

CARDIFF UNIVERSITY
SCHOOL OF MEDICINE
DEPARTMENT OF SURGERY



**“The Impact of Two Types of Educational Intervention on
Clinical Practice in Venous Ulceration”**

By

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**This thesis is submitted in fulfilment of the requirements of the degree
of Doctor of Philosophy**

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GLOSSARY

- Control Group:** Comprised 20 randomly allocated District Nurses who attended the control educational intervention.
- CPV:** Clinical Practice Variation. The degree to which District Nurses varied their clinical practice in the assessment and treatment of venous leg ulcer wounds following attendance at either the experimental or control educational intervention. CPV was measured on a post-educational intervention T² basis only, adopting the CPVQ measurement instrument.
- CPVQ:** Clinical Practice Variation Questionnaire. A specifically constructed measurement instrument aimed at measuring the level at which District Nurses varied the way they assessed and treated venous leg ulcer wounds.
- District Nurses:** Sample of experimental and control group District Nurses who participated in this study from across the South Wales geography.
- DN:** District Nurse.
- EI:** Educational Interventions. Planned training events in which experimental and control group District Nurses participated. Experimental group District Nurses underwent an educational intervention based upon identified training needs and preferred learning styles. Control group District Nurses underwent an educational intervention that discounted identified training needs and preferred learning styles.
- Experimental Group:** Comprised 14 randomly allocated District Nurses who attended the experimental educational intervention.
- HRQoL:** Health-Related Quality of Life.
- IKT:** Identified Key Tasks, considered essential in the assessment and treatment of venous leg ulcers, as determined by a sample of expert nurses from across the U.K.

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ITN:	Identified Training Needs. Identified through the application of knowledge and skill-related measurement instruments. T ¹ RCNCE Examination Paper and OSCE measurement scores were adopted as the basis of ITN determination and experimental educational intervention design.
Expert Questionnaire:	Administered to expert nurses eminent in the field of wound management, intended to capture key tasks concerned with the assessment and treatment of venous leg ulcer wounds.
KST:	Knowledge and Skills Translator. A specifically constructed method designed to translate District Nurse knowledge and skill scores into identified training needs.
LSI:	Kolb's Learning Styles Inventory. A commercially available measurement instrument aimed at determining preferred learning styles of District Nurses.
MBI:	Maslach's Burnout Inventory. A commercially available measurement instrument aimed at measuring the degree of burnout in District Nurses.
OSCE:	Objective Structured Clinical Examination. A specifically constructed measurement instrument aimed at measuring District Nurse skills.
PDQ:	Previous Development Questionnaire. A specifically constructed measurement instrument aimed at measuring venous leg ulcer-related previous development for District Nurses.
PLS:	Preferred Learning Styles. The style in which people prefer to learn, categorised by, and determined by the commercially available Learning Styles Inventory measurement instrument.
QoL:	Quality of Life.
RCNCE Exam:	A measurement instrument obtained from the RCN Continuing Education Department aimed at measuring District Nurse venous leg ulcer knowledge.
VLU:	Venous Leg Ulcer.

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Abstract

This study aimed to establish the effect of two types of educational intervention on clinical practice involving 34 [experimental = 14, control = 20] District Nurses from communities across South Wales who were actively engaged in the assessment and treatment of venous leg ulcer wounds.

Experimental and control educational interventions were each designed around expert-ranked venous leg ulcer assessment and treatment key tasks. The experimental educational intervention incorporated added dimensions of identified training needs and preferred learning styles in the educational intervention following knowledge, skill and learning style assessments using valid and reliable measurement instruments.

Measurement instruments used were: Royal College of Nursing Continuing Education Examination; a specifically constructed Objective Structured Clinical Examination; and Kolb's Learning Styles Inventory.

Burnout and Previous Development as potential confounding variables were accounted for across each of the two groups using valid and reliable measurement instruments. Measurement Instruments used were: Maslach's Burnout Inventory; and a specifically constructed previous development questionnaire.

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Post-intervention District Nurse clinical practice variation levels were recorded over a six-month period using a specifically constructed clinical practice variation questionnaire.

Surprisingly, control group results demonstrated improved clinical practice levels of: being better informed about clinical subjects contained within the clinical practice variation questionnaire [+5.4%]; consciously changing the way clinical tasks were approached [+3.8%]; and changing practice by undertaking clinical tasks differently [+22.0%].

No statistical difference existed between experimental and control groups for categories of: being better informed about clinical subjects; and consciously changing the way clinical tasks were approached. However, statistical significance existed between experimental and control groups for the category of changing practice by undertaking clinical tasks differently.

The main conclusion to be drawn from this study was that the hypothetical proposal of this type of educational intervention demonstrating improved experimental group District Nurse clinical practice over control group District Nurse clinical practice was, at a statistical level, not supported. However, clinical practice variation questionnaire results demonstrated improved control group clinical practice over experimental group clinical practice and that in such unexpected circumstances, this phenomenon required further investigation.

Chapter 1: General Introduction

Broad and Newstrom [1992] drew attention to colossal expenditure concerned with human resource development. The authors stated that much of this investment is wasted because most knowledge and skills gained in training [well over 80% by some estimations] is not fully applied by employees in the work environment. For organisations to develop the highly skilled workforce needed, improving transfer of training to the work environment must be a top priority for professionals engaged in training and development.

Barriers concerned with transfer of knowledge gained in educational settings to clinical environments were identified by: Broad and Newstrom [1992]; Stocking [1992]; Rouiller and Goldstein [1993]; Allison [1995]; Moffatt and Dorman [1996]; Goodman [1998]; Royal College of Nursing [1998]; Corlett [2000]; Su *et al* [2000]; Chau *et al* [2001]; Clarke [2003]; Davis *et al* [2003]; Lauder *et al* [2004]; Bartfay *et al* [2004]; and Murphy *et al* [2004].

Against a background of rising U.K. healthcare expenditure [Department of Health, 2003], the strive for reduced morbidity [Murphy and Topel, 2003], improved patient quality of life [Callam *et al*, 1987; Bosanquet, 1992; Price and Harding, 1996; Anderson, 2003], benefits of applying evidence-based practice in the clinical environment [Davis *et al*, 1995; Baker and Kirk, 1996; Davis *et al*, 2003] and with evidence of barriers concerned with the transfer of knowledge gained in educational settings to the clinical environment, the potential for sustained interest in the effectiveness of educational interventions designed to improve health professional practice was evident.

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Simka and Majewski [2003] cite chronic venous insufficiency [CVI] to be associated with high healthcare costs, significant morbidity and reduced quality of life.

Laing [1992] described that chronic venous insufficiency arises from a variety of causes and that most frequently chronic venous insufficiency originates from incompetence of valves in the perforator veins [or from their congenital absence].

Skene *et al* [1992], in a study into the prognostic aspects of healing, drew attention to venous insufficiency concerned with superficial and deep venous ulceration.

Laing [1992] further described the end result of chronic venous insufficiency for a small but significant proportion of the population to be venous ulceration of the legs.

Valuable research-based efforts have been made to establish the most effective methods of assessing and treating venous leg ulcers [Cullum *et al*, 2002]. Less is known about the design of educational interventions intended to impact upon venous leg ulcer clinical practice.

This study hypothesised that a structured educational intervention, designed around evidence-based educational principles, would positively impact upon

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clinical practice for District Nurses engaged in the assessment and treatment of venous ulceration.

Specifically, this study aimed to investigate the effect of two types of venous leg ulcer educational intervention on clinical practice involving 34 [experimental = 14, control = 20] District Nurses from communities across South Wales who were actively engaged in the assessment and treatment of venous leg ulcers.

The experimental educational intervention aimed to investigate the degree of District Nurse clinical practice variation following administration of an intensive study programme designed to take account of District Nurse identified training needs and preferred learning styles in this study.

The control educational intervention aimed to investigate the degree of District Nurse clinical practice variation following administration of an intensive study programme designed to discount District Nurse identified training needs and preferred learning styles in this study.

Chapter 2 describes the literature search concerned with: determining whether the epidemiological consequences of venous ulceration were of a magnitude to justify research into the impact of venous leg ulcer educational interventions; establishing the predominant U.K. profession engaged in assessing and treating venous leg ulcers; identifying evidence of limited clinical practice ability within the predominant profession; identifying evidence-

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based educational principles reported to be effective in the design of educational interventions; evaluating studies relevant to educational interventions designed to improve venous leg ulcer clinical practice and the degree to which studies identified were based upon evidence-based educational principles; and concluding with study rationale.

Chapter 3 describes methods associated with study design, including: description of primary and secondary research objectives; study sample; measurement instruments used to investigate primary and secondary research objectives; procedure; ethical approval; the piloting of study design and the measurement instruments used; and data analysis.

Chapter 4 records results against primary and secondary research objectives.

Chapter 5 provides for discussion of this study's findings and details research limitations, suggestions for future research, recommendations and conclusions resulting from research investigations.

Chapter 2: Review of the Literature

2.1 Literature Search Strategy

An initial literature search strategy was undertaken to: identify the aetiology and epidemiology of venous ulceration and its impact upon society generally; establish the predominant U.K. profession by which venous leg ulcers are usually treated; identify any limitations in professional ability to practice; determine educational principles in educational intervention design; and determine the existence of venous leg ulcer-related educational interventions reported to influence clinical practice.

Six principal bibliographic databases were searched: CINAHL [1982 to 2005]; EMBASE [1974 to 2005]; MEDLINE [1966 to 2005]; PsycINFO [1987 to 2005]; the Cochrane Library; and the Cardiff University Information Services database, as well as manual searches of selected conference proceedings, wound care journals and reference books.

The literature search was confined to the use of the English language.

Relevant search terms used for each subject area are detailed in respective Sub Sections.

Titles and abstracts of articles were identified and reviewed. Articles relevant to the search were furthermore obtained and examined.

2.2 Aetiology and Epidemiology of Venous Ulceration

To identify literature concerned with the aetiology and epidemiology of venous ulceration, the search terms: venous leg ulcers; aetiology; epidemiology; statistics; prevalence; incidence; health economics; financial costs; social costs; cost-effectiveness; social dimensions; and quality of life were used.

The literature search produced a total of 545 studies. Four hundred and eighty-one studies identified were excluded due to them bearing no direct relevance to this study. Sixty-four of the studies identified were considered pertinent to this study due to each of the 64 studies reporting upon issues concerned with the aetiology and epidemiology of venous ulceration.

This Sub Section reports on each of the 64 studies within categories of: aetiology of ulceration; venous leg ulcer occurrence rates; age distribution; sex distribution; race distribution; social class distribution; quality of life; and cost of venous ulceration.

Aetiology of Ulceration

Moffatt and Harper [1997] described that venous ulceration results from chronic venous hypertension. The factors that contribute to venous hypertension are damage to the valves in the vein with resultant venous reflux and reflux resulting in high pressure in the dermal capillary bed and damage to the microcirculation.

In contrast, arterial ulceration results from atherosclerosis and peripheral vascular disease. As people get older, fatty material is deposited on arterial

walls. This process, which begins in early life and leads to the narrowing of the lumen of the artery, is called atherosclerosis. Atherosclerosis is the most common cause of arterial ulceration owing to ischaemia and necrosis caused by reduced blood supply.

The symptoms and degree of ulceration depend on the degree of blockage and site of occlusion. Patients may frequently experience intermittent claudication as diseased vessels fail to dilate sufficiently to cope with the demand for more oxygen.

The authors highlighted the importance of understanding the origins of ulceration. They described venous ulceration as the most common origin, with less common origins such as malignancy. Between the two are the mixed aetiologies, which are complex and make decision-making very difficult when deciding how to provide treatment.

Cornwall *et al* [1986], in a comprehensive study into the aetiological and epidemiological aspects of leg ulceration in one Regional Health District with a population of 198,900, identified that concurrent arterial disease presented in five per cent of patients aged over seventy-five years.

The authors described how it is this group who have the highest level of mixed aetiology, though appear to have least access to specialised diagnosis and treatment.

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Franks *et al* [1997] cite Callam *et al* [1985], who in the Lothian and Forth Valley study, found that out of 827 ulcerated legs, 92 [11.12%] were of mixed aetiology; and Alan *et al* [1993] who found that 16% of clients who attended a nurse led ulcer clinic had ulcers of mixed aetiology.

Furthermore, the authors noted that approximately seventy per cent of ulcers of the leg are caused by venous disease, with nearly thirty per cent of ulcers having an arterial component.

Venous Leg Ulcer Occurrence Rates

Dale *et al* [1983], in a postal survey into chronic leg ulcer prevalence carried out on patients aged >65 in a single group practice in a Scottish community, concluded that chronic leg ulceration occurs in 8 per 1000 of the total population, 10 per 1000 of the adult population, and 36 per 1000 of individuals over 65.

The authors stated that for practical reasons it was decided to exclude the most elderly patients from the sampling process in this study. This broad assumption by the researchers was made on the unconfirmed basis that many of the most elderly patients were likely to have died or to have moved house.

The study by Dale *et al* [1983] relied upon a self-reporting method by postal questionnaire respondents to two questions concerned with the presence of leg ulcers at the time of the study or previous to the study. No clinical validation of leg ulcer prevalence was reported in this study.

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Whilst Dale *et al* [1983] provided valuable insight into chronic leg ulcer prevalence in patients aged >65 in a single group practice in a Scottish community, broad assumptions concerned with the study population and lack of clinical validation required that the results of this study be treated with caution.

Callam *et al* [1985], in a comprehensive study aimed at identifying patients receiving treatment for chronic leg ulceration in the neighbouring health board areas of Lothian and Forth Valley, identified 1477 patients in a population of one million [0.15%] who were found to be experiencing leg ulceration.

Prevalence rates were non-static due to re-ulceration, with little known of the true incidence of re-ulceration. The authors claimed, however, that in this study, two-thirds of patients experienced more than one episode of ulceration.

To identify patients receiving treatment in the community, recording forms were sent to all general practitioners, district and occupational nurses, and wardens of old peoples homes.

To identify patients receiving outpatient or inpatient care, recording forms were sent to outpatient departments, physiotherapy departments, and inpatient wards of general hospitals and all acute and long stay hospitals.

In each case the correspondent was asked to identify all the patients currently undergoing treatment for active chronic leg ulceration or who had received

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treatment within three months. Resulting returns were crosschecked to ensure that patients reported from more than one source were included only once in the final total.

Of the 572 general practitioners approached, only 37 refused to cooperate with the study. Complete returns were obtained from all other correspondent groups.

The authors discussed the difficulty in seeking to quantify the demand that the care of leg ulcers places on the health service. The first obstacle was that care is provided by many different specialties and in almost every part of the health service. Patients seen periodically in outpatient departments were often cared for by the District Nurse between appointments. Patients also moved from one source of care to another during the survey.

A paucity of available data concerned with re-ulceration, identified by Callam *et al* [1985] potentially limited health policy makers' and health professionals' understanding of the need to focus upon maintaining healed ulcers and to maximise upon recurrence prevention.

Cornwall *et al* [1986], in a study in one Regional Health District with a population of 198,900, identified that 357 patients presented with 424 ulcerated legs, an overall prevalence of 0.18%. This study circulated a proforma concerned with social, clinical and management aspects of the leg

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to all general practitioners, wards, nursing homes, old people's homes and residential homes within the District.

The authors reported how the frequent lack of any clinical assessment of patients with limb ulceration in the community had led to long periods of ineffective and often inappropriate treatment. This not only applied in terms of compression and the inappropriate application of topical agents, but also in the delay in instituting potentially pain relieving limb salvage procedures.

Whilst this study was comprehensive in its coverage, leg ulcer prevalence related to the population that had presented for treatment. The population of leg-ulcer patients who may not have presented for treatment, or who received treatment elsewhere, potentially suggested that prevalence rates were even higher than those reported in this study.

Bosanquet [1992] cites studies concerned with leg ulcer prevalence using case ascertainment methods by professional nurses. One study in Harrow, with a population of 200,000, produced 357 patients with leg ulceration. A study in Norwich in 1990 showed 481 leg ulcer patients in a population of 470,000.

These studies suggested a population prevalence of 1.8/1000 [.002%] and 1.0/1000 [.001%] respectively, with between 75,000 and 90,000 patients estimated to receive treatment in Great Britain at any one time.

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Callam [1992] drew distinction between 'point' prevalence [the number of patients with a condition at one point in time] and 'period' prevalence [the number of patients presenting with the condition over a period of time]. He suggested that where leg ulceration is concerned, which is both chronic and recurrent, there is likely to be considerable difference between point and period prevalence.

The author argued that point-prevalence most accurately reflects demand upon health resources, point-prevalence indicating how many people require treatment at one point in time.

The author concluded that active chronic leg ulceration has a point-prevalence of 0.1% to 0.2% of the adult population, approximately 1% of the population suffering from leg ulceration at some point in time.

Lees and Lambert [1992] undertook a caseload survey of 70 District Nurses [$n=59$] in the Newcastle Health District to estimate lower limb ulceration prevalence.

Prevalence was 1.9% per 1000 in patients over the age of 45 years. Recurrent ulcers represented 47% of the total. Fifty per cent of all ulcers had been present for >6 months.

Moffatt and Oldroyd [1994] inferred a potential to underestimate prevalence of venous ulceration within society. The authors found that in a study conducted

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within the Riverside Health District of London, a further 25% of patients were identified who were not receiving either medical or nursing interventions who self-referred when a new system of care was introduced throughout the District.

The impact of healthcare systems design upon unmet need in the community, identified by Moffatt and Oldroyd [1994], suggested a need for health policy makers and health commissioners to consider more effective methods of healthcare delivery concerned with venous ulceration.

Furthermore, the impact of healthcare systems design upon unmet need in the community suggested a need for health educators to promote critical evaluation of healthcare systems design in educational programmes concerned with venous ulceration.

Phillips *et al* [1994] suggested that leg ulceration affects probably 2.5 million people in the USA.

Johnson [1995], in a cross-sectional study of non-institutionalised older people living in a major Australian City [$n = 1050$], estimated that prevalence of chronic leg ulceration was compatible with estimates of 1% in the over-60 age group found in Swedish and Northern American States.

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Moffatt and Dorman [1995], in a study that compared the rate of leg ulcer recurrence using two types of compression stocking, stated that leg ulceration remains the most common tissue-viability problem.

Moffatt and Oldroyd [1994] estimated that leg ulceration affects 100,000 patients in the U.K.,

The authors suggested that the high prevalence of ulceration, compared to its incidence, is a reflection of the slow healing of these ulcers, with studies showing 30% of patients with an ulcer history dating back at least ten years.

Nelzen [1995] surveyed 12,000 randomly selected inhabitants, aged 50-89 years in two defined regions of Sweden. Overall response rate was 91%. Open ulcers were reported by 306 [.026%] subjects and 143 [47%] agreed to be examined. The authors reported that the false positive response rate of ulceration was high [43%].

Moffatt and Dorman [1996] described leg ulceration as typical of one of many chronic community conditions.

Moffatt and Harper [1997] drew distinction between prevalence and incidence of leg ulceration. The authors defined prevalence of leg ulceration as the total number of cases identified at any given point in time, and incidence of leg ulceration as the number of new cases that develop over a given time span.

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Benefit in establishing prevalence and incidence rates were reported, which included: planning for the efficient use of available resources; estimating resource requirements for the future; identifying changes in the pattern of the disease; and identifying risk factors to aid preventive measures and targeting particularly vulnerable groups.

Fletcher [2001] described the optimum method of data collection as to estimate prevalence of leg ulcers from a random or total sample of the at risk population using a standardised clinical examination, the disadvantages of this approach being that very large surveys are needed for conditions with a relatively low prevalence.

