Université d'Ottawa · University of Ottawa

Profiling the Venous Leg Ulcer Population and State of Community Practice:

Designing a Nurse-Lead Leg Ulcer Service

By

Karen R. Lorimer

Thesis submitted to the
School of Graduate Studies and Research
In partial fulfilment for the requirement of the degree of
Master of Science in Nursing

University of Ottawa

Abstract

In order to plan for a new community leg ulcer service, local evidence was required on the regional population with venous leg ulcers and the current state of community practice. There is strong evidence in the literature supporting the assessment and management of venous leg ulcers, but little is known about the local population profile or whether they were receiving the internationally recommended care.

This is a manuscript-based thesis that consists of three distinct papers intended for submission for publication. The first two papers detail the planning studies that were undertaken to generate local evidence in order to design a new nurse-lead community leg ulcer service. The first paper provides a population profile of the venous leg ulcer population receiving home care in one Ontario region. The second paper provides a critical appraisal of the state of community venous leg ulcer care. In the final paper, an advanced practice nurse (APN) reflects on her role in the design and implementation of the new service. The new leg ulcer service was designed using the evidence from the population profile and to address the gaps and inconsistencies in the provision of "best practice" that were identified in the appraisal of care. In this third paper, a number of barriers to the new evidence-based service were identified on a number of different levels and the multiple strategies tailored to the barriers were described.

Acknowledgements

There are a number of individuals whose contributions made this thesis possible. As a part of my thesis work, I had a unique opportunity to be a part of a large research project and am extremely fortunate to work with some very wonderful and talented people.

My thesis advisor, Dr. Margaret Harrison served as a mentor. Margaret had a vision for improving the community care of the population with chronic wounds. It has becomes a reality through her skilled sharing of that vision. Margaret guided me through the thesis process and helped me to grow in my thinking as an advanced practice nurse. Her confidence in my ability is especially appreciated.

I am grateful for the opportunity to work with Dr. Ian Graham on the development of the evidence-based leg ulcer protocol. Ian assisted with developing the methodology for both research papers, and provided support throughout the thesis process. His valuable feedback on the various drafts of the thesis papers challenged me to broaden my thinking.

Elaine Friedberg assisted me through the data analysis, and was always willing to answer questions and provide support. Her attention to detail in developing an implementation plan was instrumental to the launch the nurse-lead community service.

Dr. Barbara Davies provided a fresh perspective on the thesis papers. As someone not directly involved in the research project, she was able to identify ideas requiring clarification. Barbara's expertise in evidence-based practice provided a valuable addition to the thesis committee. I am appreciative of her encouragement to complete the thesis and for her guidance in the requirements of the University.

The Ottawa-Carleton Community Care Access Centre (CCAC) provided administrative and financial support to the Regional Prevalence and Profile Study. Their recognition of the special needs of the population with leg ulcers is appreciated, as is their continued financial support.

A very special thank you to all VON nurses involved with this project over the past three years. Their commitment to continued learning and quality client care is inspiring. Special acknowledgement goes to Diane Brophy, Ruth Carley, Angela Stephenson, and Diane Gregoire. The nurse-lead community leg ulcer service would not exist without their extraordinary skill and commitment. They readily shared their expertise and mentored nurses who joined the leg ulcer service. Two support staff, Elli Wieschellock and Gisele Ngembwe-Masengo, ensured the smooth operation of the service, especially as I was preoccupied writing my thesis. Dawn Christiansen, VON manager for the leg ulcer service, is committed to the service and has been a wonderful support to me in my role as clinical leader. Thank you to Susan Vandevelde-Coke, former executive director at the VON, for allowing my access to the client records.

Dr. Tad Pierscianowski, a member of our interdisciplinary team, whole-heartedly endorses the dedicated nurse-lead leg ulcer service. He serves as our specialist physician, readily consulting with nurses by telephone, and has seen many of our very challenging clients. I am extremely grateful for his support.

Funding for the Regional Prevalence and Profile Study was received from Smith and Nephew and Convatec. Margaret Harrison and Ian Graham received a research grant from the Medical Research Council for the demonstration nurse-lead leg ulcer service.

The loving support and encouragement of my husband Gord has been extra special. He read my papers, provided editorial advice and now views himself as a "leg ulcer expert". My husband and daughters Caitlin and Lindsey boosted my morale with their confidence in me. They provided much needed respite and laughter.

Finally, I would like to acknowledge the contributions of our clients for their willingness to share their experiences and trust the expertise of their nurses.

Table of Contents

List of Appendices

List of Tables

List of Figures

Chapter One

Introduction

Leg ulcers are typically chronic, slow healing, malodorous and have a high likelihood of recurring. The negative impact on quality of life is significant, as individuals may experience mobility loss, chronic pain, fear, anger, depression, and social isolation (Price & Harding, 1996; Phillips, Stanton, Provan & Lew, 1994; Pieper, Szczepaniak & Templin, 2000). The long duration and high recurrence means that individuals and their families must contend with a care burden that is characterized as "forever healing" (Chase, Melloni, & Savage, 1997). Caring for a leg ulcer becomes a "way of life" (Bland, 1996). The unsightly dressings interfere with bathing and personal hygiene. In the United Kingdom, leg ulcer care consumes 25 % to 50 % of home nursing visit resources (Lees & Lambert, 1992). Reports from the United Kingdom and France indicate that the cost of venous diseases of the leg accounts for two per cent of their total national health budgets (Laing, 1992).

In Ottawa-Carleton, our awareness of the problem of chronic wounds in the community was heightened during a collaborative, interagency project focused on evidence-based nursing. In an exploration of potential next steps, community nurses expressed feelings of frustration with the general lack of success in healing chronic leg ulcers and the desire to do something that would improve client outcomes. A literature search was conducted by the researcher to learn more about this common and costly problem.

Definition and Review of the Literature on the Problem of Venous leg Ulcers

Venous leg ulcers result from chronic venous hypertension caused by the failure of the calf muscle pump (Blair, Wright, Backhouse, Riddle & McCollum, 1988). The two main reasons for the incompetence of the calf muscle pump are: 1) damage to the valves in the

venous system designed to prevent the retrograde flow of blood, and 2) immobility. The ineffectiveness of the calf muscle pump leads to a reflux of blood between the superficial, deep and perforating veins. The resulting reflux of blood away from the heart results in high pressure in the dermal capillary bed that causes damage to the microcirculation and predisposes to ulceration (Moffatt & Harper, 1997).

Pertinent literature on venous leg ulcers was found by using MeSH headings in the following electronic databases for available dates: Medline (1966-Feb. 2001); CINAHL (1982-Feb. 01); Embase (1988-March 00). Key words included leg ulcer, venous leg ulcer, stasis ulcer, varicose ulcer, etiology, epidemiology, prevalence, and incidence.

Research reports on the percentage of leg ulcers resulting from venous etiology vary greatly. Studies done in the 1980's in the United Kingdom (UK) indicated that the majority of leg ulcers (76 – 81 %) were the result of venous disease (Callam, Ruckley, Harper, & Dale, 1985; Cornwall, Dore, & Lewis, 1986). Table 1.1 summarizes the research on the percentage of leg ulcers resulting from the most common etiologies. More recent research has reported leg ulcers with a predominantly venous etiology in the 37 % to 62 % range (Baker, Stacey, Jopp-McKay, & Thompson, 1991; Musgrove, Woodham, & Dearie, 1997, Salman & Harding, 1995). The higher percentage of venous ulcers identified in the UK studies is a result of the exclusion of isolated foot and toe ulcers as these are more likely the result of a non venous etiology (Callam et al., 1985; Cornwall et al., 1986).

Clinical Features of Venous and Non-venous Disease

Clients with venous and non-venous leg ulcers often have a readily recognized clinical syndrome comprising signs and symptoms, medical history and risk factors (Moffatt & Harper, 1997; Royal College of Nurses (RCN), 1998). The RCN (1998) clinical practice guideline for venous leg ulcers recommends using the features of the clinical syndrome of venous and non-

venous disease in combination with an Ankle Brachial Pressure Index to ascertain the most probable cause of the ulceration. The medical history and risk factors associated with venous disease include: a family history of leg ulcers, varicose veins, deep vein thrombosis, phlebitis, leg surgery, or fracture of the leg. Clinical features of venous disease include: hyperpigmentation, ulcer located in the gaiter region, varicose eczema, and hyperkeratotic skin. Table 1.2 provides a summary of the medical history and features of both venous and non-venous disease.

Prevalence and Factors Associated with Venous Disease

Factors that are closely associated with venous disease include: advanced age, female gender, varicose veins, deep vein thrombosis, reduced mobility, pregnancy, previous surgery, limb fracture or trauma, social isolation, and a family history of leg ulcers (Andersson, Hansson, & Swanback, 1993; Baker et al., 1991; Callam et al., 1987; Cornwall et al., 1996; Ebbeskog et al., 1996; Franks et al., 1996; Nelzen et al., 1991; Nelzen et al., 1995).

The point prevalence of venous leg ulcers ranges from 0.6 to 1.6 per 1000. For persons older than 85 years, the prevalence rate dramatically increases to between 10 and 30 per 1000 (Callam et al., 1985; Nelzen, Bergquist, & Lindhagen., 1994). Although there is a clear association with advancing years, the majority of leg ulcer sufferers developed their first ulceration before the age of retirement (Callam et al., 1987; Nelzen et al., 1994; Nelzen, Bergquist & Lindhagen, 1996). The majority of studies also report a larger proportion of females to males. However, the female predominance holds true only for the older population and most studies have not accounted for female longevity (Baker et al., 1991; Nelzen et al., 1994).

Nelzen et al. (1994) found the presence of varicose veins to be the most useful predictor of venous ulceration. Deep vein thrombosis (DVT) is important in the development of varicose veins and venous ulcers (Moffatt & Harper, 1997). An increased risk of DVT is associated with advancing age, a high body mass index, immobility, trauma, surgery, high-risk disease (e.g. CHF),

venous insufficiency, and a history of more than three pregnancies (Autar, 1996). Baker et al. (1991) found that only 17 % of the patients in his study had a confirmed history of a DVT, but that 79 % had experienced a predisposing factor for DVT, supporting the view that many individuals with chronic venous ulcers have had a previous subclinical DVT.

The association between reduced physical activity and venous disease has been recognized (Moffatt & Harper, 1997). Functional changes occur in individuals who are immobile due to reduced calf muscle pump function and a rise in venous pressure (Brand, 1988). Arthritis, paralysis and a fixed ankle joint are associated health problems that result in immobility and the development of venous ulceration (Cornwall et al., 1986; Blair et al., 1987; Franks, Moffatt, Connelly, Bosanquet, Oldroyd, et al., 1995). Social isolation has also been reported to affect mobility and therefore venous ulceration (Franks, Oldroyd & Moffatt, 1994).

The Chronic Nature of Leg Ulcers

Venous leg ulcers are a chronic condition. Callam et al. (1987) identified three measures describing the chronic nature of the disease: 1) the duration of the ulceration, 2) ulcer recurrence, and 3) the ulcer diathesis, defined as the period of time since the onset of the first ulcer to the time of the survey. Studies report that 25 % to 54 % of ulcers were present for more than one year (Cornwall et al., 1986; Ebbeskog, Lindholm, & Ohman,1996; Nelzen et al., 1994). Between 28 % and 45 % of individuals experienced episodes of ulceration for more than 10 years (Baker et al., 1991; Callam et al., 1987). The recurrence rate for venous ulcers was 67 % to 76 % (Baker et al., 1991; Callam et al., 1987; Nelzen et al., 1994). Table 1.3 summarizes a review of the literature on the chronic nature of venous leg ulcers.

Evidence-Based Care and Service Delivery for Venous Leg Ulcers

Evidence-based practice (EBP) is the conscientious, explicit, and judicious use of the current best evidence in making decisions about the care of individual clients (Sackett,

Rosenberg, Gray, Haynes, & Richardson, 1996). A multitude of factors are weighed in evidence-based decision-making. In the model adapted by Dicenso, Cullum, and Ciliska (1998), four components influencing decisions include: clinical evidence, client preference, research/evidence, and available resources. According to Mead (2000), EBP incorporates the concepts of quality care, clinical effectiveness, and consumer choice and is inseparable from issues of diminishing resources and the escalating demand for health care.

The current best available evidence for the treatment of venous leg ulcers includes a systematic review by Cullum, Nelson, Fletcher, and Sheldon (2000) on the use of compression bandaging or stockings. Significant improvements in the healing rates of uncomplicated venous leg ulcers were shown. Compression is contraindicated in the presence of arterial disease, therefore international nursing practice guidelines for the assessment and management of venous leg ulcers recommend that an ankle brachial index (ABPI) measurement be done to rule out arterial involvement prior to the use of compression bandages or stockings (CREST, 1998; RCN, 1998; SIGN. 1998). Despite the strong supporting evidence for the use of compression and the ABPI measurement, it has been reported that individuals are not receiving this care (Graham, Harrison, Moffatt, & Franks, 2000; Hickie, Ross & Bond, 1998).

Evidence for the successful service delivery of care for venous leg ulcers supports programs developed in the United Kingdom that provide leg ulcer care in community nurse-lead clinics. Prior to the implementation of the leg ulcer clinics healing rates ranged from 22 % to 26 % at 12 weeks. After the implementation of the clinics, healing rates with care provided in the clinics improved to between 42 % and 69 % at 12 weeks (Lambourne, Moffatt, Jones, & Franks, 1996; Moffatt, Franks, Oldroyd, Brown, Greenhalgh, & McCollum, 1992; Simon, Freak, Kinsella, Walsh, Lane, et al., 1996; Stevens, Franks, & Harrington, 1997). These studies also reported reductions in the cost of care. Moffatt et al.

(1992) reported improvements in quality of life as well. Table 1.4 provides a summary of the outcomes achieved with nurse-lead clinic care in the United Kingdom. Clients receiving evidence-based care in a clinic provided by nurses trained in leg ulcer care had better healing rates than clients receiving usual care at home. The evidence-based care focused on the screening ABPI and the use of compression.

The Ottawa-Carleton Regional Leg Ulcer Project

The Ottawa-Carleton Regional Leg Ulcer Project (OCLUP) was formed in response to the growing demand for the community care of leg ulcers. An interdisciplinary team of researchers, health practitioners, and the local home care authority decided to develop a demonstration evidence-based leg ulcer service along the lines of successful nurse lead clinics in the United Kingdom. Extensive research and preparatory work prior to the implementation of the demonstration leg ulcer service was required.

The preliminary research began with a Regional Prevalence and Profile Study (RPP) (Harrison, Graham, Friedberg, Lorimer, Vandevelde-Coke, 2001). The prevalence study was intended to identify the magnitude of the problem of leg ulcers in the region, and to profile information on the client socio-demographic, circumstance of living, and health history.

The RPP study included leg and foot ulcers that resulted from all etiologies (e.g. arterial, venous diabetic, mixed). Table 1.5 provides an overview of the methodology of the RPP study. The RPP study found that the rate of lower limb ulceration was 1.8 per 1000 population over the age of 25 years. Nearly three-quarters of the study population was over age 65 years, and nearly 60 % had four or more co-morbid conditions with the leg ulcer. The recurrence rate was nearly 45 %, and one-third had the ulcer for more than one year.

This thesis focuses on the problem of leg ulcers resulting only from a venous etiology. As a nurse manager, I was interested in understanding the characteristics of this population in

order to better plan nursing services. Although community nursing clinics had been successful in the United Kingdom, it was not known if the establishment of clinics would meet the needs of clients in a Canadian context. As has been shown, there is strong evidence in the literature supporting the assessment and nursing management of venous leg ulcers, but little is known about the venous leg ulcer client profile or whether this population of Ottawa-Carleton was receiving the internationally recommended care.

This thesis addresses the following four questions:

1. What was the profile of clients with venous leg ulcers who received home care in one Ontario region (in March 1999) and what are the implications for a new evidence-based leg ulcer service?
2. How congruent was nursing practice with 'best practice' for venous leg ulcers?
3. What factors were associated with the provision of 'best practice'?
4. What is the role of the Advanced Practice Nurse in the design and implementation of an evidence-based leg ulcer service?

The population for the venous leg ulcer study (VLU) (chapter 2) is a subgroup of the RPP study and the population for the Practice Variation Study (PVS) (chapter 3) is derived from the VLU study. An overview of the two phases of the RPP study, the VLU (chapter 3) and PVS (chapter 3) is found in Figure 1.1.

Chapter 2, "An Assessment of Individuals with Venous Leg Ulcers in a Community Home Care Population," describes the socio-demographic, circumstance of living and clinical data of a cohort of clients receiving care from one nursing agency and how this information was used to profile the venous leg ulcer population in order to plan appropriate health care services.

Chapter 3, "Venous leg ulcer care: How evidence-based was nursing practice" addresses research questions two and three. This practice variation study appraises the

venous leg ulcer care in one nursing agency as documented in the client nursing records. The care is examined for congruence with 'best practice' as defined by the common care recommendations from three international nursing practice guidelines. Clinical and organisational factors associated with 'best practice' as discussed in the literature are also examined.

Chapter 4, "The Design and Implementation of a Nurse-Lead Community Leg Ulcer Service: Role of an Advanced Practice Nurse (APN)," is a reflection on my involvement as an APN in the design and implementation of a nurse-lead community leg ulcer service. The Ottawa Model of Research (OMRU) provides a conceptual framework for focusing the APN's attention on the barriers and supports of the evidence-based service and on tailoring the strategies aimed at negating the effects of the barriers and enhancing the supports to the service.

Chapter 5 provides a general discussion and conclusion and integrates the findings from all three main papers with implications for nursing practice and continued research.

Chapters 2 and 3 in this thesis are intended as articles for publication in a journal, thus able to stand on their own. The journal type will have wound care or vascular nursing focus.

Table 1.1

Summary of the Literature on the Etiology of Leg Ulcers

Study Location	Study Location	Inclusion of isolated foot and toe ulcers	Venous Disease	Arterial Insufficiency	Mixed Venous/ Arterial	Diabetes	Other Classifications
Stevens et al. (1997)	UK	Yes	44 %	21 %	21 %	Not reported	Not reported
Musgrove et al. (1997)	UK	Yes	62 %	3 %	15 %	Not reported	20 % not recorded
Ebbeskog et al. (1996)	Sweden	Yes	42 %	9 %	13 %	18 %	6 %
Salman et al. (1995)	UK	Yes	58 %	9 %	8 %	2 %	23 %
Nelzen et al. (1995)	Sweden	Yes	37 %	7 %	15 %	24 %	Not reported
Nelzen et al. (1994)	Sweden	Yes	54 %	6 %	22 %	4 %	Traumatic Pressure
Nelzen et al. (1991)	Sweden	Yes	40 %	7 %	23 %	43 %	Pressure
Baker et al. (1992)	Australia	Yes	57 %	9 %	15 %	12 %	Not reported
Cornwall et al. (1986)	UK	No	81 %	9 %	22 %	Not reported	Not reported
Callam et al. (1985)	UK	No	76 %	22 %	Not reported	5 %	Rheumatoid arthritis 9 %

Table 1.2

Clinical History/Risk Factors and Clinical Features of Venous and Non-venous Disease

(RCN, 1998)

Venous Leg Ulcer Desease	**Non-Venous Leg Ulcer Disease**
Clinical History and Risk factors • Family history of venous disease • Varicose Veins • Deep Vein Thrombosis in the affected leg • Phlebitis in the affected leg • Suspected Deep-Vein Thrombosis (a swollen leg after surgery, pregnancy, trauma or a period of enforced bed rest) • Surgery/fracture to the leg • Episodes of chest pain, hemoptysis, or history of pulmonary embolus	**Clinical History and Risk Factors** • Family history of non-venous etiology • Heart attack, stroke, transient ischemic attack • Diabetes mellitus • Smoking • Peripheral vascular disease/ intermittent claudication • Rheumatoid arthritis • Ischemic rest pain
Clinical features of venous disease • Ankle flare • Warm leg • Varicose eczema • Varicose veins • Atrophe blanche • lipodermatosclerosis • Hyperkeratotic skin • Pedal pulses present • Edema • Hyperpigmentation • Shallow ulcer located in the gaiter region	***Clinical features of non-venous disease*** • Calf pain on walking relieved by rest • Nocturnal pain • Shiny, hairless limb • Cold legs/feet (in a warm environment) • Dependent rubor • Pale or blue feet • Ulcers with a 'punched out ' appearance • Gangrenous toes
Ankle-Brachial Pressure Index (ABPI) that approximates 1	Ankle-Brachial Pressure Index (ABPI) of less than 0.8 (indicates arterial involvement)
* *Ulcers that are mixed venous/non-venous will have features of both*	

Table 1.3

Literature Review on the Chronic Nature of the Disease

Author, Year and Location	Ulcer Type	Duration	Diathesis	Recurrence
Ebbeskog et al. (1996) **Sweden**	Chronic leg and foot ulcers	Median 6 months > 1 year 25 % > 5 years 5 %	Not reported	Not reported
Nelzen et al. (1994) **Sweden**	Leg and foot ulcers present for more than 6 weeks	> 1 year 54 % (venous)	< 1 year 27 % Median 13.4 years (venous)	72 % (venous)
Baker et al. (1991) **Australia**	Venous defined as abnormal venous filling time	Median 26 weeks > 26weeks 46% > 2 years 15%	> 5 years 47 % >10 years 28 %	76%
Callam et al. (1987) **United Kingdom**	All open ulcers below the knee, excluded isolated toe and foot lesions, 76 % venous	Up to 9 months in 50 % > 2 years 20 % > 5 years 8 %	1-5 years 26 % 5-10 years 21 % > 10 years 45 %	67 %
Cornwall et al. (1986) **England**	Same as Callam et al. (1987) 81 % venous	> 6 months in 10% >1 year in 50 %	Not reported	Not reported

Table 1.4

A Review of the Literature on the Outcomes of Nurse-lead Community Leg Ulcer Clinics

Study	**Country Setting Duration**	**Research Design**	**Sample**	**Comparison of groups at baseline**	**Outcome measures**	**Findings**
Morrell et al. (1998)	U.K. Trent 1994-95	Comparison of clients receiving usual care by district nurses versus care received in a community leg ulcer clinic.	Random assignment to 1 of 2 groups if inclusion criteria met	2 groups well matched to baseline demographic and health measures	Healing rates Time to recurrence Cost of treatments Quality of life	20 weeks for clinic versus 43 weeks for usual. Clinic 1.65 times more likely to heal. Free of ulcers longer 20.1 weeks versus 14.2 for control. No differences in cost or quality of life.
Musgrove et al. (1998)	U.K. Northamp -ton 1996-97	Prospective study that determined healing rates after a new leg ulcer service initiated.	Clinic clients with venous ulcers treated with compression N= 100	Intervention group only	Healing rates	66 % healed by end of study that lasted 8 months. 13 % by 24 weeks 9 % by 12 weeks, .
Stevens et al. (1997)	U.K Hounslow & Spelthorne 1993-95	Baseline audit of usual care by district nurses serves as a comparison for outcomes in community clinics. Clinic care includes specially trained nurses, Doppler assessment, access to compression bandaging, and links to specialist referral.	Audit = 236 Clinic = 181	No	Healing rates Cost of treatments Quality of life	Healing: No baseline healing rates Clinic: 66% at 12 weeks and 79 % at 24 weeks. Reduction on cost by 1/3. No clear improvements in quality of life

Table 1.4 (continued)

