Review Board as an expedited review (category #5). The requirement to obtain informed consent and/or authorization for use and disclosure of protected health information form has been waived, as this research does not include the collection of identifiable health information as defined by the HIPAA Privacy Rule. It was determined that this waiver for informed consent and authorization for use and disclosure of protected health information form at this site will not adversely affect the rights or welfare of the participants. This approval is in effect until the expiration date listed below, unless the IRB notifies you otherwise. The full board will review this research at its meeting on 07/21/2005.

APPROVAL DATE:  6/23/2005
EXPIRATION DATE:  6/22/2006

NOTE:     ALL of the materials (data, documents, records, or specimens) to be utilized in this project must “have been collected, or will be collected solely for nonresearch purposes” (such as medical treatment or diagnosis)” [Expeditied category description as revised, effective November 9, 1998]. (* MUOT IRB emphasis)
All information - that which is pertinent to the research project and that which is incidental to the project - must be handled at all times in a manner to protect patient confidentiality and privacy.

It is the Principal Investigator's (P.I.’s) responsibility to:
1. Abide by all federal, state, and local laws and regulations; the MUOT federal assurance and institutional policies for human subject research and protection of individually identifiable health information including those related to record keeping and be sure that all members of your research team have completed the required education in these areas.
2. Promptly notify the MUOT IRB at (419) 383-6796 of any untoward incidents or unanticipated adverse events that develop in the course of your research. Please complete and submit RGA Form 317 for ALL SUCH REPORTS for this protocol. The Principal Investigator is also responsible for submitting to the MUOT IRB reports of adverse events that occur at other sites conducting this study and for maintaining an up-to-date cumulative table of adverse events (RGA Form 316) and submitting it to the MUOT IRB for each research project. The Principal Investigator is responsible for reporting adverse events to the appropriate federal agencies and the sponsor (when one exists).
3. Report promptly to the MUOT IRB any deviations or violations from the MUOT IRB approved protocol in accordance with the procedures outlined in RGA Form 309. In your report include the protocol number and title, the subject's initials/specimen identifier (as appropriate) and study I.D. number, date of the event, a brief description of the occurrence and a description of any corrective actions taken. The Principal Investigator is responsible for reporting deviations, violations and participant non-compliance to the appropriate federal agencies and the sponsor.
(when one exists) in accordance with federal regulations, institutional policy and any other legal agreements with these organizations.

4. Obtain prior MUOT IRB review and approval for changes in study personnel and for any and all changes/new information that may require additional information to be provided to participants.

5. Report promptly to the MUOT IRB, sponsor (if this research is sponsored) and all other required federal and state agencies all new information affecting the risk/benefit ratio and obtain prior MUOT IRB approval for any changes in the study documents that may be required by the new information.

6. Obtain prior MUOT IRB review and approval for all modified and/or added incentives going to the P.I., study coordinator, other study personnel, and/or the institution. These incentives may be in the form of money or other items of value, including, but not limited to, equipment, such as computers, and intangibles, such as frequent flyer miles.

7. Promptly notify the MUOT IRB; other required MUOT committees, departments or individuals; the sponsor (if this research is sponsored); and all other required federal and state agencies of all potential conflicts of interest before beginning this research and, during the course of this research report to these committees, individuals and agencies any changes that may affect conflict of interest for any of the study personnel. Prior MUOT IRB approval must be obtained for any changes in the study documents that may be required by information related to conflict of interest or any changes in this information during the course of the research.

8. Promptly notify the MUOT IRB of any changes in contracts, budgets, grants or other agreements with sponsors, agencies or individuals regarding the conduct of this research before initiating these changes. The IRB reserves the right to review these study related documents and changes to them to verify accuracy and consistency with regard to the research protocol in order to protect the rights and welfare of the study subjects. Changes in these documents that have the potential to affect the rights, welfare or willingness of the study subjects to participate in or continue to participate in this research and changes in subject documents (such as informed consent, assent or authorization for use and disclosure of protected health information forms, etc.) that are a result of these changes must be reviewed and approved by the MUOT IRB prior to being instituted.

Additional Information:

➢ Other Required Review(s) or Approval(s)
   Review or approval by the MUOT Institutional Review Board does not take the place of any other review or approval required by the Medical University of Ohio at Toledo, non-MUOT performance sites, the government and/or the study sponsor.