Fowkes *et al* [2001] suggested venous leg ulceration to occur commonly in the general population of Western Countries.

Cullum *et al* [2002] and Ruckley [1997] estimated one per cent of people in industrialised countries suffer from a venous leg ulcer at some time during their lives.

Poore *et al* [2002] stated that following healing, there remains the challenge to maintain healed ulcers and prevent recurrence. A programme of recurrence prevention should be an integral part of ongoing care.

Anand *et al* [2003] cite Morrison *et al* [1998], who described that venous ulceration is estimated to affect between 80,000-100,000 of the U.K.

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population at any one time, whereby a further 400,000 patients experience recurrence.

Graham *et al* [2003] undertook a systematic review of the literature to identify reported levels of leg ulcer prevalence. Twenty-two prevalence studies were identified.

This systematic review identified that: eight population-based prevalence studies used clinical validation for reported prevalence rates of active ulcers, which ranged from 0.12% to 1.1% of the population; the prevalence rate of open and healed leg ulcer wounds was reported to be 1.8%; seven population-based studies without clinical validation reported prevalence rates of open ulcers ranging from 0.12% to 0.32% of the population; and in most studies that considered age and sex, the prevalence of ulcers increased with age and was higher for women.

This systematic review concluded that: differences in populations studied; study design; ulcer definition; ulcer aetiology; inclusion of foot ulcers; methods of clinical assessment; and clinical validation of ulcer cases, indicate that it is inappropriate to pool estimates of prevalence in this condition.

Furthermore, this systematic review concluded that: better-quality prevalence studies are needed; studies should clearly define the populations being studied; studies should be inclusive of large numbers of individuals and total populations; clear ulcer definitions should be provided; case identification

procedures should be described; and clinical validation of ulcers should feature.

Moffatt *et al* [2004] described that current prevalence estimates of chronic leg ulceration are frequently based on studies from the 1980's. In this study the authors aimed to determine the prevalence and cause of leg ulceration in a defined geographical population following eight years of providing standardised evidence-based protocols of care.

Patients with leg ulceration of > 4 weeks duration within an integrated acute and community leg ulcer service were identified, interviewed and clinically assessed, using a standardised questionnaire on medical history, ulcer details and non-invasive vascular investigation to describe causes of leg ulceration.

One hundred and thirteen patients in a population of 252,000 were identified, giving a crude prevalence of 0.45/1000. Prevalence of chronic leg ulceration was approximately one-third of that predicted by previous studies using similar methodologies in the 1980's.

The authors described, however, that the results of this study might not be representative of the pattern of ulceration in developed countries, particularly in areas where there has been less investment in service development.

Following the 2001 National Demographic Census, the Office of National Statistics [ONS][2003] estimated the U.K. population to be 59.2 million in 2002.

Based upon Bosanquet [1992] and Moffatt and Dorman [1995] estimations, between 75,000 to 100,000 of the U.K. population experience significant morbidity resulting from venous ulceration.

Age Distribution

Callam *et al* [1985], in the Lothian and Forth Valley Leg Ulcer Study, found that over one-third of those who developed a leg ulcer did so before the age of 50 and two-thirds before the age of 65, and that the median age of women was 74 and men 67.

Cornwall *et al* [1986] reported a marked increase in venous leg ulcer prevalence in the over 65's.

Callam [1988] and Callam [1992] concluded that the weight of evidence would suggest ulceration is age-related and is particularly marked in later life.

Flett *et al* [1994] studied the perceived health of a group of elderly people with chronic leg ulceration, compared with health perceptions of a matched group of controls. The perceived psychological well-being, self-esteem, life satisfaction, and social support of the two groups were also compared.

People with leg ulceration described significantly more problems with activity and mobility, pain and health worries and concerns than the control group. The leg ulcer group reported significantly lower levels of self-esteem and higher levels of negative effect.

Moffatt and Harper [1997] cite Rose [1993] who described that demographic changes suggest a dramatic increase in venous ulceration in the very elderly, with obvious health economic implications resulting.

With Callam *et al* [1985]; Cornwall *et al* [1986]; Callam [1988]; Callam [1992] and Moffatt and Harper [1997] pointing to venous ulceration prevalence as increasing with age, combined with a predicted growth in the elderly population [ONS, 2003], the possibility of increased venous leg ulcer prevalence was evident.

Sex Distribution

Callam *et al* [1985] reported that where leg ulceration is concerned, women outnumbered men by a rate of 2.8:1.

Cornwall *et al* [1986] reported that sixty nine per cent of the population with leg ulceration studied were women.

Callam [1988] concluded that the weight of evidence would suggest ulceration is more common in women, with most studies reporting a ratio of between 1:1.5 and 1:2.5.

Anand *et al* [2003] cite Bale *et al* [1997], who described that venous ulceration increases with age from 10 per 1000 within the adult population [<65 years] to 36 per 1000 in the age range 65+, the condition being predominant in women.

Moffatt and Harper [1997] stated that reasons for gender difference are unclear, although it is suggested that reasons for gender difference relate to high risk of Deep Vein Thrombosis [DVT] and varicose veins during pregnancy, plus increased longevity.

Race Distribution

Franks *et al* [1997] stated little is known of the influence that race has on the development of leg ulceration, with most studies performed in almost exclusively Caucasian populations.

This study requested health care professionals to give details of age, sex and ethnic background of all patients who attended for treatment of leg ulceration over a one-year period in an area of West London serving a population of 275,000, of whom 53,000 had an ethnic background from the Indian Sub Continent.

In all, 280 patients were identified, of whom 264 [94%] had details of age and sex. There was a significantly higher proportion of Caucasians suffering from leg ulceration than South Asians. The expected frequency of South Asian patients should have been 23, based on rates from the Caucasian population, of which thirteen would be women and ten men. Only five South Asian men were identified and no Asian women were identified with leg ulceration.

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Reasons for this were considered to be two-fold. Either there was a real difference between the Caucasian and South Asian populations, or South Asian patients were not presenting for treatment. Further work was deemed necessary to determine whether this was an effect of low prevalence, or unmet need in the community.

Social Class Distribution

Callam *et al* [1988], in a study conducted in the Lothian and Forth Valley region of South East Scotland, considered prevalence of chronic leg ulceration according to the Registrar General's socio-economic classification, mobility and employment. Six hundred patients with chronic leg ulceration were assessed.

The authors concluded that there was no evidence of increased incidence of chronic leg ulceration in the more disadvantaged socio-economic groups, but when leg ulceration occurs, it is more likely to be recurrent and to take longer to heal.

Franks *et al* [1994] studied the impact of socio-economic factors upon healing in patients with venous ulceration. Patients were interviewed at their first visit to a community ulcer clinic. Treatment was commenced using high compression bandaging in patients with an ABPI of > 0.8 and patients were re-interviewed after twelve weeks of treatment.

Of 168 patients with venous ulceration, 87 [52%] healed after twelve weeks of treatment. Univariate analysis revealed that low social class, lack of central

heating, less frequent contact with family and friends, and poor mobility were all significantly associated with prolonged healing.

Moffatt and Franks [1994] suggested there is a strongly held view within nursing that in the lower class group, there are those who are resistant to healing, either for social reasons, or because of deep beliefs about the reason for the ulcer, but so far this is based on anecdotal evidence alone.

Moffatt and Harper [1997] pointed to the danger in treating variables too simplistically. For example, the study by Franks *et al* [1994] drew subjects from an inner city area where the quality of heating in private accommodation was poor in relation to that found in council housing.

The authors cite a case control study by Fowkes and Callam [1994], which provided some indication of connection between social class and leg ulceration.

The case control group [those matched for age and sex, without ulceration] contained more subjects in the higher social class groups one and two, than the group of patients with ulceration [who were predominantly in the lower social classes].

Quality of Life

Charmaz [1983] described that physical pain, psychological distress and the deleterious effects of medical procedures all cause the chronically ill to suffer as they experience their illness.

With regard to the social consequences of venous ulceration as one chronic condition within society, Callam *et al* [1987] reported venous leg ulceration to pose a significant burden upon people.

Callam *et al* [1988] described the effects of leg ulceration upon mobility and employment to be unclear. The authors estimated, however, that leg ulceration affected the earning capacity of forty per cent of this patient population. The authors further estimated that forty two per cent of this patient population had moderate or severe limitation with regard to leisure activities.

The impact of collateral health and socio-economic conditions upon earning capacity and leisure activities for patients with leg ulceration were, however, not well defined.

Franks *et al* [1994] stated that quality of life studies are now being incorporated into the evaluation of new treatments. The authors cite the Riverside study as one study which demonstrated an improvement in patient quality of life following effective treatment.

Patients were interviewed using a standard questionnaire and then re-interviewed after twelve weeks of four-layer compression bandaging in order to observe changes.

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Treatment over the twelve-week period resulted in a mean reduction in anxiety, depression, hostility and cognition. Pain significantly improved following treatment.

The authors concluded that there were clear improvements in patient quality of life following twelve weeks treatment in a community leg ulcer clinic. The authors further concluded that systems of care that offer rapid healing and improve patients' well-being must be considered when planning an effective leg ulcer service.

Phillips *et al* [1994] assessed the financial, social and psychological implications of leg ulcers, data being collected by standardised personal interviews with seventy-three patients with chronic leg ulceration in the City of Boston, USA.

The authors found that a significant number of patients had moderate to severe symptoms, principally pain. Eighty-one per cent believed their mobility was adversely affected. The dominant predictor of impaired mobility was swelling of the leg. For younger working patients, leg ulceration was correlated with time lost from work, job loss and adverse effects on finances. Fifty-eight per cent of patients found caring for the leg ulcer burdensome.

There was a strong correlation between time spent on ulcer care and feelings of anger and resentment. Sixty-eight per cent reported that the ulcer had a negative emotional impact on their lives, including feelings of fear, social

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isolation, anger, depression and negative self-image. The authors concluded that leg ulcers pose a substantial threat to a variety of dimensions of a patient's quality of life.

Moffatt and Harper [1997] cite Callam *et al* [1988], who found that leg ulceration affected the earning capacity of forty per cent of those who were still working, whereby twenty one per cent had moderate to severe limitations of work owing to long periods of sickness, and in five per cent of cases, this led to loss of employment.

The authors made reference to direct personal financial implications resulting from leg ulceration. For example, the application of a multi-layer compression bandage might require alternative clothing and footwear, and that prescription costs may be very high.

Price and Harding [1996] described that health professionals generally pay lip service to quality of life-related measures.

The authors described, however, that various methods had been developed to measure the impact of a variety of clinical conditions, including that of venous ulceration, upon patient quality of life.

A major decision to make is whether to use a generic or disease-specific tool. Generic tools cover a wide range of dimensions in one single test. Examples include the Nottingham Health Profile and the SF-36 Health Survey.

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Disease-specific tools include only relevant dimensions for a particular disorder. Disease-specific measurement scales have been designed for a variety of disorders.

Price [1996] reported on a consensus meeting of the European Tissue Repair Society, whereby fifty-four delegates interested in the quality of life of patients with chronic wounds agreed that quality of life assessment is a priority, with several available generic measures available for use with different patient groups. The author reported that the 'generic' SF-36 was favourite amongst delegates, despite its ongoing translation into mainland European languages.

Price and Harding [1996] conducted a study to identify the usefulness of the SF-36 questionnaire to measure the quality of life of sixty-three patients suffering from venous leg ulceration who attended a specialist wound healing clinic.

Results from this study suggested that when describing the functional status and well being of the patients, the SF-36 questionnaire served its purpose. The authors stressed the need, however, for a disease-specific questionnaire to further the research by comparing the SF-36 with a condition-specific tool.

Reid [1996] reported that mobility, pain, social isolation, health worries and mood problems were concerns consistently raised by old people in health research and that other issues reported in leg ulcer studies include: sleep

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disturbance; lack of confidence in the professional providing care; low self-esteem; and feelings of anger, resentment and loss of control.

The author concluded that the measurement of quality of life in older people with leg ulceration should be sensitive to these concerns.

Ruckley [1997] cited quality of life studies associated with venous leg ulcer prevalence, describing venous ulceration to be characterised by chronicity and relapse, causing major disability and social impairment.

Franks and Moffatt [1998] studied health-related quality of life in patients with leg ulceration aimed at determining patient groups mostly affected by this condition. This cross-sectional study used the Nottingham Health Profile and age/sex matched normal scores in patients entering six clinical audit cycles.

The 758 patients included in the study had been affected by leg ulceration for a median of 10.5 months. Patients produced significantly higher scores than age/sex-matched normal values for all domains of the Nottingham Health Profile, indicating poorer health-related quality of life.

Increased age led to greater deficits in energy and mobility, with greater social isolation. Women experienced poorer energy, sleep patterns, mobility and emotional reactions, and increased physical pain and social isolation compared to men. The authors reported, however, that it was younger patients who experienced a greater deficit in health-related quality of life over

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domains of the Nottingham Health Profile, with men scoring higher than women in the domains of bodily pain, sleep, social isolation and energy.

The authors concluded that leg ulceration has a major impact on patients' quality of life as detected by the Nottingham Health Profile. The excess in scores compared with age/sex-matched normal values indicated that it is younger male patients in whom ulceration makes a greater impact on health-related quality of life.

Krasner [1998] in a study aimed at describing, understanding and interpreting the experience of living with painful venous ulcers, concluded that four out of the eight most compelling themes that relate to quality of life were: feelings of frustration; interference with the job; making significant life changes; and finding satisfaction in new activities.

The author concluded that increased sensitivity to and understanding of the impact of painful venous ulcers on quality of life might lead to more effective intervention strategies and improved outcome for patients.

Lindholm *et al* [1998] reported on the use of the short version of the Nottingham Health Profile on 125 patients [74 females and 51 males] who were suffering from venous ulceration. They reported that males generally scored worse.

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Price [1998] in a paper focused on health-related quality of life and activities of daily living cite Phillips *et al* [1994], whereby sixty-two patients reported that pain and impact on mobility were aspects of living with a chronic wound that they found most difficult, with younger patients reporting concern over the financial impact of living with a chronic wound.

Hyde *et al* [1999] in a study conducted in Sydney, sought to gain insight into the lives of older women, to focus on the experience of living with ulcers. Twelve women of >70 years who had experienced leg ulceration for three years or more were interviewed. The findings of this research showed that elderly women who live with leg ulcers experience multiple consequences.

Price and Harding [2000] reported on a study involving 17 patients [10 female] with acute wounds [pilonidal sinus] and 32 patients [19 female] with chronic wounds [venous leg ulcers] who attended a specialist wound clinic. Attendees at the clinic completed a condition-specific health-related quality of life tool on two occasions, five to seven days apart.

The ratings for the two groups were statistically different for two sub-scales, with those with acute wounds rating themselves more positively.

There were no differences between the groups for overall health-related quality of life, though there was a trend for those with chronic wounds to rate their overall health-related quality of life as higher than those with acute wounds, possibly indicating adoption to their health status.

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Smith *et al* [2000] validated a newly designed disease-specific questionnaire called the Charing Cross Venous Leg Ulcer Questionnaire. The study was conducted on 98 venous leg ulcer patients [50 female, 48 male] who completed both the SF-36 questionnaire and the new tool. The new tool was assessed for its validity, reliability and responsiveness.

The new ulcer-specific questionnaire showed a highly significant negative correlation in all eight domains of the SF-36. The correlations were negative because the ulcer-specific tool measured one hundred as the worst possible situation, whilst the SF-36 measured one hundred as the best possible health.

The authors claimed that the high correlation of venous ulcer-specific questionnaire scores with all eight domains of SF-36 was because the ulcer questionnaire was picking up the adverse effects of venous ulceration. The responsiveness of the tool was shown by a significant reduction in the scores of ulcer questionnaires whose venous ulcers had healed.

The conclusions drawn were that generic measurement tools are more detailed in their coverage on quality of life and have broad application on different outcomes and treatments. In contrast, disease-specific questionnaires are used to measure the impact of certain diseases on patients' health.

The authors concluded that the most difficult task is to select a suitable questionnaire that will already have shown to possess an acceptable level of

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validity, reliability and responsiveness, and that discusses the problems experienced by venous-ulcerated patients.

Douglas [2001] sought to identify patient need and help healthcare professionals to understand the effects of chronic leg ulceration from a patient's perspective. Results were that five major categories were developed relating to: physical experience; loss of control; vision for the future; carers' perspective; and health professional and patient relationships.

The author concluded that although the physical and psychological effects of leg ulceration featured prominently in this study, these were heavily influenced by the relationships between the patient and the health care professional.

Participants and carers often referred to the apparent lack of understanding from practitioners and the public about leg ulcer management. This led to several participants seeking alternative treatments, which created issues surrounding adherence.

Franks and Moffatt [2001] identified that the Nottingham Health Profile had been used in several studies of patients being treated for chronic venous ulceration, though with a paucity of information on the validity of the Nottingham Health Profile in this patient group. This study was carried out to determine validity and to compare and contrast the results with a previous study that had used the SF-36 in this patient group.

This study concluded that the Nottingham Health Profile has limitations in terms of a large floor effect [best possible health], but has similar internal consistency to the SF-36 in patients with leg ulceration. However, unlike the SF-36, the Nottingham Health Profile was sensitive to change in the patient's ulcer status, and should therefore be considered in studies of venous leg ulcer healing.

Lindsay [2001], in a study concerned with the social dimensions of leg ulcer management, cites social isolation, pain, and odour to be associated with leg ulceration.

Zschocke *et al* [2002], in a study concerned with quality of life at different stages of chronic venous insufficiency, cite chronic venous insufficiency to severely impair patient quality of life, causing negative social as well as economic effects.

Charles [2002] emphasised feelings of helplessness and severity of pain experienced by patients with leg ulceration.

Anand *et al* [2003] aimed to: explore the concept of quality of life; evaluate measurement tools used to assess individuals' views on treatment; review studies conducted in this area; and identify a relevant questionnaire from the published literature to assess perspectives of patients suffering from venous ulceration while participating in clinical trials evaluating the performance of medical devices.

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The authors described that many experts in this field report that quality of life is a multi-dimensional construct that covers issues relating to general health, physical functioning, physical symptoms, toxic effects, sleep, emotional functioning, social, sexual and occupational functioning.

Simka and Majewski [2003], in a similar vein to Carpentier and Priollet [1994], suggested venous ulceration to be a major medical, social and economic problem in society generally.

Persoon *et al* [2004] undertook a systematic review of literature concerned with the impact of leg ulcers on patients' daily life as described in qualitative and quantitative studies. A total of thirty-seven studies were included.

All studies reported that leg ulcers pose a threat to physical functioning. Furthermore, a negative impact on psychological functioning was reported, and to a lesser degree, on social functioning. Major limitations were pain and immobility, followed by sleep disturbance, lack of energy, limitations in work and leisure activities, worries and frustrations and a lack of self-esteem. Patients had a significantly poorer quality of life compared with healthy people. Finally, patients reported problems with regard to follow-up treatment.

The authors concluded that leg ulceration has a major impact on a patient's life, with indications of under-treatment of pain.

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Price and Harding [2004], following a study intended to establish any differences in health-related quality of life between those with chronic and acute wounds, described how a disease-specific tool, namely the Cardiff Wound Impact Schedule [CWIS], was created.

Data suggested that the CWIS had high internal consistency and the ability to discriminate between health statuses. The CWIS was described as a valid tool for studying the impact of chronic wounds of the lower leg on health-related quality of life, whereby the CWIS allows clinicians to identify items of patient concern, which can then be used to negotiate aspects of care most suited to individual patients.

Ribu and Wahl [2004], in a study in Norway, explored nursing care experienced by diabetic patients with foot and/or leg ulcers. The authors concluded that crucial to the successful treatment of diabetic patients with foot and/or leg ulcers is an understanding of their feelings about their ulcer and its impact on quality of life.