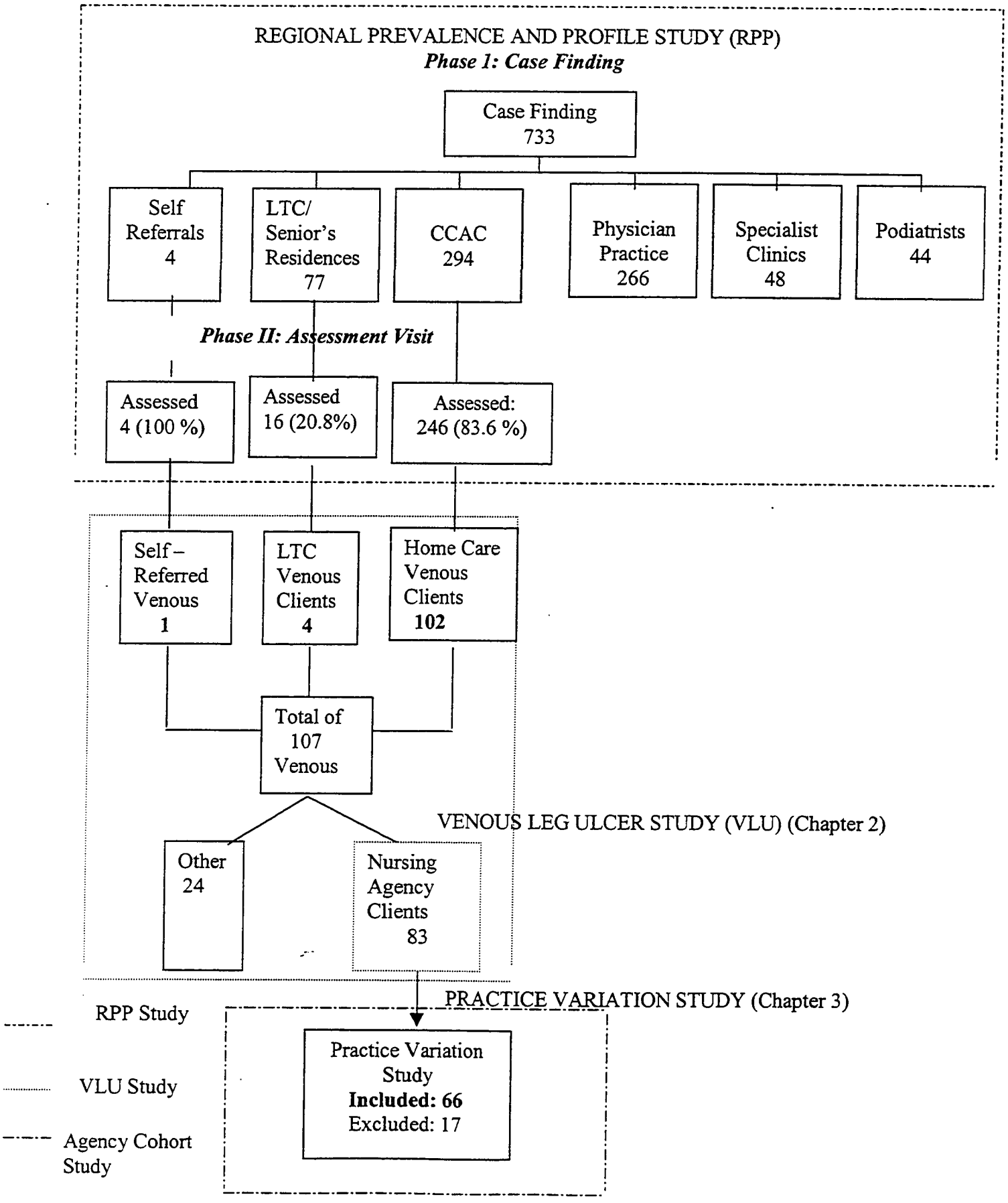
Study	Country Setting Duration	Research Design	Sample	Comparison of Groups at Baseline	Outcome Measures	Findings
Lambourne et al. (1996)	U.K South Bedford 1993-95	Similar to the Stevens study	Baseline =260 Second audit = 166	Compared for age, sex, duration of ulcer. 2nd audit also compared clinic patients with those treated at home.	Healing rates Cost of treatments	Only results for clients treated with compression. 54 % healed after12 weeks. Reduction of costs by ¼.
Simon et al. (1996)	U.K. Stockport & Trafford 1993-95	Cost and efficacy studies prospectively over 3 months in both districts and repeated one year after leg ulcer clinics introduced in Stockport	1993-Baseline Trafford= 203 Stockport = 252 1994 Trafford = 213 Stockport= 233	Two cities chosen because of the similar population. No statistical differences in terms of age, size of ulcer, etc.	Healing rates Costs of treatments	Healing Stockport improved from 26% to 42 % at 12 weeks In Trafford 23% to 20%. Cost:↓ 32.2 % in Stockport ↑ 21.1 % in Trafford
Moffatt & Franks (1992)	U.K. Riverside 1988-90	As in the Stevens study	Baseline Audit = 51 Clinic = 477 Excluded clients with severe arterial disease or inability to travel to clinic	No	Time to complete healing Cost of treatments Quality of Life	Healing Audit: 22% at 12 weeks Clinic: 69% at 12 weeks and 81% by 24 weeks. Decreased costs by 1/3 while increasing number of clients by 50%. Quality of life Reductions in anxiety, depression, and hostility

Table: 1.5

Regional Prevalence and Profile Study Methodology (Harrison et al., 2001)	
Study Design:	Period prevalence over a one month period in March 1999
Study Population:	All individuals living in the Ottawa-Carleton Region with a leg ulcer identified by home care, family physicians, specialist clinics, podiatrists, long term care facilities, seniors' residences, or individuals responding to an advertisement in one of 15 local newspapers.
Study Team:	Partnership between the Loeb Health Research Institute, the local home care authority, and 3 Home Care Agencies. Researchers, clinicians, & administrators on team.
Survey Team:	8 Registered Nurses, 3 with Enterostomal Therapy (ET) credentials.
Leg Ulcer Definition:	A defect in the dermis at a site below the knee, persistent for one month or longer.
Instruments:	Completed during a client's regularly scheduled visits. Included: • Leg Ulcer Assessment Form: Clinical assessment of the leg, socio-demographic characteristics, circumstances of living, medical history. Textbook for baccalaureate level leg ulcer course in the UK and international leg ulcer guideline used as a resource for the assessment tool development. • Ankle Brachial Pressure Index (ABPI) using a portable hand-held Doppler, • SF 12 Quality of Life, • McGill Pain Assessment (PPI): Before and after dressing change. • Resource and service utilization form
Procedures:	*Pre-Study* • Training Workshops for Registered Nurse surveyors on leg assessment, ABPI measurement, and completion of survey tools. • Information sessions for all Home Care agency nurses on completion of the resource and service utilization form, • Letter delivered to CCAC clients by Home Care Agency Nurses *Phase I:* • Case Finding Audit of home care authority's list of wound supplies followed by a chart review to confirm the presence of an ulcer • Identification of individuals not receiving home care through: leg ulcer clinic at tertiary centre, family physicians, podiatrists,

	long term care/seniors residences, and advertisements placed in newspapers. • Track home care leg ulcer admissions on a daily basis. • Document all non-inclusions and reasons Phase II: Validation and Client Profile • Deploy 8 survey nurses across the region to conduct validation assessments. First 3-4 visits done in pairs to test inter-rater reliability for ABPI • Completion of clinical history, leg ulcer assessments, ABPI, pain scale, SF12 (quality of life) on all consenting home care clients and on individuals from long term care facilities, senior residences, and respondents to newspaper advertisements.
Data Management	All missing cases accounted for Data entered in the SPSS by experienced data analyst Acceptable error rate < 1%

Figure 1.1: Overview of the Three Studies



References

Autar, R. (1996). Nursing assessment of clients at risk of deep vein thrombosis (DVT): The Autar DVT scale. Journal of Advanced Nursing 23 (4), 763-70.

Baker, S., Stacy, M., Jopp-McKay, A., & Thompson, P. (1991). Epidemiology of chronic venous ulcers. British Journal of Surgery, 64, 258-261.

Baker, S., Stacey, M., Singh, G., Hoskin, S., & Thompson, P. (1992). Aetiology of chronic leg ulcers. European Journal of Vascular Surgery, 6, 245-251.

Blair, S. D., Wright, D.D. I., Backhouse, C. M., Riddle, E., & McCollum, C. N. (1988). Sustained compression and healing of chronic venous ulcers. British Medical Journal, 297, 1159-1161.

Bland, M. (1996). Coping with leg ulcers. Nursing in New Zealand, 2, 13-4.

Brand, F. N. (1988). The epidemiology of varicose veins. The Framington study. American Journal of Preventative Medicine, 4, 96-101.

Callam, M. (1992). Prevalence of chronic leg ulceration and severe chronic venous disease in Western Countries. Phlebology Supp. 1, 6, 2-8.

Callam, M.J., Harper, D. R., Dale, J.,& Ruckley, C. (1987). Chronic ulcer of the leg: Clinical history. British Medical Journal, 294, 1389-1391.

Callam, M.J., Ruckley, C.V., Harper, D.R., Dale, J.J, (1985). Chronic ulceration of the leg: Extent of the problem and provision of care. British Medical Journal, June, 290, 1855-1857.

Chase, S.K., Melloni, M., & Savage, A. (1997). A forever healing: the lived experience of venous ulcer disease. Journal of Vascular Nursing, 15, 73-8.

Clinical Resource Efficiency Support Team (CREST, 1998). Guidelines for the assessment and management of leg ulceration. Belfast.

Cornwall, J., Dore, C. & Lewis, J. (1986). Leg ulcers: Epidemiology and aetiology. British Journal of Surgery, 73, 693-696.

Cullum, N., Nelson, E. A, Fletcher, A., & Sheldon, T. (2000). Compression bandaging and stockings for venous leg ulcers. The Cochrane Library, I

Dicenso, A., Cullum, N., & Ciliska, D. (1998). Implementation Forum. Evidence-Based Nursing: some misconceptions. Evidence-based Nursing, 1 (2), 30-40.

Ebbeskog, B., Lindholm, C. & Ohman, S. (1996). Leg and foot ulcer patients: Epidemiology and nursing care in an urban population in South Stockholm, Sweden. Scandinavian Journal of Primary Health Care, 14, (4), 238-243.

Franks, P.J., Moffatt, C.J., Connolly, M., Bosanquet, N., Oldroyd, M., Greenhalgh, R.M., & McCollum, C.N. (1994). Community leg ulcer clinics: Effect on quality of life. Phlebology, 9, 83-86.

Franks, P., Moffat, C., Connolly, M., Bosanquet, N., Oldroyd, M., Greenhalgh, R., and McCollum, C. (1995). Factors associated with healing leg ulceration with high compression. Age and Aging, 24, 407-410.

Harrison, M. B., Graham, I., Friedberg, E., Lorimer, K., & Vandervelde-Coke, S. (2001). Assessing the population with leg and foot ulcers. Canadian Nurse, 97(2), 18-23.

Hickie, S., Ross, S., & Bond, C. (1998). A survey of the management of leg ulcers in primary care settings in Scotland. Journal of Clinical Nursing 7(1) 45-50.

Laing, W. (1992). Chronic venous diseases of the leg. London: Office of Health Economics, United Kingdom.

Lambourne, L., Moffatt, C., Jones, A., & Franks, P. (1996). Clinical audit and effective change in leg ulcer services. Journal of Wound Care, 5, (8), 348-51.

Lees, T. & Lambert, D. (1992). Prevalence of lower limb ulceration in an urban district. British Journal of Surgery, 79 (10), 269-274.

Mead, P. (2000). Clinical guidelines: Promoting clinical effectiveness or a professional minefield? Journal of Advanced Nursing, 31 (1), 110-116.

Moffatt, C., Franks, P., Oldroyd, M., Bosanquet, N., Brown, P., Greenhalgh, R., & McCollum, C. (1992) Community clinics for leg ulcers and impact on healing. British Medical Journal, 305, 1389-92.

Moffatt, C. and Harper, P. (1997). Leg Ulcers. New York: Churchill Livingstone

Morrell, J., Walters, S., Dixon, S., Collins, K., Brereton, L., Peters, J., & Brooker, C. (1998). Cost effectiveness of community leg ulcer clinics: Randomized controlled trial. British Medical Journal, 316, 1487-91.

Musgrove, E., Woodham, C., & Dearie, P. (1998). Leg ulceration and clinical effectiveness: nurse-led clinics. Nursing Standard, 12, (28), 57-60.

Nelzen, O., Bergquist, D., & Lindhagen, A. (1995). The prevalence of chronic lower-limb ulceration has been underestimated: Results of a validated population study. British Journal of Surgery, 83, 255-258.

Nelzen, O., Bergquist, D., & Lindhagen, A. (1994). Leg ulcer etiology: A cross sectional population study. Journal of Vascular Surgery, 14, 557-64.

Nelzen, O., Bergquist, D., Lindhagen, A., & Hallbook, T. (1991). Chronic leg ulcers: an underestimated problem in primary health care among elderly patients. Journal of Epidemiology and Community Health, 45, (1), 184-87.

Phillips, T., Stanton, B., Provan, A., & Lew, R., Price, P., & Harding (1996). A study of the impact of leg ulcers on quality of life: Financial, social, and psychological implications. Journal of the American Academy of Dermatology, July, 31 (1), 49-53.

Pieper, B., Szczepaniak, K., & Templin, T. (2000). Psychological adjustment, coping, and quality of life in persons with venous ulcers and a history of intravenous drug use. Journal of Wound, Ostomy, and Continence, July, 27 (4), 227-237.

Price, P. & Harding, K. (1996). Measuring Health-related quality of life in patients with chronic leg ulcers. Wounds: A Compendium of Clinical Reseach and Practice, May/June, 8 (3), 91-93.

Royal College of Nurses (RCN). (1998). Clinical Practice Guidelines: The management of patients with venous ulcers. York: RCN Institute.

Sackett, D. L., Rosenberg, W. M., Gray, J. A., Haynes, R. B., & Richardson, W. S. (1996). Evidence-based medicine: what it is and what it isn't. British Medical Journal, 312, 71-2.

Salman, R. & Harding, K. (1995). The aetiology and healing rates of chronic leg ulcers. Journal of Wound Care, 4, (7), 320-323.

Scottish Intercollegiate Guidelines Network (SIGN, 1998). The care of patients with chronic leg ulcers. SIGN Publication Number 26, Edinburgh. [On-line] Available: www.sign.ac.ik/html/htmtxt26.htm.

Simon, D., Freak, L., Kinsella, A., Walsh, J., Lane, C., Groake, L., & McCollum, C. (1996). Community leg ulcer clinics: a comparative study in two health authorities. British Medical Journal, 312, 1648-51.

Stevens, J., Franks, P., & Harrington, M. (1997). A community/hospital leg ulcer service. Journal of Wound Care,6, (2), 62-68.

Chapter Two

An Assessment of Individuals with Venous Leg Ulcers in a Community Home Care Population

An Assessment of Individuals with Venous Leg Ulcers in a Community Home Care Population

Abstract

Objectives: 1) to describe the characteristics of a venous leg ulcer population receiving home care in one Ontario region; and 2) to develop a population profile for use in planning a new community leg ulcer service.

Methods: The population was a home care cohort (n=83) with venous leg ulcers. The venous cases assessed during a Regional Prevalence and Profile Study (RPP) on leg ulcers of all etiologies (Harrison, Graham, Lorimer, & Vandervelde-Coke, 2001) were identified using the clinical history and risk factors for venous and non-venous disease and the features of the clinical syndrome described in the Royal College of Nurses (RCN, 1998).

Results: There were 51 females and 32 males with a mean age of 73 (median 77, range 28 to 98). One half had four or more co-morbid conditions. More than 60 % (51/80) had a previous leg ulcer. The average duration of the current ulceration was 15 months (median 6). Thirty per cent (22/71) reported episodes of ulceration for more than five years.

Conclusions: In determining appropriate community service for leg ulcer care, issues such as transportation, language and cultural differences, and care options for clients need to be resolved. Leg ulcer clients are complex and need early intervention and care that is evidence-based. There are significant resource implications for nurse education and training to deliver evidence-based care.

An Assessment of Individuals with Venous Leg Ulcers in a Community Home Care Population

With hospital restructuring and downsizing there has been an increased demand for community care. This in combination with a shortage of nurses has focused attention on ways of providing more effective and efficient community care. The inappropriate management of a chronic disease such as venous leg ulcers is expensive, both in terms of human suffering and resource use, particularly community nursing services. District or homecare nurses are recognized as the key professionals involved in leg ulcer management in the community (Callam, Ruckley, Harper, & Dale, 1985; Lee & Lambert, 1992; Nelzen, Bergquist, Lindhaden & Hallbrook, 1991; Simon & McCollum, 1996).

The problem of venous leg ulcers has not received detailed study in Canada. Although there are studies that profile individuals with leg ulcers from other western countries, it is not known whether the findings from these studies are generalizable to a Canadian context (Baker, Stacy, Jopp-McKay & Thompson, 1991; Callam et al., 1985; Cornwall, Dore & Lewis, 1986; Nelzen, Berquist & Lindhagen, 1996). The first step in planning and developing an evidence-based leg ulcer service is to fully assess the population for whom the service is intended. Profile information was needed on this population and on the current community care provided. The actual number of individuals with venous leg ulcers, issues of health risk, health needs and resource use has implications for the priorities of planning and resource allocation (Laffrey, Loveland-Cherry, & Winkler, 1986). Population profile information on clinical, socio-demographic, and circumstance-of-living factors can serve as both a planning and evaluation baseline for improving outcomes.

In one Ontario region, population information was required to determine the appropriateness of developing a new community leg ulcer service along the lines of successful nurse-lead clinics in the United Kingdom (Lambourne, Moffatt, Jones & Franks, 1996; Moffatt, Franks, Oldroyd, Bosanquet, Brown,Greenhalgh, & McCollum, 1992; Simon, Freak, Kinsella, Walsh, Lane, Groake, McCollum, 1996; Stevens, Franks & Harrington, 1997). Prior to developing the new leg ulcer service, there was a need to determine the magnitude of the problem of leg ulcers. A Regional Prevalence and Profile Study (RPP) was conducted on a large, mixed urban and rural region in Ontario (Harrison, Graham, Friedberg, Lorimer & Vandervelde-Coke, 2001). In the RPP study, the researchers identified the number of cases of individuals in the region with a leg ulcer resulting from all etiologies, and generated a general profile on their characteristics. Individuals receiving care from home care, long term care, and physician family practice were included.

The venous group requires specific management and to that end were the focus for a second more comprehensive profile study. The objective of this Venous Leg Ulcer Study (VLU) was to describe the cohort of individuals with leg ulcers of venous etiology who received care from one large not-for-profit home nursing agency in one Ontario region during the month of March 1999.

Background

Venous leg ulcers are a chronic and recurrent condition. For afflicted individuals, there are physical, psychological and economic consequences of this chronic disease that frequently results in premature disability, reduced work productivity and a loss of independence (Ruckley, 1997; Phillips, Stanton, Provan, & Lew, 1994). The associated health care costs are also substantial. In the United States, the estimated annual health care expenditures for venous disease are between 1.9 and 2.5 billion dollars (Simon & McCollum, 1996).

The point prevalence of venous leg ulcers ranges from 0.6 to 1.6 per 1000 for the total adult population, increasing to between 10 and 30 per 1000 in the population over the age of 85 (Baker et al., 1991; Callam et al., 1985; Nelzen et al., 1996). There is a wide variation in the studies on the percentage of leg ulcers with a predominantly venous etiology, with a range from 37 % to 81 % (Baker et al., 1991; Callam et al., 1985; Cornwall et al., 1986; Musgrove, Woodham, & Dearie, 1997; Nelzen, Harper, Ruckley, Prescot, Gibson, & Dale, 1995; Salman & Harding, 1995). Studies conducted in the United Kingdom in the 1980's had higher venous rates because of the exclusion of isolated foot and toe ulcers. Ulcers in these locations tend to be non-venous in origin (Callam et al., 1985; Cornwall et al., 1986).

Callam, Harper, Dale & Ruckley (1987) characterized the chronic nature of the disease with three measures: 1) the duration of the ulceration, 2) ulcer recurrence, and 3) the ulcer diathesis, defined as the period of time since the onset of the first ulceration to the time of the survey. Reports from studies in other Western countries on the duration of leg ulcers indicate that over 50 % last longer than one year (Cornwall et al., 1987; Nelzen et al., 1995). Recurrence rates of leg ulcers range from 45 % to 76 % within one year, with venous leg ulcers having higher duration and recurrence rates than ulcers with a non-venous etiology (Baker et a., 1991; Callam et al., 1986; Nelzen et al., 1995). Results of data collected on the ulcer diathesis indicate that between 28 % and 45 % of leg ulcer sufferers experience episodes of leg ulcers for more than 10 years (Baker et al., 1991; Callam et al., 1987).

A number of factors have been reported to be associated with venous disease (Table 2.1). These include: advanced age, female gender, varicose veins, deep vein thrombosis, reduced mobility, pregnancy, previous surgery, limb fracture or trauma, social isolation, and a family history of leg ulcers (Andersson, Hansson, & Swanback, 1993; Baker et al., 1991; Callam et al., 1987; Cornwall et al., 1996; Ebbeskog et al., 1996; Franks et al., 1996; Nelzen et al., 1991; Nelzen et al., 1995).

Table 2.1

Summary of the Literature on the Factors Reported to be Associated with Venous Leg Ulcers

Author & Year	Older Age	Ratio F:M	VV	DVT	Trauma/ fractures	Major Surgery	Pregnancy	Decreased Mobility	Lives alone	Family History
Cornwall et al. 1996	+	2.2 :1		+		+		+		
Ebbeskog et al. 1996	+	2 :1							+	
Franks et al. 1996	+	2 :1		+				+		
Nelzen et al. 1995	+	1.2 :1								
Andersson al. 1993	+	1.2 :1	+	+						+
Baker et al. 1991	+	1.8 :1		+	+	+	+	+		
Nelzen et al. 1991	+	1.8 :1	+	+				+	+	
Callam et al. 1987	+	2.5 :1								

+ Indicates authors have reported that the factor is associated with venous disease
F:M = Female to male ratio VV=Varicose vein DVT= Deep vein thrombosis

Nurse lead evidence-based community leg ulcer clinics established in the United Kingdom have reported improved healing rates at reduced costs (Lambourne, Moffatt, Jones & Franks, 1996; Moffatt, Franks, Oldroyd, Bosanquet, Brown, Greenhalgh, & McCollum, 1992; Simon, Freak, Kinsella, Walsh, Lane, Groake, McCollum, 1996; Stevens, Franks & Harrington, 1997). Healing rates for leg ulcers improved from between 22 % and 26 % at twelve weeks prior to establishing the nurse lead clinics to between 42 % and 69 % after implementation. Appropriateness of similar programs in a Canadian context is unknown for several reasons. The magnitude of the problem of venous leg ulcers and the characteristics of the population are poorly understood. Key to proceeding with the adoption of nursing clinics in a Canadian jurisdiction is an improved understanding of the population. Factors such as

age and mobility are important when contemplating the introduction of nurse clinics instead of home care. In Ontario, additional factors such as geography and proximity to service delivery and winter climate need to be considered.

Methods

The sample for the VLU study is a cohort of the RPP study, therefore the larger study will first be described.

The Regional Prevalence and Profile Study (RPP)

In phase I of the RPP study (Harrison et al., 2001), a rigorous audit was done using databases from home care, long term care, tertiary care, family physicians and podiatrists to identify all individuals with leg ulcers in the region. An individual was considered to have an active leg ulcer if: 1) there was a defect in the dermis below the knee including the foot, or 2) the ulcer had healed within the 3 months prior to the survey. Following the example of Callam, Ruckley, Harper, and Dale (1985) newly healed ulcers were included because the exact time of healing is difficult to ascertain and because of the high recurrence rates. The maturational stage of healing may take months or years. During the time period when fragile new tissue has not completed the maturational stage of healing, an ulcer recurrence is more likely (Silver, 1994).

In phase II of the RPP study, a survey team of trained Registered Nurses conducted clinical assessments on consenting individuals in home care, long term care or respondents from newspaper advertisements. A comprehensive standardized assessment was conducted and included socio-demographic characteristics, circumstances of living, health history, leg ulcer history, and a full clinical assessment of the leg and ulcers. Measurements were taken of the ulcers (length x width x depth). An ankle brachial pressure index (ABPI) measurement was performed using portable Doppler equipment.

The Venous Leg Ulcer Cohort Study (VLU)

In the VLU study, the first step was to identify the individuals in the RPP who had venous disease. Individuals assessed in the RPP study were categorized according to the etiology of their ulcers into two groups: venous or non-venous. This was done by using the RPP database. The clinical history and risk factors for venous disease and the features of the clinical syndrome described in the Royal College of Nurses (RCN, 1998) clinical practice guidelines formed the basis for identifying the venous and non-venous cases. As well, an Ankle Brachial Pressure Index (ABPI) of 0.8 or greater was required to classify the ulcer as venous. Individuals who presented with clinical features of diabetic neuropathy were excluded, as were individuals with isolated ulcers on the toes, heel or plantar surface of the foot, as ulcers located in these areas are more likely to result from a non-venous etiology (Callam et al., 1985; Moffatt & Harper, 1997).

For methodological and logistic reasons, the VLU cohort was limited to the main service provider. The majority (78 %) of the leg ulcer cases were cared for by a single home nursing agency. The cases from sectors other than the nursing agency assessed in the RPP study included: 1) clients who received care from one of the two smaller nursing agencies with home care contracts; 2) residents in long term care facilities; and 3) individuals who self reported their leg ulcer as a result of an advertisement in local newspapers. These cases were combined and treated as a separate group for the purpose of comparison to the VLU cohort. Due to the variation in nursing records and the logistics of accessing the client records at multiple sites, the inclusion of the cases from the other sectors was not feasible.

The identification of the ulcer as venous or non venous using the criteria from the RCN guideline was compared to the ulcer classification derived by a second researcher from a convenience sample of 68 nursing agency records. There was 94 per cent (64/68) agreement in the ulcer classification using the two methods. Of the ulcers misclassified as venous using the RCN

criteria, two were pressure ulcers, one was arterial, and a third the result of a rare etiology. Given the high interrater reliability, the researchers felt confident in classifying the other clients using the RCN guideline for which the information from a chart audit was not available.

The percentage of missing data was typical of secondary analysis conducted on studies of a similar size to the RPP. The highest percentage of missing data was for ulcer duration, and diathesis (12 % and 14.5 % respectively).

Ethics approval was received from the Research Ethics Board at the Ottawa Health Research Institute for the RPP study and for the VLU study (# 200028701H, Appendix F).

Data Analysis

The RPP data was entered in SPSS version 10 at the Ottawa Health Research Institute from which a dataset was constructed of the cohort of individuals with venous disease. Descriptive statistics were employed to summarize the demographic and social data of the sample population, their health related characteristics, and the leg and ulcer assessments. Frequency distributions summarized the data on gender, social data, the clinical history, and the clinical findings of leg ulcers (size, duration, recurrence, and ulcer diathesis). Measures of central tendency (range, median, mode, mean, standard deviation) summarized the data on age and on the characteristics of ulcers such as size, duration of ulceration, recurrence rates, and the number of episodes of ulceration. Continuous variables such as age, duration of ulceration, ulcer diathesis, and ulcer size were analyzed and then converted into categorical variables for analysis and comparison. Within the cohort, statistical testing was done on two subgroups: 1) males and females, and 2) individuals with active ulcers and individuals with healed ulcers at the time of the survey. The t test for differences in means tested age, number of previous episodes of ulceration, duration of ulcer, ulcer diathesis, ulcer size, and number of ulcers. The chi square test for independence tested for differences related to specific

characteristics (gender, health problems and risk factors, mobility, and circumstances of living). Because multiple testing was done, a conservative significance level of 0.01 was used. From a planning perspective, differences of 15 % or greater were considered as clinically and administratively important regional population characteristics.

To determine if the VLU cohort was representative of the regional venous leg ulcer population, this cohort was compared to the cohort comprised of the combined cases from the other nursing agencies, long term care, and newspaper respondents on key variables (socio-demographic, circumstances of living, clinical history, and characteristics of the ulcers).

Geographic dispersion was assessed using postal codes and street addresses to pinpoint each case on a regional map. This mapping exercise provided a visual display that highlighted where the client clusters were in relation to the current home nursing districts to assist in a delivery plan close to the clients' place of residence.