➢ Required Procedure to Request Review and Approval for Changes/Updates to MUOT IRB Approved Research:
   Please complete and submit the Request for Amendment/Changes/Updates (RGA Form 314 found at [http://www.meduohio.edu/research/rga_frmis/rga314.doc] with a copy of all materials relevant to the requested change (including consent/assent/authorization for use and disclosure of protected health information forms if applicable) with the changes underlined. If you are requesting review and approval of consent/assent/authorization for use and disclosure of protected health information forms, please attach a clean copy of the revised forms for the MUOT IRB to stamp. Please remember that all changes and correspondence submitted to the MUOT IRB (regardless if they are generated by a sponsor, the P.I. or requested by the MUOT IRB) must be in writing, signed and dated by the Principal Investigator.

➢ Federally Mandated Continuing Review:
   MUOT IRB protocols must be reviewed and reapproved not less than once per year. The Institutional Review Board will try to remind you when reapproval is due. However, it is the responsibility of the Principal Investigator to have his/her own reminder system in place to initiate the re-approval process at least a month prior to the expiration date shown above. Please note that Federal Regulations prohibit the extension of this expiration date. Please see the Application for Continuing Review (RGA Form 319 found at [http://www.meduohio.edu/research/rga_frmis/rga319.doc]) for items required for continuing review.

➢ Required Final Report Upon Termination of Research:
   When you decide to stop this research, you are responsible for completing and submitting a Final Report (RGA Form 320 found at [http://www.meduohio.edu/research/rga_frmis/rga320.doc]) to the MUOT IRB for review.
May 12, 2005

To Whom It May Concern:

RE: Request for review of closed medical records for the research study, "Chronic Vascular Wounds."

Principal Investigator:  Sue Mason, MSN, RN, CNS
Manager, The Center for Wound Care of NW Ohio

Co-Investigator:  Diane Smolen, PhD, RN
Faculty, The Medical University of Ohio
Carol Krieger, BSN, RN
Graduate student, The Medical University of Ohio

In accordance with the ProMedica Health System IRB approval processes, the purpose of this letter is to obtain administrative permission to access closed medical records for the purpose of this research study. In order to support this request, a brief overview of the study in question is provided below.

The purpose of this study is to compare the effect of using compression wraps alone against compression wraps combined with silver impregnated dressings on improving the healing time of chronic venous wounds of adults treated in an outpatient wound care clinic. The design of this study is a descriptive, retrospective, non-experimental design using a chart review.

The data collection will occur in a northwest Ohio outpatient wound care program that is in an urban, 600 bed hospital. Closed hospital medical records of males and females 50 to 70 years of age who were patients at the wound care center between August 1, 2002 and December 31, 2004 being treated for CVI ulcers will be reviewed. The wound clinic manager (principal investigator) will provide to the researcher (co-investigator) a randomly selected convenience sample of patients’ charts. The sample size will be a total of 40 to 80 patients as determined by a power analysis. This study will include the charts of 20 to 40 patients with compression wraps in Group I and 20 to 40 patients with compression wraps and silver impregnated dressings in Group II.

I, Julie Hellinski, Vice-President of ProMedica Continuing Care Services Corporation (PCCSC), Ambulatory Services Division, give my permission for Ms. Carol Krieger to have access to The Center for Wound Care of NW Ohio’s medical records as outlined in the request above, provided that Ms. Krieger has met all the requirements to obtain IRB approval. It is expected that Ms. Krieger will keep a record of the medical records that she has accessed as outlined by the IRB. It is also expected that Ms. Krieger will coordinate the review process with the Sue Mason, Manager of The Center for Wound Care of NW Ohio.

Please feel free to contact me should you need any additional information regarding this request at 419-291-3943.

Sincerely,

Julie Hellinski
Vice-President, PCCSC, Ambulatory Division
ABSTRACT

Chronic venous insufficiency is a widespread, debilitating disease and is estimated to affect 10-15 million Americans with a loss of two million work days annually (Motykie, et al., 1999). The purpose of this study using Lewin’s change theory was to compare the effect of using compression wraps alone against compression wraps combined with silver impregnated dressings on improving the healing time of chronic venous wounds of adults.

The design of this study was a descriptive, retrospective, non-experimental design using a chart review. The 27 patient charts (11 males [40.7%] and 16 females [59.3%] between 50-70 years of age) contained seven compression wraps and 20 compression wraps with silver impregnated dressings. Results indicated no statistical difference in the 7-10 days and the 14-20 days healing rate between the two types of dressings, the gender or the ages.

Conclusions are that compression wraps were used on smaller wounds while the compression impregnated wraps were used on larger wounds with the latter having a faster healing rate in days. Implications are that it is imperative for healthcare professionals to promote improved wound healing with advanced wound healing methods.