Wilson [2004], in a study concerned with the patient's perspective of leg ulceration, stated that leg ulceration might have a profound impact on a patient's quality of life. Studies had shown that pain and general interference with normal activities of living were major themes emerging, which were often not dealt with in a consistent manner by healthcare professionals.

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The author concluded that, whilst a literature review of this subject showed that a number of studies had been carried out on quality of life related to chronic leg ulceration, there was little evidence that findings were being addressed in the daily management of these often-complex leg ulcer patients.

Hareendran *et al* [2005], in a study concerned with measuring the impact of venous ulceration on quality of life, described that older patients had worse health-related quality of life, as did those with pain and non-healing ulcers.

Ulcer duration and size did not correlate with health-related quality of life. Interviews revealed the effects of ulceration to be: pain; itching; altered appearance; loss of sleep; functional limitation; and disappointment with treatment.

Cost of Venous Ulceration

Cornwall *et al* [1988] estimated that the cost of leg ulcer dressings based on community figures alone to be well in excess of £100,000 per annum in one Regional Health District with a population of 198,000.

Mallett and Charles [1990], in a study concerned with defining the extent of leg ulceration in two areas of North London, estimated the cost to the NHS of treating leg ulceration to be as high as £1,300 million per annum.

Bosanquet [1992] estimated that for bandages, hospital and general practitioner treatment, based on treatment frequencies in Riverside and other

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local surveys, the total cost of treating venous leg ulcers in the U.K. to be in the range of £230 million to £400 million per annum at 1991 prices with the implication that costs are higher at 2006 prices.

The author reported a growing awareness that the problem of leg ulceration is extremely expensive and that the impact of leg ulceration significantly impacted upon the nursing profession.

Carpentier and Priollet [1994], in a French study concerned with the epidemiology of chronic venous insufficiency, suggested venous ulceration to be a major medical, social and economic problem in society generally.

Phillips *et al* [1994], in a study in the City of Boston, USA, described the cost of leg ulceration to society as enormous.

West and Priestly [1994] estimated the annual cost to the NHS of treating venous ulceration to be between £300 million and £600 million.

Nicolini *et al* [1997], in a study concerned with the surgical treatment of cutaneous vein ulcers, cited venous leg ulceration as a major health-economy problem.

Ruckley [1997], in a study concerned with the socio-economic impact of chronic venous insufficiency and leg ulceration, estimated that chronic venous insufficiency gives rise to massive health care expenditure amounting to

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approximately £400 million per annum in the U.K. The author stated, however, that imprecise disease classifications and codings impede the acquisition of accurate data and that there is a compelling need for better socio-economic data in this area.

Carr *et al* [1999] reported the results of an analysis designed to: estimate the expected annual cost per patient of treating venous ulceration; and to evaluate the relative cost-effectiveness of a systematic treatment regime using a four-layer compression bandaging system [Profore] compared with usual care.

The authors described that a Markov model had been developed to simulate the transition of patients between health status [healed and unhealed] over a 52-week period.

By running the model for a cohort of one hundred patients, it was possible to estimate expected outcomes and annual budgetary costs for alternative treatment regimes.

Results suggested that, when compared with usual care, a systematic treatment regime using Profore was unambiguously more cost-effective. Patient outcomes were improved and annual treatment costs reduced.

One important implication was that failure to coordinate treatment policies and to use the most cost-effective treatments might result in substantial

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inefficiency in the use of NHS resources. This inefficiency could represent the equivalent of between £350,000 and £1.08 million annually for a typical Health Authority.

The implication for health educators is to promote the critical analysis of effective treatment regimes reported in studies similar to those by Carr *et al* [1999] within clinical educational programmes, including educational programmes concerned with venous ulceration.

Anand *et al* [2003] cite Marlow [1999], who estimated that leg ulcer management costs the U.K. £600 million per annum and that approximately two per cent of the budget of NHS resources is spent on the management of venous disease.

The authors further cite Nelzen [2000] who stated that factors influencing the cost of leg ulcer treatment include time to heal, use of dressing regime, ability to prevent recurrence, and quality of life.

The cost to each U.K. Strategic Health Authority, the regulatory body responsible for health services within locally defined geographies, based upon West and Priestly's [1994] £300 million to £600 million approximation and Ruckley's [1997] £400 million approximation, is estimated to be £14.3 million per annum, a significant proportion of any Strategic Health Authority resource.

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Practitioners and researchers have attempted to improve ways in which venous ulceration is treated within society.

Young [1994] described work undertaken by Moffatt *et al* [1993] within the Riverside Health District of London as 'pioneering' and that it had offered a lifeline to those many clients whose leg ulceration has been labelled a chronic condition to be endured rather than cured.

The author further described that this study had many positive outcomes, but that which had the most clinical impact was the dramatic increase in the healing rate of patients with chronic leg ulceration who were treated with a compression-bandaging regime.

Whilst evidence from the literature pointed to significant detrimental consequences of venous ulceration within society generally, a paucity of evidence existed with regard to the wider economic impact of venous ulceration within society.

The literature search, however, produced numerous studies that identified venous ulceration as generally a disease found to be most common in those aged 65 years and older.

Within the U.K. context, the normal retirement age for the majority of the working population is sixty-five. It is probable, therefore, that where venous ulceration is generally a disease found to be most common in those aged

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sixty-five years and older, the wider economic consequences of, for example, lost production, whilst important, are lessened.

With an understanding of the aetiological and epidemiological consequences of venous ulceration, it was pertinent to determine the predominant profession by which venous leg ulcers are usually treated, leading to an evaluation of venous leg ulcer clinical practice ability within the U.K. predominant profession.

2.3 An Estimation of Community Nurse Time Spent Treating VLU's

For literature relating to the predominant profession by which venous leg ulcers are usually treated the search terms: venous leg ulcers; epidemiology; health professionals; district nurses; community nurses; practice nurses; general practitioners; family practitioners; and treatments were used.

The literature search produced a total of 1274 studies. One thousand two hundred and sixty-eight studies identified were excluded due to them bearing no direct relevance to this study. Six studies were considered pertinent to this study due to each of the six studies reporting on the predominant profession by which venous leg ulcers are usually treated. The six studies identified were:

Cornwall *et al* [1986] drew attention to venous ulceration within one regional Health District, where 357 patients with 424 ulcerated legs were documented.

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Ulcers were dressed at home in sixty-nine per cent of cases, forty-one per cent by the District Nurse and twenty-one per cent by the patient or relative, usually with inadequate instruction and supervision. Nine per cent of the ulcers were dressed in general practitioner surgeries. The remaining twenty-two per cent were resident either in hospital or in long stay accommodation.

Bosanquet [1992] stated that patients with venous ulceration are treated mainly by District Nurses, with surveys on time spent by District Nurses in the treatment of venous ulceration having taken place in Walsall, Rochester, Norwich and Riverside.

In Walsall and Rochester, District Nurses spent 30-50% of their time treating patients with ulcers. In Norwich, District Nurses spent 10-20% of time treating ulcers. In Riverside, results of a survey of District Nurses showed that 75% were spending at least 25% of their time treating ulcers.

Morrison and Moffatt [1994] estimated that over eighty per cent of all venous leg ulcer patients are cared for in the community by District and Practice Nurses.

Moffatt and Dorman [1994] stated that despite the fact that District Nurses spend between twenty five per cent and fifty per cent of their time treating leg ulcers, training is generally inadequate to equip them to treat these patients.

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Mallett and Dougherty [2000] suggested much of the impact of treating venous leg ulcers to be borne by district nursing services.

Oien *et al* [2000] estimated seven per cent of District Nurse workload to be devoted to ulcer care.

Whilst each of the above studies identified significant District and Community Nurse involvement in the assessment and treatment of leg ulceration, studies that reported levels of District and Community Nurse involvement in the assessment and treatment of leg ulceration were small in number.

Methods of data collection on District and Community Nurse involvement in the assessment and treatment of leg ulceration were limited to specific sample populations. Data presented was only relevant at the point in time at which District and Community Nurse involvement in the assessment and treatment of leg ulceration were reported in each study.

Furthermore, no on-going or intended comprehensive and systematic method of District and Community Nurse data capture associated with time spent assessing and treating leg ulcers, either in the U.K. or elsewhere was reported in the literature.

Oien *et al* [2000], however, described a longitudinal study associated with District and Community Nurse time spent assessing and treating leg ulcers.

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The authors administered questionnaires involving District and Community Nurses from the Swedish community of Karlskrona.

The research questionnaire consisted of nineteen research questions. One of the research questions was specific to treatment time for District and Community Nurses engaged in assessing and treating leg ulcers. Another of the research questions was specific to travelling time for District and Community Nurses engaged in assessing and treating leg ulcers.

Whilst Oien *et al* [2000] reported a systematic method of data capture associated with District and Community Nurse involvement in assessing and treating leg ulcers, this research was not specific to venous leg ulceration, but to leg ulceration generally.

Furthermore, Oien *et al* [2000] were concerned with data capture associated with District and Community Nurse involvement in assessing and treating leg ulcers which was limited to the Swedish community of Karlskrona.

The small number of studies aimed at establishing District and Community Nurse time spent assessing and treating leg ulcers, and more specifically venous leg ulcers, combined with no reported comprehensive and systematic method of District and Community Nurse data capture either in the U.K. or elsewhere lead to the conclusion that the level of District and Community Nurse involvement in assessing and treating venous leg ulcers had not been

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well established and was unlikely to be well established in the foreseeable future.

Studies reported did, however, provide a meaningful benchmark for estimating U.K. District and Community Nurse involvement in assessing and treating venous leg ulcers.

The consequence of predominant District and Community Nurse involvement in the assessment and treatment of venous leg ulcers is a requirement for District and Community Nurses to demonstrate an acceptable level of clinical ability in the assessment and treatment of venous leg ulcers.

Sub Section 2.4 reviews literature concerned with District and Community Nurse clinical ability in the assessment and treatment of venous leg ulcers.

2.4 Limitations in Venous Leg Ulcer Clinical Practice

For literature relating to District and Community Nurse clinical ability in the assessment and treatment of venous ulceration, the search terms: venous leg ulcers; knowledge; skills; professional practice; and evidence-based practice were used.

The literature search produced a total of 152 studies. One hundred and thirty-four studies identified were excluded due to them bearing no direct relevance to this study. Eighteen studies were considered pertinent to this study due to each of the studies reporting on issues concerned with the ability of District

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and Community Nurses to assess and treat venous ulceration. The eighteen studies identified were:

O' Connor [1993] stated that the gap between theory and practice in relation to wound management practices has been well documented. Ozcan and Shukla [1993] reported large variations in Community Nurse clinical competency. Bell [1994] reported that nurses had difficulty in applying the knowledge of the physiology of wound healing to practice. Periton [1998] described that Community Nurses are not always up to date on wound care.

Roberts [1998] suggested nurses do not generally apply research-based evidence in practice. Coulliet *et al* [2001] described basic knowledge of chronic wound care in a cohort of seventy-two French nurses involved in venous leg ulcer management as insufficient. Haram *et al* [2003], in a review of one hundred and two Community Nurses' views on their level of knowledge about the treatment of leg and foot ulcers in Oslo concluded nurses' perceived knowledge of leg and foot ulcer treatment to be insufficient. Lorimer *et al* [2003] concluded several gaps in venous leg ulcer care to be apparent across a cohort of sixty-six Community Nurses in Ontario.

Haram and Dagfinn [2003], in a descriptive study aimed to explore the treatment experiences of nine patients [5 women and 4 men] with a leg ulcer condition who lived at home and aged between 60-96 years who had a leg ulcer for >6 months, found that treatment was not always carried out in a correct and caring manner. The patients experienced trial and error in their

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treatment, delays in the arrival of the helpers, unhygienic methods and lack of information about the cause and treatment of their ulcers. The authors concluded that the treatment, hygiene and organisation of the care of patients with leg ulcers living at home needed improving.

With regard to reported limitations in venous leg ulcer clinical practice, Dowsett [1997] suggested many Community Nurses working in relative isolation might well lack training, whilst Jones *et al* [1997] suggested that many nurses receive little instruction in wound healing, though organisations such as the Wound Care Society, Tissue Viability Society and specialist centres attempt to meet the growing demand for wound-care education.

Wong [1979] reported that the ability to transfer classroom knowledge to clinical practice is a common learning problem encountered by many health care professionals, including nursing students.

Cook [1991] stated that the theory-practice gap had been well researched. Studies have viewed the subject from the practice area and in terms of educational design in the classroom. This has raised many questions, and presented a complex picture of many facets, including the educational process, the institutions and clinical practices of the ward and the individual.

Moffatt and Karn [1994] reported how nurse education had failed to keep pace with rapid developments in leg ulcer management. Many nurses receive little

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instruction in the normal and abnormal mechanisms of wound healing and the management of simple and complex wounds.

Practice is based on trial and error rather than on research methods. The growing demand by nurses for education is partly met by societies such as the Tissue Viability Society and the Wound Care Society, which provide vital educational resources. Specialist centres, such as the Cardiff Wound Care Institute, also supply educational materials and training.

The authors gave recognition to the value of educational resources provided by societies and specialist centres, whilst drawing attention to the wider benefits of wound care forming an important part of course curricula at both pre and post-registration levels.

Falanga and Sabolinski [2000] described that diabetic foot and venous leg ulcers result in severe personal suffering, leading to costly healthcare. Recent advances in wound treatment and the development of new and innovative products can accelerate the healing of these ulcers. Professions engaged in the treatment of diabetic foot and venous leg ulcers would benefit from being up to date in these advances.

Moffatt and Dorman [1996] stated that changing practices involves changing a deeply ingrained culture that extends beyond the reaches of the professional directly providing care.

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A change in clinical practice may be resisted by other nurses who fear change. This often stems from a fear of loss of role, or that the change will require skills that the practitioner does not possess.

A collateral key factor thought to impact upon the ability of health professionals to apply healthcare effectively includes the concept of burnout [Maslach *et al*, 1996].

Manktelow [2004] described burnout as 'a state of physical, emotional and mental exhaustion caused by long-term involvement in emotionally demanding situations'. Furthermore, the author described burnout as 'a state of fatigue or frustration brought about by devotion to a cause, way of life, or relationship that failed to produce the expected reward'.

Manktelow [2004] described that, between them, these definitions embrace the essence of burnout. The first definition stresses the part that exhaustion plays in it. The second stresses the sense of disillusionment that is at its core.

The author further described how Selye, one of the founding fathers of stress research, studied the concept of burnout. Over many hundreds of experiments, Selye observed the way that organisms handled long-term stress. Results demonstrated that after initial periods of adaptation, organisms survived very well, though ultimately their resistance to stress factors collapsed without any obvious direct cause.

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Manktelow [2004] commented that whilst exhaustion and long-term stress contribute to burnout, these factors are not the most destructive parts of it. The real damage of burnout comes from the sense of deep disillusionment that lies at its heart.

The author described how many people achieve a sense of identity and meaning from work, commenting that the problem comes when things become too much. Perhaps exhaustion sets in because people have been working too hard for too long. Perhaps performance begins to deteriorate because of this. Perhaps the problem being solved is too great and the resources available too meagre. Perhaps co-workers or team members make just too many emotional demands, or people being served prove to be ungrateful and difficult. This can be where burnout begins to set in. As we get less satisfaction from our jobs, the downside becomes more troublesome. As we get more tired, we have less energy to give. In extreme cases, we can lose faith completely in what we are doing.

Manktelow [2004] noted that emotional symptoms of burnout include: disillusionment with the job; loss of sense of meaning and cynicism towards our organisations or clients; feelings of helplessness; frustration of effort and a lack of power to change events; strong feelings of anger against the people we hold responsible for the situation; and feelings of depression and isolation. Behavioural symptoms can include: increased detachment from co-workers; increased absenteeism; increased harshness in dealing with teams; marked

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reduction in commitment to work; and increased alcohol consumption. These symptoms reflect exhaustion and a loss of satisfaction in the work situation.

The literature search produced evidence of potential limitations in the way in which leg ulceration is managed within society, through a combination of limited awareness due to lack of training or experience, or through some inability to transfer knowledge into practice. Furthermore, the literature search drew attention to the concept of burnout and the potential consequences of burnout upon clinicians in discharging their duties.

Despite widespread recognition of the importance of measuring clinical skills as one essential component of clinical competence [Harden and Gleeson, 1979], all eighteen studies reviewed failed to report on clinical skills as one essential component for individuals involved in delivering clinical care.

Although a paucity of evidence existed on clinical skills as one essential component, the eighteen studies identified provided a meaningful benchmark for determining District and Community Nurse clinical ability in the assessment and treatment of venous ulceration and provided essential reference to the concept of burnout as a potential confounding variable upon District Nurse participants' ability to learn and to transfer learning to the clinical environment.

With evidence from the literature to suggest a degree of District and Community Nurse clinical inability in the assessment and treatment of venous

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ulceration, clinical practice, made more effective through appropriate educational interventions, could help reduce the burden of venous ulceration upon society.

Arguably the challenge facing health professionals and educators is to design evidence-based educational interventions aimed at enhancing clinical practice.

Sub Section 2.5 is concerned with the identification and review of evidence-based principles in educational intervention design.

2.5 Principles in Educational Intervention Design

For literature relating to evidence-based principles in educational intervention design, the search terms: training; education; training needs; interventions; identification; and analysis were used.

The literature search produced a total of 126 studies. One hundred and four studies identified were excluded due to them bearing no direct relevance to this study. Twenty-two studies were considered pertinent to this study due to their relevance to principles concerned with educational intervention design.

Shepherd [1995], in an article intended to highlight the importance of needs analysis when considering programme planning in post-registration nurse education, stated that needs identification describes the learning requirements of a given group using some type of data collection tool or assortment of tools, and an assessment to estimate the relative importance of the needs identified.

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Identification of needs by way of training needs analysis has resulted in educational programmes that are effective and contribute substantially to the growth of the healthcare organisation, practitioners working within it, and the quality of care provided to its clients. However, it was stated that theory had done little to assist those who face this difficult task.

The author cites Bashford [1991], who suggested that training needs arise when knowledge or skills are deficient and that in such cases a training intervention is required. Training needs analysis should result in the design and implementation of more relevant training interventions.

Shepherd [1995] concluded that post-registration education could find difficulty in providing appropriate, quality programmes which meet the needs of the consumer, without first having carried out a wide reaching survey into the area of needs assessment. The author cites Clarke [1985] as agreeing with this assumption.

Specifically, Clarke [1985] suggested that within a profession such as nursing, registered nurses' perceived requirements for continuing education is influenced very strongly by the view that such education is instrumental in helping them to do their job in a more effective way.

Shepherd [1995] documented the importance of knowledge and skills as two components essential to the effective identification of training needs [Harden and Gleeson, 1979]. However, the author failed to report on the availability of

measurement instruments concerned with effecting training needs analyses or to identify methods concerned with estimating the relative importance of identified training needs. Furthermore, the author failed to report on methods concerned with effective programme evaluation.

Hicks *et al* [1996], in a study concerned with the application of training needs analysis within Primary Health Care Teams, described how the growing demand for professional updating and training within the health service had created a proliferation of post-registration courses, many of which fail to make the required impact.

The author suggested that one reason behind this problem relates to the fact that many courses are constructed and delivered in a haphazard way. A more rational approach to post-experience provision of this sort might involve the methodological collection of information regarding the training needs of target populations.

Pedder [1998], in her article concerned with training needs analysis, aimed to inform or update nurses in the knowledge necessary to gain an understanding of the basic concept and principles of training needs analysis.