Findings

Individuals Identified with Leg Ulcers with a Venous Etiology

Of the 263 clients assessed during the RPP, 41 per cent (107/263) had leg ulcers resulting predominately from a venous etiology. Of the 107 individuals with venous disease, 83 (78 %) were comprised from a single nursing agency and formed the study cohort. In comparing this cohort with the cohort comprised of the combined cases from the other sectors, there were no significant statistical differences in age, gender, circumstances of living, clinical history or in the clinical features of venous disease including ulcer size, duration of ulcer, or the diathesis of ulceration. There was also no significant difference between the group with healed ulcers (within the previous three months) and the group with active ulcers.

Focusing on the cohort as a group, there was variation in the clinical features and the clinical history and known risk factors for venous disease that comprise the clinical syndrome described in RCN (1998). There was no one clinical feature, health problem, or associated risk factor common to all individuals with venous ulcers (Table 2.2). Despite the classification of the ulcer etiology as venous, several individuals presented with clinical features and health problems or known risk factors associated with non-venous disease (Table 2.3)

Table 2.2

Frequency of Clinical Features and Clinical History/Risk Factors in the Study Population Associated with Venous Disease

Clinical Feature of Venous Disease in Affected Limb (n = 99)	**n**	**%**	**Clinical History or Risk Factor of Venous Disease (n = 83)**	**n**	**%**
Palpable dorsalis pedis (DP) pulse (n = 92)	68	73.9	Arthritis	38	45.8
Warm feet/legs	65	65.6	Varicose Veins	34	41.0
Dry, Flaky Skin	61	61.6	Limb Trauma	25	30.1
Edema	58	58.6	Family history of VLU	22	26.5
Brown or red skin staining	57	57.6	Phlebitis	19	22.9
Diffuse, irregular ulcer shape (n = 98)	57	57.6	Deep Vein Thrombosis	18	21.7
Varicose Veins	20	20.2	Orthopedic Procedure	18	21.7
Venous Eczema	20	20.2	Venous Surgery	17	20.5
Ankle Flare	14	14.1	Articulation impairment	7	8.4
Narrow ankle	9	9.1	Pregnancy (n = 51)	31	60.8

Table 2.3

Frequency of Clinical Features and Clinical History/Risk Factors in the Study Population Associated with Non-venous Disease

Clinical Feature in Affected Limb of Non-venous (n = 99)	**n**	**%**	**Clinical History or Risk Factors of Non-venous (n = 83)**	**n**	**%**
Ulcer shape regular or punched-out (n = 98)	37	37.8	Hypertension	29	34.9
Cool/cold feet/limbs	34	34.0	Cardiac Disease	25	30.1
Diminished or non palpable pulses (n = 92)	24	26.0	Diabetes	17	20.5
Hairless	18	18.2	Intermittent Claudication	14	16.9
Purplish mottling of skin	9	9.1	Smoker	12	14.5
Deformed foot	5	5.1	Peripheral Vascular Disease	10	12.0
Pale Skin	3	3.0	Vascular Surgery	7	8.4
Missing toes	1	1.1	Renal Disease	3	3.6

Those with venous leg ulcers comprise a complex group with a range of health problems. Forty-six per cent of individuals (38/83) had 4 or more co-morbid conditions, while 18 % (15/83) had 6 or more. The leg ulcer was the only reported conditions for less than 9 % (7/83) of individuals.

Socio-demographics and Circumstances of living

The main findings of the VLU are summarized in Table 2.4. The study population was 61 % female (51/83), and the mean age was 73 years (median 77, range 28 to 98). Of the clients assessed, three quarters (64/83) were aged 65 years or older, 59 % (49/83) were 75 or older, and 23 % (19/83) were age 85 or older. The mean age of females was 76 (median 80) compared to 69 for the males (median 74.0). Males comprised a higher proportion of the cohort that was younger than age 65 years. Figure 2.1 presents the percentage of males and females less than or equal to age 75, compared to those over age 75.

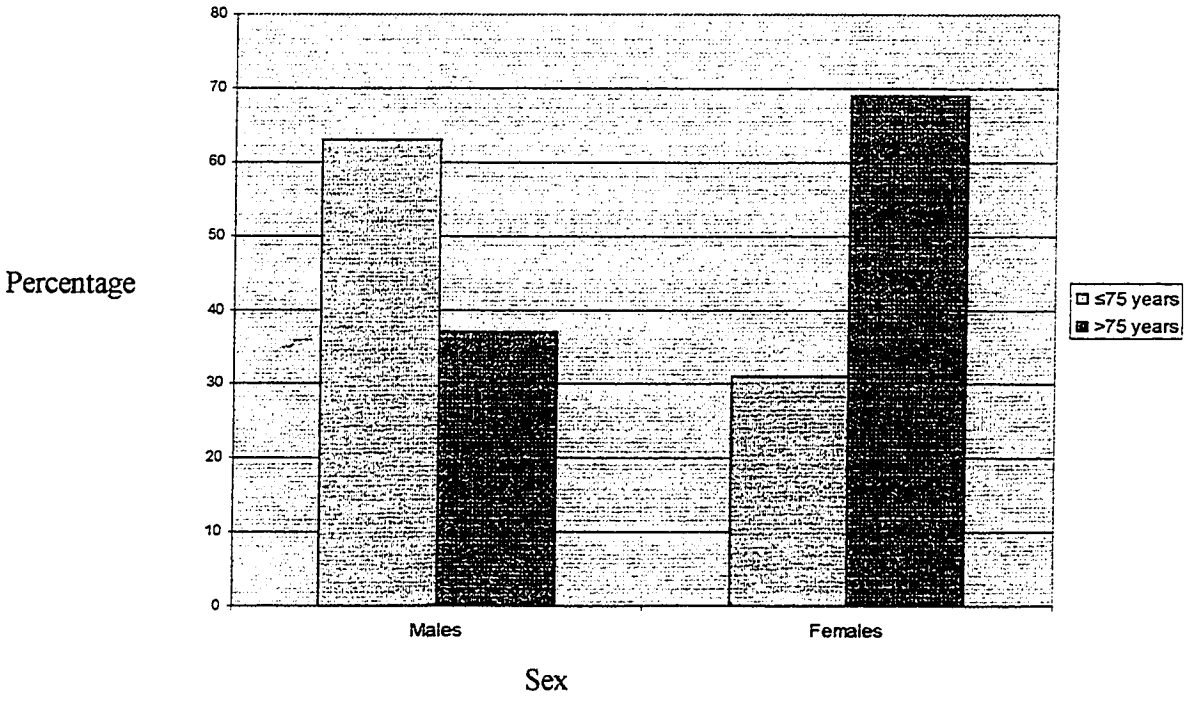
Table 2.4

Characteristics of Clients with Venous Leg Ulcers n = 83

Characteristics	n	%
Over 65 years of age	65	78.3
Women	51	61.4
Living alone (n = 76)	29	38.2
Housebound (unable to leave home)	5	6.0
Independent with mobility (do not use physical aids or assistance)	38	45.8
First language other than English or French (n = 81)	9	11.1
Co-morbid conditions ≥ 4	38	45.8
Most common conditions		
• Arthritis	38	45.8
• Varicose veins	34	41.0
• Hypertension	27	32.5
• Cardiac disease	25	30.1
• Diabetes	17	20.5
Previous history of leg ulcers (n = 80)	51	64.0
Duration of Current Ulcer > 6 months (n = 54)	29	53.7
Diathesis of Ulcer episodes > 5 years (n = 71)	22	31.0
Ulcers ≥ 9 cm^2 (n = 98)	20	20.4
Number of ulcers ≥ 2 (n = 64)	29	45.3

Figure 2.1

Comparison of Venous Cohort by Age and Sex



The mean age of first leg ulcer occurrence was 65 (median 71). Although leg ulcers are predominately an ailment that affects the elderly, 34 % of individuals (28/83) reported developing their first leg ulcer before the age of retirement (age 65 years).

The majority of individuals indicated that they were English speaking (78 per cent, 63/81). Eleven per cent (9/81) spoke French and another 11 % (9/81) of the population spoke languages other than English or French. This percentage is representative of the Regional population (Statistics Canada, 1996).

Thirty-eight per cent (29/76) reported living alone and 40 % (31/76) with a spouse. More females lived with family or friends (25 %, 12/48 to 14 %, 4/28), while a higher proportion of males lived with a spouse (50 %, 14/28 to 35 %, 17/48). Fifty-nine per cent (49/83) were living in a house, while a third lived in an apartment (30/83). When the location of clients receiving care was pinpointed on a regional map, the three main clusters of clients requiring leg ulcer care were in regions where high proportions of seniors' housing were found.

Forty-six per cent (38/83) reported that they were independent with mobility (did not require physical aids or assistance). A higher proportion of females than males required aids or physical assistance (57 %, 28/49 to 45 %, 14/31). Although 6 % (5/83) indicated that they were housebound, 98 % (81/83) reported that they were able to travel outside of their home. Of those able to leave home, 72 % (58/81) traveled by automobile and of these 64 % (37/58) were driven by family members or friends. Fewer females (16 %, 8/51) than males (31 %, 10/32) drove themselves. Other modes of transportation are summarized in table 2.5.

A number of differences were found in the comparison of the male and female population. Those that may have clinical and administrative significance when determining attendance at a community clinic are summarized in table 2.6.

Table 2.5

Modes of Transportation Used n = 81

	n	%
Automobile		
• Drives self	18	22.2
• Family or friends drive	38	46.7
• Missing data	2	2.5
Total	58	71.6
Walking	23	28.4
Para Transpo	17	21.0
Taxi	11	13.6
City Bus	10	12.3

(% does not total 100 % as some clients chose more than one means of transportation)

Table 2.6

Comparison of Differences between Males and Females

Characteristic	Male (%)	Female (%)	Delta	Chi- square
≤ 75 years compared to	63	31	32	0.01
> 75 years	37	69	32	
Independently mobile	62	44	18	0.16
Live with a spouse	50	34	16	0.36
Drives self	31	16	15	0.11
Arthritis	28	57	29	0.01
Diabetes	31	13	18	0.09

The Chronic Nature of Venous Leg Ulcers

The mean ulcer diathesis (time from onset of first episode of ulceration to the current time) was 14 years (median 8 years, SD 17, range 1 to 63 years). Thirty per cent of (22/71) reported ulcer episodes for more than five years and 14 % (10/71) for more than 20 years.

The average duration of the current ulceration was 15 months (median 6, SD 2.3 years, range 4 weeks to 14 years). A third (19/54) had an ulcer for more than one year and 19 % (10/54) had an ulcer for more than two years.

Sixty-four per cent (51/80) reported that they had had previous leg ulcers. The range of previous episodes of ulceration was one and 25. Fifteen per cent (12/77) had experienced five or more previous episodes of leg ulcers. Of those with previous ulcers, 48 % (22/46) reported that the ulcer taken more than six months to heal, and 24 % (11/46) had taken more than one year.

Characteristics of the Current Ulcers

At the time of the March 1999 assessment, 23 % of individuals (19/83) had leg ulcers that had healed (within the previous 3 months). Of those with an active ulcer, 55 % (35/64) had one ulcer, while another 28 % (18/64) had two ulcers, and 17 % (11/64) had three or more ulcers. Four individuals were described as having redness and weeping over all aspects their legs.

Seventeen per cent of individuals (11/64) with an active leg ulcer had bilateral ulcerations. The 64 individuals with active ulcers had a total of 121 ulcers. The most common location of the ulcer was on the ankle (40 %, 48/121) and the calf (34 %, 41/121). Although individuals with isolated foot ulcers were excluded, eight per cent (10/121) of ulcers were found on the foot and four per cent (5/121) on the toes in combination with a leg ulcer.

Ulcer measurements were taken on a total 98 ulcers in 64 individuals. Ulcers smaller than one cm^2 accounted for 15 % (15/98) of ulcers, while 64 % (63/98) were between one and 8.9 cm^2. Large ulcers of 9 cm^2 or greater comprised 20 % (20/98) of ulcers.

Health Care Professional Seen for Previous Ulcerations.

The general practitioner was the main medical provider for individuals receiving ulcer care. The percentage who consulted a general practitioner was 58 % (48/83) for the current ulcer and 77 % (37/48) for a previous ulcer. The percentage of the VLU cohort who had seen a dermatologist for a current ulcer was 42 % (35/83) and 20 % (17/83) had seen a surgeon. For a previous ulcer, 56 % (27/48) had seen a dermatologist and 38 % (18/48) a surgeon. Seventy three per cent (35/48) had received previous care from a home care nurse, while 15 % (7/48) indicted they had done self-care for a previous ulcer.

Population Profile Summary

The cohort of individuals with leg ulcers of venous etiology who received care from one large not-for-profit home nursing agency in one Ontario region during the month of March 1999 presented:

- as a mainly elderly complex group with an average of four co-morbid conditions in addition to the venous leg ulcer.
- with a higher proportion of females who from a clinical and administrative perspective were significantly older and tended to be less mobile
- as a third living alone
- as half requiring assistance with mobility (physical aids or assistance)
- as mainly able to travel outside of their home

- as mainly traveling by automobile with most dependent on others to drive.
- as mainly English speaking, although 11 % spoke French and 11 % languages other than French or English.
- with a high leg ulcer recurrence rate of 64 % and an average ulcer diathesis of 14 years (time since the first ulcer occurrence)
- with the average duration of a current leg ulcer of 15 months
- as the majority (85 per cent) of ulcers medium sized or larger, most commonly at the ankle
- with the general practitioner as the main medical provider of care, and with 60 % having been referred to a dermatologist, surgeon or both.

Discussion

The VLU cohort study provided essential information for planning the new leg ulcer service. The leg ulcer cases could not be identified through community databases held at home care or the nursing agency and the identification of the ulcer etiology using these sources was also out of the question. Therefore, the first task was to identify the number of cases with venous leg ulcers receiving home care. The proportion of ulcers of venous origin (40 %) found in the region was similar to other international studies using a similar leg ulcer definition (Ebbeskog et al., 1996; Nelzen et al., 1995: Stevens et al.1997). The importance of distinguishing venous and non-venous ulcer etiology is crucial, as the treatment methods and nursing care are very different. The bandages applied for treating venous ulcers can have serious adverse affects if applied inappropriately or incorrectly to arterial ulcers. Training nurses to correctly assess for venous leg ulcers and apply these bandages is essential to preventing untoward effects. Therefore, understanding the proportion of venous ulcer cases

preventing untoward effects. Therefore, understanding the proportion of venous ulcer cases assisted the decision-makers to determine the number of nurses and training requirements prior to establishing the new service.

Second, the complexity of the venous leg ulcer population has major implications for the most appropriate provider of leg ulcer care. The scope of practice for the Registered Practical Nurse (RPN) focuses on the care of stable clients whose health can be predicted or anticipated and whose care needs have predictable outcomes (CNO, 1999). The VLU population does not have stable health or predictable outcomes. They are coping with several other chronic illnesses in addition to the leg ulcer. These co-morbid conditions negatively influence the healing of the ulcer and complicate the treatment decisions. For instance, there was a significant proportion with diabetes (21 %). This is a similar finding to the Swedish study by Nelzen et al. (1992) that attributed venous insufficiency as the ulcer cause in 19 % of the individuals with diabetes. The application of high compression bandaging is the 'gold standard' for the treatment of venous leg ulcers, but the decision for compression use and level of compression must be balanced in the context of the entire client assessment. For example, individuals with diabetes frequently have abnormally high ABPI readings as a result of calcification of the arteries. A decision to treat a diabetic client with compression based on an incorrect high ABPI reading could have serious consequences. Therefore, nurses caring for this complex venous leg ulcer population need to be vigilant in identifying both the risks and benefits of the treatment plan. Based on the combination of a complex client group and the necessity for evidence-based decision-making, a new service would need to be staffed by registered nurses with additional training.

Third, the chronic nature of the disease measured by the duration of ulceration, recurrence rate, and ulcer diathesis emphasizes the persistence of the condition. Three-quarters of the individuals with leg ulcers had ulcers that were medium sized or greater. As

active and early intervention might reduce the number of large and slow-healing ulcers (Skene, Smith, Dore, Charlett, & Lewis, 1992). The information on the ulcer size and duration suggests that ulcers are well involved and that immediate results may not be achieved with a change to the new service. The high recurrence rate supports the notion that an individual who has developed an ulcer will always have the potential for recurrence. Appropriate client services for the treatment of leg ulcers includes access to early intervention and a focus on improved client education and secondary prevention to reduce recurrence rates. These data were used to build a case for a service that would permit access to early intervention and the need for ongoing care focused on ulcer prevention.

Fourth, the access to early intervention is further complicated by the lack of available medical expertise. The general practitioner is the main medical provider of health care, but few family doctors see sufficient numbers of patients with leg ulcers to develop extensive expertise with this group. In a recent survey of family physicians, only 16 per cent agreed that they were confident in their ability to treat leg ulcer (Graham & Harrison, 2000).

International studies have reported that very few leg ulcer patients have received referrals to a specialist for their leg ulcer (Callam et al., 1987; Lees & Lambert, 1991). Recommendations in international leg ulcer guidelines recommend referrals to physician specialists for non-healing wounds after three months of treatment (CREST, 1998; RCN, 1998; SIGN, 1998). Interestingly, this study found that 60 % of individuals had seen a specialist physician for their leg ulcer. Despite the higher referral rate, the healing results and recurrent rates were remarkably similar to countries reporting low referral rates. Although the reasons for the lack of improved outcomes with specialist referrals are beyond the scope of this paper, the reasons may be as varied as: whether specialists prescribe evidence-based care, the length of time to referral, and client adherence to prescribed regimens.

In planning for the new service, clients need to receive early intervention, and care that is evidence-based, and coordinated from skilled providers. In the UK, leg ulcer healing rates improved from 23 % at 12 weeks to 69 % after the implementation of community nurse lead clinics (Moffatt, Franks, Oldroyd, Brown, Greenhalgh, & McCollum, 1992). The clinics combined the elements of evidence-based care, nurses trained in leg ulcer assessment and management, and linkages to physicians specializing in leg ulcers. Community nurses measured the Ankle Brachial Pressure Index (ABPI) to screen for arterial disease, and initiated compression bandaging if the client was assessed as having venous leg ulcers. Clients not meeting the criteria for venous leg ulcer care were referred to a specialist physician. In a reorganization of service delivery to the leg ulcer population of Ottawa-Carleton, the recommendation is that nurses trained in leg ulcer assessment and management conduct the client assessment including the ABPI and initiate compression or physician referral according to established criteria. Reorganizing care with an expanded nursing role has resource implications for the education and training, and the purchase of equipment to take the ABPI.

Fifth, despite impaired mobility being an issue for more than half of the cohort, very few were confined to their homes. These data indicate that the delivery of leg ulcer care in a centralized clinic location would be feasible. The exercise of mapping geographic locations where clients lived identified where clusters of clients were located, and the best location for proposed leg ulcer clinics in close proximity to where clients live. However, the majority of leg ulcer clients traveled by automobile and most were dependent on others to drive. Very few claimed to live close to a city bus route. In the clinic programs in the United Kingdom, transportation was provided for the clients attending the leg ulcer clinic. With a clinic approach to care, these data served as an alert to carefully consider the transportation needs of individuals.

The differences in the proportion of male and female in the cohort revealed the need to consider that women may be less likely to attend a clinic. Older age and arthritis, significantly higher in the females, are associated with increased mobility problems. In planning appropriate services, receiving care in the home needs to remain an option. Clients unable to attend a clinic require access to the same quality of care.

Finally, the representation of minority languages (other than English and French) underscores the multicultural nature of this community. The small number of clients who speak any one language may mean hiring nurses who speak languages other than French and English is not feasible. However, services need to be linguistically and culturally sensitive. With the continued influx of new Canadians to this region, this diversity is likely to grow.

A limitation of this study is the small size. In the RPP study, a rigorous process was undertaken to identify all individuals with leg ulcers in the region from the various sectors. Despite the rigor, a number of cases may have been missed, especially recently healed ulcers as most of these cases would not have received ulcer care at the time of the survey. Missed cases would underestimate the magnitude of the problem.

Another limitation in this study is that the ulcer classification was done retrospectively. At the time of the RPP, nurses lacked the skill to classify ulcers according to probable etiology. The retrospective categorization of ulcers as venous and non-venous was based on the Royal College of Nurses (RCN, 1998) internationally accepted method. Sophisticated vascular diagnostic testing would have reduced the chance of misclassification of ulcers, especially for the more obscure etiologies. However, vascular testing in the community was not feasible given the number of leg ulcers and the limited resources. To quantify the accuracy of the ulcer classification, the results achieved using the RCN criteria were compared to the chart audit.

Despite the limitations in this study, the findings (socio-demographic, circumstances of living, and the chronic nature of the disease) are similar to large studies from other western countries. The confidence in the generalizability of the findings from this study is therefore strengthened. Focusing on only one nursing agency strengthened confidence in the quality of data but was also a limitation. There were no statistical differences on key variables between the VLU cohort and cases from the all other sources combined. Thus, the researchers were reasonably confident that the findings reflect the regional population with venous leg ulcers.

This study has reinforced the importance of evidence-based planning when developing health care services for a population. This in-depth planning study addressed the needs of the population contributing to an understanding of the number of cases, the complexity of the population, and the persistence of the condition. Clients who receive care in a community leg ulcer clinic may have better outcomes than clients who receive care at home (Moffatt et al., 1992). For clinics to meet client needs, issues such as transportation, language and cultural differences, and care options for clients unable to attend a clinic need to be resolved. Clients require access to evidence-based care that is initiated in the early stages of the ulcer development. Continuity of care and coordination of care are also important for improving client outcomes. 'Best practice' for venous leg ulcers is supported by strong research (Cullum et al., 2000) and involves a significant contribution by community nurses (Graham et al., 2000). The next step is to consider the actual practice of whether clients are receiving this care.

References

Andersson, E., Hansson, C., Swanback, G. (1993). Leg and foot ulcer prevalence and investigation of the peripheral arterial and venous circulation in a randomized elderly population: An epidemiological survey and clinical investigation. Acta Derma Venereol, 73, 57-61.

Baker, S., Stacey, M., Singh, G., Hoskin, S. & Thompson, P. (1992). Aetiology of chronic leg ulcers. European Journal of Vascular Surgery, 6, 245-251.

Baker, S., Stacy, M., Jopp-McKay, A., Thompson, P. (1991). Epidemiology of chronic venous ulcers. British Journal of Surgery, 64, 258-261.

Callam, M. (1992). Prevalence of chronic leg ulceration and severe chronic venous disease in Western Countries. Phlebology Supp. 1, 6, 2-8.

Callam, M.J., Harper, D. R., Dale, J.,& Ruckley, C. (1987). Chronic ulcer of the leg: Clinical history. British Medical Journal, 294, 1389-1391.

Callam, M.J., Ruckley, C.V., Harper, D.R., & Dale, J.J. (1985). Chronic ulceration of the leg: extent of the problem and provision of care. Bristish Medical Journal, 290, 1855-6.

College of Nurses of Ontario (1999). Entry to practice competencies for Ontario Registered Practical Nurses [On-line]. Available: www.cno.org

Cornwall, J., Dore, C. & Lewis, J. (1986). Leg ulcers: Epidemiology and aetiology. British Journal of Surgery. 73, 693-696.

Cullum, N., Nelson, E. A, Fletcher, A. & Sheldon, T. (2000). Compression bandaging and stockings for venous leg ulcers. The Cochrane Library, I

Ebbeskog, B., Lindholm, C., & Ohman, S. (1996). Leg and foot ulcer patients: Epidemiology and nursing care in an urban population in South Stockholm, Sweden. Scandinavian Journal of Primary Health Care, 14, (4), 238-243.

Franks, P., Oldroyd, M., Dickson, D., Sharpe, E., & Moffat, C. (1995). Risk Factors for leg ulcer recurrence: a randomized trial of two types of compression stockings. Age and Aging, 24, 409-4.

Graham, I. D. & Harrison, M. B. (2002) Family physician survey of attitudes toward the care of leg ulcers (unpublished data).

Graham, I. D., Harrison, M. B., Moffat, C., & Franks, P. (2001). Leg ulcer care: Nursing attitudes and knowledge. The Canadian Nurse, 7 (3), 19-24.

Harrison, M. B., Graham, I., Friedberg, E., Lorimer, K., & Vandervelde-Coke, S. (2001). Assessing the population with leg and foot ulcers. Canadian Nurse, 97(2), 18-23.

Laffrey, S. C., Loveland-Cherry, C., & Winkler, S. J. (1986). Health behaviour. Evolution of two models. Public Health Nursing, 3 (2), 92-100.

Lambourne, L., Moffatt, C., Jones, A., & Franks, P. (1996). Clinical audit and effective change in leg ulcer services. Journal of Wound Care, 5, (8), 348-51.

Lees, T. & Lambert, D. (1992). Prevalence of lower limb ulceration in an urban district. British Journal of Surgery, 79 (10), 269-274.

Lambourne, L., Moffatt, C., Jones, A., & Franks, P. (1996). Clinical audit and effective change in leg ulcer services. Journal of Wound Care, 5, (8), 348-51.

Moffatt, C. and Harper, P. (1997). Leg Ulcers New York: Churchill Livingstone.

Moffatt, C., Franks, P., Oldroyd, M., Bosanquet, N., Brown, P., Greenhalgh, R. & McCollum, C. (1992) Community clinics for leg ulcers and impact on healing. British Medical Journal, 305, 1389-92.

Musgrove, E., Woodham, C., & Dearie, P. (1998). Leg ulceration and clinical effectiveness: nurse-led clinics. Nursing Standard, 12, (28), 57-60.

Nelson, E. A., Harper, D., Ruckley, C., Prescot, R., Gibson, B. & Dale, J. (1995). A randomized trial of single layer and multiplayer bandages in the treatment of chronic venous ulceration. Phlebology, Supp. 1, 915-916.