The author defined 'Training Strategy' as the umbrella term used to describe the processes for education and training in the workplace. It should identify, implement, evaluate and audit over time, education and training activities that have been given priority over the length of the cycle.

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A training strategy should be driven by, or planned around, information and issues arising from an organisation's business cycle, which may include budget availability, service developments, available educational activities, training and educational staff availability, and time scales.

The author defined 'Training Needs Analysis' as the formal term used to describe part of the overall training strategy. It consists of: systematic consultation and identification of the learning or training of the key people involved; subsequent training needs for these groups; and suggests how the gaps should be met.

Petty [1998] suggested educational courses or programmes are often designed without reference to the students' training needs, commenting that this neglect can often lead to disaster especially for adult courses. The author further suggested the knowledge, abilities, skills, experience, preferences, attitudes and expectations of course participants should bear on any course designed for them.

Whilst Hicks [1996], Pedder [1998] and Petty [1998] described the importance of training needs analysis in the design and delivery of educational interventions, the authors failed to specify methods concerned with the identification of training needs or how to apply identified training needs within the context of the educational programme.

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Salas and Cannon-Bowers [2001] reviewed training research literature reported over the past decade, describing progress in five areas of research, including training theory, training needs analysis, and post-training conditions.

Main findings from this review were that advancements had been made that assist an understanding of the design and delivery of training in organisations.

The authors described that some influential theories had been developed about training since 1992. For example, Tannenbaum *et al* [1993] provided an integrative framework for all the variables that influence the design and delivery of training interventions.

This framework detailed the pre-training and during-training conditions that may influence learning, as well as the factors that may facilitate the transfer of skills after training.

The authors cite Kazlowski and Salas [1997], who discussed the importance of characterising the factors and processes in which training interventions are implemented in organisations.

Salas and Cannon-Bowers [2001] stated that it is now well acknowledged that one of the most important steps in training development is conducting a training needs analysis.

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The first stage in training development focuses on the process of deciding who and what should be trained. Training needs analysis is primarily conducted to determine where training is needed, what needs to be taught, and who needs to be trained [Goldstein, 1993]. This phase has several outcomes. One outcome is the specification of learning objectives, which in turn shape the design and delivery of training.

A second stage in training development is concerned with 'Organisational Analysis'. The purpose of organisational analysis is to outline the system-wide components of the organisation that may affect the delivery of a training programme. That is, it focuses on the congruence between training objectives with such factors as organisational goals, available resources, constraints, and support for transfer. The authors reported that only recently have training researchers begun to pay attention to organisational analysis.

A third stage in training development is concerned with Job/Task Analysis. Historically, job/task analysis has been used to identify the information necessary to create the learning objective. A job/task analysis results in a detailed description of the work functions to be performed in a job.

The authors drew attention to the concept of 'antecedent training conditions' as an important addition to the training research literature. Events that occur before training can be as important [and sometimes more important] than those that occur during and after training. Research has shown that activities that occur prior to training have an impact on how effective training turns out

to be [Tannenbaum *et al*, 1993]. These factors fall into three general categories.

The first category is concerned with what trainees bring to the training setting, for example, those with high cognitive ability, *ceteris paribus*, are likely to learn more quickly, whilst those with high self-efficacy are likely to demonstrate positive learning and performance outcomes.

The second category is concerned with training motivation. Training motivation can be conceptualised as the direction, effort, intensity and persistence that trainees apply to learning-oriented activities before, during and after training [Kanzer 1991; Tannenbaum and Yukl 1992].

Recently, several studies have found that trainees motivation to learn and attend training has an effect on their skill acquisition, retention, and willingness to apply newly acquired knowledge, skills and attitudes on the job [Martocchio and Webster 1992; Mathieu *et al* 1992; Quinanes 1995; Tannenbaum and Yukl 1992].

The authors cite Colquitt *et al* [2000] as shedding light on the underlying processes and variables involved in understanding training motivation throughout the training process. Their integrative narrative and meta-analytic review suggested that training motivation is multi-faceted and influenced by a set of individual characteristics, for example, cognitive ability, self-efficacy, anxiety, age and environment.

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The third category is concerned with training induction and the pre-training environment. Considerable research has gone into understanding the factors that help trainees to optimise the benefits of training. For example, Quinanes [1995] demonstrated that the manner in which training was framed [i.e. as advanced or remedial] influenced training and motivation.

The authors further cite Gould *et al* [2003], who in a literature review and re-appraisal concerned with training needs analysis, described training needs analysis as the initial step in a cyclical process which contributes to the overall training and educational strategy of staff in an organisation or a professional group. The cycle commences with a systematic consultation to identify the learning needs of the population considered, followed by course planning, delivery and evaluation.

Salas and Cannon-Bowers [2001] reported that initial searches of nursing databases identified 266 studies relevant to progress concerned with training and development. Twenty-three [8.6%] studies contained empirical findings relating to post-registration nursing education in which the assessment of training needs was presented as the major aim. The review reported on the benefits of applying training needs analysis, with great potential to influence service delivery and quality of patient care.

Specifically, the authors stated how, nurse educators, like the more traditional advocates of training needs analysis, recognise that it is the initial step of a cyclical process, contributing to an overall strategy of training and education.

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The cycle should begin with systematic consultation to identify the learning needs of the target population [Pedder, 1998]. A training intervention is then developed to meet the needs, and once implemented is evaluated to determine how effective it has been.

Salas and Cannon-Bowers' [2001] systematic review of the training literature added significant weight to the importance of undertaking systematic training needs analyses within the context of educational programme design.

Clarke [2003] described how training needs analysis refers to data collection activities that underpin decision-making, particularly in relation to whether training might improve performance, who should receive training, and training content.

The author further described that there are relatively few models to guide training practitioners, and that the models fail to fully capture the range of factors that affect the quality of training decisions.

Filomena [1982], in a study concerned with matching instruction to preferred learning style in clinical nursing, concluded that the matching of instruction to learning styles provided a rational basis for the individualisation of teaching for senior nursing students enrolled in a medical-surgical clinical rotation.

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Having an awareness of the students' learning styles assisted the teachers in planning and implementing the instructional activities leading to a successful and satisfying learning experience.

Smith and Kolb [1985] described how an understanding of individuals' learning styles gives the teacher or trainer designing educational programmes a greater potential of maximising upon student learning opportunities. Students or trainees learn more quickly, effectively and comfortably when learning experiences are geared to their learning needs.

Garity [1985] cited Skipwith [1980], who reported that nursing students with access to their preferred learning style experienced more success in their course work, were more efficient partners in the teaching-learning process, and assumed more responsibility for the manipulation of learning activities according to their specific needs.

The author described that each of us learn in different ways. We learn by generating theories or concepts, by reading and sharing with others, or through a well-organised and teacher-directed class. Much of what we learn in these situations is related to how we first perceive information. Our preferred manner of processing information is known as our predominant learning style.

An individual's learning style influences preferences for learning. Whilst educators acknowledge that people learn in a variety of ways, they have infrequently considered preferences for different modes of learning in the

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classroom. Learning preference is defined as the choice of one learning situation or condition over another.

The author concluded that whilst little is known about learning styles within nursing, it is clear from studies that utilised other populations that there are many implications for nurses in operational, administrative, and educational roles. Particularly, as learning style theory is empirically sound and theoretically useful, it could be adopted as a framework for on-going curriculum development.

Marshall and Merritt [1986] stated that learning style assessment had provided a framework for determining individuals' preferences for ways of learning [Kirby, 1979]. One model, Experiential Learning [Kolb, 1978], which has considerable face validity, is a four-stage one, in which the most integrated learner uses all four stages.

This study reported that a new instrument, the Learning Style Questionnaire [LSQ], designed by Kolb and associates to assess the constructs defined in the Experiential Learning model, was both valid and reliable.

Newble and Cannon [1987] described that all students [and teachers] have distinctive approaches to learning, which are influenced by many factors. One of these factors is dependent on personality traits and is sometimes referred to as the preferred learning style.

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Hodges [1988] cites Kolb [1979] who described a learning theory that provides a model of learning consistent with the structure of human cognition and the stages of human growth and development.

By combining the characteristics of learning and problem-solving and conceiving of them as a single process, we can come closer to understanding how it is that people generate from their experience the concepts, rules and principles that guide their behaviour in new situations, and how they modify these concepts to improve their effectiveness.

This model conceptualises the learning process in such a way that differences in individual learning styles and corresponding learning environments can be identified.

Kolb [1979] described that this can be conceived of as a four-stage cycle: concrete experience, followed by observation and reflection, followed by the formation of abstract concepts and generalisations, leading to hypotheses to be tested in future actions, which in turn lead to new experiences.

The learner, to be effective, needs four different kinds of adaptive abilities: concrete experience abilities; reflective observation abilities; abstract conceptualisation abilities; and active experimentation abilities. That is, they must be able to involve themselves fully, openly and without bias in new experiences, they must be able to observe and reflect on those experiences from many perspectives, they must be able to create concepts that integrate

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their observations into logically sound theories, and they must be able to use these theories to make decisions and solve problems.

Hodges [1988] further described that Kolb [1976] had developed a brief self-descriptive inventory called the Learning Styles Inventory to measure differences in learning style along the two basic dimensions of abstract/concrete and action/reflection. Whilst the individuals tested on this measure showed many different patterns of scores, he had identified four statistically prevalent types of learning style, namely: converger, diverger, assimilator and accommodator.

Kenney and Reid [1988] suggested educational interventions should be inclusive of identified training needs and preferred student-learning styles.

The authors suggested that if an organisation is to achieve its goals, it must have sufficient numbers of people with the appropriate expertise. At an individual level, the present abilities of each member of staff must be assessed against the higher standards needed to carry out their work satisfactorily, and any shortfall remedied through training. When applying a planned training approach to an individual or group of employees, it is very important first to identify the knowledge, skills and attitude required in a job and then to assess any shortfall in that required, i.e. determining the training gap.

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Furthermore, the authors suggested these two processes should be carried out as accurately as possible because the results provide the data from which the programme is developed. The subsequent training can be no better than the quality of the analysis permits.

Anderson and Adams [1992] described the importance of acknowledging learning styles generally within student populations, drawing attention to the importance of preferred learning styles determination in educational intervention design.

Henry [1997] cites the determination of preferred learning styles as an essential component in the design of effective educational interventions, suggesting students have different learning styles and will learn best when information is presented in a way that corresponds to their particular style.

Bonacci [1999] advocated the use of the Computerised Assessment and Prescription Styles of Learning Style Inventory as a measurement instrument to determine preferred learning styles of 603 undergraduates enrolled in a core curriculum introductory health course, whereby: visual; auditory; bodily-kinesthetic; individual and group learner; oral and written expressive learner; sequential; and global learner preferred learning styles were measured.

Linares [1999], in a study concerned with learning styles of students and faculty in selected health care professions, described how in recent years, a dramatic shift in students' demographic profiles had been observed. More

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older and second career individuals are entering nursing programmes, and students in general resemble the so-called adult learner or non-traditional learner.

Adult learners have been described as being self-directed, highly motivated, goal directed individuals who want active input into the learning process. These learners are often primarily motivated by a desire to solve immediate problems and are less tolerant of the traditional educational system.

Self-directedness and learning style are presumed to be related characteristics that influence how an individual approaches and interacts with the learning situation. Research conducted by Kolb and associates demonstrated a positive relationship between learning style and an individual's self-directedness when adaptive flexibility in the context of various learning situations was explored [Kolb, 1984].

Learning style has generally been described as an attribute or characteristic of an individual who interacts with instructional circumstances in such a way as to produce differential learning outcomes. Learning style preference, as one aspect of learning style, relates to the likes and dislikes that individuals have for certain sensory modes and conditions of learning.

With regard to implications for nursing education, Linares [1999] stated that it is unfortunate that a review of the literature provided very few publications in

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this area, with the recommendation that this concept should be an area for further study.

The importance of establishing preferred learning styles in the design of educational interventions was furthermore emphasised by Reid and Barrington [1999].

Specifically, the authors advocated the use of teaching methods that appear to accord with the student's preferred or natural learning style in the design and delivery of educational interventions.

Wessel *et al* [1999], in a study aimed at determining the learning styles and problem-solving ability of health workers, cite Harb, Durrant and Terry [1993], who advocated two reasons for applying the Kolb model to education. They suggested that educators should teach to each of the learning styles in order to reach all students. They also saw the model as a framework for students' lifelong learning.

Janing [2001] in a study aimed at investigating the impact of linking various teaching approaches and preferred learning styles to student learning, concluded that although generally learning style inventory-type measurement instruments measured only certain factors, the results that were available using Kolb's Learning Styles Inventory measurement instrument seemed significant enough to at least consider Kolb's Learning Styles Inventory and

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associated results as one resource for the application of preferred learning styles in the design of educational interventions.

Titiloye and Scott [2001] in a study concerned with the application of learning styles to professional academic training for health workers, summarised that methods of optimising students' learning have been a major concern of educators over time. If educators know the students' learning styles at the onset of their training, teaching can be designed to enhance students' optimal learning throughout their education.

The authors stated that many learning models had been developed [Gregorc 1985, Kolb 1981, Dunn and Dunn 1978] and that Kolb's experiential learning theory is most commonly applied by health care professions [Farina 1998, Katz and Heimann 1991 and Laschinger 1984].

Whilst Filomena [1982], Garity [1985], Smith and Kolb [1985], Hodges [1988], Kenney and Reid [1988], Anderson and Adams [1992], Henry [1997], Bonacci [1999], Linares [1999], Reid and Barrington [1999], Wessel *et al* [1999], Janing [2001] and Titiloye and Scott [2001] reported on the importance of applying preferred learning styles within educational programme design, each of the authors fell short of fully describing any method of translating preferred learning styles within the context of educational programme delivery.

The challenge in this study was to establish effective methods aimed at: identifying training needs based upon knowledge and skills measurement;

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applying identified training needs and preferred learning styles within the context of the experimental educational intervention; and to evaluate the effectiveness of the educational intervention upon post-educational intervention clinical practice, appropriate to the sample of District Nurses engaged in this study.

Sub Section 2.6 is concerned with identifying and evaluating studies containing educational interventions aimed specifically at improving venous leg ulcer-related clinical practice.

The purpose of identifying and evaluating studies containing educational interventions aimed specifically at improving venous leg ulcer-related clinical practice was two-fold: firstly to build upon the merits and methods of applying identified training needs and preferred learning styles within the context of educational intervention design; and secondly to avoid replication in this study.

Methods appropriate to study design are discussed in Chapter 3.

2.6 Evaluation of Interventions to Improve Clinical Practice

In a systematic review of the effects of continuing medical education strategies upon physician performance, Davis *et al* [1995] cite ninety nine trials involving one hundred and sixty educational interventions designed to investigate a combination of clinician performance and health outcomes.

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Study selection criteria under Davis' *et al* [1995] systematic review included randomised controlled trials of education strategies or interventions that objectively assessed physician performance and/or health care outcomes.

Intervention strategies included [alone and in combination]: educational materials [including non-interactive printed, audio-visual, and computer-produced information]; formal CME programs such as conferences, seminars, workshops, small group sessions, traineeships [in-depth, mini residencies], and teleconferences; outreach visits such as academic detailing; opinion leaders; patient-mediated strategies; audit with feedback; and reminders.

Whilst Davis' *et al* [1995] systematic review of the effects of continuing medical education strategies upon physician performance was helpful in that the systematic review concluded widely used CME delivery methods such as conferences had little direct impact on improving professional practice, with more effective methods such as systematic educational interventions being seldom used by CME providers, this systematic review did not report specifically upon the inclusion of identified training needs and preferred learning styles within each of the ninety-nine studies reviewed.

The authors did, however, cite increased interest generally in studies aimed at measuring the effectiveness of educational interventions designed to improve clinical practice.

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On the basis of Davis' *et al* [1995] systematic review not reporting specifically upon the inclusion of identified training needs, preferred learning styles, nor venous leg ulcer-related clinical practice within each of the ninety-nine studies reviewed, and for the purpose of undertaking a more refined and contemporary literature review relating to evidence-based educational interventions aimed at improving venous leg ulcer-related clinical practice involving the principles of identified training needs and preferred learning styles, a literature review using the search terms: education; training; development; learning; programmes; courses; interventions; training needs analysis; preferred learning styles; clinical behaviour; clinical practice; and venous leg ulcers was undertaken.

The literature search produced a total of 403 studies. Three hundred and sixty-one studies identified were excluded due to them bearing no direct relevance to this study. Forty-two studies identified were considered pertinent to this study. The forty-two studies identified are summarised in Table 2.6.1 below.

Of the forty-two studies reviewed: Jones *et al* [1997] made reference to the audit of community nurse training needs; Jones and Nelson [1997], Luker and Kenrick [1995] and Wong [2003] reported upon community nurse knowledge levels; and Jones and Nelson [1997] and Luker and Kenrick [1995] made reference to post-educational intervention community nurse clinical practice.

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None of the forty-two studies identified were concerned specifically with venous leg ulcer-related educational interventions designed to take into account a combination of knowledge and skill-based identified training needs and preferred learning styles.

Furthermore, none of the forty-two studies identified were concerned specifically with the impact of venous leg ulcer-related educational interventions upon clinical practice.

Table 2.6.1 Summary analysis of studies reported to include Identified Training Needs, Preferred Learning Styles and the impact of Educational Interventions upon Venous Leg Ulceration Clinical Practice

Author	Date	Educational Intervention	Subject	Identified Training Needs	Preferred Learning Styles	Venous Leg Ulceration EI's and Clinical Practice
<i>Berwick et al</i>	1986	Audit and feedback	Feedback reducing test use	X	X	X
<i>Borgiel et al</i>	1999	Educational programme	Improving quality of care provided by family physicians	X	X	X
Brown	1988	Educational programme	Primary care physicians on the management of alcoholism	X	X	X
<i>Buekens et al</i>	1993	Educational programme	Awareness rates of obstetric interventions changing practice	X	X	X
<i>Everett et al</i>	1983	Cost audits	Use of laboratory services	X	X	X
<i>Feder et al</i>	1995	Clinical guidelines	Practice based education	X	X	X
<i>Gask et al</i>	1991	Educational programme	Training of general practitioners to teach psychiatric interviewing skills	X	X	X
<i>Gerbert et al</i>	1988	Educational programme	Improving dentists' knowledge, attitudes and behaviours about AIDS	X	X	X
<i>Grimshaw et al</i>	1995	Consensus development	Developing and implementing clinical practice guidelines	X	X	X
Grimshaw and Russell	1993	Clinical guidelines	Effect of on medical practice	X	X	X
Grimshaw and Russell	1993	Clinical guidelines	Uncertainty persists about whether they are effective	X	X	X
Grol	1992	Clinical guidelines	Implementing guidelines in general practice care	X	X	X

Hampshire <i>et al</i>	1999	Action research	Promoting change in primary care	X	X	X
Hendryx <i>et al</i>	1998	Educational programme	Outreach education	X	X	X
Hux <i>et al</i>	1999	Mailed intervention	Effectiveness of combining confidential prescribing feedback with targeted educational bulletins in increasing the use of less expensive, first-line antibiotics by practising physicians	X	X	X
Jamtvedt <i>et al</i>	2003	Audit and feedback	Associated effects on professional practice and health care	X	X	X
Jones <i>et al</i>	1997	Audit/Educational Programme	Audited training needs	✓	X	X
Jones and Nelson	1997	Educational programme	Effects upon reported practice in venous ulceration	X	X	X
Kerse <i>et al</i>	1999	Educational programme	Effect of an E.P. for general practitioners on the health and wellbeing of elderly patients	X	X	X
Lagerlov <i>et al</i>	2000	Guidelines and feedback	Improving doctors' prescribing behaviour	X	X	X
Luker and Kenrick	1993		Questionnaire to measure knowledge and reported practice	X	X	X
Lundborg <i>et al</i>	1999	Educational programme	Effects of prescribing for UTI and asthma	X	X	X
Marton <i>et al</i>	1985	Educational programme	Modifying physician use of the laboratory	X	X	X
Mc Connell <i>et al</i>	1982	Educational programme	Physician behaviour modification using claims data	X	X	X
McCartney <i>et al</i>	1997	Audit and feedback	Feedback to general practitioners on their prophylactic aspirin prescribing.	X	X	X
Mowatt <i>et al</i>	2001	Consensus development	Development of clinical policies and guidelines	X	X	X
Mugford <i>et al</i>	1991	Audit and feedback	Feedback of information on clinical practice	X	X	X

<i>O'Connell et al</i>	1999	Audit and feedback	Effect of feedback on general practitioners' prescribing	X	X	X
<i>Robertson et al</i>	1996		Changing clinical behaviour of doctors	X	X	X
<i>Sandbaek and Kragstrup</i>	1999	Medical audit	AIDS prevention in general practice	X	X	X
<i>Schectman et al</i>	1995	Education and feedback	H2-blocker prescribing patterns	X	X	X
<i>Smith et al</i>	1995	Training interventions	Obstetricians' and midwives' explanations to patients of a routine prenatal screening test.	X	X	X
<i>Stanley et al</i>	1993	Self-directed learning	educational provision adopting a complementary role in sustaining motivation to learn	X	X	X
<i>Veninga et al</i>	1999	Educational programme	Improving the treatment of asthma	X	X	X
<i>Veninga et al</i>	2000	Educational programme	Improving drug treatment in general practice	X	X	X
<i>Vinacor et al</i>	1987	Educational programme	Effects of physician and/or patient education on diabetes	X	X	X
<i>Ward et al</i>	1996	Audit and feedback	Feedback in the management of type 2 diabetes in general practice	X	X	X
<i>Watson et al</i>	2001	Educational strategies	Promoting evidence-based community pharmacy practice	X	X	X
<i>Wells et al</i>	2000	Quality improvement programmes	Impact on depression in primary care	X	X	X
<i>Winickoff et al</i>	1984	Audit and feedback	Improving physician performance through peer comparison feedback	X	X	X
<i>Wong</i>	2003	Teaching Programme	Community nurse knowledge of leg ulcers	X	X	X
<i>Zwar et al</i>	2002	Audit and feedback	Influencing antibiotic prescribing by prescriber feedback	X	X	X

- √: Inclusive of Identified Training Needs, Preferred Learning Styles, or Venous Leg Ulcer components
- X: Exclusive of Identified Training Needs, Preferred Learning Styles, or Venous Leg Ulcer components

Jones *et al* [1997] audited Community Nurses' training needs and developed a programme on leg ulcer management generally. The twelve-week half-day training programme comprised theoretical input followed by six practical training sessions at leg ulcer clinics.

The authors did not report specifically upon the extent to which Community Nurse audited training needs were reflected in the development of the educational programme on leg ulcer management.

Post-training, 28 [58%] of nurses felt adequately prepared to assess and treat leg ulcers. No information was reported on nurses' increase in knowledge.

Jones and Nelson [1997] were concerned with the impact of a leg ulcer educational intervention upon knowledge base and reported practice.

The authors conducted a study involving 264 [experimental = 224, control = 40] nurses, whereby a knowledge and reported practice questionnaire was completed before and after nurses in the experimental group received an educational intervention.

Jones and Nelson's [1997] study aimed firstly to measure nurses' pre-educational intervention knowledge base and reported practice, and secondly to measure nurses' post-educational intervention knowledge base and reported practice.

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The two-day educational intervention included: assessment and differential diagnosis; referral criteria [the role of vascular and dermatology services]; introduction to local clinical guidelines; bandaging theory; skin care; prevention of recurrence; doppler and bandaging workshops; and case studies. All participants were reported to receive a video illustrating bandaging techniques and an open-learning pack. The programme was consolidated with a supervised clinical visit.

The results were calculated in terms of the difference in pre and post-educational intervention scores and were the total scores for the sub sections on assessment, treatment and knowledge.

From an available score of 62, the experimental group pre-educational intervention mean score was reportedly 25 [40.32%]. The experimental group post-educational intervention overall score increased from 25 to 34 [55%] where experimental group nurses received the educational intervention.

Luker and Kenrick [1995] used a validated questionnaire to measure knowledge and reported practice of Community Nurses concerned with the treatment of leg ulcers generally.

The results were again calculated in terms of the difference between pre and post-educational intervention scores and were the total scores for the sub sections on assessment, treatment and knowledge. From an available score

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of 62, the experimental group pre-educational intervention mean score was reportedly 26 [42%]. Knowledge and reported practice scores increased from 26 [42%] to 33 [53%] post-educational intervention.

Wong [2003] undertook a study, involving forty-two Community Nurses, to examine the effect of a teaching programme on Community Nurses' knowledge of leg ulcer management.

Pre and post-educational intervention knowledge scores were obtained by totalling responses to each of the four sections of the knowledge questionnaire.

Knowledge scores were reported to increase from 10.3 [34%] to 20.4 [68%] following a three-hour educational intervention. Total score availability was 30.

A paucity of studies aimed at investigating the impact of educational interventions designed to take into account knowledge and skill-based identified training needs and preferred learning styles upon venous leg ulcer-related clinical practice was, then, evident from the literature.

The evidence presented from the literature search therefore avoided any replication in this study.

Study rationale, taking account of issues described earlier in this Chapter, is summarised in Sub Section 2.7.

2.7 Study Rationale

Sub Section 2.2 of this Chapter pointed to significant epidemiological consequences of venous ulceration within society generally. It was identified that the financial consequences of treating venous leg ulceration are vast, with venous leg ulcer-related impairment found to adversely impact upon quality of life across the U.K. population.

Sub Section 2.3 estimated that the majority of District and Community Nurse time is spent treating venous leg ulcers. Sub Section 2.4 demonstrated limitations in venous leg ulcer clinical practice by District and Community nurses. Sub Section 2.5 explored educational principles in educational intervention design. Sub Section 2.6 explored the existence of educational interventions aimed at improving venous leg ulcer-related clinical practice.

Despite clear evidence to indicate: high U.K. venous leg ulcer prevalence; high financial costs; causation of social impairment; potential limitations in District and Community Nurse clinical practice; and the benefits of applying identified training needs and preferred learning styles in the design of educational interventions, a paucity of studies aimed at investigating identified training needs and preferred learning style-designed educational interventions upon venous leg ulcer-related clinical practice was evident.

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This study aimed to fill this research gap. It hypothesised that a structured educational intervention, designed around evidence-based educational principles, would positively impact upon clinical practice for District Nurses engaged in the assessment and treatment of venous leg ulcers.

Chapter 3 provides for a description of study design and methods concerned specifically with testing this study's stated hypothesis.

Chapter 3: Methods

This Chapter is concerned with study design and methods aimed specifically at measuring the impact of two types of educational intervention on clinical practice for District Nurses engaged in the assessment and treatment of venous leg ulcers.

Primary research objectives, study design, secondary research objectives, study sample, primary and secondary research objective measurement instruments, procedure, ethical approval, pilot surveys and data analysis, all considered essential in testing the stated hypothesis, are further considered.

3.1 Primary Research Objectives

Primary research objectives were those associated directly with the study hypothesis and are detailed in Table 3.1.1 below.

Table 3.1.1 Primary Research Objectives

1.	To identify key tasks associated with the assessment and treatment of venous leg ulcers.
2.	To measure pre-educational intervention District Nurse knowledge and skill in assessing and treating venous leg ulcers, by experimental and control group.
3.	To interpret knowledge and skill outcome measures in the form of identified training needs and to apply identified training needs within the context of the experimental educational intervention.
4.	To determine preferred learning styles for pre-educational intervention District Nurses by experimental and control group.
5.	To apply preferred learning styles within the context of the experimental educational intervention.
6.	To measure District Nurse clinical practice variation relating to the assessment and treatment of venous leg ulcers post- experimental and control educational interventions.

Primary research objectives served to focus the design of this study and the use of appropriate measurement instruments aimed at capturing valid and reliable data against the stated hypothesis.

To arrive at a meaningful and scientific conclusion, it was imperative that appropriate methods were adopted in designing this study and in capturing valid and reliable data. These methods are discussed later in this Chapter. First, however, an overview of study design is provided.

3.2 Study Design

Figure 3.2.1 below places into context the various stages involved in study design and data capture.

Column [a] illustrates that study design commenced with a literature review concerned with venous ulceration and evidence-based educational interventions, whereby six principal bibliographic databases were searched, namely: CINAHL [1982 to 2005]; EMBASE [1974 to 2005]; MEDLINE [1966 to 2005]; PsycINFO [1987 to 2005]; the Cochrane Library; and the Cardiff University Information Services database, as well as manual searches of selected conference proceedings, wound care journals and reference books.

Column [b] illustrates that this study's hypothesis was next formulated following a review of the literature concerned with venous ulceration and evidence-based educational interventions.

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This study hypothesised that a structured educational intervention, designed around evidence-based educational principles, would positively impact upon clinical practice for District Nurses engaged in the assessment and treatment of venous leg ulcers.

The dependent variable [DV] was defined as the level of clinical practice variation demonstrated by District Nurses, measured through the use of a specifically designed clinical practice variation questionnaire.

District Nurse clinical practice measurement concentrated upon ten key task-related subjects concerned with venous ulceration, identified by expert nurses adopting a modified version of the Delphi Technique,

The independent variables [IV's] were defined as experimental group District Nurse clinical practice variation and control group District Nurse clinical practice variation.

The dependent variable was put to effect by incorporating key tasks associated with venous leg ulcer assessment and treatment into an appropriately designed clinical practice variation questionnaire.

The independent variables were put to effect by administering the clinical practice variation questionnaire to experimental and control group District Nurses.

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Column [c] illustrates that this study's primary and secondary research objectives were next formulated.

Column [d] illustrates that key tasks concerned with District Nurse assessment and treatment of venous leg ulcers required identification with reference to a sample of expert nurses, for the purpose of acquiring or designing measurement instruments aimed at measuring experimental and control group District Nurse knowledge, skill and clinical practice.

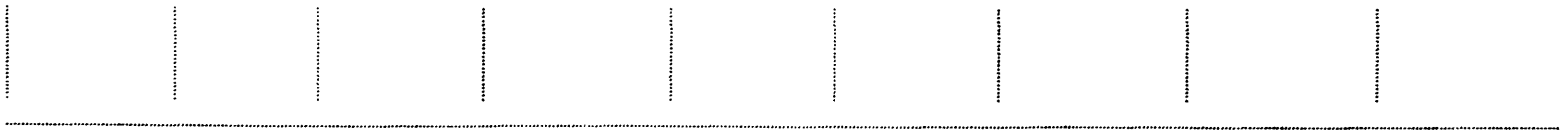
Column [e] illustrates measurement instrument acquisition/design concerned with measuring experimental and control group District Nurse knowledge, skill and clinical practice. Furthermore, Column [e] illustrates measurement instrument acquisition/design concerned with measuring experimental and control group District Nurse: learning styles; burnout; and previous development.

Column [f] illustrates the piloting of measurement instruments concerned with measuring experimental and control group District Nurse knowledge, skill, learning styles, clinical practice, burnout, and previous development.

Column [g] illustrates the use of pre-educational intervention measurement instruments in this study, concerned with measuring experimental and control group District Nurse knowledge, skill, learning style, burnout, and previous development.

Figure 3.2.1 Study Design

[a]	[b]	[c]	[d]	[e]	[f]	[g]	[h]	[i]	[j]
Lit. Review	Hypothesis Formulation	Primary and Secondary Research Objectives Formulated	Key Tasks Identified	Measurement Instrument Acquisition/ Design	Pilot Study	T ¹ Measurement Instruments	Educational Interventions	T ² Measurement Instruments	Clinical Practice Variation
					Design Test Re-Design Re-Test	RCN Exam OSCE LSI MBI PDQ	Experimental EI -v- Control EI	RCN Exam OSCE MBI PDQ	CPV Questionnaire Experimental V Control



Study Direction

Key:

RCN Exam: Royal College of Nursing Examination
 OSCE: Objective Structured Clinical Examination
 LSI: Kolb's Learning Styles Inventory
 MBI: Maslach's Burnout Inventory

PDQ: Previous Development Questionnaire
 EI: Educational Intervention
 CPV: Clinical Practice Variation

Column [h] illustrates the administration of two venous leg ulcer-related educational interventions. The experimental educational intervention was designed according to experimental group District Nurse identified training needs and learning styles. The control educational intervention was designed to discount control group District Nurse identified training needs and learning styles and was of a standardised format.

Column [i] illustrates the use of post-educational intervention measurement instruments concerned with measuring experimental and control group District Nurse knowledge, skill, burnout, and previous development.

Column [j] illustrates the measurement of post-experimental and control educational intervention District Nurse clinical practice using the clinical practice variation questionnaire.

Clinical practice variation questionnaire administration and associated results were anticipated to confirm this study's hypothesis that a structured experimental educational intervention would positively impact upon clinical practice for experimental group District Nurses engaged in assessing and treating venous leg ulcers when compared with control group District Nurses.

3.3 Secondary Research Objectives

Secondary research objectives were those indirectly associated with this study's hypothesis and are detailed in Table 3.3.1 below. They were peripheral to this study, though equally served to focus the design and use of

appropriate measurements instruments, aimed at capturing valid and reliable data.

Table 3.3.1 Secondary Research Objectives

1.	To measure the level of burnout in experimental and control group District Nurses at pre-educational intervention T ¹ and to measure the degree of change in experimental and control District Nurse burnout between pre-educational intervention T ¹ and post-educational intervention T ² .
2.	To measure the level of previous development for District Nurses in the assessment and treatment of venous leg ulcers, at pre-educational intervention T ¹ and post-educational intervention T ² .
3.	To compare the difference between pre-educational intervention T ¹ and post-educational intervention T ² District Nurse knowledge and skill in assessing and treating venous leg ulcers by experimental and control group.
4.	To measure inter-rater reliability/agreement levels, detailing the level of agreement between scores allocated to measurement instruments for District Nurses at pre-educational intervention T ¹ by Examiner 1 and Examiner 2.

With an understanding of this study's primary research objectives, study design, and secondary research objectives, a description of two sample populations concerned with study design is provided.

3.4 Sample

Key Tasks

A sample of perceived expert nurses who were significantly involved in wound management protocol required identification for the purpose of determining key tasks associated with venous leg ulcer assessments and treatments.

To identify the sample of perceived expert nurses, a review of the literature was undertaken. Collaterally, perceived expert nurses were identified with the

assistance of senior academic and clinical staff from within an academic and treatment centre.

RCNCE Examination, OSCE, LSI, MBI, PDQ, EI and CPV

The primary outcome markers for this study were comparative changes in RCNCE Examination and OSCE [T²-T¹] scores between experimental and control groups. The power size calculations were based on these outcomes.

Machin *et al* [1997] described that the power size of any given sample should range between 80% to 99%, the power calculation being dependent upon the level of estimated difference in scores between pre-intervention T¹ and post-intervention T².

In three studies concerned with the measurement of pre-educational intervention and post-educational intervention District Nurse knowledge, Jones and Nelson [1997] reported an increase in knowledge scores of 14.68%, Luker and Kenrick [1995] reported an increase in knowledge scores of 11% and Wong [2003] reported an increase in knowledge scores of 34%.

The literature search had failed to identify any studies concerned with pre-educational intervention and post-educational intervention District Nurse skill levels.

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An average of the 'effect size' taken from the two studies by Luker and Kenrick [1995] and Wong [2003] was calculated. This equated to a plausible difference in a score value of 4 across experimental and control groups.

Based upon a score value of 4, and with reference to a table concerned with the identification of sample size power [Machin *et al* [1997]], a sample of 52 District Nurses was identified as required to achieve 80% power within this study.

Rossi and Freeman [1993] described that research design needs to take into account two competing pressures: on the one hand research should be undertaken with sufficient rigour so that relatively firm conclusions can be reached; on the other hand, practical considerations of time, money, co-operation, and protection of human subjects limit the design options and methodological procedures that can be employed.

With a sample size of 52 District Nurses identified as relevant to achieving 80% power within this study, and taking into account practical considerations of time, money, and co-operation identified by Rossi and Freeman [1993], combined with predicted District Nurse staff turnover and absence, a minimum target population of 57 District Nurses from across South Wales was deemed relevant to data capture in this study.

3.5 Primary Research Objectives-Measurement Instruments

For studies relating to the availability and use of appropriate, valid and reliable primary research objective measurement instruments, the search terms: key task analysis; training needs; identification; analysis; knowledge; skill; learning styles; inventories; clinical practice; venous leg ulcers; validity; and reliability were used.

The literature search produced a total of 652 studies. Six hundred and fifty studies identified were excluded due to them bearing no direct relevance to this study. The consequence of this being that a small literature base existed with regard to the availability and use of appropriate, valid and reliable primary research objective measurement instruments.

Two of the studies identified [Luker and Kenrick, 1995 and Jones and Nelson, 1997] used validated questionnaires for the purpose of capturing data concerned with community nurse knowledge and reported practice.

The questionnaires used in the two studies were considered inappropriate to this study's design in that this study intended to capture knowledge, skill and clinical practice data concerned specifically with ten key tasks identified by expert nurses.

Questionnaires used in the two studies by Luker and Kenrick [1995] and Jones and Nelson [1997] were pragmatically not designed to take account of ten key tasks identified by expert nurses in this study.

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The paucity of studies reported to include appropriate, valid and reliable measurement instruments concerned with this study's primary research objectives resulted in a reliance upon measurement instruments identified through a manual search of the literature.

Six primary research objective measurement instruments/methods were used in this study, namely:

The Delphi Technique for the purpose of identifying key tasks for District Nurses engaged in the assessment and treatment of venous leg ulcers; the Royal College of Nursing Continuing Education examination for the purpose of measuring District Nurse knowledge levels; a specifically constructed Objective Structured Clinical Examination for the purpose of measuring District Nurse skill; a specifically constructed Knowledge and Skills Translator method for the purpose of translating District Nurse experimental group knowledge and skill outcome measures into identified training needs; Kolb's Learning Styles Inventory for the purpose of identifying learning styles; and a specifically constructed Clinical Practice Variation Questionnaire for the purpose of measuring post-educational intervention clinical practice amongst experimental and control group District Nurses. Each measurement instrument is described below.

Key Tasks- Expert Opinion and the Delphi Technique

The purpose of identifying District Nurse-related key tasks associated with the assessment and treatment of venous leg ulcers was two-fold.

First was to allow that this study be systematically designed according to a list of ten key tasks recorded by expert nurses to be of priority importance in the assessment and treatment of venous leg ulcers.

Second was to provide a basis for the identification of experimental group District Nurse training needs.

Without an understanding of District Nurse-related key tasks applicable to the assessment and treatment of venous leg ulcers, no basis for study design or for the identification of experimental group District Nurse training needs was apparent.

The literature search had identified the Delphi Technique as one measurement instrument appropriate to the identification of District Nurse key tasks concerned with venous ulceration.

Prior to identifying key tasks associated with District Nurse assessment and treatment of venous ulceration, a more detailed review of literature relating to the Delphi Technique as a method of expert data collection was undertaken.

Williams and Webb [1994] described the Delphi Technique as a measurement instrument that can be used to systematically collect information from a sample of experts on specific questions or issues, whereby repeated rounds of information collection can be carried out until full agreement on a particular subject is reached.