Nelzen, O., Bergquist, D., & Lindhagen, A. (1994). Leg ulcer etiology: A cross sectional population study. Journal of Vascular Surgery, 14, 557-64.

Nelzen, O., Bergquist, D., & Lindhagen, A. (1996). The prevalence of chronic lower-limb ulceration has been underestimated: Results of a validated population study. British Journal of Surgery, 83, 255-258.

Nelzen, O., Bergquist, D., Lindhagen, A. & Hallbook, T. (1991). Chronic leg ulcers: an underestimated problem in primary health care among elderly patients. Journal of Epidemiology and Community Health, 45, (1), 184-87.

Phillips, T., Stanton, B., Provan, A., & Lew, R. (1994). A study of the impact of leg ulcers on quality of life: Financial, social, and psychological implications. Journal of the American

Academy of Dermatology, 31 (1), 49-53.

Royal College of Nurses (RCN). (1998). Clinical Practice Guidelines: The management of patients with venous ulcers. York: RCN Institute.

Ruckley, C. V. (1997). Socioeconomic impact of chronic venous insufficiency. Angiology, 48, 67-9.

Salman, R. & Harding, K. (1995). The aetiology and healing rates of chronic leg ulcers. Journal of Wound Care, 4, (7), 320-323.

Scottish Intercollegiate Guidelines Network (SIGN). (1998). The care of patients with chronic leg ulcer: A national clinical guideline. Edinburgh: SIGN.

Simon, D., Freak, L., Kinsella, A., Walsh, J., Lane, C., Groake, L., & McCollum, C. (1996). Community leg ulcer clinics: a comparative study in two health authorities. British Medical Journal, 312, 1648-51.

Simon, D. & McCollum, C. (1996). Approaches to venous leg ulcer care within the community: Compression, pinch skin grafts and simple venous surgery. Ostomy/Wound Management, 42 (2), 34–40.

Skene, A., Smith, J., Dore, C., Charlett, J., & Lewis, J. (1992). Venous leg ulcers: a prognostic index to predict time to healing. British Medical Journal, 305, 1119-21.

Silver, I. A. (1994). The physiology of wound healing. Journal of Wound Care, 3, (2). In C. Moffatt, & P. Harper, Leg Ulcers. (pp.125-128), New York: Churchill Livingstone.

Statistics Canada (1996). Population statistics for Ottawa Carleton Public Health Unit. [On-line] Available: http://www.statcan.ca

Stevens, J., Franks, P., & Harrington, M. (1997). A community/hospital leg ulcer service. Journal of Wound Care,6, (2), 62-68.

Appendix A

Technical Report for the Venous Leg Ulcer Study

Table A1

Frequency of the Clinical Features of Venous Disease Present in the Lower Limbs of the Study Cohort (n = 166 limbs)

Indicator	Right Leg Affected (n = 39) n (%)	Right Leg Unaffected (n = 25) n (%)	Right Leg Healed (n = 19) n (%)	Left Leg Affected (n = 41) n (%)	Left Leg Unaffected (n = 23) n (%)	*Left Leg Healed (n = 19) n (%)*
Warm legs	30 (76.9)	18 (72.0)	16 (84.2)	35 (85.4)	21 (91.3)	*15 (79.0)*
Dry, Flaky skin	22 (56.4)	13 (52.0)	15 (78.9)	25 (61.0)	9 (39.1)	*14 (73.7)*
Edema	23 (59.0)	10 (40.0)	8 (42.1)	27 (65.9)	13 (56.5)	*8 (42.1)*
Brown or reddish colour	22 (56.4)	9 (36.0)	12 (63.2)	22 (53.7)	8 (34.8)	*13 (68.4)*
Firm texture	16 (41.0)	5 (20.0)	5 (26.3)	19 (46.3)	4 (17.4)	*5 (26.3)*
Varicose Veins	8 (20.5)	5 (20.0)	6 (31.6)	6 (14.6)	6 (26.1)	*6 (31.6)*
Eczema	7 (17.9)	3 (12.0)	3 (15.8)	10 (24.4)	3 (13.0)	*3 (15.8)*
Ankle Flare	6 (15.4)	2 (8.0)	2 (10.5)	5 (12.2)	2 (8.7)	*3 (15.8)*
Narrow Ankle	2 (5.1)	1 (4.0)	2 (10.5)	4 (9.8)	1 (4.3)	*3 (15.8)*
Palpable Pulses • *Dorsalis pedis* • *Posterior tibial*	*25 (73.5) (n = 34)* *23 (69.7) (n = 33)*	*17 (89.5) (n = 19)* *11 (64.7) (n = 17)*	*17 (89.5) (n = 19)* *19 (100.0) (n = 19)*	*26 (66.7) (n = 39)* *16 (48.5) (n = 33)*	*19 (100.0) (n = 19)* *14 (73.7) (n = 19)*	*15 (79.0) n = 18* *16 (94.1) n = 17*

Table A2

Frequency of the Clinical History and Risk Factors Associated with Venous Disease in the VLU Cohort (n = 166 limbs)

Health Problem or Risk Factor	(n = 83) n (%)	Females (n = 51) n (%)	Males (n = 32) n (%)	Active (n = 64) n (%)	Healed (n = 19) n (%)
Arthritis	38 (45.8)	29 (56.9)	9 (28.0)	30 (46.7)	8 (42.1)
Varicose Veins	34 (41.0)	24 (47.0)	10 (31.3)	26 (40.6)	8 (42.1)
Limb Trauma	25 (30.1)	12 (23.5)	13 (40.6)	19 (29.7)	6 (31.6)
Family History of Leg Ulcers	22 (26.5)	16 (31.4)	6 (18.6)	14 (21.9)	8 (42.1)
Orthopedic Procedures	17 (20.5)	12 (23.5)	5 (15.6)	13 (20.3)	4 (21.1)
Phlebitis	19 (22.9)	13 (25.5)	6 (18.6)	14 (21.9)	5 (26.3)
Deep Vein Thrombosis	18 (21.7)	11 (21.6)	7 (21.9)	13 (20.4)	5 (26.3)
Venous Surgery	17 (20.5)	9 (17.6)	8 (25.0)	11 (17.2)	6 (31.6)
Articulation Impairment	7 (8.4)	5 (9.8)	2 (6.3)	2 (3.1)	5 (26.3)
Pregnancy		31 (60.8)	NA	26 (68.4) n = 38	12 (92.3) n = 13

Table A3

Frequency of Clinical Health Problems or Risk Factors Associated with Non-venous Disease

Health Problem or Risk Factor	(n = 83) n = %	Females (n = 51) n (%)	Males (n = 32) n (%)	Active (n = 64) n (%)	Healed (n = 19) n (%)
Hypertension	27 (32.5)	19 (37.3)	8 (25.0)	20 (31.3)	7 (36.8)
Cardiac Disease	25 (30.1)	16 (31.4)	9 (28.1)	21 (32.8)	4 (21.1)
Diabetes	17 (20.5)	7 (13.7)	10 (31.3)	12 (18.8)	5 (26.3)
Intermittent Claudication	14 (16.9)	8 (15.7)	6 (18.6)	10 (15.6)	4 (21.1)
Smoker	12 (14.5)	6 (11.8)	6 (18.6)	10 (15.6)	2 (10.5)
Vascular Surgery	7 (8.4)	4 (7.8)	3 (9.4)	3 (4.7)	4 (21.1)
Peripheral Vascular Disease	10 (12.0)	6 (11.8)	4 (12.5)	6 (9.4)	2 (10.5)
Renal Disease	3 (3.6)	0	3 (9.4)	1 (1.6)	2 (10.5)

Table A4

Number of Co-morbid Conditions n = 83

	n = 83 n (%)	Females n = 51 n (%)	Males n = 32 n (%)	Active n = 64 n (%)	Healed n = 19 n (%)
None	7 (8.4)	5 (9.8)	2 (6.3)	7 (10.9)	0 (0.0)
One	12 (14.5)	6 (11.7)	6 (18.8)	9 (14.1)	3 (15.8)
Two – three	26 (31.4)	16 (31.4)	10 (31.3)	19 (29.7)	7 (36.8)
Four – five	23 (27.7)	15 (29.4)	8 (25.0)	17 (26.6)	6 (31.6)
Six – seven	8 (9.6)	4 (7.8)	4 (12.5)	8 (12.5)	0 (0.0)
Eight and more	7 (8.4)	5 (9.8)	2 (6.3)	4 (6.3)	3 (15.8)

Table A5

Comparison of the Age Range of the Active Ulcer Group and the Healed Ulcer Group (n = 83).

Age Range	Active Leg Ulcer n = 64 n (%)	Healed Leg Ulcer n = 19 n (%)
25 - 54	12 (18.8)	1 (5.3)
55-64	6 (8.4)	0 (0.0)
65-75	11 (17.2)	4 (21.1)
≥ 75 years	35 (54.7)	14 (73.7)

Table A6

Age at the Time of the First Leg Ulcer Occurrence n = 83

	n (%)	Females n = 51	Males n = 32 n (%)	Active n = 64 n (%)	Healed n = 19 n (%)
< 25 years	4 (4.8)	2 (3.9)	2 (6.3)	4 (6.3)	0 (0.0)
25 to 54 years	17 (20.5)	10 (19.6)	7 (21.9)	13 (20.1)	4 (21.1)
55 to 64 years	7 (8.4)	2 (3.9)	5 (15.7)	5 (7.8)	2 (10.5)
65 to 74 years	13 (15.7)	7 (13.7)	6 (18.8)	10 (15.6)	3 (15.8)
75 and older	29 (34.9)	23 (45.1)	6 (18.8)	23 (35.9)	6 (31.6)
missing data	13 (15.7)	7 (13.7)	6 (18.8)	9 (14.1)	4 (21.1)

Table A7
Circumstances of Living (n = 83)

Living Arrangements	Cohort n = 83 n (%)	Males n = 28 n (%)	Females n = 48 n (%)
Alone	29 (34.9)	10 (3i.3)	19 (37.2)
With Spouse	31 (37.4)	14 (50.0)	17 (34.3)
With Family or Friends	16 (19.2)	4 (14.3)	12 (23.5)
Missing	7 (8.4)	4 (14.3)	3 (5.9)
Total	83	32	51

Dwelling	Cohort n = 83 (%)	Males n = 32	Females n = 51
Apartment	30 (36.1)	11 (34.3)	19 (37.3)
House	49 (59.0)	19 (59.4)	30 (58.8)
Senior's Residence	4 (4.8)	2 (6.3)	2 (3.9)

Table A 8: Aids or Physical Assistance Required n = 83

	Cohort n = 83 n (%)	Male n = 32 n (%)	Female n = 51 n (%)
Requires physical aids	25 (30.5)	10	15
Requires assistance of another person	6 (7.3)	1	5
Requires physical aids and assistance	11 (13.4)	3	8
Total	45 (54.2)	14	28
Missing data on specifics of clients requiring aids or assistance	3	1	2

* number of individuals indicating aids or assistance were required

Table A9

Languages Spoken

Languages Spoken	VLU population n = 83 (%)	Regional Statistics 721,144 (%)
English	63 (75.9)	471,854 (65.4 %)
French	8 (9.6)	104,890 (14.5 %)
English and French	1 (1.2)	13,730 (1.9 %)
Other	9 (10.8)	130,670 (18.1 %)
Missing	2 (2.4)	

Table A10

Number of Previous Episodes of Leg Ulceration (n = 83)

	(n = 83) n (%)	Females (n = 51) n (%)	Males (n = 32) n (%)	Active (n = 64) n (%)	Healed (n = 19) n (%)
None	32 (38.6)	22 (43.1))	10 (31.3)	31 (48.4)	1 (5.3)
One	17 (20.5)	7 (13.7)	10 (31.3)	13 (20.3)	4 (21.1)
Two – four	16 (19.3)	10 (19.6)	6 (18.6)	8 (12.5)	8 (42.1)
Five – seven	4 (4.8)	3 (5.9)	1 (3.1)	3 (4.7)	1 (5.3)
Eight – ten	3 (3.6)	3 (5.9)	0 (0.0)	1 (1.6)	2 (10.5)
Eleven or more	5 (6.0)	2 (3.9)	3 (9.4)	4 (6.3)	1 (5.3)
Missing	6 (7.2)	4 (7.8)	2 (6.3)	4 (6.3)	2 (10.5)

Table A 11

Table 12: Duration of Previous Ulceration n = 51*

* number of individuals reporting a previous ulceration

	n (%)
Less than 6 weeks	4 (7.8)
6 weeks to 3 months	10 (19.6)
4 – 6 months	10 (19.6)
7 –9 months	6 (11.8)
10 months – 1 year	5 (9.8)
greater than 1 year	11 (21.6)
missing	5 (9.8)

Table A12

Duration of Current Ulceration (n = 83)

	n (%)	Females n = 51 n (%)	Males n = 32 n (%)
< 6 weeks	5 (6.0)	2 (3.9)	3 (9.4)
7 to 12 weeks	13 (15.7)	12 (23.5)	1 (3.1)
13 – 24 weeks	7 (8.4)	4 (7.8)	3 (9.4)
25 – 36 weeks	6 (7.2)	2 (3.9)	4 (12.5)
37 – 52 weeks	4 (4.8)	3 (5.9)	1 (3.1)
> 1 year	19 (22.9)	9 (17.6)	10 (31.3)
Healed	19 (22.9)	12 (23.5)	7 (21.9)
Missing data	10 (12.0)	8 (15.7)	2 (6.3)

Table A13

Duration of the Ulcer Diathesis in Years (n = 83)

	n	%	Females n = 51 n (%)	Males n = 32 n (%)
No previous ulcer	32	38.6	22 (43.1)	10 (31.3)
1 – 2 years	9	10.8	5 (9.8)	4 (12.5)
2.1 – 5 years	8	9.6	2 (3.9)	6 (18.8)
5.1 – 10 years	6	7.2	5 (9.8)	1 (3.1)
10.1– 20 years	6	7.2	5 (9.8)	1 (3.1)
21.1 – 30 years	3	3.6	1 (2.0)	2 (6.3)
31.1 – 50 years	5	6.0	3 (5.9)	2 (6.3)
> 50 years	2	2.4	1 (2.0)	1 (3.1)
Missing	12	14.5	7 (13.7)	5 (15.6)

Table A14

Health Care Professionals Consulted for Previous Leg Ulcers (n = 51)

	n	%
No previous leg ulcer	19	22.9
General Practitioner	37	72.5
Dermatologist	27	52.9
Surgeon	18	35.3
Podiatrist	3	6.3
Rheumatologist	1	2.1
Nurse	35	72.9
Self-treated	7	14.6
Missing	3	5.9

Table A 15

Number of ulcers (n = 83)

	n (%)
None	19 (22.9)
One	35 (42.2)
Two	18 (21.7)
Three	3 (3.6)
Four	3 (3.6)
Five	3 (3.6)
Six	1 (1.2)
Seven	1 (1.2)

Location of Current Ulcerations

The 64 individuals with ulcers had a total of 121 ulcers including 7 weeping red legs

Table A16

Site of Ulceration n = 121

Ulcer Site	n (%)
Ankle	48 (39.7)
Calf	41 (33.9)
Shin	10 (8.3)
Foot	10 (8.3)
Weepy red legs	7 (5.8)
Toes	5 (4.1)

Table A 17

Ulcer Shape n = 98

	n (%)
Diffuse, irregular	57 (58.1)
Well defined, punched out appearance	37 (37.8)
Cliff-like edge	4 (4.1)

Table A 18
Distribution of the Ulcer by Size n = 98

The size of each ulcer was measured for the length, width and depth.

Size of ulcer	n (%)
Less than 1 cm^2	15 (15.3)
1.0 – 3.9 cm^2	47 (48.0)
4.0 – 8.9 cm^2	16 (16.3)
9.0 – 15.9 cm^2	8 (8.2)
16.0 – 24.9 cm^2	2 (2.0)
25.0 – 35.9 cm^2	3 (3.1)
36.0 – 50.0 cm^2	7 (7.1)
Total	98

Chapter Three

Venous Leg Ulcer Care:

How Evidence-Based was Nursing Practice?

Venous Leg Ulcer Care

How Evidence-based was Nursing Practice

Abstract

Objectives: 1) to determine how congruent nursing care was with 'best practice' of venous leg ulcers, and 2) to identify organizational and clinical factors associated with the provision of 'best practice'.

Methods: The study population was a home care cohort of individuals with venous leg ulcers (n = 66) who received care from one home care nursing agency between March 1999 and November 1999. Common recommendations from three United Kingdom leg ulcer practice guidelines (CREST, 1998; RCN, 1998; SIGN, 1998) were used to define 'best practice'. Data were obtained from the nursing agency client records.

Results: One half of client records (35/66) had an identified etiology of the leg ulcer noted. Two-third of clients (44/66) had compression in the form of bandaging or stockings at some time during the course of their leg ulcer care. Less than a half (21/44) had an ABPI measurement documented prior to compression being initiated. More than 60 % (40/66) had been seen by either a dermatologist or a vascular surgeon. Two-thirds (44/64) were prescribed topical antibiotics. Fifteen per cent (10/66) were assessed for pain, and 17 % (11/66) had some form of pain management. Documentation on client education specific to the leg ulcer was present on two client records.

Conclusions:

All leg ulcer clients need to have an ABPI to screen for the presence of arterial disease as a requirement for admission to home care. Clients who meet the criteria for venous disease require treatment with compression bandaging with an adherence to evidence-based recommendations for leg ulcers.

Venous Leg Ulcer Care:

How Evidence-Based is Nursing Practice?

The interest in evidence-based practice is driven by the emphasis on using research to improve client outcomes and to contain escalating health care costs (Mead, 2000). There is evidence that practice based on sound research affects client outcomes positively (Estabrooks, 1998). In leg ulcer care, using treatments with known efficacy leads to improvements in both healing rates and quality of life for the leg ulcer sufferer (Cullum, Nelson, Fletcher & Sheldon, 2000, Franks, Moffatt, Connolly, Bosanquet, Oldroyd et al., 1994). Effective leg ulcer care is also more cost efficient (Bosanquet, 1992). Despite the evidence supporting effective leg ulcer management, many individuals are not receiving this care (Harrison, Graham, Friedberg, Lorimer & Coke, 2001; Hickie, Ross, & Bond, 1998). The majority of individuals with leg ulcers are cared for in the community by visiting nurses. The generally accepted custom and practice in many Western countries is to delegate the overall care of this client group to nurses without the physician first determining the nature of the underlying pathology (Husband, 1996). Appropriate treatment varies with the underlying etiology of the ulcer, thus determining the ulcer cause is essential to develop an effective plan of care.

To plan for a reorganization of community leg ulcer care in one region, an appraisal of current nursing care was undertaken. The objective of this study was to explore the community nursing care provided to clients with venous leg ulcers by one nursing agency in a large Ontario region between March and November 1999. This paper addresses the following questions:

1) How congruent was nursing practice in one region with 'best practice' for venous leg ulcers?

2) What factors are associated with the provision of 'best practice'?

'Best Practice' for the Assessment and Management of Leg Ulcers

Prior to determining whether current nursing care was congruent with 'best practice,' it was first necessary to define current 'best practice' for the assessment and management of venous leg ulcers. Concurrent work was being done by a local interdisciplinary Leg Ulcer Protocol Task Force to develop recommendations for an evidence-based leg ulcer protocol for the regional home care authority. The Leg Ulcer Protocol Task Force used a systematic process of critically appraising and adapting existing international clinical practice guidelines (CPG) for leg ulcers to develop the protocol. The Practice Guideline Evaluation Cycle (PGEC) used by the Protocol Task Force is published elsewhere (Graham, Lorimer, Harrison, et al., 2000).

In the PGEC appraisal process, three nursing clinical practice guidelines scored well in terms of rigor of development and clinical content, and formed the basis for the protocol recommendations developed by the Task Force. These guidelines were: 1) the Royal College of Nursing (RCN, 1998), 2) the Scottish Intercollegiate Guideline Network (SIGN, 1998), and 3) the Clinical Resource Efficiency Support Team (CREST, 1998). These guidelines were appropriate to define 'best practice' for the PVS because they: 1) were published in 1998, prior to the time frame of the practice audit, and therefore could have been available to the nurses, and 2) generated by the discipline of nursing, although multidisciplinary focused.

There were some differences between the three guidelines recommendations and the assigned levels of evidence. A recommendation for 'best practice' was included by the researcher in the PVS if at least two of the three guidelines made the same recommendation. A comparison of the common recommendations from the three practice guidelines is presented in Table 3.1. The level of evidence cited by the clinical practice guideline

developers accompanies each recommendation. A description of the levels of evidence is found at the bottom of the table.

Methods

This practice variation study (PVS) was conducted on the care provided to a cohort of clients from one nursing agency with venous leg ulcers over a nine month period, beginning in March 1999 until discharge from home care or to the end of November 1999. The time frame marked the beginning of the major regional planning for restructuring of leg ulcer care. The data collection for the Regional Prevalence and Profile study (RPP) (Harrison et al., 2001), identified all leg ulcer clients in the Ottawa-Carleton region in all home nursing agencies. The cohort: 1) had leg ulcer assessments as a part of the RPP study, 2) had leg ulcers resulting predominately from a venous etiology, and 3) received care at the beginning of March 1999 from one large not-for-profit home nursing agency. Seventy-six clients met the inclusion criteria for the practice variation study. Some nursing records were lost, thus complete data was available on 66. The agency client records are kept in the client's home during active treatment and it is not unusual for them to be inadvertently discarded or go missing when taken on trips to the physician's office or to the emergency department.

Data for the PVS was drawn from the client's agency nursing record for the time period March to November 1999. The client's nursing record included the medical referral form completed by the physician/home care case manager, as well as the nursing documentation. This record consisted of a nursing history, nursing care plan, physician orders, a list of the client medications, the nursing notes, an activity log where dates of nursing visits were recorded, and a clinical flow sheet where details of the nursing assessment and treatments were recorded for each visit, along with the nurse's signature and classification.

In caring for venous leg ulcers, recommendations about the assessment and screening for etiology and the application of compression are key. The practice variation data extraction tool (Appendix B) was designed to collect information reflecting recommendations in the selected practice guidelines (Table 3.1). The requirement for Doppler measurement of the ankle brachial pressure index (ABPI) to rule out arterial involvement has strong supporting evidence (RCT). This is important because the use of compression bandages or stockings in the presence of arterial disease can result in tissue damage and possibly necrosis. The guidelines recommendations for assessment of leg ulcers, meant to serve as a guide to determining the underlying etiology of the ulcer, have level III supporting evidence (expert opinion, consensus). The appropriate treatment is dependent on the underlying ulcer etiology.

The recommendation for compression bandaging in the treatment of venous leg ulcers has strong supporting evidence from randomized control trials and meta-analyses, with agreement from all three practice guidelines. The evidence supports the benefits of improved client outcomes.

Other guideline recommendations that care practices were compared against included: referrals to specialists (e.g. dermatologist, vascular surgeon) for non-healing after 3 months of care or unusual ulcer presentations, the documentation of an ulcer assessment, serial measurement of the wound, cleansing of the wound with tap water or saline, avoiding the use of topical antibiotics (a known allergen), pain assessment and management, and client education to prevent recurrence. Non-randomized trials supporting two of the guideline recommendations provided the evidence that the ulcer should be measured on a regular basis, and that pain should be assessed and managed. Although there are differences between the three guidelines in terms of the research cited and the levels of evidence assigned, there is agreement that 'best practice' includes: ulcers cleansed with tap water or saline, avoiding the use of topical antibiotics on ulcers and client education to prevent recurrence of ulcers.

Other organizational and clinical factors that may be important to consider include: the classification of nurse, the number of different nurses providing care to any one client, adverse client experiences with compression bandaging and stockings, delay in physician specialist referral, the duration of the ulcer care, and the delay in initiation of compression (Arnold & Weir, 1994; Callam, Harper, Dale & Ruckley, 1987; Franks, Oldroyd, Dickson, Sharp, & Moffatt, 1995; Hickie, Becker & Olson, 1998; Luker & Kendrick, 1992; Turner, Larson, Kornewicz & Baigis-Smith, 1994). The PVS also captures information on these factors.

The practice variation study received written approval from the Executive Director at the not-for-profit home nursing agency. Following administrative approval, it was submitted and received ethics approval from the Ottawa Health Research Institute (protocol # 2000287, Appendix F).

Data Analysis

Data entry and analysis was completed by the researcher using SPSS for Windows V. 9. Frequency distributions summarized the data on nurse provider, and care practices. Measures of central tendency (mean, median, standard deviation, range) summarized the data on duration of leg ulcer care, number of nurses caring for clients, time to specialist referral. Chi square analysis tested the various factors that may be associated with 'best practice' (e.g. client age, gender, number of nurses visiting, nurse classification, specialist assessment) and the evidence-based recommendations (compression bandaging, ABPI measurement). Continuous variables (e.g. age, duration of leg ulcer care) were converted into categorical variables for the purpose of the Chi square analysis. Because of the multiple testing and the exploratory nature of the research, a conservative level of 0.01 was used.

Findings

Adherence to Evidence-based Recommendations

The results of adherence to the evidence-based recommendations are summarized in Table 3.2. The guideline recommendations indicate that it is essential that an accurate assessment of the cause and contributing factors of the ulcer is determined before the onset of treatment. The features indicative of venous and non-venous disease should be recorded (CREST, 1998; RCN, 1998). The etiology of the ulcer was identified in just over one-half of the client records (35/66). Terms used to identify the ulcer etiology included varicose ulcer, venous ulcer, stasis ulcer, or chronic venous insufficiency (CVI). The ulcer etiology was sometimes found on the medical referral received from home care, the nursing history on the client record, on notes written back to nurse from physicians, or in the nursing notes written by the Enterostomal Therapist (ET). The ET had additional training and expertise in wound care. The difficulty of identifying the ulcer etiology is illustrated by one client who was diagnosed as having a diabetic ulcer by his family physician. Later the ulcer was identified as venous when assessed by a dermatologist.