Individual responses, generally anonymous and confidential, would be scrutinised and collated by the researcher, who would then compile a second or subsequent list for re-submission to the sample of experts. At this stage, the experts would again be asked to reconsider the list and respond to the researcher, indicating their level of agreement with the issues presented.

Importantly, Williams and Webb [1994] suggested that when the skills [or tasks] of professional effectiveness are an objective of the research question, then the use of consultative methods like the Delphi Technique improve the validity of the study from two aspects.

First, they suggested, the skills identified have high face validity. In this instance, the skills [or tasks] identified would appear to be most relevant to District Nurses who assess and treat wounds. Second, when consensus is achieved by the sample of experts, there is evidence of concurrent validity, in that the experts themselves have both identified and agreed upon the requisite skills.

Goodman [1987] reported that originators of the Delphi Technique tend not to advocate a random sample of panellists who are representative of the target population and that instead, the use of experts or at least informed advocates is recommended.

Crotty [1993] listed areas of nursing research where the Delphi Technique had been used, including: nurse education for curriculum planning; selection and evaluation of care; anticipation of future events in psychiatric nursing; evaluation of the clinical learning environment; and the identification of possible directions for collaborative nursing work in Europe.

Everett [1993] made reference to possible uses of the Delphi method on a more general basis. He listed: gathering current and historical data not accurately known or available; examining the significance of historical events; evaluating possible budget allocations; explaining urban and regional planning options; planning university campus and curriculum development; amongst others.

Lundvall and Olson [2001] described a particularly pertinent study involving the use of a modified version of the Delphi Technique largely comparable to the use of the Delphi Technique in this study. The authors described how a two-round modified Delphi Technique was used to attain a consensus among participants related to agricultural health nurse functions and competencies.

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Particularly, the Delphi Technique in this study was designed to systematically collect information from a sample of informed experts, adopting the postal questionnaire method, concerned with key tasks associated with the assessment and treatment of venous leg ulcers as required by Primary Research Objective No. 1.

A sample of expert nurses involved in wound management protocol, identified from the literature and with the assistance of senior academic and clinical staff from within an academic and treatment centre, were asked to list the ten interventions considered to be most important in assessing and treating venous leg ulcers through the administration of an initial postal questionnaire.

In a follow-up questionnaire, the sample of expert nurse respondents were asked to rank the ten most frequent responses listed from the initial postal questionnaire in order of perceived priority.

The purpose of expert nurses ranking the ten most frequent responses was that the experimental educational intervention could be weighted according to the order of priority-ranked responses.

Appendix 1 and Appendix 2 illustrate first and second-round postal questionnaires used in collecting expert data through the adoption of a modified version of the Delphi Technique in this study.

Results concerned with the use of the Delphi Technique are detailed in Sub Section 4.3.

RCN Continuing Education Examination T¹

The importance of identifying District Nurse knowledge as one component of identified training needs was described earlier in Sub Section 2.5 and referenced in Primary Research Objectives 2 and 3.

The use of the traditional written examination method in the assessment of clinical and other types of knowledge has existed since time-in-memorial. Schools, Colleges, Universities and other forms of organisation have routinely used the written examination method as a means of determinative, formative and summative assessment.

Kenney and Reid [1988] suggested the examination could present in many different forms. For example, it may be written, verbal, practical, or a combination of modes. It may contain elements of problem-solving and knowledge recollection. It may contain closed questions in the form of multiple-choice questions or it may contain open questions requiring descriptive prose. The design and administration of the examination is largely dependent upon the circumstances under which it is deemed to be necessary in the first instance.

The manual literature search had produced one examination-related measurement instrument concerned specifically with the examination of District Nurse venous leg ulcer knowledge.

Educational Interventions & Clinical Practice

The twenty-one multiple choice question written examination [Cameron, 1995], published by the Royal College of Nursing Continuing Education Department, considered appropriate to this study in terms of construct and content, is illustrated in Appendix 4.

Reference by candidates to a specifically designed 'Geomatrix' was required for questions one to seven, whereby a maximum of thirty multiple-choice options were available for each of the seven questions. The remaining eight to twenty-one questions allowed for one multiple-choice answer out of five options. An identical RCN Continuing Education Examination and accompanying answer sheet was administered to District Nurse experimental and control groups at pre-educational intervention T¹ and post-educational intervention T².

The RCN Continuing Education Examination was considered particularly appropriate to knowledge data capture in this study because of the relevance of questions included within the examination paper to key tasks identified by expert nurses. However, the RCNCE Examination was pragmatically not specific to key tasks identified by expert nurses.

Table 3.5.1 details construct validity, reliability and practicability concerned with the RCNCE Examination measurement instrument.

Table 3.5.2 details RCNCE Examination subjects and associated score values against each of the twenty-one multiple choice examination questions.

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In using the RCNCE Examination in this study, verbal permission was first granted from the RCN Continuing Education Department.

**Table 3.5.1 RCNCE Examination Paper:
Construct Validity, Reliability & Practicability**

KEY CONCEPTS	
Construct Validity:	MCQ examination paper measurement instruments reported generally to contain high validity.
	Face validity probable due to topics contained within RCNCE Examination matching key tasks identified by sample of expert nurses.
	Face validity tested with reference to six pilot District Nurse participants in alternative NHS Region in Hertfordshire.
	Content validity not reported.
	External criterion-related validity not reported.
Reliability:	MCQ examination paper measurement instruments reported generally to contain high reliability.
	Twenty-one closed MCQ's with inter-rater reliability measurement.
Practicability:	Specific to majority of key tasks concerned with assessment and treatment of venous leg ulceration, identified by twenty-two expert nurses adopting modified version of Delphi Technique.
	Applicable to knowledge measurement.
	Alternative examination measurement instruments identified as inappropriate to study design.
	Unavailability of District Nurse resource to test for validity and reliability.
	Quick and effective method of knowledge data capture. Self-administering.
	RCNCE Examination not specific to all-10 key tasks identified by expert nurses.

Table 3.5.2 RCNCE Examination Paper Measurements

Question	Subject	Score Value
1	Clinical signs of venous insufficiency	Score point range 0 [min] - 6 [max].
2	Combination treatments	Score point range 0 [min] - 3 [max].
3	Items not to be used on patients with VLU	Score point range 0 [min] - 6 [max].
4	Treatments of patients with signs of clinical infection	Score point range 0 [min] - 1 [max].
5	Compression therapy[ies]	Score point range 0 [min] - 2 [max].
6	Treatment of dry scaly skin	Score point range 0 [min] - 1 [max].
7	Compression application	Score point range 0 [min] - 3 [max].
8	Protecting skin from wound exudate	Score point range 0 [min] - 1 [max].
9	Emollient usage for dry scaly skin	Score point range 0 [min] - 1 [max].
10	Compression bandage monitoring	Score point range 0 [min] - 1 [max].
11	Avoidance strategies	Score point range 0 [min] - 1 [max].
12	Post-healing advice	Score point range 0 [min] - 1 [max].
13	Ulcer site and venous insufficiency	Score point range 0 [min] - 1 [max].
14	Graduated compression	Score point range 0 [min] - 1 [max].
15	Characteristics of venous ulceration	Score point range 0 [min] - 1 [max].
16	ABPI and compression therapy	Score point range 0 [min] - 1 [max].
17	Unsuitable VLU treatments	Score point range 0 [min] - 1 [max].
18	Paste bandage description	Score point range 0 [min] - 1 [max].
19	Class II compression stocking application	Score point range 0 [min] - 1 [max].
20	Post-healing monitoring	Score point range 0 [min] - 1 [max].
21	Post-healing advice	Score point range 0 [min] - 1 [max].

Educational Interventions & Clinical Practice

At the pre-educational intervention stage, experimental and control group District Nurses were required to complete the written RCN Continuing Education Examination under timed thirty-minute examination conditions. District Nurse participants were unaware of the examination method and content prior to pre-educational intervention examination administration.

Results concerned with the use of the RCNCE Examination in this study are detailed in Sub Section 4.3.

Whilst the traditional written examination method continues to be evident in contemporary knowledge measurement, concern had been expressed over its ability to accurately capture the wider abilities of individuals undergoing assessment, particularly with regard to skill measurement [Harden and Gleeson, 1979].

With this in mind, educators have turned to alternative forms of assessment, including that of the Objective Structured Clinical Examination, described below.

Objective Structured Clinical Examination T¹

The importance of identifying District Nurse skill as one component of identified training needs was described in Sub Section 2.5 and referenced within Primary Research Objectives 2 and 3.

Educational Interventions & Clinical Practice

To measure pre-educational intervention District Nurse skill in assessing and treating venous leg ulcers by experimental and control group, a more detailed review of literature relating to the Objective Structured Clinical Examination as a method of skill measurement was undertaken.

Harden and Gleeson [1979] described the OSCE as a procedure designed to assess the clinical competence of individuals involved in delivering clinical care, advocating many advantages where the OSCE is incorporated into examinations aimed at testing clinical skills.

The authors advocated the OSCE as a method that is objective rather than subjective, whereby the areas examined need careful planning by the examiners.

Other advocates of the OSCE include: Bramble [1994]; Koop and Borbasi [1994]; Rothman [1995]; and Dauphinee [1995]. Bramble [1994] suggested, however, that whilst the OSCE is acknowledged to be a valuable tool for formative and summative clinical examination of medical students, little on the use of the OSCE has been reported in the nursing literature.

The literature search had failed to produce any results concerned specifically with the OSCE method of measuring venous leg ulcer-related District Nurse skills. In this circumstance a 12-Task Station Venous Leg Ulcer OSCE was constructed by the researcher in conjunction with senior academic and clinical staff from within an academic and treatment centre.

Educational Interventions & Clinical Practice

The OSCE, illustrated in Appendix 5 and Appendix 6, was carefully planned so that each of its twelve Task Stations would incorporate subjects associated with one of the ten key tasks identified by expert nurses, for example, on patient history taking and doppler application.

Table 3.5.3 details construct validity, reliability and practicability concerned with the OSCE measurement instrument.

Table 3.5.3 OSCE: Construct Validity, Reliability & Practicability

KEY CONCEPTS	
Construct Validity:	OSCE measurement instruments reported to contain high validity [Harden and Gleeson, 1979].
	Face validity tested with reference to six pilot District Nurse participants in alternative NHS Region in Hertfordshire.
	Content validity established with reference to specialist staff employed within an academic and treatment centre.
	External criterion-related validity not reported.
Reliability:	OSCE measurement instruments reported to contain high reliability [Harden and Gleeson, 1979].
	Three procedure stations and nine question stations with inter-rater reliability measurement.
Practicability:	Specific to key tasks concerned with assessment and treatment of venous leg ulceration, identified by twenty-two expert nurses adopting modified version of Delphi Technique.
	Applicable to skills measurement.
	No alternative skill measurement instruments appropriate to study design identified.
	Unavailability of District Nurse resource to test for validity and reliability.
	Effective and intricate method of skill data capture.

At the pre-educational intervention stage, 34 [experimental = 14, control = 20] District Nurses were required to rotate around the specifically constructed Venous Leg Ulcer OSCE, spending five minutes at each of the OSCE's twelve Task Stations. District Nurse participants were unaware of the OSCE method and its content prior to pre-educational intervention OSCE administration.

Three procedure stations and nine question stations were constructed as part of overall OSCE design. The three procedure stations were constructed to measure skills associated directly with: doppler assessment; bandaging technique; and size measurement. At procedure stations where doppler assessment and bandaging technique were to be assessed, an expert examiner [a specialist research nurse] was present. The examiner used a checklist, illustrated in Appendix 6, to record the performance of each District Nurse as they rotated through Task Stations Two and Five. For Task Station Nine on measuring technique, no examiner was present. Results were recorded on acetate tracing and inserted into an envelope at the designated Task Station.

The District Nurses would carry with them throughout the examination a standard answer sheet on which they noted their responses. At the end of the examination, the examiners' checklists and the District Nurses' answer sheets were to be marked according to a previously agreed scheme, this having been determined by the same OSCE construction panel of experts described earlier.

Educational Interventions & Clinical Practice

Results concerned with the use of the OSCE in this study are detailed in Sub Section 4.3.

An identical OSCE and accompanying answer sheet were administered to District Nurse experimental and control groups at pre-educational intervention T¹ and post-educational intervention T².

OSCE skill-related measurements are detailed in Table 3.5.4 below.

Table 3.5.4 OSCE Measurements

Task Station	Subject	Score Value
1	Patient History Taking	Score point range 0 [min] - 5 [max].
2	Doppler Assessment	Score point range 0 [min] - 5 [max].
3	Venous Disease Awareness	Score point range 0 [min] - 5 [max].
4	Arterial Disease Awareness	Score point range 0 [min] - 5 [max].
5	Bandaging Technique	Score point range 0 [min] - 2 [max].
6	Infection Recognition	Score point range 0 [min] - 3 [max].
7	Educating Patient	Score point range 0 [min] - 5 [max].
8	Skin Care	Score point range 0 [min] - 8 [max].
9	Size Measurement	Score point range 0 [min] - 1 [max].
10	Dressing Application	Score point range 0 [min] - 3 [max].
11	Compression Bandaging	Score point range 0 [min] - 1 [max].
12	Doppler Interpretation	Score point range 0 [min] - 5 [max].

Educational Interventions & Clinical Practice

Methods concerned with the identification of venous leg ulcer key tasks [Primary research objective No. 1], combined with the measurement of District Nurse knowledge and skills [Primary research objective No. 2] as two components involved in the identification of training needs, have so far been described.

Primary research objective No. 3 required the translation of District Nurse knowledge and skill measures into identified training needs. Furthermore, primary research objective No. 3 required the application of identified training needs within the context of the experimental educational intervention.

Methods concerned with the translation of District Nurse knowledge and skill measures into District Nurse training needs are described below.

Knowledge, Skills & Training Needs Identification

A specifically constructed 'Knowledge and Skills Translator' method was used to translate knowledge and skill measurements into experimental group District Nurse training needs.

The process of translating RCNCE Examination knowledge measurements into District Nurse experimental group training needs was to: list all twenty-one subjects associated directly with the twenty-one multiple choice questions included in the examination; exclude subjects collectively scoring $\geq 40\%$; and rank residual subjects scoring $< 40\%$ according to expert nurse rank prioritisation in the Round Two Delphi method.

Educational Interventions & Clinical Practice

The process of translating OSCE skill measurements into District Nurse experimental group training needs was to: list all subjects associated directly with the 12 Task Stations included in the OSCE; exclude subjects collectively scoring $\geq 40\%$; and rank residual subjects scoring $< 40\%$ according to expert nurse rank prioritisation in the Round Two Delphi method.

Table 3.5.5 below illustrates the 'Knowledge and Skills Translator' method used to translate pre-educational intervention RCNCE Examination scores and OSCE scores into experimental group training needs.

Table 3.5.5 Knowledge and Skills Translator [KST]

RCN Paper – Experimental Group				OSCE – Experimental Group			
Q.	%	Subject	Rank	Task Station	%	Subject	Rank
1				1			
2				2			
3				3			
15				11			
21				12			

RCNCE Examination and OSCE subjects scoring $< 40\%$ would lead to Delphi-weighted identified training needs, which in turn would form the basis of experimental educational intervention design.

Results concerned with the translation of pre-educational intervention examination scores and OSCE scores into experimental group training needs in this study are detailed in Sub Section 4.3.

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Primary research objective No. 4 required the identification of learning-styles for pre-educational intervention District Nurses by experimental and control group. Primary research objective No. 5 required the application of learning styles within the context of the experimental educational intervention.

Methods concerned with the identification of learning styles for pre-educational intervention District Nurses by experimental and control group are described below.

Kolb's Learning Styles Inventory T¹

The importance of designing educational interventions based upon student learning styles was described earlier in Sub Section 2.5.

The literature search had identified Kolb's Learning Styles Inventory [LSI] [Smith and Kolb, 1985] as a method appropriate to the identification of District Nurse learning styles.

Kolb's LSI, reportedly tested for validity and reliability, was considered appropriate to learning styles data capture in this study because of its construct relevance to professions employed in health care [Titiloye and Scott 2001; Wessel *et al* 1999; Hodges 1988; Newble and Cannon 1987; Marshall and Merritt 1986; Garity 1985; Filomena 1982].

Smith and Kolb [1985] described the purpose behind the development of the Learning Style Inventory [Human Services Survey] as helping people to

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understand the learning process and individual learning preferences, the notion being that different people learn in different ways.

Table 3.5.6 details construct validity, reliability and practicability concerned with Kolb's LSI.

Table 3.5.6 Kolb's LSI: Construct Validity, Reliability & Practicability

KEY CONCEPTS	
Construct Validity:	LSI measurement instrument reported to contain high validity [Smith and Kolb, 1985 and Marshall and Merritt, 1986].
	Face validity not reported.
	Content validity not reported.
	External criterion-related validity not reported.
Reliability:	LSI measurement instrument reported to contain high reliability [Smith and Kolb, 1985 and Marshall and Merritt, 1986].
	Four basic scales and two combination scores all show very good internal reliability as measured by Cronbach's α [$n=268$][Smith and Kolb, 1985].
	Comparison of LSI 1985 with items from the original LSI [OLSI] indicate strong correlations between the two instruments [Smith and Kolb, 1985].
Practicability:	Brief and straightforward.
	Constructed so that individuals respond as they would to a learning situation.
	Predicts behaviour in a way consistent with theory of experiential learning.
	Effective method of learning styles data capture. Self-administering.
	Link between learning style outcomes and educational mode delivery limited.

Prior to using Kolb's LSI in this study, the product was purchased commercially and a copyright declaration signed to prevent its reproduction.

Kolb's LSI is therefore illustrated in part in Appendix 7.

At the pre-educational intervention stage, the 34 [experimental = 14, control = 20] participant District Nurses were required to complete Kolb's LSI, whereby each District Nurse was required to rank twelve separate statements on a scale from one to four.

Learning Style Inventory measurements are illustrated in Table 3.5.7 below.

Table 3.5.7 Kolb's Learning Styles Inventory Measurements

Question	Statement	Measurement/Value
1	When I learn I like to ...	Score point = 1 for relevant test outcome of either:
6	When I am learning ...	
12	I learn best when ...	Concrete Experience Reflective Observation Abstract Conceptualisation Active Experimentation

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Results concerned with Kolb's LSI are detailed in Sub Section 4.3.

Experimental educational intervention design, taking account of results concerned with Kolb's LSI, is further discussed in Sub Section 3.7.

Clinical Practice Variation

Primary research objective No. 6 required that post-educational intervention clinical practice variation be measured.

Polgar and Thomas [1995] suggested that in research investigations, information might be collected through the application of a variety of techniques such as interviews, questionnaires, observation, direct physical measurement and the use of standardised tests.

The authors advocated the use of the questionnaire as a method of data capture, with qualities of validity, reliability, resilience, flexibility and low maintenance, with questionnaire design being crucial to data capture success.

The literature search had failed to identify any studies aimed at measuring District Nurse venous leg ulcer clinical practice using the questionnaire method.

In the absence of this, a specifically constructed questionnaire, illustrated in Appendix 8, was designed to capture data relevant to District Nurse post-educational intervention clinical practice.

Questionnaire construction was based upon key tasks concerned with the assessment and treatment of venous leg ulcers, as identified by the sample of expert nurses, adopting a modified version of the Delphi Technique.

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The questionnaire was constructed with reference to senior academic and clinical staff from within an academic and treatment centre and was piloted with reference to six District Nurses in an alternative NHS Region in Hertfordshire.

Table 3.5.8 below details clinical practice outcome measures.

Results concerned with clinical practice variation questionnaire measurements are detailed in Sub Section 4.3.

Table 3.5.8 Clinical Practice Variation Outcome Measures

Q.	Subject	Measurement/Value		
		[a]	[b]	[c]
		Better¹ Informed	Behaviour² Change	Degree of³ Change
1	Emollients/Dressings	Score	Score	Score
2	Wound Dressings	Point	Point	Point
3	Graduated Compression	=	=	=
4	Dry/Flaky Skin	1	1	1
5	Compression Therapy	for	for	for
6	Patient Advice	categories	categories	relevant
7	Venous Insufficiency	of	of	category
8	Assessment Frequency	either:	either:	of
9	Assessment Frequency	*	*	behaviour
10	Combination Treatment	Strongly	Strongly	change.
11	Wound Measurements	Agree	Agree	Score
12	Patient Compliance	*	*	Range
13	Venous Disease Awareness	Disagree	Disagree	=
14	Arterial Disease Awareness	*	*	1 to 7
15	Doppler Interpretation	Strongly	Strongly	
16	Doppler Machine Usage	Disagree	Disagree	
17	Patient History Taking			
18	Infection Recognition			

Key:

¹ Better informed about a particular clinical subject [Knowledge component]

² Consciously changed the way in which a clinical task is approached [Skill component]

³ Changed clinical behaviour by undertaking clinical task differently [Behaviour component]

3.6 Secondary Research Objectives-Measurement Instruments

For literature relating to the availability and use of appropriate, valid and reliable secondary research objective measurement instruments, the search terms: burnout; previous development; inter-rater reliability; district nurses; community nurses; and venous leg ulcers were used.

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The literature search produced a total of thirty-eight references. Thirty-seven references were excluded due to them bearing no direct relevance to this study.

Manktelow [2004] identified two measurement instruments relevant to data capture concerned with the concept of burnout.

The first measurement instrument, 'Identifying Burnout Pressure Points', was constructed to identify areas of job-related desirability and to rationally assess areas of related risk. The second measurement instrument, 'The Burnout Self Test', was constructed to establish any risk of burnout.

The first measurement instrument identified was inappropriate to this study. The second measurement instrument was designed to target populations generally and was non-specific to healthcare.

An on-line search of the British Psychological Society's database was undertaken to identify burnout-related instruments, with reference to the concept of 'motivation' as the most relevant area of search available.

A total of seven instruments were identified as potentially relevant. All seven instruments were further reviewed. Five out of the seven instruments were considered inappropriate. Two of the seven instruments were further reviewed to establish relevance to this study, i.e. the 'Motivation Questionnaire' and 'Motivation Styles Questionnaire'.

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The Motivation Questionnaire was constructed to provide a means of assessing differences in motivational strengths between individuals. It was considered irrelevant to this study's design.

The Motivation Styles Questionnaire consisted of a two-part self-report questionnaire, constructed to assess motivational tendencies. Part one [work style preferences] reflected the workplace and direction in which effort is likely to be exerted. Part two [work and life attributes] reflected how effort would be exerted in relation to work objectives. The Motivation Styles Questionnaire was further considered to be irrelevant to this study's design.

The paucity of studies concerned with this study's secondary research objectives resulted in a reliance upon measurement instruments identified through a manual search of the literature.

Three secondary research objective measurement instruments/methods used in this study were: Maslach's Burnout Inventory; a specifically constructed Previous Development Questionnaire; and the Inter-Rater Reliability method used to measure the level of agreement in test scores.

Measurement instruments/methods are each described below with particular reference to supporting literature and applicability to this study.

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Statistical methods rather than specific measurement instruments *per se* were applicable to measuring any difference between pre-educational intervention and post-educational intervention knowledge and skill.

Statistical methods, where relevant, are described in Chapter 4.

Maslach's Burnout Inventory

Secondary research objective No. 1 required that: burnout be measured in experimental and control group District Nurses at pre-educational intervention T¹ and; that any change in experimental and control group burnout between pre-educational intervention T¹ and post-educational intervention T² be measured to establish any confounding influence of burnout upon post-educational intervention clinical practice.

The manual literature search had identified Maslach's Burnout Inventory [MBI] as appropriate to measuring burnout.

Maslach *et al* [1996] described burnout as a syndrome of emotional exhaustion, depersonalisation, and reduced personal accomplishment that can occur among individuals who work with people in some capacity.

Manifestations of burnout include: increased feelings of emotional exhaustion, whereby workers feel unable to work to an optimum capacity; depersonalisation, whereby workers acquire negative, cynical attitudes and feelings about one's clients; and personal accomplishment, whereby workers

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tend to evaluate themselves negatively, particularly with regard to working with clients. Workers may feel unhappy about themselves and dissatisfied with their accomplishment on the job.

The authors described the consequences of burnout, including the potential for deterioration in the quality of care provided, as potentially very serious for workers, their clients, and the larger institutions in which they interact.

A generally consistent pattern of burnout-related findings that emerged from the authors' research led them to design the Maslach Burnout Inventory, reportedly tested for qualities of validity and reliability [Maslach *et al*, 1996].

Prior to using the MBI measurement instrument in this study, the product was purchased commercially and a copyright declaration signed to prevent its reproduction. The MBI is therefore illustrated in part in Appendix 9.

Twenty-two statements were ranked by each experimental and control group District Nurse on a scale ranging between 0 to 6, resulting in the allocation of one sub-scale type to respective District Nurses. An identical MBI was administered to experimental and control groups at pre-educational intervention T¹ and post-educational intervention T².

Table 3.6.1 details construct validity, reliability and practicability concerned with the Maslach's Burnout Inventory measurement instrument.

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Table 3.6.2 details measurements associated with the Maslach's Burnout Inventory measurement instrument.

Results concerned with the MBI are detailed in Sub Section 4.4.

Table 3.6.1 MBI: Construct Validity, Reliability & Practicability

KEY CONCEPTS	
Construct Validity:	MBI measurement instrument reported to contain high validity [Maslach <i>et al</i> , 1996].
	Face validity not reported.
	Content validity not reported.
	External criterion-related validity not reported.
Reliability:	MBI measurement instrument reported to contain high reliability [Maslach <i>et al</i> , 1996].
Practicability:	Applicable to burnout measurement specific to people employed within healthcare.
	Alternative burnout measurement instruments considered inappropriate to study design.
	Effective method of burnout data capture. Self-administering.

Table 3.6.2 Maslach's Burnout Inventory Measurements

Question	Statement	Measurement/Value
1	I feel ... from my work	Score point = 1 for relevant test outcome of either: Emotional Exhaustion Depersonalisation Personal Accomplishment
17	I can easily create a ... my recipients	
22	I feel recipients blame ..	

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Previous Development Questionnaire

Secondary research objective No. 2 required that previous development be identified for experimental and control group District Nurses, at pre-educational intervention T¹ and post-educational intervention T².

The purpose of identifying previous development was to avoid confoundability within this study.

The literature search had identified the questionnaire method of measuring previous development at pre-educational intervention T¹ and post-educational intervention T².

The literature search had failed to identify any specific questionnaire measurement instrument constructed to measure previous development.

The previous development questionnaire, illustrated in Appendix 10, was specifically constructed to capture data relevant to experimental and control

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group District Nurse previous development, two-years prior to the study commencing and over the study reference period.

Previous development questionnaire measurements are detailed in Table 3.6.3 below.

Table 3.6.3 Previous Development Questionnaire Measurements

Question	Previous Instruction	Measurement/Value
1	Formal/informal instruction in assessing/treating VLUs	'Yes' score point = 1 'No' score point = 0
2	Instruction description	N/A

Results concerned with previous development questionnaire measurements are detailed in Sub Section 4.4.

RCN Continuing Education Examination T²

Secondary research objective No. 3 required that any difference between pre-educational intervention and post-educational intervention knowledge be measured, by experimental and control group.

The literature search had previously identified the RCNCE Examination appropriate to measuring pre-educational intervention knowledge.

To measure post-educational intervention knowledge, an identical RCNCE Examination was used to that at pre-educational intervention T¹.

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At the post-educational intervention stage, the same 34 [experimental = 14, control = 20] District Nurses were required to complete the written RCNCE Examination under timed thirty-minute examination conditions. District Nurse participants were unaware of the fact that the same examination method and content would be administered to that at pre-educational intervention T¹.

Results concerned with RCNCE Examination T²-T¹ measurements are detailed in Sub Section 4.4.

Objective Structured Clinical Examination T²

Secondary research objective No. 3 required that pre-educational intervention and post-educational intervention District Nurse skill be measured.

The literature search had previously identified the OSCE appropriate to measuring pre-educational intervention District Nurse skill.

To measure post-educational intervention skill, an identical OSCE was used to that described at pre-educational intervention T¹.

At the post-educational intervention T² stage, the same 34 [experimental = 14, control = 20] District Nurses were required to complete the Objective Structured Clinical Examination under timed sixty-minute examination conditions. District Nurse participants were unaware of the fact

that the same OSCE method and content would be administered to that at pre-educational intervention T¹.

Results concerned with Objective Structured Clinical Examination T²-T¹ measurements are detailed in Sub Section 4.4.

Inter-Rater Reliability/Agreement Levels

Secondary research objective No. 4 required that inter-rater reliability/agreement levels be measured. The purpose of inter-rater reliability measurement was to establish the level of agreement between Marker 1 [the researcher] and Marker 2 [a specialist Lecturer in Wound Healing] following administration of the RCNCE Examination, OSCE, Kolb's Learning Styles Inventory and Maslach's Burnout Inventory.

The literature search had produced no specific method concerned with the measurement of inter-rater reliability/agreement levels.

The method used to establish inter-rater reliability/agreement was for the marking of each measurement instrument to be undertaken by Marker 1, followed by marking of each measurement instrument to be undertaken by Marker 2, with Marker 1 and Marker 2 values compared.

Results concerned with inter-rater reliability measurements are detailed in Sub Section 4.4.

With an understanding of primary research objectives, study design, secondary research objectives, study sample, and primary research objective and secondary research objective measurement instruments, the next step was to design two types of educational intervention aimed at testing this study's hypothesis.

3.7 Procedure

District Nurse participation in this study was divided into four distinct areas: knowledge, skill, learning styles, burnout, and previous development measurement at pre-educational intervention T¹; attendance at experimental and control educational interventions; knowledge, skill, burnout and previous development measurement at post-educational intervention T²; and post-educational intervention clinical practice measurement.

Eligibility for participation in this study was that each District Nurse remained engaged in the assessment and treatment of a minimum of one venous leg ulcer over the defined study period.

The number of patients upon which District Nurses reported clinical practice through completion of the clinical practice variation questionnaire was determined by the number of patients with venous leg ulcers on individual District Nurse caseloads over a six-month post-educational intervention period.

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A requirement of this study was that all participants were qualified to Registered Nurse [RN] or equivalent and all significantly involved in wound assessments and treatments in their respective community settings.

Identified training needs and preferred learning styles as evidence-based educational principles in the design of educational interventions were earlier described in Sub Section 2.5.

Educational intervention Type-1, the experimental educational intervention, was to be designed according to experimental group District Nurse identified training needs and preferred learning styles, measured using valid and reliable measurement instruments described in Sub Section 3.5.

Educational intervention Type-2, the control educational intervention, was to be designed to discount control group District Nurse identified training needs and preferred learning styles, measured using valid and reliable measurement instruments described in Sub Section 3.5.

Figure 3.7.1 and Figure 3.7.2 provide for an illustration of experimental and control educational intervention design.

Experimental educational intervention took into account identified training needs and preferred learning styles. RCN/OSCE scores of <40% translated into identified training needs. Experimental programme weighted according to importance of key tasks ranked by expert nurses.

	Key Task	RCN/OSCE Scores	Rank	Preferred Learning Style
Experimental Group	Patient History Taking	< 40%	1	Assimilator/ Diverger Categories Applied
	Doppler Assessment	< 40%	2	
	Venous Disease Awareness	< 40%	3	
	Arterial Disease Awareness	< 40%	4	
	Bandaging Techniques	< 40%	5	
	Skin Care	< 40%	8	
	Size Measurement	< 40%	9	

Figure 3.7.2 Control Educational Intervention Design

Control educational intervention discounted identified training needs and preferred learning styles and was of a standardised format.

	Key Task	RCN/OSCE Scores	Rank	Preferred Learning Style
Control Group	Patient History Taking	Discounted for purpose of EI design	Equal weighting applied to 10 key tasks for purpose of EI design	Discounted for purpose of EI design
	Doppler Assessment			
	Venous Disease Awareness			
	Arterial Disease Awareness			
	Bandaging Techniques			
	Infection Recognition			
	Educating Patient			
	Skin Care			
	Size Measurement			
	Dressing Application			

Specifically, the experimental educational intervention was designed to take account of seven out of ten key tasks identified by expert nurses to be of priority importance for District Nurses engaged in the assessment and treatment of venous leg ulcers.

Seven key tasks, ranging from Patient History Taking [Rank 1] to Size Measurement [Rank 9] were selected for inclusion into the experimental educational intervention due to experimental group District Nurses having scored <40% when tested for venous leg ulcer knowledge and skill, using RCNCE Examination and OSCE measurement instruments.

Three out of ten key tasks perceived by expert nurses to be of priority importance for District Nurses were excluded from experimental educational intervention design due to experimental group District Nurses having scored $\geq 40\%$ when tested for venous leg ulcer knowledge and skill, using the RCNCE Examination and OSCE measurement instruments.

A score of $\geq 40\%$ as a reason for the exclusion of: Infection Recognition; Patient Education; and Dressing Application from experimental educational intervention design was considered appropriate due to a score of $\geq 40\%$ being typically acceptable in many higher educational institutions as an indication of students having demonstrated reasonable levels of subject knowledge.

The experimental educational intervention was further weighted according to the relevance of key tasks identified by expert nurses using the Delphi method.

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Expert nurses had previously ranked Patient History Taking [Rank 1] as the most important of key tasks in the assessment and treatment of venous leg ulcers. Similarly, expert nurses had previously ranked Size Measurement [Rank 9] as the ninth most important of key tasks in the assessment and treatment of venous leg ulcers.

Accordingly, the four-hour intensive experimental educational intervention [the maximum time made available for participant release by sponsoring organisations] was designed so that experimental District Nurses were exposed most of all to the subject of Patient History Taking. Experimental District Nurses were exposed least of all to the subject of Size Measurement.

Assimilator [$n=6$][42.9%] and Diverger [$n=4$][28.6%] learning style categories were determined to be dominant for the experimental group.

The experimental educational intervention was furthermore designed to take account of Assimilator and Diverger learning styles. Specifically, the educational intervention was designed according to: a formal lecture programme inclusive of weighted key subjects; individual and collective off-the-job instructional techniques, for example on doppler machine usage; separate problem-solving discussion groups in the form of a three-case Vignette; brainstorming; and collective debates and group discussion.

Experimental group learning styles were discounted for the purpose of experimental educational intervention design for the minority of participants [$n=4$][28.6%].

Table 3.7.1 rationalises the discounting of learning styles for the minority of experimental group participants.

Table 3.7.1 Discounting of Minority Learning Styles

Rationale
Diverse range of educational delivery modes aimed at capturing four learning style-types within four-hour intensive study programme difficult to achieve.
Diverse range of educational delivery modes aimed at capturing four learning style-types had potential to dilute educational delivery modes for majority of experimental group District Nurse participants [$n = 10$][72%].
Diverse range of educational delivery modes costly and time-consuming to prepare and deliver. Limited resources available for educational delivery in this study.

The control educational intervention was designed to take account of ten key tasks identified by expert nurses to be of priority importance for District Nurses, ranging from Patient History Taking [Rank 1] to Dressing Application [Rank 10].

Furthermore, the four-hour intensive control educational intervention was designed so that control group District Nurses were exposed to all ten-subject areas, ranging from Patient History Taking to Dressing Application with equal weighting.

The control educational intervention was designed to discount learning styles. The educational intervention was designed according to a primarily didactic style of delivery, i.e. a formal lecture programme exclusive of weighted key task subjects; exclusive of collective off-the-job instructional techniques, for example on doppler machine usage; and exclusive of collective debates and group discussion.

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District Nurse participation was not openly encouraged during the control educational intervention. Specifically, the three-case Vignette was excluded from control educational intervention design.

Experimental and control educational interventions were each delivered by highly experienced registered nurses [one specialist lecturer and two research nurses] from within an academic and treatment centre.

Prior to this study formally commencing, ethical approval from the appropriate ethics committee was sought.

Sub Section 3.8 below describes the rationale and protocol for ethical approval acquisition.

3.8 Ethical Approval

This study was governed by principles and protocols laid down by Iechyd Morgannwg Health Authority, the public health authority responsible at the time of application for ethical approval for regulating health services within the identified geographical area.

A specific responsibility of any public health authority is to ensure that health-related research is carried out ethically and effectively. In fulfilment of their responsibilities, the Iechyd Morgannwg Health Authority required that ethical approval be granted prior to the commencement of this study.

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To comply with Iechyd Morgannwg Health Authority requirements, an application was submitted by the researcher to the relevant Local Research Ethics Committee prior to the commencement of this study. The application was approved following the researcher's Ethics Panel attendance for the purpose of explaining and justifying the proposed research [see Appendix 11].

As part of ethical approval, each District Nurse participant was required to sign a consent form, consenting to participation, prior to this study commencing.

3.9 Pilot Surveys and Modification

Prior to embarking upon the full study, a pilot of research methods was undertaken, which involved a sample of six District Nurses employed within an alternative NHS Region in Hertfordshire.

The reason for piloting research methods within an alternative NHS Region in Hertfordshire was to avoid the potential for cross-contamination between District Nurses engaged in the pilot study and District Nurses engaged in the full study.

The aim of the research pilot was to test measurement instruments to be used in the full study and to test the quality of research design. This pilot took account of formal feedback from the sample of six District Nurse participants with regard to 'floor' and 'ceiling' effects concerned with RCNCE Examination and OSCE measurement instruments.

The pilot study concentrated on the use of the: RCNCE Examination, concerned with measuring District Nurse knowledge; Objective Structured Clinical Examination, concerned with measuring District Nurse skill; Kolb's Learning Styles Inventory, concerned with identifying learning styles; Maslach's Burnout Inventory, concerned with the measurement of burnout; Previous Development Questionnaire, concerned with establishing District Nurses' previous development associated with venous leg ulcer assessment and treatments; and the clinical practice variation questionnaire concerned with measuring post-educational intervention clinical practice.

The pilot study took place on two occasions with reference to the same cohort of six District Nurses in Hertfordshire.

On the first occasion, District Nurses reported minor procedural issues concerned with the use of the RCNCE Examination and minor procedural issues concerned with the use of the OSCE.

The first procedural issue concerned completion of the RCNCE Examination, which required the researcher to provide a more thorough explanation to participating District Nurses on how the RCNCE Examination was to be completed, particularly with reference to the 'Geomatrix Answer Grid' incorporated within the paper.

The second procedural issue concerned the use of the OSCE, which required the researcher to provide a more thorough explanation to participating District Nurses of the OSCE pathway, with specific reference to Task Station design, content, materials and answer sheets.

All six District Nurse participants engaged in this pilot study formally reported that RCNCE Examination and OSCE measurement instruments had neither a floor nor ceiling effect according to the six participants' knowledge and skill base.

The second pilot followed an eight-week time-lapse whereby more thorough explanations were presented by the researcher concerning issues identified at the first pilot. No corrective procedural or design issues were raised at the follow-up pilot.

With an understanding of this study's primary research objectives, study design, secondary research objectives, study sample, primary research objective and secondary research objective measurement instruments, procedure, ethical approval, and piloting, a consideration of methods concerned with data analysis is provided.

3.10 Data Analysis

This Sub Section is concerned with data analysis in respect of six primary research objective data sets and five secondary research objective data sets.