Five client records had a description of the features of venous disease (e.g. hyperpigmentation, venous eczema, ankle flare) documented by an ET. A description of the ulcer (e.g. location, colour, slough) was present on 20 % (13/64) of the client records. Of these, half (7/13) had been documented by an ET.

The guideline recommendations state that all individuals presenting with a leg ulcer are to have a doppler measurement of the Ankle Brachial Pressure Index (ABPI). Individuals treated with compression bandaging are to have an ABPI done prior to the initiation of the compression. An ABPI of 0.8 or above is considered a safe level for the application of high compression bandaging (CREST, 1998; RCN, 1998; SIGN, 1998). All clients with leg ulcers had a Doppler measurement of their ABPI done in March 1999 as a part of the RPP study.

Prior to this time, the nursing agency did not have the ability to do the ABPI. The responsibility for ordering an ABPI and ensuring that it was done rested with the client's physician. Before March 1999, 24 clients had started treatment with compression (15 bandaging, 9 stockings). Of these, half (13/24) had documentation that an ABPI was done prior to the initiation of compression therapy. Of 15 clients who had compression therapy initiated between March 1999 and November 1999 (9 bandages, 6 stockings), a third of those prescribed bandaging (3/9) had the ABPI results recorded on the client record or indicated that an ABPI was done. None of the client records on the six clients prescribed stockings had a documented ABPI.

One illustration of the difficulty nurses had with ensuring that the ABPI was done involved a vascular surgeon who prescribed high compression bandaging for a client. The notes revealed that he refused to order an ABPI and was emphatic that his order for the compression bandage be carried out by the nursing agency.

Graduated compression bandaging is the recommended treatment for venous leg ulcers (CREST, 1998; RCN, 1998; SIGN, 1998). At the time of the RPP survey in March 1999, 42 % of the clients (28/66) were treated with either compression bandaging or stockings (20 bandaging, 8 stockings). Fifteen of the original 66 clients were started in compression between March and November 1999 (9 bandaging, 6 stockings). By November, 35 of the original 66 clients continued to receive home care and of these 27 (77 %) were treated with some form of compression. Of the eight remaining clients not receiving compression, two had been assessed as candidates for compression by an ET, but there was no documentation that the compression was ever initiated and no follow- up. Another three had received compression but were refusing further compression treatment because of adverse experiences.

High compression bandaging is more effective in healing leg ulcers than low compression (CREST, 1998; RCN, 1998; SIGN, 1998). In both March and November 1999 slightly more than half of the clients (11/20 and 8/15 respectively) were treated with low compression bandaging. There may have been clinical factors influencing the decision to use low compression, but these were not discernable from the record.

Correctly fitted compression hosiery should be prescribed for all clients with healed ulcers to prevent recurrence (CREST, 1998; RCN, 1998; SIGN, 1998). Eight clients were prescribed compression stockings in March 1999. Of the 20 clients who were treated with compression bandaging in March 1999, nine were prescribed compression stockings after healing. There was no indication on two client records as to whether or not the clients actually received the stockings, and another two clients were discharged as soon as they received the stockings. One of these clients was readmitted to home care prior to November 1999 because of a recurrent ulcer. Six clients prescribed compression stockings between March and November had not been treated with compression bandages and only received the stockings after the ulcer had healed.

If there is no improvement in the ulcer after three months of treatment, the individual is to be referred to a physician specializing in leg ulcer care (CREST, 1998; RCN, 1998; SIGN, 1998). Sixty per cent of clients (40/66) had a referral to a dermatologist or a vascular surgeon and more than one-third saw one of these specialists within the first three months of receiving care from the nursing agency. Of these clients, three-quarters saw a dermatologist and one-quarter a vascular surgeon.

Serial measurement is used as a means of evaluating the healing of the ulcer and is a reliable index of healing (RCN, 1998; SIGN, 1998). Twenty-eight per cent (18/64) had at least one measurement and 11 % (7/64) of the ulcers were assessed with serial measurements

over time. There was no standard interval when the measurement was done. An ET had initiated the serial ulcer measurements on five of the seven clients.

Cleansing of the ulcer should be kept simple with tap water or saline (CREST, 1998; RCN, 1998; SIGN, 1998). Eighty per cent (49/62) of ulcers were cleansed either with tap water or saline, while the other 20 % (13/62) of ulcers were being cleansed with either sodium hypochlorite, chlorhexidine, hydrogen peroxide, or proviodine, solutions known to be toxic to the cells (RCN, 1998).

Topical antibiotics are known sensitizers (cause allergy) and should be avoided (CREST, 1998; RCN, 1998; SIGN, 1998). Two-thirds of clients (44/64) were prescribed topical antibiotics on the ulcer. There was no documentation of signs or symptoms of infection on any of the client records that would serve as a rationale for the topical antibiotic use.

Pain is to be monitored and an individual pain management plan formulated (CREST, 1998; RCN, 1998). Documentation of a pain assessment was present on 15 % (10/66) of the client records. The methods of assessment included: describing the pain as mild, moderate, or severe; using a zero to five point scale; using a zero to ten point scale; or simply indicated that the client experienced pain without the use of a scale. In five cases, the nurses assessed that the client had pain, but there was no documented pain management. The pain medication used by the client was recorded on 17 client flow sheets, but there was no evaluation of effectiveness. Opioids (morphine, talwin, duragesic patch, codeine) were listed on six client medication records. There was no pain assessment documented on four of these clients and no record as to whether the clients were taking the listed medication. It was also not clear from the client record whether the opioids were prescribed for the leg ulcer or for some other reason. One client record indicated that the client was attending a pain clinic, but there was no documented pain assessment or management.

Recommendations for client education aimed at preventing ulcer recurrence include compliance with compression therapy, moisturizing the skin regularly, and elevation of the affected limb when immobile (CREST, 1998; RCN, 1998, SIGN, 1998). Two client records indicated that the client was instructed to keep their legs elevated. No records documented teaching on the importance of compression, or skin care.

Table 3.2

Adherence to Evidence-based Care n = 66

Recommendations for Best Practice	**n**	**%**
Etiology of the ulcer identified	35	53.0
Description of the ulcer on at least one occasion n = 64	13	20.3
ABPI prior to initiation of compression n = 44*	21	47.7
Serial Measurement of the ulcer n = 64	7	10.9
Number of clients treated with compression at some time during the assessment period	44	66.7
Ulcer cleansed with tap water or normal saline n = 62	49	79.0
Use of topical antibiotics should be avoided n = 64	44	68.8
Assessment of Pain	10	15.1
Management of Pain	11	16.9
Client Education to prevent ulcer recurrence	2	3.0

* number of individuals treated with compression at some point during the ulceration

Organizational and Clinical Factors Associated with Inconsistencies in 'Best Practice'

Table 3.3 examines inconsistencies in the provision of evidence-based practice and organizational and clinical factors associated with 'best practice' identified in this study. In a comparison of individuals who received compression and those who did not, there were no demographic differences. One difference found for treatment with compression was that

those clients referred to a specialist physician were significantly more likely to have compression prescribed (chi square, p = .001, 2 tail, df 1). Of the 41 clients who saw a specialist, 85 % (35/41) were prescribed compression either in the form of bandaging or stockings. Thirty-six per cent (9/25) of clients were treated with compression who did not see a specialist.

Delay in receiving the appropriate treatment with compression undoubtedly delays healing as access to early intervention improves outcomes. For some clients, the initiation of compression began after several months of receiving leg ulcer care. Compression was delayed more than six months for 33 % (13/40) of clients, and more than a year for 15 % (6/40). A date for the initiation of compression stockings was not clearly documented on four client records. As the average time to see a specialist physician was 6.6 months (median 2.8, SD 6.4), there was most likely a relationship between the delay in receiving compression and the time it took to be seen by a specialist.

For some clients there were problems with adherence to treatment with compression because of problems encountered with either the bandages or stockings. Forty-two per cent of clients (13/31) treated with bandages had an adverse experience, resulting in four client refusals. The documented problems included skin breakdown (6), pain or discomfort (4), and slippage (3). Problems with compression stockings were recorded for 45 % of clients (12/27) with five client refusing to wear the stockings. Documented problems with compression stockings were that they were painful (5), caused a rash (3), and were difficult to apply (4).

Usually clients receiving compression require visits once or twice a week to change the compression bandages. In this study, 40 % of clients received either daily or twice a day nursing visits reflecting the absence of the use of compression. The misuse of topical antibiotics may account for the high visit frequency as daily visits are made to apply the topical antibiotic to the ulcer.

Consistency of wound assessment, treatment, and documentation are high when the same practitioner provides care and low with a number of different practitioners (Arnold & Weir, 1994). The average number of different nurses visiting a client during the specified time frame was 19 (median 17, SD 10.4, range 4 – 45). The number was higher for clients with more frequent visits, and for clients who remained active for the entire duration for the study period. There was no one nurse distinguishable as the one visiting the client most frequently in two-thirds of client records (44/66). A plan of care was written by the nurse admitting the client to service. There were no written evaluations on the effectiveness of plan of care or revisions to any of the care plans. From the number of different nurses, the lack of evaluation and revisions of care plans, it appears that no one was assuming the responsibility for the clients' care.

The criteria for clients cared for by the Registered Practical Nurse (RPN) are that clients are stable and have predictable outcomes (College of Nurses of Ontario, 1999). The classification of nurse most frequently visiting the clients were: RPN 44 % (29/66), RN 38 % (25/66), BScN 14 % (9/66), and ET 5 % (3/66). An ET saw the client on at least one occasion in 48 % (30/62) of cases.

Table 3.3

Organizational and Clinical Factors Associated with Inconsistencies in the Delivery of 'Best Practice'

Factors	Mean (Median, SD, Range)
Referral Patterns: • Time receiving leg ulcer care before seen by a specialist physician (n = 41)	6.6 (2.8, 6.4, 0-96) months
Delay in Receiving Evidence-based care • Time receiving care prior to initiation of compression Mean (median, SD, range) (n = 32)	7.1 (2.8, 6.8, 0-40) months
Staffing: • Number of nurses visiting a client from March to November 1999 Mean (median, SD, range) (n = 62)	19 (17, 10.4, 4–45)
Problems Encountered with Compression	%
• Bandages (n = 31) • Stockings (n = 27)	41.9 % 44.4 %
Frequency of Visits: March 1999 • Percentage of clients receiving daily or twice daily visits in March 1999 (n = 66)	39.4 %
• Classification of nurse assigned to the client (n = 66) ➢ RPN ➢ RN ➢ BSCN ➢ ET	 43.8 % 37.9 % 13.6 % 4.5 %

Discussion

The duration of a leg ulcer is a summary measure used to indicate the effectiveness of care. Healing rates achieved in the nurse lead clinics in the United Kingdom ranged from 42 % to 69 % at 12 weeks (Lambourne et al., 1996; Moffatt, Franks, Oldroyd, Brown, Greenhalgh, & McCollum, 1992; Simon, Freak, Kinsella, Walsh, Lane, et al., 1996; Stevens,

Franks, & Harrington, 1997). In this study, the mean duration of leg ulcer care was 20 months (median 12, SD 21.6, range .5 to 96 months). In comparing this healing rate with the literature, clearly the evidence suggests that there were problems with the effectiveness of care.

This study found a number of care practices that were incongruent with the guideline recommendations for 'best practice'. Identification of the underlying etiology of the leg ulcer was not a standard requirement prior to the initiation of treatment, despite the fact that treatment decisions for venous leg ulcers are very different from non-venous ulcers. An ABPI to screen for the presence of arterial disease was not routinely done, even when clients were treated with compression bandaging. Despite the high level of supporting evidence for the use of compression for venous leg ulcers, only 42 % of clients received this treatment. An average delay of seven months before the initiation of compression, undoubtedly affected the rate of healing as access to early intervention improves outcomes. The average time of seven months to see a physician specialist is longer than the three months recommended for non-healing ulcers in the practice guidelines. At the time of this study, the identification of the ulcer etiology, ABPI measurement, ordering compression, and specialist referral were all physician responsibilities. The absence of documented assessments of the ulcer, wound measurements, pain assessment and management, and client education to prevent ulcer recurrence may reflect the lack of nursing knowledge and skill in leg ulcer care as nurses may be not know which assessments to make and the client teaching required to prevent ulcer recurrence. The problems experienced with skin breakdown, slippage and pain associated with compression bandages may also be a reflection on nursing skill if these problems resulted from incorrectly applied bandages. The number of different nurses, the lack of continuity of provider, absence of documented evaluation and revision of care plans suggests that no one was accountable for the client's plan of care.

The environment exerts a powerful set of influences on the adoption of 'best practice' (Harvey & Kitson, 1996; Logan & Graham, 1998; Lomas, 1994). At the time of the PVS, three very important influences were occurring within the practice setting. First, the Regional Prevalence and Profile Study (RPP), conducted in March 1999, heightened the awareness of the problem of leg ulcers, at least for the six registered nurses from the agency who had been a part of the survey team. In preparation for conducting the client assessments for the RPP study, these nurses had been trained to do Doppler ABPI and leg ulcer assessments, had a portable hand held Doppler, and had received instruction in the use of compression for the treatment of venous leg ulcers. Three members of the nurse survey team had certification in ET and therefore had additional knowledge and experience in leg ulcer care. However, the care was not solely designated to these six trained nurses. Despite agency policy that a referral ABPI be done prior to initiation of compression, compression was initiated without the documentation of the ABPI. Two-thirds of the PVS clients were eventually treated with compression. The nurses involved in the research may have influenced the use of compression, or the increase may be related to other factors such as the eventual referral to a specialist physician The prevalence study influened the skills of a few nurses but may not have been enough to affect large scale change.

A second influence in the agency setting at the time of the PVS study was a reduction in nursing visit volume as a result of a request for proposal process. The visiting nursing contract, previously held by the one not-for-profit nursing agency, was divided between three home nursing agencies. The resulting loss in visit volume meant an increase in the number of different nurses visiting the remaining clients as nursing districts were realigned, primary nurses changed, and senior nurses redeployed

A third environmental factor influencing nursing practice may have been the method of agency remuneration for nursing services on a per visit basis. The higher the number of

visits made, the higher the remuneration to the agency. Therefore, a solution to the agency's chronic budget shortfall may be to increase the number of visits that nurses complete. The resulting increase pressure on time leads to task-focused care that has an impact on both client follow-up and documentation.

A limitation of this study is its reliance on the documentation in the agency's client record. The documentation of care is not what is necessarily provided. It may be incomplete and errors occur. The researcher had more confidence in the documentation of treatments, because the expectation is that prescribed treatments are recorded on the flow sheet. A reliability check was done against a standardized supply utilization form listing the usage of supply products during the one-month study period in March 1999. The form was left in the client's home and completed by the visiting nurse for each visit during the month. A comparison between the treatment supplies listed on the supply usage form for specific dates and the treatments documented in the agency's client record for the same dates served to confirm the accuracy of the treatments. The researcher is less confident that the absence of other documented care, especially client education, means that care was not provided. Factors such as time pressures may affect the nurses' ability to complete the documentation.

The findings in this study support recommendations for practice, education, and research. First, to improve practice, this study supports the need for a standardized evidence-based approach to leg ulcer care. The development of a leg ulcer protocol with inclusion of a comprehensive assessment to determine the ulcer etiology, and a screening ABPI should be a requirement for all leg ulcer clients admitted to home care. The development of an evidence-based protocol with recommendations on leg ulcer management requires the involvement of all key stakeholders as leg ulcer care is multidisciplinary. In current practice family physicians do not see leg ulcer clients in sufficient numbers to develop the required expertise in leg ulcer care. Nor do they all have access to the necessary Doppler equipment. There are

too few specialist physicians to see the volume of clients who present with a leg ulcer. If the recommendations for improved community leg ulcer care are to be realized in this Ontario setting, community nurses need to assume a more active role in ensuring that 'best practice' recommendations are implemented. For this to occur, nurses require training and continuing education in leg ulcer assessment and management to acquire and maintain clinical proficiency.

The combination of the adoption of a leg ulcer protocol and additional training for nurses in leg ulcer care should address other identified gaps in care: the absence of ulcer description, serial measurement of the ulcer, pain assessment and management, client education. Standardization of the assessment tools (e.g. wound, pain) with written guidelines for the requirement and method of completion would provide consistency in evaluating the effectiveness of treatment. The attention to the procurement of bandaging skills with designated nurses could resolve problems related to incorrectly applied bandaging (Nelson, Ruckley, & Barbenell, 1995). Several studies have demonstrated significant variation in the pressures obtained with compression bandaging applied by different practitioners. Untrained and inexperienced nurses apply bandaging at inappropriate and widely varying pressure, while experienced and well-trained nurses obtain better and more consistent pressure results (Logan & Thomas, 1992; Nelson et al., 1996; RCN, 1998; Stockport, Groarke, Ellison, & McCollum, 1997; Taylor, Taylor, & Said, 1998).

It appeared that no one nurse assumed responsibility for the plan of care because of the number of different nurses visiting the clients. This type of lack of continuity resulted in no consistency of wound assessment, treatment, and documentation (Arnold & Weir, 1994). To improve care, it is necessary for a primary nurse to be accountable for developing, evaluating, and revising the client's plan of care that provides for 'best practice', continuity,

and ensures communication with the client and interdisciplinary health providers (Manthey, 1980; Pontin, 1999).

The problem of leg ulcer care is multidisciplinary in the nature of care. Therefore, to improve leg ulcer care, there needs to be broad system change. To identify the means of expediting the referral and treatment process, the communication and linkage patterns between the home care authority, nursing agency, family physicians, and specialist physicians needs to be scrutinized. Change that occurs only within the confines of the nursing agency is insufficient.

A number of areas for continued research emerge from the study recommendations. Studies that examine the dissemination of evidence-based leg ulcer care from differing perspective of community nurses, clients, physicians, and systems are needed. This paper supports an increased role for the registered nurse in the assessment and treatment of leg ulcers. Further research to identify factors influencing nurse's decision-making in leg ulcer care is important. One advantage of a concentrated specialty RN service is that it affords opportunities for continued research in 'best practice' on clinical issues.

The World Health Organization (WHO, 1978) identified the challenge in health care as providing the right kind of services, by the most appropriate people, at the right price, and in the right place. For some time, individuals with venous leg ulcers have not received the most effective and efficient care. The adoption of the recommendations for the 'best practice' of venous leg ulcer care has large resource implications in terms of human resources, equipment, education and training. The benefits of improved client outcomes may not be immediately apparent. However, the mismanagement of individuals with chronic wounds is expensive (Flanagan, 1996). Community nurses are well positioned to improve client outcomes for individuals with leg ulcers through the implementation of 'best practice'.

Table 3.1

Comparison of Leg Ulcer Practice Guideline Recommendations for Venous Leg Ulcers

(Modified from Graham, Lorimer, Harrison et al., 2000)

Assessment of Leg Ulcers	**RCN**	**SIGN**	**CREST**
A health care professional trained in leg ulcer management should undertake the assessment and clinical investigation	III		III
It is essential that an accurate assessment of the cause and contributing factors of the ulcer is determined before the onset of treatment	III		II
Record features indicative of venous disease	III		II
Record features on non-venous disease	III	III	II
The person conducting the assessment should be aware that ulcers may result from many different causes. If any unusual appearance refer for specialist assessment.	III	III	III
Information relating to the ulcer history should be recorded in a structured format: Ulcer site, first recurrence, number of episodes, time to heal, past treatments, previous venous surgery, use of compression hosiery	III	II Current ulcer site only	*
Assess the ulcer and surrounding skin	III	* ulcer only	
Doppler measurement of the Ankle Brachial Pressure Index (ABPI)	I	II	I
ABPI should be done by trained staff	II		*
Criteria for when the ABPI should be repeated	II	III ongoing assessment only	
Serial measurement of the ulcer	III	II	II
Criteria for specialist referral	III	III	III
Management of Leg Ulcers			
Graduated compression bandaging for the uncomplicated venous ulcer. High compression is more effective than low compression.	I	I	I
Compression applied by a trained practitioner	II	Correct application	II
Monitoring of pain and formulate an individual management plan	II	*	II
Cleansing, debridement, dressing, contact sensitivity			

Cleansing of the ulcer should be kept simple with tap water or saline	III	I Tap water	
Products that commonly cause skin sensitivity should not be used e.g. lanolin, topical antibiotics	III	III	II
Strategies to prevent recurrence of ulcers			
Correctly fitted compression hosiery should be prescribed for all clients with healed ulcers to prevent recurrence	II	I	II
Lifetime compression therapy	III	* 5 years	II
Client Education			
Compliance with compression hosiery	III	*	*
Moisturize skin regularly to maintain integrity	III skin care	*	
Elevation of the affected limb when immobile	III	*	

LEGEND
I= Level I evidence (evidence from randomized clinical trials or meta-analyses)
II= Level II evidence (evidence from well designed controlled or uncontrolled non-randomized studies)
III= Level III evidence (expert opinion, consensus statements, guideline developers' recommendation based on clinical experience)
*Level of evidence not stated by guideline developers

+ RCN definitions of levels of evidence
Level I= Generally consistent finding in a majority of multiple acceptable studies
Level II= Either based on a single acceptable study, or a weak or inconsistent finding from multiple studies
Level III= Limited scientific evidence which does not met all the criteria of acceptable studies or absence of directly applicable studies of good quality. This includes published or unpublished expert opinion.

References

Arnold, N., & Weir, D. (1994). Retrospective analysis of healing in wounds cared for by ET nurses versus staff nurses in as home setting. Journal of Ostomy, Wound Continence Nursing, 21 (4), 156-160.

Baker, S., Stacy, M., Jopp-McKay, A., & Thompson, P. (1991). Epidemiology of chronic venous ulcers. British Journal of Surgery, 64, 258-261.

Bosanquet, N. (1992). Costs of venous ulcers: From maintenance therapy to investment programs. Phlebology, 7, Supplement 1, 44-46.

Callam, M., Harper, D., Dale, J., & Ruckley, C. (1987). Chronic ulcer of the leg: Clinical history. British Medical Journal, 294, 1389-1391.

Callam, M.J., Ruckley, C.V., Harper, D.R., & Dale, J.J. (1985). Chronic ulceration of the leg: extent of the problem and provision of care. Bristish Medical Journal, 290, 1855-6.

Clinical Resource Efficiency Support Team (CREST, 1998). Guidelines for the assessment and management of leg ulceration. Belfast.

College of Nurses of Ontario (1999). Entry to practice competencies for Ontario Registered Practical Nurses [On-line]. Available: www.cno.org

Cullum, N., Nelson, E. A., Fletcher, A., & Sheldon, T. (2000). Compression bandaging and stockings for venous leg ulcers. The Cochrane Library, I

Ebbeskog, B., Lindholm, C., & Ohman, S. (1996). Leg and foot ulcer patients: Epidemiology and nursing care in an urban population in South Stockholm, Sweden. Scandinavian Journal of Primary Health Care, 14, (4), 238-243.

Eriksson, E., Moffatt, C., & Neumann, H. (1999). Guidelines for outpatient treatment. Venous and venous-arterial mixed leg ulcer. Compliance Network Physicians/Health Force Initiative. [Online] Available:www.cnhfi.de/index-eng.html.

Estabrooks, C.A. (1998). Will evidence-based nursing practice make perfect? Canadian Journal of Nursing Research, 30, (1), 15-35.

Flanagan, M. (1996). The role of the clinical nurse specialist in tissue viability. British Journal of Nursing, 5 (11), 676-681.

Franks, P.J., Moffatt, C.J., Connolly, M., Bosanquet, N., Oldroyd, M., Greenhalgh, R.M., & McCollum, C.N. (1994). Community leg ulcer clinics: Effect on quality of life. Phlebology, 9, 83-86.

Franks, P., Oldroyd, M., Dickson, D., Sharpe, E., & Moffat, C. (1995). Risk Factors for leg ulcer recurrence: A randomized trial of two types of compression stockings. Age and Aging, 24, 409-4.

Graham, I. D., Harrison, M., Moffat, C. & Franks, P. (2001). Leg ulcer care: Nursing attitudes and knowledge. The Canadian Nurse, 7 (3), 19-24.

Graham, I.D., Lorimer, K., Harrison, M.B., Pierscianowski, T., for the Leg Ulcer Protocol Task Force, Leg Ulcer Protocol Task Force Working Group, and External Leg Ulcer Expert Group (2000). Evaluating the quality and content of international clinical practice guidelines for leg ulcers: Preparing for Canadian adaptation. Canadian Association of Enterostomal Therapy Journal, 19 (3), 15-31.

Harrison, M. B., Graham, I. D., Friedberg, E., Lorimer, K., & Vandervelde-Coke, S. (2001). Assessing the population with leg and foot ulcers. Canadian Nurse, 97(2), 18-23.

Harvey, G., & Kitson, A. L. (1996). Achieving improvements through quality: an evaluation of key factors in the implementation process. Journal of Advanced Nursing, 24, 185-95.

Hickie, S., Ross, S. & Bond, C. (1998). A survey of the management of leg ulcers in primary care settings in Scotland. Journal of Clinical Nursing, 7, (1), 45-50.

Husband, L. (1996). The management of the client with a leg ulcer: Precarious nursing practice. Journal of Advanced Nursing, 24, 53-59.

Lees, T. & Lambert, D. (1992). Prevalence of lower limb ulceration in an urban district. British Journal of Surgery, 79 (10), 269-274.

Lomas, J. (1994). Teaching old (and not so old) docs new tricks: Effective ways to implement research findings. In E.V. Dunn, P.G. Norton, M. Stewart, F. Tudiver, and M.J. Bass (eds). Disseminating research/changing practice, Thousand Oaks, CA: Sage, 1-18.

Logan, J. & Graham, I. D. (1998). Toward a comprehensive interdisciplinary model of health care research use. Science Communication, 20 (2), 227-246.

Logan, R. & Thomas, S. (1992). A comparison of sub-bandage pressures produced by experienced and inexperienced bandagers. Journal of Wound Care,1(3) 23-26.

Luker, K. & Kendrick, M. (1992). An exploratory study of the sources of influence on the clinical decisions of community nurses. Journal of Advanced Nursing, 17, 457-466.

Manthey, M. (1980). A theoretical framework for primary nursing. Journal of Nursing Administration, 10 (6), 11-15.

Mead, P. (2000). Clinical guidelines: Promoting clinical effectiveness or a professional minefield? Journal of Advanced Nursing, 31 (1), 110-116.

Lambourne, L., Moffatt, C., Jones, A., & Franks, P. (1996). Clinical audit and effective change in leg ulcer services. Journal of Wound Care, 5, (8), 348-51.

Moffatt, C., Franks, P., Oldroyd, M., Bosanquet, N., Brown, P., Greenhalgh, R. & McCollum, C. (1992) Community clinics for leg ulcers and impact on healing. British Medical Journal, 305, 1389-92.

Moffatt, C.J., Oldroyd, M.I., Greenhalgh, R.M. and Franks, P.J. (1994). Palpating ankle pulses is insufficient in detecting arterial insufficiency in patients with leg ulceration. Phlebology 9 , 170-172.

Nelson, E.A., Ruckley, C.V., Barbenel, J.C. (1995). Improvements in bandaging technique following training. The Journal of Wound Care, 4(4) Feb 125-128.

Nelzen , O., Berquist, D., & Lindhagen, A. (1992). High prevalence of diabetes in chronic leg ulcer patients: a cross-sectional population study. Diabetes Medicine, 10, 345-350.

Nelzen, O., Bergquist, D., Lindhagen, A. & Hallbook, T. (1991). Chronic leg ulcers: an underestimated problem in primary health care among elderly patients. Journal of Epidemiology and Community Health, 45, (1), 184-87.

Phillips, T., Stanton, B., Provan, A. & Lew, R. (1994). A study of the impact of leg ulcers on quality of life: Financial, social, and psychological implications. Journal of the American Academy of Dermatology, 31 (1), 49-53.

Pontin, D. (1999). Primary nursing: a mode of care or a philosophy of nursing? Journal of Advanced Nursing, 29 (3), 584-591.

Reynolds, S. (1999). The impact of a bandage training programme. Journal of Wound Care 8 ,(2) 55-60.

Royal College of Nurses (RCN). (1998). Clinical Practice Guidelines: The management of patients with venous ulcers. York: RCN Institute.

Sackett, D.L., Rosenberg, W.M., Gray, J.A.A. & Haynes, R.B. (1996). Evidence-based medicine: What it is and what it isn't. British Medical Journal, 312, 71-71.

Scottish Intercollegiate Guidelines Network (SIGN, 1998). The care of patients with chronic leg ulcers. SIGN Publication Number 26, Edinburgh. [On-line] Available: www.sign.ac.ik/html/htmtxt26.htm.

Simon, D., Freak, L., Kinsella, A., Walsh, J., Lane, C., Groake, L., McCollum, C. (1996). Community leg ulcer clinics: a comparative study in two health authorities. British Medical Journal, 312, 1648-51.

Skene, A., Smith, J., Dore, C., Charlett, J., & Lewis, J. (1992). Venous leg ulcers: A prognostic index to predict time to healing. British Medical Journal, 305, 1119-21.

Stevens, J., Franks, P., & Harrington, M. (1997). A community/hospital leg ulcer service. Journal of Wound Care,6, (2), 62-68.

Stockport, C.J., Groarke, L., Ellison, D.A., and McCollum, C. (1997). Single layer and multi-layer bandaging in the treatment of venous leg ulcers. Journal of Wound Care 6(10) 485-488.

Taylor, A.D., Taylor, R.J., & Said, S. (1998). Using a bandage pressure monitor as an aid in improving bandaging skills. Journal of Wound Care 7(3) 131-133.

Turner, J.G., Larson, E.L., Korniewicz, D., & Baigis-Smith, J. (1994). Consistency and cost of home wound management by contract nurses. Public Health Nursing, 11 (5), 337-342.

World Health Organization (1978). Report of the International Conference on Primary Health Care, September 1 – 12, 1978, Alma Ata, USSR, Geneva: Author

APPENDIX B

Practice Variation Tool

Client ID	Admission Date:	Age:	Gender: M F
Number of different nurses who saw the client	Classification of the Primary Nurse RPN RN BScN ET	ET Consult: Yes No Visit Frequency March 1999	
Length of time on service for leg ulcer care	Continued to receive care after November 30, 1999 Yes No	If not receiving care 99/11/30 1. Healed 3. Died 2. Institutionalized 4. Other	
Assessment of Ulcers			
Etiology of Ulcer Identified Yes No Diagnosis: _____			
Initial ABPI recorded on chart Yes No	ABPI prior to initiating Compression Yes No	Follow-up ABPI (within 3 months of compression) Yes No	
Serial Measurement of the Ulcer Yes No	Description of the ulcer Yes No	Referral to Specialist Yes No	
Type of specialist 1. Dermatologist 2. Vascular Surgeon	3. Orthopedic Surgeon 4. Endocrinologist 5. Infectious disease	6. Other	Length of time on service prior to specialist referral
Management of Ulcers			
Compression Bandaging • Prior to March 1999 Yes No • March 1999 Yes No • After March 1999 Yes No • November 1999 Yes No Type of compression bandaging: 4 layer Profore Surpress 3 layer Profore Short Stretch Coban		Problems with Bandaging Yes No If yes: 1. Pain/Discomfort 2. Skin Breakdown 3. Slippage 4. Rash 5. Other: Specify _____ Refused Compression Bandaging: Yes No	
Compression Stockings: • March 1999 Yes No • After March 1999 Yes No • November 1999 Yes No Refused Compression Stockings Yes No		Problems with Stockings Yes No If yes: 1. Pain/Discomfort 2. Skin Breakdown 3. Slippage 4. Rash 5. Other: Specify _____	

<table>
<tr><td colspan="2">Length of time received leg ulcer care prior to initiating compression: _____ months</td></tr>
<tr><td>Topical Antibiotics:
Yes No

If yes, is there a rationale for the antibiotic?
Yes No</td><td>Cleansing Solution
1. Normal Saline
2. Tap water
3. Proviodine
4. Hypochlorite
5. Hydrogen peroxide
6. Other: Specify</td></tr>
<tr><td>Pain Assessment:
Yes No

Method Used</td><td>Pain management:
Yes No

Specify analgesics: _____</td></tr>
<tr><td colspan="2">Client Education to Prevent Recurrence of Leg Ulcers : Yes No

If Yes Specify Education:</td></tr>
<tr><td colspan="2">Comments:</td></tr>
</table>

Appendix C

Technical Report for the Practice Variation Study

Table C1

Assessment of the Wound

Wound Assessment	**n**	**(%)**
Etiology of ulcer determined (n = 66)	35	53.0
Description of the Ulcer (n = 64)	13	20.0
Serial Measurement of the wound (n = 64)	7	10.9

Table C 2

Doppler Assessment prior to the Initiation of Compression (n = 66)

Date	**Compression Type**	**ABPI Prior to Initiation of Compression**		**Total**
		Yes	**No**	
Pre March 1999	Bandaging	10	5	15
	Stockings	3	6	9*
March 1999	Bandaging	5	0	5
	Stockings	0	0	0
Between March & November 1999	Bandaging	3	6	9
	Stockings	0	6	6
	Total	21	23	44

* one client refused any compression by March 1999

Table C 3

Level of Compression Received by Clients in Compression Bandaging

Date	**Light Compression 15 – 20 mm Hg**		**High Compression 35 – 40 mm Hg**		**Total**
	n	**%**	**n**	**%**	
March 1999 (n = 20)	11	55.0	9	45.0	20
November *1999 (n = 15)	8	53.3	7	46.7	15

* Some clients from March 1999 continued to receive compression in November 1999

Table C 4

Treatment with Compression

	Compression					
Dates	**Bandaging**		**Stockings**		**No Compression**	
	n	**%**	**n**	**%**	**n**	**%**
March 1999 (n = 66)	20	30.3 %	8	12.1 %	38	57.6 %
November 1999 (n = 35)	15	42.9 %	12	34.3 %	8	22.6 %

Table C 5

Length of Time Receiving Leg Ulcer Care to Referral to a Specialist Physician

Referrals to Specialist Physicians n = 66							
Time to Specialist Referral	Dermatologist	Vascular Surgeon	Orthopedic Surgeon	Endocrinologist	Infectious Disease	Total	
						n	%
< 3 month	17	5	1	1		24	36.4
3 – 6 months	4	3				7	8.7
7- 12 months	3	1				4	6.1
13 – 18 months	1					1	1.5
19 –24 months	3		1			4	6.1
> 25 months	2	1			1	3	4.5
Totals	30	10	2	1	1	44	100

(3 clients received referrals to 2 specialsits)

Table C 6

Wound Management	**n**	**%**
Ulcer cleansed with saline or tap water (n = 62)	49	79.0
Topical antibiotics were used (n = 64)	44	68.8

Table C 7

Client Education to Prevent Ulcer Recurrence (n = 62)

Client Education to Prevent Recurrence (n = 62)		
	n	**%**
Use of compression stockings	0	0
Skin Care	0	0
Elevation of legs	2	3.2
Nonspecific	1	1.6

Table C 8

Pain Assessment and Management (n = 66)

Pain Assessment and Management	**n**	**%**
Pain Assessment	10	15.1
Pain Management	11	16.7

Table C 9

Nurses Providing Leg Ulcer Care to Client

Nurses Who Visited the Clients		**n**	**%**
Classification of Nurse assigned as the Primary (n = 66)	RPN	29	43.8
	RN	25	37.9
	BScN	9	13.6
	ET	3	4.5
Number of different nurses who visited the clients (n = 62)	Mean	19	
	Median	17	
	SD	10.4	
	Range	4 - 45	
Seen by ET (at least one occasion) (n = 62)	Yes	30	48.4

Table C 10

Duration of leg Ulcer Care (n = 66)

Length of time received leg ulcer care from the agency	Mean Median SD Range	20.4 months 12.0 months 21.6 1 – 96 months
Continued to receive agency care as of November 1999	Yes No • *Healed and Discharged* • *Died* • *Admission to Nursing Home*	35 (53 %) 31 (47 %) *27 (40.9%)* *3 (4.5 %)* *1 (3.2 %)*

Table C 11

Frequency of Nursing Visits

Frequency of nursing visits 1999 (n = 62)		n	%
	2 x day	3	4.8
	daily	23	37.0
	4 –5 x week	2	3.2
	3 x week	10	16.1
	2 x week	13	21.0
	weekly	10	16.1
	1 x month	1	1.6

Chapter Four

The Design and Implementation of a Nurse-Lead Community Leg Ulcer Service: Role of an Advanced Practice Nurse

The Design of a Nurse-Lead Community Leg Ulcer Service: Role of an Advanced Practice Nurse

In Ottawa Carleton, the restructuring of health services for the population with leg ulcers was fuelled by the high demand for community leg ulcer care in an environment of cost containment and nursing shortages. In order to plan for more effective and efficient health care delivery to this population, several planning studies were conducted: a prevalence and client profile survey, a survey of the knowledge, attitude and practice of both medical and nursing service providers, profiling of the venous leg ulcer population, and a practice variation study on the community leg ulcer care practices (Graham & Harrison, 2000; Graham, Harrison, Moffatt, & Franks, 2001; Harrison, Graham, Friedberg, Lorimer, & Vandervelde-Coke, 2001; Lorimer, 2002). Using the results from these studies, a local interdisciplinary team developed a regional demonstration nurse-lead community leg ulcer service.

My involvement began during the planning phase of the leg ulcer service as a nurse manager with a "not-for-profit" community nursing agency. As a part of my graduate studies, I continued work on the population planning studies, and on the development of an interdisciplinary evidence-based leg ulcer protocol. Concurrently, I was enrolled in a baccalaureate level specialty leg ulcer distance course along with eight of my colleagues from the nursing agency. As a result of my studies and my previous nurse management position, my role evolved into an Advanced Practice Nurse (APN) role with my assuming the position of clinical leader of the Ottawa-Carleton Regional Leg Ulcer Project. As an APN and a member of the research team, I was involved in the design of the new service and was charged with the responsibility for overseeing the implementation of the service, and the

ongoing operations and continuous quality improvement (CQI) from both a research and clinical perspective.

Advanced nursing practice builds on graduate education and experience to maximize the use of in-depth nursing knowledge and skill in meeting the health needs of clients (individuals, families, group, populations or entire communities) (CNA, 1999). This paper is a reflection on my advanced practice role and discusses: 1) the role of an APN as it relates to the design and implementation of the nurse-lead community leg ulcer service; and 2) the design and implementation strategies directed at minimizing the effect of barriers and enhancing supports to the new service using the conceptual elements of the Ottawa Model of Research Use (OMRU).

The State of Practice Prior to the Design and Implementation of the New Service

Prior to the development of the nurse-lead community leg ulcer service, the local home care authority brokered community leg ulcer care with three different nursing agencies. The large not-for-profit nursing agency experienced environmental influences affecting the provision of care that were not shared with the other nursing agencies. The contract for visiting nursing, previously held exclusively by this one nursing agency, was divided between three home nursing agencies. The diminished visit volume resulted in a realignment of nursing districts and a change of nurses on a daily basis as the most senior nurses were redeployed to districts where visits were available.

The practice variation study (PVS) (Lorimer, 2002) conducted an appraisal of the provision of venous leg ulcer care in the largest nursing agency. The PVS revealed that the average number of nurses visiting each client during the nine month appraisal period was 19 different nurses. It appeared that no one individual nurse assumed responsibility for the client's plan of care. There was very little documentation of ulcer assessments and no documented evaluations or revisions to the client's plan of care.

The venous leg ulcer population presented as a complex group, who experience a long duration of ulceration and high recurrence rate. Concurrent multiple health problems complicate ulcer healing and treatment (Lorimer, 2002). Yet, 44 % of this complex population was cared for by a registered practical nurse (RPN). The criteria for the provision of care from a RPN are that the clients are stable and have predictable outcomes (CNO, 1999).

A number of care practices were not congruent with 'best practice' as defined by three international nursing guidelines (CREST, 1998; RCN, 1999; SIGN, 1998). Half of clients receiving home care for a leg ulcer did not have an identified etiology of their ulcer, despite the treatments for venous leg ulcers being very different than ulcers with a non-venous etiology. Clients did not routinely have an ankle brachial pressure index (ABPI) to screen for the presence of arterial disease. Compression is the 'gold standard' treatment for venous ulcers but is contraindicated in the presence of severe arterial disease. Yet, only a half of clients treated with compression had a documented ABPI. Despite the high level of supporting evidence (Cullum et al., 2000), only 42 % of clients received treatment with compression. Sixty per cent of clients were referred for specialist referral as per guideline recommendations. However, the average referral time of six months was higher than the guideline recommendation of three months. Two-thirds of clients were treated with topical antibiotics, contrary to the guideline recommendations that these products are known as allergens should be avoided. Documentation of pain assessment and management was absent from the majority of client records, as well as client education aimed at preventing ulcer recurrence.

The family physician was identified as the main medical provider of care for clients with venous leg ulcers. Several evidence-based recommendations contained in the clinical practice guidelines were within the physician scope of practice at the time of the PVS and

included: the identification of the ulcer etiology; ABPI measurement; prescribing compression, topical antibiotics, pain medication, and referral to physicians specializing in leg ulcer care. In a knowledge, attitude and practice survey to family physicians, only 16 % reported being confident in their ability to manage leg ulcers, and 50 % were aware that four and two layer compression bandages are an effective treatment for venous leg ulcers (Graham & Harrison, 2002). There was an estimated 226 patients receiving care from one of 107 physicians who reported clients with leg ulcers. Based on these data, few family physicians in the region care for many leg ulcer patients at any one time.

The results from the planning studies provided population information and identified inefficiencies and ineffectiveness in care, and potential barriers to the implementation of an evidence-based leg ulcer service. The next step was to design a new model of health service delivery to the population with leg ulcers drawing on the findings obtained from the various planning studies (Graham & Harrison, 2002; Graham, Harrison, Moffatt, & Franks, 2001; Harrison, Graham, Friedberg, Lorimer, & Vandervelde-Coke, 2001; Lorimer, 2002).

Design of the Nurse-Lead Community Leg Ulcer Service

The nurse-lead community service was designed to support the delivery of evidence-based care to the population with leg ulcers receiving community care. An objective of the research associated with the design of the new service was to compare the outcomes of care provided in a nurse-lead community leg ulcer clinic to home care. The four core elements of the service are the same regardless of the location of care: an evidence-based clinical leg ulcer protocol, primary nursing, a dedicated nursing team educated in leg ulcer care, and continuous quality improvement measures (CQI). To evaluate the new service, data on outcome measures of healing rates, quality of life, care costs, and client and provider satisfaction are collected at regular intervals as clients are followed over a one year period.

The Evidence-based Protocol

The purpose of the evidence-based leg ulcer protocol was to provide health professionals with up-to-date information on the most effective methods of assessing and managing venous leg ulcers so as to improve the healing of leg ulcers and the quality of community care in the region. The process to develop the clinical recommendations was guided by a conceptual framework known as the Practice Guideline Evaluation Cycle (PGEC) (Graham, Lorimer, Harrison et al., 2000). Many aspects of the cycle are to increase confidence in the resulting recommendations by following a systematic and rigorous process of protocol development which is reproducible.

Primary Nursing

To support evidence-based practice, restructuring service delivery had to be considered from the "district based" centrally organized current system. The PVS revealed a lack of continuity of care as a cause of concern, as no one appeared to be accountable for the client's care (Lorimer, 2002). In the new service, a primary nursing delivery model based on Manthey's concept (1980) was selected. According to Manthey, the tenets of primary nursing are: 1) allocation and acceptance of individual responsibility for decision-making; 2) direct person-to-person communication, and 3) one person operationally responsible for the quality of care to patients twenty-four hours a day, seven days a week. Building on Manthey's work, several authors contributed to the articulation of ten elements in the concept of primary nursing: accountability, advocacy, assertiveness, authority, autonomy, collaboration, communication, commitment, continuity, and co-ordination (Pontin, 1999). In the design of our service model, we considered these elements as essential to the primary nurse role.

Dedicated Nurse Leg Ulcer Team

With the new service model, the nurse became the lynch pin of care. The community nurses assumed responsibility for the implementation of the protocol. The leg ulcer protocol was intended to empower nurses with the necessary clinical decision-making authority. The success of the new service depended on the expertise of the primary nurses completing the assessments and making recommendations for care. Therefore, nurse education in leg ulcer assessment and management was key to the success of the new service. Arrangements were made for eight agency nurses to take a baccalaureate distance education course in leg ulcer care taught by two key researchers and clinicians in the field of leg ulcer care. The nurses who completed the course became primary nurses who were responsible for the implementation of the evidence-based protocol.

To increase continuity and primary care, nursing teams were organized by dividing the region into geographical quadrants. A primary nurse, with specialized training in leg ulcer care, became the leader of each quadrant. Two or three secondary nurses were initially assigned to work with each primary nurse to assist with the day-to-day client assessments and care. Nurses were scheduled to ensure continuity of care with secondary nurses scheduled to work on regular work days and on the primary nurses' days off.

The Leg Ulcer Service Continuous Quality Assurance Measures (CQI)

The premise of CQI is that quality care reduces costs and improves healing rates for the leg ulcer population. The associated risks of enhanced nurse decision making are minimized through CQI measures. There are stringent criteria for nurses serving in the primary nurse role. The initial primary nurses had the credentialing of baccalaureate credits in leg ulcer care from a recognized university. Nurses without the baccalaureate course require

four to six months of experience as secondary nurses plus an additional three to four months of one-on-one training with the APN to complete the comprehensive assessments and the plan of care. Nurses performing ankle brachial pressure measurements must have a minimum of three readings validated with the APN (within 0.06). All nurses applying compression bandaging must have their skills assessed by the APN or primary nurse. On-going education is provided at weekly team meetings in the form of formal and informal presentations, case studies, and discussion about complex issues.

Adherence to the evidence-based protocol is monitored by the APN and primary nurses as a part of the evaluation of providing care. Care is appraised using a chart audit tool that reflects the protocol recommendations. Adjustments to the documentation tools were done after identifying problems with the recording of client education, and the assessment and management of pain. Client satisfaction is monitored every three months until the client is discharged.

Implementation Strategies for EBP in the Nurse-Lead Community Leg Ulcer Service

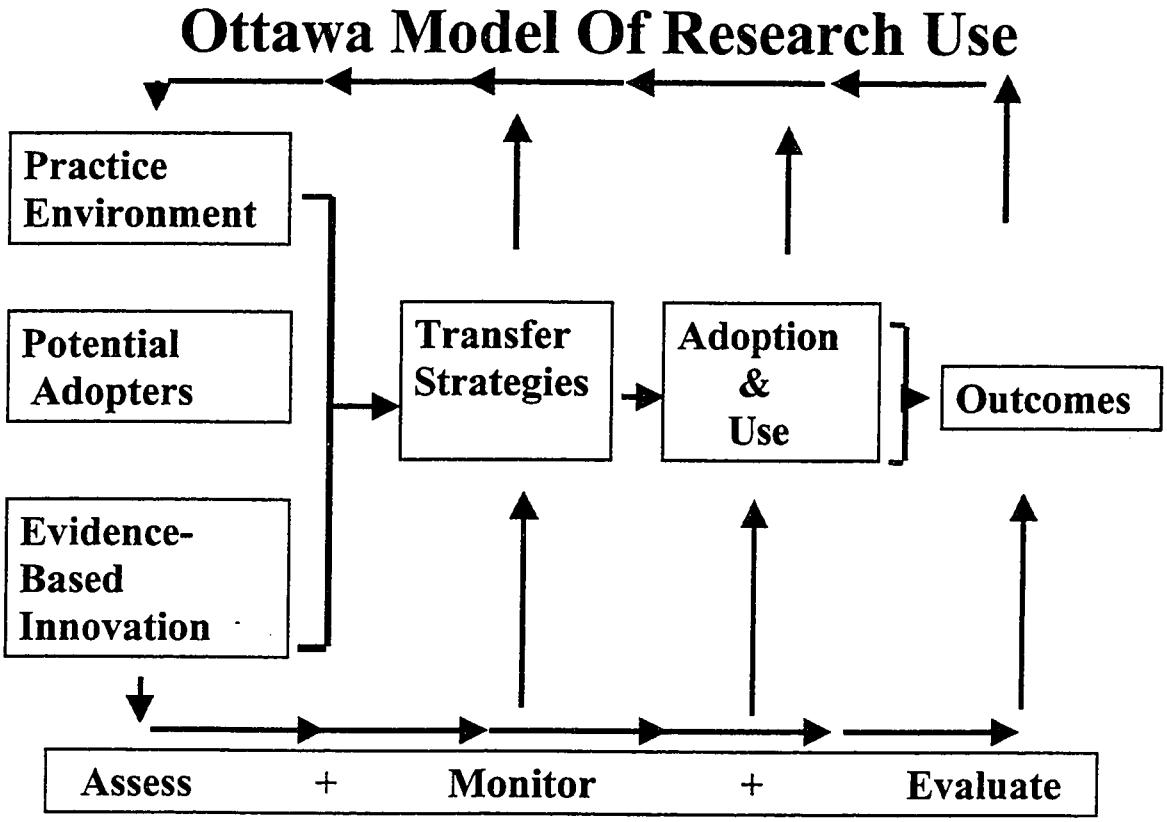
The Ottawa Model of Research Use (OMRU) consists of six key elements interconnected through the process of evaluation (Logan & Graham, 1998).These elements address the central components in the process of using research: the research based innovation (evidence-based protocol), the potential adopters, the practice environment, strategies for transferring the innovation into practice, adoption or use of the evidence, and health and other outcomes (Figure 4.1).

Integral to the OMRU is the systemic assessment, monitoring, and evaluation (AME) of each of the six elements, prior to, during, and following any research effort. The AME data serve four functions: 1) to identify potential barriers and supports to evidence-based practice related to the practice environment, potential adopters, and the evidence-based innovation, 2) to provide direction for selecting and tailoring strategies to overcome the identified barriers

and enhance supports; 3) to track the progress of the evidence-based practice; and 4) to evaluate the actual use of the evidence-based practice and its impact on outcomes (Logan & Graham, 1998).

Figure 4.1

Ottawa Model of Research Use



Logan & Graham, 1998

(Reprinted with the permission of the authors)

In keeping with the OMRU model, assessment of the evidence-based protocol, adopters, and practice environment was undertaken as part of the planning studies (Graham & Harrison, 2000; Graham, Harrison, Moffatt, & Franks, 2001; Harrison, Graham, Friedberg, Lorimer, & Vandervelde-Coke, 2001; Lorimer, 2002). Monitoring activities included the CQI measures that were instituted during the project. Evaluation of the client, provider, and

systems outcomes is being done as a part of the study (healing rates, quality of life, client and provider satisfaction, cost of care).

Tables 4.1 to 4.3 provide the details of the strategies tailored to the barriers and supports of the implementation of the evidence-based service. Table 4.1 focuses on the evidence-based protocol and indicates the barriers and supports to the use of the protocol and the strategies adopted to address these issues. Table 4.2 identifies the issues related to individual providers and the approaches used to overcome these. Table 4.3 describes the practice setting or more system level factors that were encountered and the methods used to neutralize these barriers.

Successful implementation of the evidence-based service required identification of barriers and implementation strategies targeted at these barriers. A lot of potential barriers were identified. Therefore multiple strategies were developed, as no one strategy would work. There is a need to consider the whole evidence, adopters, and practice environment as they interact. In our experience, the community nurse adopters were highly motivated and supportive of the evidence-based protocol, and they were able to positively influence the practice environment. Other settings would undoubtedly have different experiences.

The barriers and supports to the implementation of the evidence-based service occurred on a number of different levels, so a conceptual framework like the OMRU was helpful in focusing the APN's activities. The assessment, monitoring, and evaluation integral to the OMRU, reflect the steps in the nursing process and use of the OMRU can be viewed as an extension of these inherent nursing functions.

Role of an Advanced Practice Nurse in the Design and Implementation of a Nurse-Lead Community Leg Ulcer Service

As an APN in my role of clinical leader, I was directly accountable for the nurse-lead community service. My involvement was not always direct, as with various aspects of the

research proposal development, and negotiations with the administration around establishing the new service. The relationship between the APN and the researchers, nursing agency, home care authority, nurses, and physicians, meant one individual was familiar and connected to all aspects of the leg ulcer service. Understanding the 'big picture' was instrumental in determining what was workable within the service.

In the leg ulcer service, the APN is responsible for ensuring that the regional leg ulcer population receives quality community care. The function of the APN as the clinical leader of the leg ulcer service, resulted from the marrying of two primary role domains: expert clinical practitioner and manager. Competencies consistent to both clinical practice and management include: 1) quality leadership, 2) interdisciplinary educator, 3) interdisciplinary consultant, and 4) researcher (CNA, 1999, Davies & Hughes, 1995; Hamric & Spross, 1989; Wojner & Kite-Powell, 1997). The ability to manage change is a fundamental skill extending through each of the competencies represented in the two domains (Wojner & Kite-Powell, 1997).

In overseeing the clinical aspects of the delivery of interdisciplinary care, the APN role functions include: interdisciplinary consultation and collaboration, interdisciplinary education, role modeling expert evidence-based practice, troubleshooting complex client care issues, and monitoring, assessing, and evaluating the evidence-based care provided to the population (Wojner & Kite-Powell, 1997).

The care of the leg ulcer population is interdisciplinary in nature. A requirement for the provision of care by the local home care authority is a referral by a physician. A case-manager at the home care authority is responsible for approving the client care that is provided (nursing, homemaking, physiotherapy). Clients are referred to specialist physicians based on criteria of the evidence-based protocol. Therefore, collaboration and consultation is a key component of the success of the service, as is interdisciplinary education directed at promoting evidence-based care and the protocol recommendations.

Role modeling expert practice not only functions to develop the clinical expertise of the leg ulcer team, but serves to develop relationships based on mutual trust and respect. Expert practice promotes credibility and collaboration with interdisciplinary colleagues. Involvement in clinical practice provides a better understanding of the potential barriers and supports to evidence-based care in the clinical environment. Therefore, informed decisions can be made on interventions aimed at overcoming environmental barriers and enhancing supports to evidence-based care.

Within the primary nurse model, the functioning of the team is crucial to the delivery of quality care. While the APN is accountable to the leg ulcer population as a whole, the primary nurse is accountable for the individual client's care plan development, evaluation, and revision. Secondary nurses provide the day–to-day assessments and care. Communication and collaboration is therefore essential. When conflict situations arise, the onus is on the APN to resolve issues in a manner constructive to team development.

Within the management domain, the APN is instrumental in developing the operational plan, resource management, and evidence-based planning. The promotion of evidence-based care is strengthened by the premise that high quality care is also cost effective care. Therefore, the APN needs to be accountable for financial aspects of the delivery of evidence-based care. The day-to-day operational processes need to be organized to allow maximum efficiencies for the service balanced with the requirements to deliver quality care. Nurses need to be afforded the time to conduct the necessary assessments, evaluations, and care revisions to ensure optimal outcomes.

There are resource management implications for the continued ability to deliver evidence-based care. In the leg ulcer service, one of our greatest challenges is the maintenance of an expert team of nurses capable of implementing the evidence-based

protocol. The initial and ongoing education investment is significant. The expenditure in this area must be weighed with the benefit of improved outcomes.

Evidence-based planning, based on population assessments and outcome measures, is essential for making informed planning decisions. In our experience, the planning studies provided essential information that supported the need of a specialty service for the population with leg ulcers. Embracing research and forming strategic alliances is vital to the process of evidence-based planning

Discussion

At the time of writing, the 18 month demonstration leg ulcer service has been in operation for just over 12 months. Presently, it would be premature to comment on the results of the project evaluation. The future of the leg service will be determined, at least in part, by the achievement of improved outcomes. Even if positive results are achieved, the future of a designated leg ulcer team requires ongoing commitment between the various partners in the project.

Many of the strategies tailored to support the new evidence-based service have been highly effective. The strategic alliances formed between the researchers, home care authority, nursing agency, nurses, and physicians were essential to the design and implementation process. The ongoing interdisciplinary and intersectoral communication and linkages are needed if issues and problems are to be successfully addressed. The leg ulcer nurses are highly committed to the service and to their use of evidence-based care. To date, most client satisfaction surveys reveal our clients to be very positive about the care they have received and the majority of physicians have been supportive of the use of the protocol and the evidence-based service.

There have been a number of challenges faced over the past year and a half. The greatest challenge has been in establishing and maintaining the dedicated expert nursing

team. Nurses dedicated exclusively to leg ulcer care continue to build skill and expertise. Without nurses dedicated to the leg ulcer service, the risk is that the expertise can not be developed or maintained. There was initial reluctance on the part of the agency to the concept of the dedicated nursing team. Many of the nurses trained in leg ulcer care performed a number of other nursing functions requiring specialized skill. The dedication of the four primary leg ulcer nurses exclusively to leg ulcer care had resource implications for the nursing agency. Other agency nurses needed to be trained in the other specialized skills previously done by the leg ulcer nurses.

A year and a half later, the dedicated nursing team is again threatened. The leg ulcer service has experienced a regular loss of nurses as a result of multiple factors that include: outside opportunities for career advancement, the physical demands of the type of care provided, retirement, moving from the area, and the lack of job security. In addition, ten months after the implementation of the leg ulcer service, the nursing agency received notice from the home care authority that the nursing visit volume was to be drastically reduced. This was in response to a denied budgetary increase from the provincial government to meet the increasing demands on home care service. As junior nurses in a unionized environment, several leg ulcer nurses have received lay-off notices. The nursing agency acknowledges the importance of the leg ulcer service, but is pressured by the nurses' union to train senior nurses to provide the leg ulcer care. The union's philosophy is "a nurse is a nurse" and anyone can be trained. Few senior nurses have expressed interest in joining a dedicated leg ulcer service. The initial response from the nursing agency was to train most senior nurses in leg ulcer care, which they would do in addition to their regular caseload work. The loss of the dedicated nursing team threatens the continuation of the leg ulcer service. The current level of nursing expertise has been acquired over the past 14 months and is not easily replaced.

Each element of the nurse-lead leg ulcer service is believed essential for the provision of safe, effective, and efficient care. These elements are: an evidence-based protocol, care delivered by a skilled designated nursing team, a primary nurse who is accountable for client care, continuous quality improvement, and an advanced practice nurse who oversees and is accountable for the all aspects of the service. If any one element is at risk, the whole service is threatened. The challenge is in convincing the other stakeholders. Improved outcomes for the client, care providers and the system can provide the necessary evidence.

According to Wojner and Kite-Powell (1997), "successful outcomes measurement and management depends on the clinical leader (APN)...behind the program. The key individual must understand interdisciplinary (evidence-based) practice and act as an expert clinician capable of managing a (specific client) population." (p 17-8) The APN guides the improvements in the efficiency and effectiveness of care through promoting evidence-based, quality care, and through facilitating the empowerment of nurses to continually search for answers to questions related to 'best practice'.

The leg ulcer service is a model for the service delivery of community care. The identified gaps in the way leg ulcer care was delivered are not exclusive to the community leg ulcer population. The absence of the use of evidence-based practice, the lack of coordinated care, and continuity are shared problems. The nurse-lead community leg ulcer service, comprised of the essential elements of quality community care, provides a model aimed at improving the efficiency and effectiveness of care. The essential elements of the leg ulcer service are transferable to the care of any population requiring specialized community care. The challenge is in demonstrating that quality care is also more cost effective care. The developers of the leg ulcer service are optimistic that improved outcomes in the leg ulcer service will provide the necessary clinical and economic evidence.

Table 4.1

Tailoring Implementation Strategies to the Barriers and Supports to the Evidence-Based Protocol

Description of Evidence-based Protocol	Barriers (↓) and Supports (•) to the Protocol	Implementation Strategies of the Evidence-Based Protocol
• Identification of the ulcer etiology • Ankle brachial pressure index on all clients admitted to home care for leg ulcer care • Criteria for referral to specialist physicians • Criteria for treatment decisions • Graduated, high compression bandaging for venous leg ulcers • Compression applied by trained nurses • Evidence-based wound care • Assessment and management of pain • Compression stockings and client education aimed at preventing ulcer recurrence	• EBP provides up-to-date information on the most effective methods of assessing and managing venous leg ulcers so as to improve the healing of leg ulcers quality of community care Adopters perceptions that: ↓ The protocol is too complicated and difficult to do ↓ The protocol is too different from the usual way of doing things ↓ Equipment and expertise not available in the community ↓ There is no advantage to adhering to the protocol recommendations ↓ Resources are not available to implement the protocol	• The protocol development included credible developers and multidisciplinary and multisectoral members • a rigorous search for credible existing practice guidelines • a rigorous process of development based on a systematic and critical appraisal of existing practice guidelines • an explicit, transparent, and replicable process • both clinicians and decision-makers involved in the development process • a synthesis of key protocol recommendations into a one page summary that was user friendly • developing a comprehensive assessment tool mirroring protocol recommendations • the availability of the protocol also in a detailed format, complete with rationale and supporting references for the recommendations • grading the strength of evidence for each recommendation • mailed/faxed survey to local physicians for feedback • verbal feedback from community nurses • a written response to all surveyed physicians to any concerns/questions received as feedback to the protocol • publicizing the positive attributes of improved effectiveness and efficiency with protocol use • timely, responsive, and iterate protocol development • publication in a national journal with external credibility (Graham et al., 2000) • regional endorsement by the local home care authority; product publicized under home care letterhead, letters to physicians from home care, and publicity in home care newsletter • external review by 2 international experts, & publication reviewers

Table 4.2

Tailoring Implementation Strategies to the Barriers and Supports of Potential Adopters

Description of Potential Adopters	Barriers (↓) and Supports (•)	Implementation Strategies tailored to supports and barriers of the Potential Adopters
Physicians Family physicians were the primary medical providers to LU clients. In a knowledge, attitude, and practice survey to FP (Graham et al., 2002): • Only 16 % indicated that they were confident with their skills in care for individuals with leg ulcers. • 50 % were not aware 4 and 2 layer compression are effective treatment for venous leg ulcers.	• Overwhelming support (97 %, 94/97) received from family physicians to adopt the protocol • Support from some specialist physicians who viewed the service as a complimentary nursing component ↓ Conflict resulting from some physicians who viewed the service as an infringement on their scope of practice	Awareness • Physician representation (dermatologist, vascular surgeon, hematologist, family physician) on the protocol task force • One page synthesis of protocol recommendations mailed/faxed to family physicians as part of feedback process Attitudes • Interdisciplinary linkages were facilitated during the process of the protocol development, communication plan formulated for referral process • APN contacted those physicians directly who did not want clients referred to the leg ulcer service • If failed, consulting specialist physician able at times to intervene to have a client seen by the nurses in the leg ulcer service Knowledge APN and leg ulcer nurses provided information and advocated for implementation of protocol recommendations with physicians

Description of Potential Adopters (Continued)	Barriers (↓) and Supports (•)	Implementation Strategies Tailored to the Barriers and Supports of the Potential Adopters
<u>Community Nurses</u> • Leg ulcer clients received care from an average of 19 different nurses, 44 % RPN (Lorimer, 2002) In a KAP survey to community nurses (Graham et al., 2001) • 58.5 % felt confident in ability to treat leg ulcer clients • awareness of effectiveness of 4 and 2 layer compression was 56 % and 36 % respectively	• The initial 4 primary nurses were strong advocates of the protocol and the leg ulcer service • Positive attitude of leg ulcer nurses • Leg ulcer nurses' commitment to ongoing learning ↓ Risks associated with incorrect ABPI and incorrectly or inappropriately applied compression	• Arrangement for a distance baccalaureate leg ulcer course for 8 agency nurses; taught by 2 internationally known nurse clinicians and researchers in leg ulcer care. • Nurses enrolled in course were involved in the process of the protocol development • Primary nurses were responsible for the implementation of the protocol • Verification of ABPI measurement (within 0.06) and application of each type of compression bandage

Description of Potential Adopters (Continued)	Barriers (↓) and Supports (•) of Potential Adopters	Implementation Strategies Tailored to the Barriers and Supports of the Potential Adopters
Nurses who took leg ulcer course had a number of other skills (e.g. enterostomal therapy, intravenous infusion, Chemotherapy, Continuous ambulatory peritoneal dialysis)	↓ Nursing agency initially reluctant to allow any nurses with the leg ulcer course to be dedicated to the leg ulcer service ↓ Change weary seasoned nurses ↓ Lengthy process to acquire knowledge, skill, and confidence to complete the comprehensive assessments	• Nursing agency agreed that 4 nurses who had taken the leg ulcer course would be dedicated as primary nurse (PN) to new service • Organized the city into quadrants with a primary nurse serving as a team leader in each quadrant working with 2-3 secondary nurses • The primary nurse was accountable to complete the comprehensive client assessment, establish the plan of care & regularly evaluate and revise plan. • Secondary nurses works closely with primary nurse doing the day-to-day assessments and care • APN provided secondary nurse training. Consisted of an initial 2-day group training session focused on protocol, day-to-day assessments, wound care products, compression bandaging, followed by individual training with APN or primary nurse to demonstrate application of the evidence-based protocol • APN served as clinical consultant and provided feedback in challenging cases
Ongoing Support	↓ Secondary nursed expressed concern that there was so much to learn ↓ Ongoing attrition and the need for continued nurse training ↓ Developing skill and confidence of a primary nurse is more difficult without the formal leg ulcer course	• APN organized ongoing education of team at weekly team meetings, formal and informal presentations, case studies, problem solving around difficult client situations • APN/Primary nurse available for ongoing consultation via telephone; APN carried cell phone • APN responsible for ongoing education of secondary nurses to assume primary nurse role after 4 – 6 months of leg ulcer care experience; required lengthy training and support • APN served as a support and mentor especially to secondary nurses • Nurse satisfaction survey completed at 3 months and one year after service began

Description of Potential Adopters (Continued)	Barriers (×) and Supports (↑) of Potential Adopters	Implementation Strategies Tailored to the Barriers and Supports of the Potential Adopters
Decision-maker adopters • Regional home care authority brokers contracts with 4 different nursing agencies to provide care funded through the ministry of health • Nursing agency is a large not-for profit providing the largest proportion of home care in the region	• One regional home care authority ↓ Home care authority did not want to appear to favor any one nursing agency	• Development of strategic alliances in early planning phases of developing the new service • Reconciled importance of one nursing agency providing the care during the demonstration leg ulcer service. Issues of communication, consistent approach, documentation, multiple decision-makers, changing practice across four different agencies would be logistically very difficult

Table 4.3
Tailoring Implementation Strategies to the Barriers and Supports of the Practice Environment

Description of Practice Environment	Barriers (↓) and Supports (•) in the Practice Environment for EBP	Implementation Strategies Tailored to the Barriers and Supports in the Practice Environment
1. Structure ii. Decision-making structure Administrative – Home care authority and nursing agency	↓ New service model is outside the normal process ↓ Home care and agency initial resistance to another specialty service ↓ Fragmentation of financial reporting both within the home care authority and between home care and the nursing agency ↓ Competitive environment meant both home care and nursing agency were careful with information release	• Service model was based on remuneration for the cost of a program rather cost on a per visit basis. • Planning studies (prevalence and profile; knowledge, attitude and practice survey; appraisal of practice) provided an understanding of the complexity of population and ineffectiveness and inefficiencies of care. Prevalence, healing rates, cost analysis served as a barometer to argue financial benefits of a new service. • Reconcile reporting and financial analysis in both the home care and nursing agency sectors • Reported financial information in the old way, but also in a new way that provided budgetary analysis that reflected the cost savings.
Leg Ulcer Nurses Decision-making	↓ Primary nurses having to make adjustments to enhanced decision-making authority.	• The protocol empowered nurses with enhanced decision-making authority by providing criteria for decision-making • APN reaffirmed criteria of protocol for enhanced decision-making authority, and the capacity of the primary nurses • Continuous quality improvement through initial and ongoing nurse education, verifying assessment & ankle brachial pressure index results obtained by the APN & primary nurses, chart audits to monitor use of evidence-based care.

Description of Practice Environment (Continued)	Barriers (×) and Supports(↑) in the Practice Environment	Implementation Strategies Tailored to the Barriers and Supports in the Practice Environment
• Enterostomal therapists (ET) were a team of nurse specialists with expertise in wound care & had taken leg ulcer course • a dedicated leg ulcer registered nurse team meant existing agency clients were transferred to the care of the team; Registered Practical Nurses cared for > 40 % of leg ulcer clients. • Physicians have responsibility to prescribe treatment	↓ Potential conflicts between primary nurses & ET, agency RNs & RPNs, & physician specialists ↓ Some physician specialists had little experience with compression products	• Team building based on mutual respect and trust • APN used conflict situations between team members as opportunities for growth and team building. Reinforced importance of presenting differing opinions for peer review, search for available evidence from literature review to provide rationale, basing decisions on available evidence • APN presented leg ulcer service and rationale for the expectation of improved outcomes to all agency nurses. • Nurses advised physicians of the treatment plan for their clients • Providing evidence-based information to specialist physicians, relying on specialist physician on leg ulcer task force to serve as advocate with his peers.
ii. Belief System 3. Client Population experiences a high recurrence rate. Many have had negative experiences from previous leg ulcer treatments with poor healing, and are skeptical of another type of treatment	↓ Home care belief that the liability for appropriate care rested solely with the nursing agency ↓ Unions belief that "a nurse is a nurse", and cuts to home care resulting in lay-offs of junior leg ulcer nurses ↓ May be reluctant to adhere to treatment plan that involves large bulky bandages, that may initially result in increased discomfort	• Convincing home care authority that they had responsibility to ensure appropriate practice • Reconciling the lengthy education process to assume primary nurse role and risks of inappropriate decisions too great without sufficient training • Involvement of client in decisions regarding their care as there are options for treatment with compression • Client education aimed at assisting the ulcer to heal, and preventing recurrence. Provide clients an education sheet. • Regular ongoing assessments of ulcers, legs, pain • Re-evaluation at three month intervals to evaluate outcomes of healing, pain, quality of life, to adherence to wearing compression stockings, exercise, skin care • Client satisfaction survey

References

Canadian Nurses Association [CNA]. (1999). DRAFT Core competencies for nurses in advanced practice, Ottawa, Ontario: Author.

Clinical Resource Efficiency Support Team (CREST, 1998). Guidelines for the assessment and management of leg ulceration. Belfast.

College of Nurses of Ontario (1999). Entry to practice competencies for Ontario Registered Practical Nurses [On-line]. Available: www.cno.org

Davies, B., & Hughes, A.M. (1995). Clarification of advance nursing practice: Characteristics and competencies. Clinical Nurse Specialist, 9 (3), 156-160.

Graham, I. D. & Harrison, M. B. (2002) Family physician survey of attitudes toward the care of leg ulcers (unpublished data).

Graham, I. D., Harrison, M. B., Moffat, C. & Franks, P. (2001). Leg ulcer care: Nursing attitudes and knowledge. The Canadian Nurse, 7 (3), 19-24.

Graham, I.D., Lorimer, K., Harrison, M.B., Pierscianowski, T., for the Leg Ulcer Protocol Task Force, Leg Ulcer Protocol Task Force Working Group, and External Leg Ulcer Expert Group (2000). Evaluating the quality and content of international clinical practice guidelines for leg ulcers: Preparing for Canadian adaptation. Canadian Association of Enterostomal Therapy Journal, 19 (3), 15-31.

Hamric, A.B., Spross, J. A., & Hanson, C. (1996). Advanced Nursing Practice . Philadelphia: W. B. Saunders.

Harrison, M. B., Graham, I., Friedberg, E., Lorimer, K., & Vandervelde-Coke, S. (2001). Assessing the population with leg and foot ulcers. Canadian Nurse, 97(2), 18-23.

Logan, J. & Graham, I. (1998). Toward a comprehensive interdisciplinary model of health care research use. Science Communication, 20 (2), 227-246.

Lorimer, K. (2002). An assessment of individuals with venous leg ulcers in a community home care population . Unpublished master's thesis, University of Ottawa, Ottawa.

Lorimer, K. (2002). Current care provided to individuals with venous leg ulcers. How evidence-based is nursing practice?. Unpublished master's thesis, University of Ottawa, Ottawa.

Manthey, M. (1980). A theoretical framework for primary nursing. Journal of Nursing Administration, 10 (6), 11-15.

Pontin, D. (1999). Primary nursing: a mode of care or a philosophy of nursing? Journal of Advanced Nursing, 29 (3), 584-591.

Royal College of Nurses (RCN). (1998). Clinical Practice Guidelines: The management of patients with venous ulcers. York: RCN Institute.

Scottish Intercollegiate Guidelines Network (SIGN, 1998). The care of patients with chronic leg ulcers. SIGN Publication Number 26, Edinburgh. [On-line] Available: www.sign.ac.ik/html/htmtxt26.htm.

Venegoni, S. (1996). Changing Environment of Healthcare. In J. V. Hickey, Ouimette, R., & Venegoni, S. L. (1996) Advanced Practice Nursing: Changing Role and Clinical Applications, Lippincott: Philadelphia, 77-90.

Wojner, A. W., & Kite-Powell (1997). Outcome manager: A role for the advanced practice nurse. Critical Care Nursing Quarterly,19 (4), 16-24.

Chapter Five

Summary and Conclusions

Chapter Five

Summary and Conclusion

This thesis was a part of a larger research program that set out to improve the effectiveness and efficiency of health services for the population with leg ulcers. My involvement with this research project began as a nurse manager with a large nursing agency in the region. Community nurses identified individuals with leg ulcers as having poor outcome results despite the high use of community resources. In order to bring this problem to the attention of policy/decision-makers we needed to acquire evidence on the population with leg ulcers and the community care that was provided. The challenge of planning services is that there needs to be economic as well as social and professional benefits to the change (Browne, 1999).

This thesis focused on the problems of the venous leg ulcers population, as this subgroup comprises the largest single proportion of the leg ulcer population. There is strong evidence supporting treatment with compression bandaging (Cullum et al., 1999). In the United Kingdom, clients who received evidence-based care in nurse-lead community clinics had better leg ulcer healing rates than clients who received usual community care (Moffatt et al., 1992). Evidence was required to determine if nurse lead clinics were appropriate in a Canadian context given differences in the population and context.

In this thesis, two assessment studies were conducted on a cohort of individuals with venous leg ulcers receiving community home care from one nursing agency for planning purposes. The Venous Leg Ulcer Study (VLU) (Chapter 2) identified the characteristics of the cohort receiving community leg ulcer care, from which a population profile was created. The venous leg ulcer population was a mainly elderly, complex group with multiple health problems.

The long ulcer duration and frequent episodes of recurrence confirm this population has high requirements for community care. Based on data from the VLU study, community clinic care could be a viable option as the majority are able to travel outside their home. However, the reliance on others for transportation and differences in the older, less mobile female population suggested that transportation issues needed to be resolved and that care in the home still needed to be an option. The family physicians are the main medical provider of care, but few see clients in sufficient numbers to gain the required care expertise in leg ulcer care. The majority had seen a specialist physician, but the mean time to see a specialist is 6.5 months and these clients have been receiving home care for their leg ulcer for a mean of 20 months (Chapter 3).

In the Practice Variation Study (PVS) (chapter 3), an appraisal of venous leg ulcer care provided to the same cohort as the VLU, determined incongruencies with 'best practice' as defined by the common recommendations from three international nursing best practice guidelines (Chapter 3). Of particular note was the gap in the provision of ABPI measurement and compression. Compression is the 'gold standard' treatment for venous leg ulcers, but not all clients were receiving this care. Despite the contraindication for the use of compression in the presence of arterial disease, not all cases were screened for arterial disease with an ABPI prior to the initiation of compression. A number of clinical and organizational factors were associated with inconsistencies in the provision of 'best practice'. The average number of different nurses visiting a client was 19. The lack of documented care (client education, pain assessment and managment), evaluation of care, or revisions to the care plan suggested that the number of different nurses affected accountability for care, and had implications for nusing education in leg ulcer care.

Based on data from the two research studies (chapter 2 and 3), this thesis argued that registered nurses need to be the provider of leg ulcer care. In the absence of evidence-based care, these clients had been treated as cases requiring simple dressings. The Regisitered Practical Nurse (RPN) provided care to 44 % of clients. Based on the CNO criteria for clients cared for by Registered Practical Nurses (RPN), leg uler clients were thought to be stable with predictable outcomes.(Chapter 3). The complexity of the group, and risks associated with inappropriate or incorrectly applied compression have implications that the care provider needs to have a high level of knowledge and skill in leg ulcer care. To achieve optimal outcomes, individuals with leg ulcers also require timely evidence-based interventions. Yet, family physicians lack confidence in their ability to care for individuals with leg ulcers (Graham & Harrision, 2000). Referrals to specialist physicians frequently take several months to acquire. From the UK clinic experience, nurses with appropriate training and skill are able to conduct client assessments including the ABPI measurement to determine the appropriateness of treatment with compression.

The data from several studies that included the population assessment (Chapter 2) and the appraisal of the community venous leg ulcer care (Chapter 3), provided information from which the new leg ulcer service was developed. In this service, nurses were placed at the forefront of care and charged with the responsibility of implementing evidence-based care. Several elements were determined as necessary components of the new service. To address the need for a standardized approach to care, a local interdisciplinary task force developed an evidence based leg ulcer protocol that provided up to date information on venous leg ulcer care. The protocol empowered nurses with decision-making authority, but to implement the protocol nurses needed to be equiped with the necessary education and skills. To acquire the necessary education and skills, a distance baccalaureate level leg ulcer course was organized for primary nurses in the

early phase of the planning. The dedicated leg ulcer team included an advanced practice nurse, primary and secondary nurses.The primary nurse completes the comprehensive assessment and establishes the plan of care based on the evidence-based protocol. Nurses refer clients to physician specialists according to the protocol criteria. The issues of lack of continuity of care, and accountability of care identified in the VLU study were addressed through the implementation of primary nursing. At the population health level, the APN is responsible for ensuring quality care to the leg ulcer population, employing the two primary roles of clinical nurse expert and manager to oversee the implementation and on-going operations of the nurse-lead community leg ulcer service. The conceptual framework of the Ottawa Model of Research Use (OMRU) helped to focus the APN's activities on a number of different levels to identify barriers and supports to the implementation of the evidence-based service.

Implications for Advanced Practice

Evidence-based planning of health care services in the current environment has been challenging. In my experience as a nurse manager, it was often difficult to move beyond the mindset of crisis management. The government under funding of home care has yielded an uncertain future for home care, nursing agencies, and clients. The community was facing a critical shortage of community nurses. This situation reversed to overstaffing and nurse lay-offs within a few weeks as the government's denial for additional home care funding lead to a drastic reduction in services. With the agency remuneration on per visit basis, there are demands on nurses to visit more clients in order to meet deficit budgets. As a result, care becomes task-focused. Nurses are afforded little time for health promotion or to encourage self-care practices that improve health.

Storr (1988) describes the advanced practice nurse as "a catalyst for broad system change, developing and exploring new challenges with a vision of the potential result."(p. 265). With my involvement in the leg ulcer project, I had the opportunity to see the fulfilment of a shared vision for improved community care to a population, while developing skill in the competencies of advanced practice. These competencies have been described as interdisplinary collaboration, research, clinical practice, education and leadership (CNA, 1999; Hamric & Spross, 1989; Patterson & Haddad, 1992). Change on the magnitude required for the new service required a large resource allocation that could not be achieved without the commitment from the various stakeholders and decision-makers. Interdisciplinary collaboration through the formation of strategic alliances was key to the success of this project. The research findings from the assessment studies provided the justification for developing the new leg ulcer service, instrumental to gaining the commitment of the interdisciplinary members and funding. Research guided the development of the new service. The evidence from the assessment studies had implications for the mode of delivery of the service, as well as for evidence-based care. An evidence-based protocol provided a standardized approach to care. Strategies were required to facilitate the adoption of the protocol. In order for nurses to implement the evidence-based protocol they needed to develop clinical expertise. Education was required to develop this expertise. Through leadership skills, all aspects of the project were coordinated, the process of change facilitated, and accountability for the implementation process accepted.

Evidence-based planning is needed to make the broad system changes required when planning services for any population. The current economic health care climate, provides the incentive for re-examining how community health care is delivered. The leg ulcer service presents a model of care delivery with the elements of evidence-based care, a dedicated team of

specially educated nurses, primary nursing, continuous quality improvement, and an advanced practice nurse. Further research is required to demonstrate the effectiveness on this model of care with other vulnerable populations.

References

Browne, G. B. (1999). Evidence that informs practice and policy: The role of strategic alliances at the municipal, provincial, and federal levels. Canadian Journal of Nursing Research, 31 (1), 79-94.

Canadian Nurses Association [CNA]. (1999). DRAFT Core competencies for nurses in advanced practice, Ottawa, Ontario: Author.

Hamric, A.B., & Spross, J. A. (1989). The clinical nurse specialist in theory and practice. Toronto: W. B. Saunders.

Moffatt, C., Franks, P., Oldroyd, M., Bosanquet, N., Brown, P., Greenhalgh, R. & McCollum, C. (1992) Community clinics for leg ulcers and impact on healing. British Medical Journal, 305, 1389-92.

Patterson, C., & Haddad, B. (1992). The advanced nurse practitioner: Common attributes. Canadian Journal of Nursing Administration, 5 (3), 18-22.

Storr, G. (1988). The clinical nurse specialist: From the outside looking in. Journal of Advanced Nursing, 13, 265-72.

Appendix D

Leg Ulcer Assessment Tool for the Ottawa-Carleton Regional Prevalence and Profile Study

Leg Ulcer Client Assessment Tool

General Demographic Data	
Client ID	Gender: ☐Male ☐Female Date of Birth:_____
Family Physician	Specialist/Consultant
Language most often spoken: ☐English ☐French ☐Other_____	
Living Arrangements - Lives: ☐ alone ☐With Spouse /family	
Living Accommodations ☐Apartment ☐House ☐Senior Citizen Residence ☐Long Term Facility	
Access to Transportation/Mobility Bed bound: ☐Yes ☐No House bound: ☐ Yes ☐ No Independently Mobile: ☐Yes ☐No⇨☐Chair bound ☐Requires physical aid(s) ☐Requires assistance from another person Travels Outside the House ☐Yes ☐No If yes, usually travels by : ☐Automobile ⇨ ☐Drives self ☐Family/friend drives ☐Autobus ⇨ ☐Close to bus line ☐Para transpo ☐Taxi ☐Walks	

Health History		
Smokes daily ☐Yes ☐No	☐Family History of Leg Ulcers	☐Rheumatoid Arthritis
☐Cardiac Disease	☐Varicose Veins	☐Osteoarthritis
☐Renal Disease	☐DVT	☐Articulation Impairment
☐Abdominal Surgery	☐Venous Surgery	☐Limb Trauma
☐Diabetes	☐Phlebitis	☐Taking Hydroxurea (hydria
☐COPD	☐Vascular Surgery to Lower Limbs	
☐Cerebral Vascular Disease	☐Intermittent Claudication	#Pregnancies_____
☐Hypertension	☐Peripheral Vascular Disease	

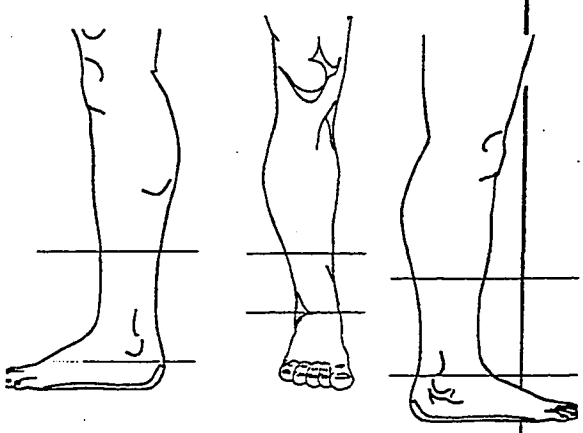
Previous Ulcer History	
Previous episodes of leg ulceration ☐Yes ☐No If yes, how many times?_____	At what age was the first occurrence of leg ulceration _____ years old
Limb Description (Right Leg)	**Limb Description (Left leg)**
Lower Leg Size & Shape Circumference: Ankle____cm Calf____cm ☐Normal ☐Muscle Wasting ☐Narrow ankle ☐Fixed Ankle Joint ☐Deformed foot ☐ Deformed toe(s) ☐Missing Toes- Specify_____	Lower Leg Size & Shape Circumference: Ankle____cm Calf____cm ☐Normal ☐Muscle Wasting ☐Narrow ankle ☐Fixed Ankle Joint ☐Deformed foot ☐ Deformed toe(s) ☐Missing Toes- Specify_____
Colour _____ ☐Normal ☐Pale ☐Purplish - Mottling of feet ☐Red when down ☐Brown/reddish brown staining	Colour _____ ☐Normal ☐Pale ☐Purplish - Mottling of feet ☐Red when down ☐Brown/reddish brown staining
Skin ____ *Appearance:* ☐Dry ☐Shiny ☐Flaky/Scaly ☐Hairless ☐Ankle flare ☐Varicose Veins ☐Eczema ⇨☐Acute (Vesicles, weepy) or ☐Chronic (dry, no vesicles) ☐Edema ⇨☐Pitting or ☐Non Pitting *Texture:* ☐Woody ☐Firm ☐Pliable *Temperature:* ☐Cold/Cool ☐Warm(Normal) ☐Hot	Skin ____ *Appearance:* ☐Dry ☐Shiny ☐Flaky/Scaly ☐Hairless ☐Ankle flare ☐Varicose Veins ☐Eczema ⇨☐Acute (Vesicles, weepy) or ☐Chronic (dry, no vesicles) ☐Edema ⇨☐Pitting or ☐Non Pitting *Texture:* ☐Woody ☐Firm ☐Pliable *Temperature:* ☐Cold/Cool ☐Warm(Normal) ☐Hot
Capillary Refilling Time _____ ☐Normal (10-15 seconds) ☐Moderate ischaemia (15-25 seconds) ☐Severe ischaemia (25-40 seconds) ☐Very severe ischaemia (>40 seconds)	Capillary Refilling Time _____ ☐Normal (10-15 seconds) ☐Moderate ischaemia (15-25 seconds) ☐Severe ischaemia (25-40 seconds) ☐Very severe ischaemia (>40 seconds)
Pulses DP: ☐Absent ☐Weak ☐Strong PT: ☐Absent ☐Weak ☐Strong	Pulses DP: ☐Absent ☐Weak ☐Strong PT: ☐Absent ☐Weak ☐Strong
Right: Brachial Systolic_____Ankle Pressure_____ ABI_____	Left: Brachial Systolic_____Ankle Pressure_____ ABI_____

Current Ulcer(s)

(Locate ulcer site by an X and number each leg ulcer on the diagram below)

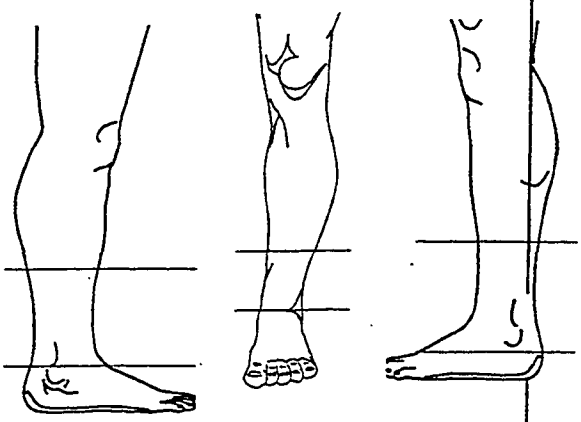
Right.

Medial Lateral



Left

Medial Lateral



Check off location of Ulcer:

☐Calf⇨☐Medial ☐Lateral ☐Anterior ☐Posterior

☐Ankle⇨

☐Medial ☐Lateral ☐Anterior ☐Posterior

☐Shin⇨ ☐Medial ☐Lateral ☐Anterior

☐Foot⇨☐Top ☐Bottom ☐Toes

Check off location of Ulcer:

☐Calf⇨☐Medial ☐Lateral ☐Anterior ☐Posterior

☐Ankle⇨

☐Medial ☐Lateral ☐Anterior ☐Posterior

☐Shin⇨ ☐Medial ☐Lateral ☐Anterior

☐Foot⇨☐Top ☐Bottom ☐Toes

Current Ulcer Description

Health Care provider for current ulcer: ☐GP ☐Dermatologist ☐Surgeon ☐Podiatrist ☐Nurse

Ulcer Number _____ Onset of Current Ulceration (Date)

Size: Length_____mm Width_____mm Depth _____mm ☐Tracking

Ulcer Base:☐Black ☐Yellow ☐Red Granulation: ☐Present ☐Absent

Skin Around Wound: ☐Normal ☐Dry ☐Macerated ☐Thick, calloused

Ulcer Margin:☐Well Defined, punched out appearance ☐Diffuse irregular ☐Cliff-like edges

Discharge

Amount: ☐ Minimal ☐Moderate ☐ Copious *Type:*☐Purulent ☐Serous ☐Serous Sanguinous Discharge

Colour ☐White ☐Yellow ☐Green

Current Treatment Frequency of Dressing Changes_____

Bandaging ☐None ☐Compression Stockings ☐Tensors ☐Zinc Oxide Boot ⇨☐Ictopaste or ☐Unnaboot

☐Two Layer Bandage (Surepress) ☐Four Layer Compression (Profore) Other _____

125

Ulcer Number _______ Onset of Current Ulceration (Date)

Size: Length_____mm Width______mm Depth ________mm

☐Tracking *Ulcer Base*: ☐Black ☐Yellow ☐Red Granulation: ☐Present ☐Absent

Skin Around Wound: ☐Normal ☐Dry ☐Macerated ☐Thick, calloused

Ulcer Margin: ☐Well Defined, punched out appearance ☐Diffuse irregular ☐Cliff-like edges

Discharge Amount : ☐ Minimal ☐Moderate ☐ Copious *Type*: ☐Purulent ☐Serous ☐Serous Sanguinous

Colour ☐White ☐Yellow ☐Green

Current Treatment Frequency of Dressing Changes____________

Bandaging ☐None ☐Compression Stockings ☐Tensors ☐Zinc Oxide Boot ⇨☐Ictopaste or ☐Unnaboot

☐Two Layer Bandage (Surepress) ☐Four Layer Compression (Profore) Other _________

Ulcer Number _______ Onset of Current Ulceration (Date)

Size: Length_____mm Width______mm Depth ________mm

☐Tracking *Ulcer Base*: ☐Black ☐Yellow ☐Red Granulation: ☐Present ☐Absent

Skin Around Wound: ☐Normal ☐Dry ☐Macerated ☐Thick, calloused

Ulcer Margin: ☐Well Defined, punched out appearance ☐Diffuse irregular ☐Cliff-like edges

Discharge Amount : ☐ Minimal ☐Moderate ☐ Copious *Type*: ☐Purulent ☐Serous ☐Serous Sanguinous

Colour ☐White ☐Yellow ☐Green

Current Treatment Frequency of Dressing Changes____________

Bandaging ☐None ☐Compression Stockings ☐Tensors ☐Zinc Oxide Boot ⇨☐Ictopaste or ☐Unnaboot

☐Two Layer Bandage (Surepress) ☐Four Layer Compression (Profore) Other _________

Ulcer Number _______ Onset of Current Ulceration (Date)

Size: Length_____mm Width______mm Depth ________mm

☐Tracking *Ulcer Base*: ☐Black ☐Yellow ☐Red Granulation: ☐Present ☐Absent

Skin Around Wound: ☐Normal ☐Dry ☐Macerated ☐Thick, calloused

Ulcer Margin: ☐Well Defined, punched out appearance ☐Diffuse irregular ☐Cliff-like edges

Discharge Amount : ☐ Minimal ☐Moderate ☐ Copious *Type*: ☐Purulent ☐Serous ☐Serous Sanguinous

Colour ☐White ☐Yellow ☐Green

Current Treatment Frequency of Dressing Changes____________

Bandaging ☐None ☐Compression Stockings ☐Tensors ☐Zinc Oxide Boot ⇨☐Ictopaste or ☐Unnaboot

☐Two Layer Bandage (Surepress) ☐Four Layer Compression (Profore) Other _________

Appendix E

Letters of Support

VON CANADA

Victorian Order of Nurses | Infirmières de l'Ordre de Victoria

OTTAWA-CARLETON BRANCH
SUCCURSALE D'OTTAWA-CARLETON

VON Canada 100 1897-1997

Caring for Life
Souci de la Vie

June 29, 2000

TO WHOM IT MAY CONCERN:

Re: Ms. Karen Lorimer

Ms. Karen Lorimer is a Masters Student at the University of Ottawa in the Nursing Graduate Program, and has requested permission from the VON to collect clinical data from client charts with the diagnosis of leg ulcers. These clients are, or have been, treated by nursing staff from the VON visiting nursing service.

Ms. Lorimer has permission to audit the charts of leg ulcer clients, recognizing that the confidentiality of the client must be maintained in the data collection analysis and results. The audit will investigate the current management of leg ulcer clients.

VON does not have an ethics committee, but I understand that the request to do a VON chart audit will be submitted to the ethics committee at the Ottawa Hospital. This would be included in Mrs. Lorimer's thesis proposal to conduct a secondary analysis on the data collected in the Regional Leg Ulcer study.

If there are any questions regarding her permission to access the client charts, please call me at 749-7557 ext 129.

Sincerely,

Susan VanDeVelde-Coke

Ms. Susan VanDeVelde-Coke
Executive Director

Centre St Laurent Shopping Centre
Box/C.P. 205
1200 St Laurent
Ottawa ON K1K 3B8
tel (613) 749-7557
fax (613) 749-4002

2000287-01H

Research, Health, Promise / Recherche, Santé, Espoir

LOEB HEALTH RESEARCH INSTITUTE
at the Ottawa Hospital
INSTITUT LOEB DE RECHERCHE EN SANTÉ
à l'Hôpital d'Ottawa

CLINICAL EPIDEMIOLOGY UNIT
UNITÉ D'ÉPIDÉMIOLOGIE CLINIQUE

Continuity of Care

Margaret B. Harrison RN, PhD
Ontario Ministry of Health
Career Scientist
Principal Investigator

Nurse Scientist
Department of Nursing
Ottawa Hospital

Adjunct Professor
Faculty of Health Sciences
School of Nursing

Faculty of Administration
MHA Program
University of Ottawa

Tel: (613) 798-5555 x.3028
Fax: (613) 761-5394
E-mail: mharrison@lri.ca
Website: www.lri.ca

Mailing Address:

Room 413, C-4 North
The Ottawa Hospital
Civic Campus
1053 Carling Avenue
Ottawa, ON, Canada
K1Y 4E9

Affiliated with the Ottawa Hospital

Affilié à l'Université d'Ottawa/
Affiliated with the University of Ottawa

June 15, 2000

Ottawa Hospital RECD JUL 04 2000 Research Ethics Board

Raphael Saginur, MD, Chairman
Research Ethics Committee
Loeb Health Research Institute

Re: REB Regional Leg Ulcer Approval 1999029-01H

Dear Dr. Saginur

Ottawa Carleton VON has requested that the Ottawa Hospital Ethics Board review this proposal for approval. Please find attached a letter and proposal from Karen Lorimer R.N., BScN., MScN candidate. Karen is a Clinical Manager at the Ottawa-Carleton VON and is working with Ian Graham and myself on the previously approved Regional Leg Ulcer project. I am supervising Karen's thesis work and her committee is comprised of Ian PhD., Barbara Davies Rn PhD and Elaine Friedberg RN, MHA.

The Regional study included home care, long term care, specialists clinics and self-referred clients. Karen's thesis work will focus on venous etiology (not mixed or arterial) and she will only be using the VON data only. Home care data for the project has been supplied from three home nursing agencies. Karen's work is contributory to planning at the Community Care Access Centre for a new nurse-led service for individuals with leg ulcers. Karen will be actively involved in that demonstration project as clinical manager of the service.

Specifically, the thesis methodology involves a secondary analysis of the regional data and a chart audit of the VON clients. I see no logistic problems with constructing a subset of VON data from our larger dataset for this purpose. Access for chart audit has received approval from the Executive Director of the VON (letter attached). To date the Regional study has been supported by the Ministry of Health, CCAC, and VON. I do not foresee and insurmountable financial implications to this graduate work that the existing study funding could not support.

Thank you of your consideration of the request. Please do not hesitate to contact me if further information or clarification is required about this thesis research, the supervisory committee, or other aspects.

Sincerely,

M. Harrison

Margaret B. Harrison, RN, PhD
Principal Investigator
Clinical Epidemiology Unit
Loeb Health Research Institute

37 Belmont Avenue
Ottawa, Ontario,
K1S 0T9

Dr. Margaret Harrison,
Nurse Researcher
Loeb Health Research Institute,
Clinical Epidemiology Unit,
The Ottawa Hospital

June 15, 2000

Dear Dr. Harrison,

I am writing to you, as the principal investigator on the Ottawa-Carleton Regional Leg Ulcer Project, to request you permission to conduct a secondary analysis on the data obtained in that study.

As a graduate student in the Master's in Nursing Program at the University of Ottawa, my thesis is on the topic of chronic venous leg ulcers. The questions addressed in this thesis are: 1) What is the best available evidence for the management of venous leg ulcers? 2) What is the profile of clients with venous leg ulcers? 3) What are the current care practices that clients with venous leg ulcers are receiving? 4) What are the factors that influence whether or not clients receive evidence-based practice?

The plan for the thesis involves two phases. Phase 1 of the thesis is an in depth profile of the client with a venous leg ulcer using the data collected as a part of the Regional Leg Ulcer Study. Phase 2 of the thesis is a practice audit, involving an audit of VON chart files. Ms. Susan VanDeVelde-Coke, the executive director at the VON, is aware of the thesis proposal and has given administrative approval. Attached please find a letter confirming her support. Sue has approved my access to the VON files for the purpose of this thesis.

Exploring these issues will assist me as a Nurse Manager to have a better understanding of the population who experience leg ulcers, as well as current community management of the problem of venous leg ulcers. This knowledge will serve to inform planning decisions to improve community care services to this population.

I look forward to your continued support in this endeavor,

Sincerely,

Karen Lorimer

Karen Lorimer, RN, MScN (candidate)

Appendix F

Research Ethics Approval

The Ottawa Hospital | L'Hôpital d'Ottawa

Research Ethics Board
Conseil d'éthique en recherches
761-4146 ~ 761-4902 ~ 761-5072
Fax No. ~ 761-4311

Tuesday, July 25, 2000

Ms. Karen Lorimer
37 Belmont Avenue
Ottawa, Ontario
K1S 0T9

Dear Ms. Lorimer:

Re: Protocol # 2000287-01H **Nurse's Use of Evidence-Based Decision-Making in the Management of Venous Leg Ulcers: A Thesis Proposal**

Protocol approval valid until - Tuesday, July 24, 2001

Thank you for your letter dated June 15, 2000. The principal investigator is Karen Lorimer, and Margaret Harrison is the Ottawa Hospital staff member responsible for the study. There is no intent in the study to contact patient subjects, and patient contact is not permitted as part of this study. Therefore, I am pleased to inform you that your study (listed above) was given expedited review by the Ottawa Hospital Research Ethics Board (OHREB) and is approved. No changes, amendments or addenda may be made in the protocol without the OHREB review and approval.

Approximately two months prior to the expiration date listed above, a single renewal form should be sent to the OHREB office.

The Tri-Council Policy Statement requires a greater involvement of the OHREB in studies over the course of their execution. You must inform the Board of adverse events encountered during the study, here or elsewhere, or of significant new information which becomes available after the Board review, either of which may impinge on the ethics of continuing the study. The OHREB will review the new information to determine if the protocol should be modified, discontinued, or should continue as originally approved.

Yours sincerely,

Raphael Saginur, M.D.
Chairman
Ottawa Hospital Research Ethics Board

Appendix G

GLOSSARY OF TERMS

Glossary of Terms

Ankle Brachial Index Pressure (ABPI)

The ABPI is a measurement that uses a portable Doppler ultrasound to screen for arterial disease. Pressure measurements are taken at the brachial pulse and at two pulse areas in the feet (usually the dorsalis pedis and posterior tibial). The ABPI is obtained by dividing the measured ankle pressure by the brachial pressure. In the absence of arterial disease, the systolic pressure should be equal or exceed that in the arm producing an ABPI of at least one. Arterial involvement is suggested by an ABPI of less than 0.8 mm Hg. A holistic assessment must also be conducted to assist in the correct interpretation of the ABPI.

Ankle Flare

The presence of small thread like venules particularly on the medial aspect of the ankle signifying valve incompetence of the perforator veins.

Atrophe Blanche

These are areas of white patches. They are avascular areas of scar tissue that are very susceptible to breakdown.

External Compression

External compression may be applied in the form of either bandages or stockings. Compression reverses venous hypertension and minimizes the skin and vascular changes by forcing fluid from the interstitial spaces back into the vascular and lymphatic compartments. Pressures of approximately 30-40 mm Hg are generally accepted as the required pressure for healing venous ulcers in a normal shaped leg. The high compression bandages currently in use in Ottawa Carleton are the Profore four layer compression bandage; and the Surpress two-layer

bandage. High compression is contradicted in the presence of arterial disease and in certain diseases such as congestive failure.

Although the bandaging systems are designed to delivery a designated sub-bandage pressure, the amount of pressure applied on a client will depend on the size and shape of the leg and the application technique. Clients with ankles less than 18 cm will receive higher pressure that could potentially cause tissue necrosis. Clients with legs larger than 25 cm will receive less than the 35 mm Hg recommended. Gaiter Region

This is the area of the lower limb over which venous ulceration frequently occurs. It extends circumferentially from the upper third of the calf down across the ankle joint and onto the dorsal foot and medial and lateral heel.

Gaiter Region

The gaiter region is defined as the area between the foot and upper calf; specifically 2.5 cm below malleoli to the point at which the calf muscles become prominent posteriorly.

Granulation tissue

Granulation tissue is healthy tissue described as appearing pale pink to beefy red and without the clinical signs of infection.

Hyperkeratosis

Eczema affects the epidermis and the superficial dermis in the early acute stages; edema collects in the lower epidermis and causes the keratinocytes to separate. This process is known as spongiosis. As the cells become pulled apart, intradermal vesicles develop. The presenting eczema is due to vasuclar dilation in the upper dermis and the accumulation of inflammatory cells. Later, following the acute stage, the epidermis thickens a process called acanthosis which,

in combination with the spongiosis, leads to hyperkeratosis where there is a thick collection of altered keratinocytes causing the scaly appearance seen in these patients.

Hyperpigmentation

The skin looks dry, scaly and discolored. These skin changes result from leakage of substances into the surrounding tissue. The brown discoloration is caused by the leakage of red cells which deposit their haem content.

Lipodermatosclerosis

This is due to the laying down (induration) of fibrous tissue in the gaiter region. The progressive development of fibrotic tissue can result in a limb that has the appearance of an inverted champagne bottle with gross narrowing of an ankle and wide edematous calf.

Venous eczema

Venous eczema is an itchy, red scaling or papulovesicular rash, occurring sub-acutely or chronically on the lower leg of someone with venous hypertension.