The six primary research objective data sets relate to: identification of District Nurse key tasks; pre-educational intervention knowledge measurement; pre-educational

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intervention skill measurement; experimental group training needs identification; experimental group learning styles identification; and post-educational intervention clinical practice measurement.

The five secondary research objective data sets relate to: pre-educational intervention burnout and the degree of change between pre-educational intervention and post-educational intervention burnout; pre-educational intervention and post-educational intervention previous development; difference between pre-educational intervention and post-educational intervention knowledge measurement; difference between pre-educational intervention and post-educational intervention skill measurement; and Marker 1 and Marker 2 inter-rater reliability concerned with scores allocated to experimental and control group District Nurses applicable to RCNCE Examination, OSCE, Kolb's Learning Styles Inventory and Maslach's Burnout Inventory measurement instruments used in this study.

Key task data was analysed, first by listing the thirty-one interventions reported by twenty two Round One expert nurse respondents to be important to District Nurses in the assessment and treatment of venous leg ulcers and, second to list ten out of the thirty-one interventions ranked in order of perceived priority as most important to District Nurses by the same sample of twenty-two Round Two Delphi expert nurse respondents.

The following were compared between the experimental and control groups using unpaired *t*-tests:

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1. Pre-educational intervention knowledge measurement.
2. Pre-educational intervention skill measurement.
3. Post-educational intervention clinical practice measurement.
4. Difference between pre-educational intervention and post-educational intervention knowledge measurement.
5. Difference between pre-educational intervention and post-educational intervention skill measurement.

Difference in pre and post-educational intervention knowledge and skill measurement between experimental group District Nurses who received the educational intervention which was designed to take account of preferred learning styles [$n = 72\%$] and experimental group District Nurses who received the educational intervention which was designed to discount preferred learning styles [$n = 28\%$] were further compared using the unpaired t -test.

The t -test was used specifically to establish whether any difference existed in mean scores between experimental and control groups, whereby values were normally distributed and variances between experimental and control groups were similar.

Furthermore, the t -test was used specifically to establish whether any improvement existed in mean scores for experimental group District Nurses who received the educational intervention which was designed to take account of preferred learning styles and experimental group District Nurses who received the educational intervention which was designed to discount preferred learning styles, whereby values were normally distributed and variances between groups were similar.

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Data analysis in respect of experimental group training needs identification was by way of a specifically constructed 'Knowledge and Skills Translator' method used to record gaps identified in experimental group District Nurse knowledge and skills post-RCNCE Examination T¹ and OSCE T¹ measurement, earlier described in Sub Section 3.5.

Data analysis in respect of learning styles was through completion of Kolb's Learning Styles Inventory by experimental and control District Nurse participants at pre-educational intervention T¹.

Data analysis in respect of measuring any change in experimental and control group burnout between T¹ and T² using Maslach's Burnout Inventory was by way of the non-parametric Mann-Whitney U-test.

Data analysis in respect of measuring any change in experimental and control group previous development between T¹ and T² using the previous development questionnaire was by way of the non-parametric Mann-Whitney U-test.

The Mann-Whitney U-Test statistical method was used specifically to test the distribution of District Nurse burnout and previous development by experimental and control group due to the low number of values being tested, the underlying assumption of the test being that the normal distribution was not satisfied in this instance.

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Data analysis in respect of Marker 1 and Marker 2 inter-rater reliability was by way of the marking of each measurement instrument by Marker 1, followed by marking of each measurement instrument by Marker 2, with Marker 1 and Marker 2 values compared.

Chapter 4 describes results concerned with this study.

Chapter 4. Results

4.1 Introduction

Results are presented in three parts, reflecting study sample, primary research objectives and secondary research objectives.

Study Sample:

The number of District Nurse participants in this study from South Wales who were actively engaged in the assessment and treatment of venous leg ulcers.

Primary Research Objectives:

Key Tasks identified by expert nurses; pre-educational intervention knowledge and skill measurement; training needs identification; pre-educational intervention learning styles identification; and post-educational intervention clinical practice measurement.

Secondary Research Objectives:

Pre and post-educational intervention burnout and previous development measurement; difference between knowledge and skill measurement at pre-educational intervention T¹ and post-educational intervention T²; and the level of agreement between RCNCE Examination, OSCE, Kolb's Learning Styles Inventory and Maslach's Burnout Inventory measurements at pre-educational intervention T¹ and post educational intervention T² by Examiner 1 and Examiner 2.

4.2 Sample

With reference to a table concerned with the identification of sample size power [Machin *et al*, 1997], it was earlier described that a sample of 52 District Nurses was relevant to achieving 80% power in this study.

Taking account of sample size power described by Machin *et al* [1997], practical considerations of time, money, and co-operation described by Rossi and Freeman [1993], and resource constraints faced by district nursing services in South Wales, this study attempted to recruit a minimum number of 57 District Nurses to achieve a powered sample, whilst taking into account the potential for District Nurse attrition and absence over the study period.

Increased caseload activity, high absence rates, and general pressures upon district nursing services across the three participating NHS Trusts in South Wales resulted in a maximum number of 53 District Nurses as potentially available to participate in this study. Ninety four per cent [50/53] of District Nurses approached consented to participation. No replacement District Nurses were subsequently available to participate in this study due to resource constraints and pressures upon district nursing services in South Wales at the point of this study commencing.

Full study participation was defined as: completion of pre and post-educational intervention measurement instruments; attendance at either the experimental or control educational intervention; and completion of the post-educational intervention clinical practice variation questionnaire.

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Figure 4.2.1 provides for an illustration of District Nurse recruitment to this study, combined with an illustration of experimental and control group participation in this study.

Figure 4.2.1 Participant Flow Diagram

	District Nurse Participants [Total Sample Population]	
Intention to Recruit	<i>n</i> = 57	
Maximum Available	<i>n</i> = 53	
Pre-Educational Intervention Measurements	<i>n</i> = 36	
Educational Intervention	Experimental Group <i>n</i> = 14	Control Group <i>n</i> = 20
Post-Educational Intervention Measurements	Experimental Group <i>n</i> = 14	Control Group <i>n</i> = 20
Post-Educational Intervention Clinical Practice Measurement	Experimental Group <i>n</i> = 14	Control Group <i>n</i> = 20

Reasons for incomplete study participation were participants leaving their posts prior to the completion of this study, changes to staff rotas, participant absence, and pressures upon district nursing services generally, thereby preventing participants from completing either pre and post-educational intervention measurement instruments and the clinical practice questionnaire, or from attending either the experimental or control educational interventions.

Thirty-four full study participants translated into a power level of 60%. This study was in the circumstances underpowered. Results of this study therefore need to be interpreted with caution. This study did, however, provide useful insight into practical and other aspects of this research area.

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District Nurses were allocated into experimental [$n=14$] and control [$n=20$] groups according to availability of attendance at either experimental or control educational interventions.

The sample population consisted of 34 registered District Nurses engaged in the assessment and treatment of venous leg ulcers as part of their role within district nursing services aligned to three integrated Hospital and Community NHS Trusts across South Wales.

All District Nurse participants were confirmed as registered in accordance with Nursing and Midwifery Council [NMC] regulations, each District Nurse having obtained either the Post-Graduate Certificate or Diploma qualification in District Nursing practice.

4.3 Primary Research Objectives

Key Tasks

Key Task identification was relevant as this study required that pre and post-educational intervention knowledge and skill measurements, educational interventions and the clinical practice variation questionnaire were each designed to take account of tasks considered to be essential to District Nurses in assessing and treating venous leg ulcers.

Constructed to identify and prioritise tasks concerned with the assessment and treatment of venous leg ulcers, blank questionnaires were administered to perceived expert nurses concerned with venous ulceration at the outset of this study.

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The sample of expert nurses [$n = 25$] were required to list the ten most important tasks concerned with the assessment and treatment of venous leg ulcers in response to an initial postal questionnaire [Response Rate: 88%].

Key Task results are detailed in Table 4.3.1 below.

**Table 4.3.1 Results: Expert Questionnaire
Assessment & Treatment Categories [Initial Listings]**

Category	Response
Bandaging Techniques	22
Patient History Taking	21
Educating Patient	17
Doppler Assessment	16
Skin Care	13
Infection Recognition	10
Venous Disease Awareness	8
Arterial Disease Awareness	8
Dressing Application	8
Size Measurement	8
Atypical Onward Referral	7
Quality of Life Improvement	6
Pain Assessment	6
Colonisation Recognition	5
Ulcer History	5
Ulcer Duration	5
Ulcer Colour	5
Understanding Current Research	5
Ulcer Site Implications	4
Anatomy/Physiology (Lower Limb)	4
Aetiology of Leg Ulceration	4
Allergy Implications	3
Pathophysiology of Leg Ulceration	2
Healing Process	1
Mobility Levels	1
Exudate Implications	1
Ischemic Disease	1
Spreading Cellulitis	1
Predominant Tissue Types	1
Recording of Information	1
Cleansing of Wound	1

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The same sample of expert nurses [$n = 22$] were next required to rank the ten most frequently recorded assessment and treatment tasks in order of perceived importance [Response Rate: 94%].

Results are illustrated in Table 4.3.2 below.

**Table 4.3.2 Results: Expert Questionnaire
Assessment & Treatment Categories [Follow-Up]**

Category	Rank Order Of Mean
Patient History Taking	1
Doppler Assessment	2
Venous Disease Awareness	3
Arterial Disease Awareness	4
Bandaging Techniques	5
Infection Recognition	6
Educating Patient	7
Skin Care	8
Size Measurement	9
Dressing Application	10

Table 4.3.2 illustrates that Patient History Taking [Rank 1] was reported by expert nurses to be the most important of assessment and treatment categories in this instance, followed by Doppler Assessment [Rank 2] and Venous Disease Awareness [Rank 3].

The results of the initial and follow-up questionnaires provide a useful insight into key tasks perceived to be essential for District Nurses concerned with the assessment and treatment of venous leg ulcers that may have implications for aspects of practice and training in the U.K. and beyond.

RCN Continuing Education Examination T¹

The RCNCE Examination aimed to measure District Nurse knowledge at pre-educational intervention T¹ to establish any baseline confoundability between experimental and control groups and to interpret experimental group knowledge measurement in the form of identified training needs.

RCNCE Examination results are detailed in Table 4.3.3 below.

Table 4.3.3 Results: RCNCE Examination T¹ Baseline Measurement

	Mean	Std. Deviation	Mean Difference	t-value	df	sig
Experimental n = 14	16.214	4.389	-1.24	-0.81	32	0.43
Control n = 20	17.450	4.395				

Statistical Test: t-test

Results demonstrated that for pre-educational intervention knowledge measurement, there was no statistically significant difference in scores between experimental and control groups.

Scores available to each District Nurse ranged between 0 [minimum] and 36 [maximum]. Mean scores indicated a fair to moderate level of baseline knowledge for experimental and control groups.

Objective Structured Clinical Examination T¹

The Objective Structured Clinical Examination aimed to measure District Nurse skill at pre-educational intervention T¹ to establish any baseline confoundability between

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experimental and control groups and to interpret experimental group skill measurement in the form of identified training needs.

OSCE results are detailed in Table 4.3.4 below.

Table 4.3.4 Results: OSCE T¹ Baseline Measurement

	Mean	Std. Deviation	Mean Difference	t-value	df	sig
Experimental n =14	24.535	4.330	0.94	0.59	32	0.56
Control n = 20	23.600	4.708				

Statistical Test: t-test

Results demonstrated that for pre-educational intervention T¹ OSCE, there was no statistically significant difference in skill-related scores between experimental and control groups.

Scores available to each District Nurse ranged between 0 [minimum] and 48 [maximum]. Mean scores indicated a fair to moderate level of baseline skill for experimental and control groups.

Knowledge, Skills & Training Needs Identification

The translation of experimental group knowledge and skill measurements into identified training needs was required so that the experimental educational intervention could be designed to take account of experimental group training needs.

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The process was to list collective percentage scores achieved by experimental group District Nurses by RCNCE Examination subject and OSCE subject, identify subjects generally scoring <40%, which in turn lead to priority identified training needs.

Subjects which generally scored <40%, illustrated in Table 4.3.5 below [shaded], formed the basis of experimental educational intervention design. Subjects identified as generally scoring <40% were: skin care; bandaging technique; patient history taking; venous disease awareness; arterial disease awareness; wound size measurement; and doppler application.

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Table 4.3.5 Results: Educational Intervention Design– Ranked Subjects

RCN Paper – Experimental Group				OSCE – Experimental Group			
Q.	%	Subject	Rank ¹	Task Station	%	Subject	Rank ¹
1	40	Venous Insufficiency	3	1	25	Pt History	1
2	60	Therapies	N/A	2	49	Doppler	2
3	13	Skin Care	8	3	19	Venous Awareness	3
4	86	Infection	6	4	37	Arterial Awareness	4
5	36	Bandaging	5	5	50	Bandaging	5
6	71	Skin Care	8	6	60	Infection	6
7	57	Bandaging	5	7	44	Educating	7
8	0	Skin Care	8	8	92	Skin Care	8
9	29	Skin Care	8	9	5	Measurement	9
10	21	Bandaging	5	10	69	Dressings	10
11	64	Skin Care	8	11	86	Bandaging	5
12	93	Bandaging	5	12	26	Doppler	2
13	43	Venous Insufficiency	3				
14	71	Therapies	N/A				
15	86	Ulcer Appearance	N/A				
16	57	Bandaging	5				
17	50	Bandaging	5				
18	100	Bandaging	5				
19	14	Bandaging	5				
20	57	Follow-Ups	N/A				
21	36	Bandaging	5				

¹ Determined by 22 expert nurses using the 2nd Round Delphi Expert [Follow-Up] Questionnaire.

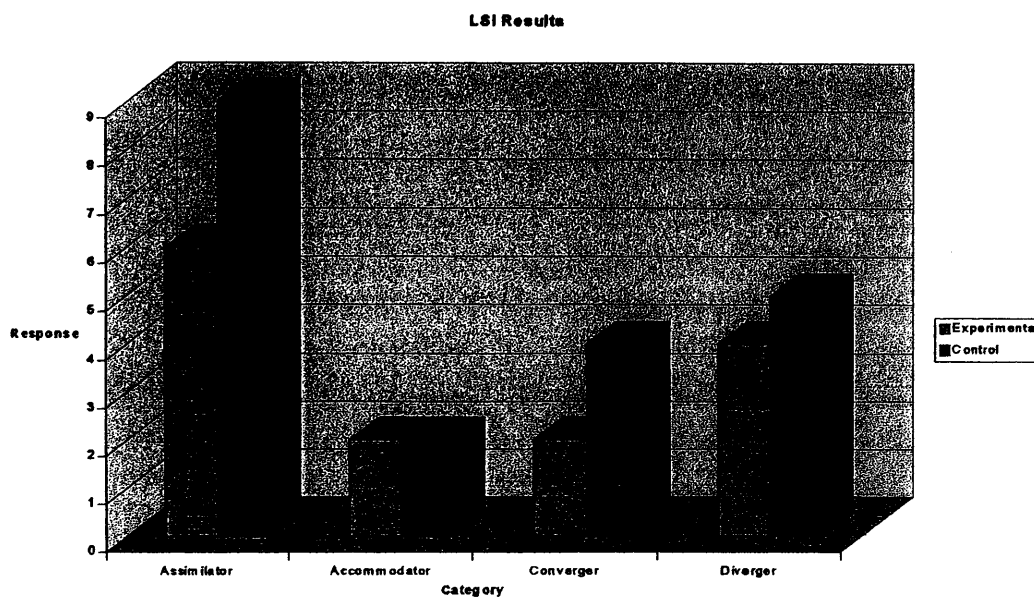
Kolb's Learning Styles Inventory T¹

Kolb's Learning Styles Inventory was used to identify District Nurse learning styles at pre-educational intervention T¹. Learning styles would subsequently be applied within the context of the experimental educational intervention.

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Learning Styles Inventories were evaluated to identify the type of learning style for all 34 District Nurse participants in this study [$n = 100\%$]. Results by category of Accommodator, Assimilator, Converger and Diverger are illustrated in Figure 4.3.6 below.

Figure 4.3.6 Data Analysis: Kolb's Learning Styles Inventory



Learning style categories are recorded along the horizontal axis. Response levels are recorded along the vertical axis. Left and right hand columns in each category illustrate experimental and control group responses respectively.

The bar chart illustrates that the learning style category of Assimilator had the highest number of responses for both experimental [$n = 6$] and control [$n = 9$] groups. The Diverger category records the second highest number of responses for both experimental [$n = 4$] and control [$n = 5$] groups. Converger is the third lowest category for the control [$n = 4$] group. Experimental [$n = 2$] and control [$n = 2$] groups

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were equally divided across the category of Accommodator. The Experimental group records joint lowest responses amongst the categories of Accommodator [$n = 2$] and Converger [$n = 2$].

Results concerned with Kolb's Learning Styles Inventory allowed that the experimental educational intervention be designed according to Assimilator and Diverger types of learning style for the majority [$n = 72\%$] of experimental group District Nurse participants.

Table 4.3.5a below details results concerned with establishing whether any improvement existed in mean knowledge and skill scores for experimental group District Nurses who received the educational intervention which was designed to take account of preferred learning styles compared with experimental group District Nurses who received the educational intervention which was designed to discount preferred learning styles.

Table 4.3.5a Kolb's LSI – Experimental Group Comparisons

Improvement	Mean	Std. Deviation	Mean Difference	t-value	df	sig
Knowledge $n = 10$ [Learning Styles]	-.70	5.79	-.70	-.218	12	.83
Knowledge $n = 4$ [Non- Learning Styles]	.00	4.08				
Skill $n = 10$ [Learning Styles]	6.4	2.99	.40	.215	12	.83
Skill $n = 4$ [Non- Learning Styles]	6.00	3.56				

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Results illustrate that no significant difference existed in mean scores [knowledge and skill] for experimental group District Nurses who received the experimental educational intervention which was designed to take account of preferred learning styles compared with experimental group District Nurses who received the experimental educational intervention which was designed to discount preferred learning styles.

Clinical Practice Variation

The clinical practice variation questionnaire was used to measure post-educational intervention venous leg ulcer clinical practice over a six-month period, by experimental and control group.

Results are detailed in Table 4.3.6 below.

Table 4.3.6 Results: Clinical Practice Variation Questionnaire

	Group	N	Mean	Mean Difference	t-value	df	Sig.
BI ¹ [Knowledge]	Experimental	8	61.44	5.44	.774	26	.45
	Control	20	66.88				
CC ² [Skill]	Experimental	8	57.7	3.8	.527	23	.60
	Control	17	61.5				
CB ³ [Behaviour]	Experimental	13	26.92	22.01	2.079	31	.046
	Control	20	48.93				

Statistical Test: t-test

Key: ¹ Better Informed about a particular clinical subject [Knowledge component]
² Consciously changed way in which clinical task is approached [Skill component]
³ Changed clinical behaviour by undertaking clinical task differently [Behaviour component]

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Surprisingly, the control group reported improved clinical practice when compared to the experimental group. Specifically, the control group reported greater improvement in knowledge [5.4%], skill [3.8%] and behaviour [22.0%].

No statistically significant difference existed between experimental and control groups for Knowledge [BI] and Skill [CC] categories. However, statistical significance existed between experimental and control groups for the Behaviour [CB] category.

Clinical practice variation questionnaire results therefore indicated that the control group had reported a significant change to their clinical practice at the point of questionnaire completion.

Potential reasons for reported change in clinical practice by the control group are discussed in Chapter 5.

4.4 Secondary Research Objectives

Maslach's Burnout Inventory

The commercially available Maslach's Burnout Inventory was administered to experimental and control group District Nurses to account for any confounding influence that burnout might have had upon this study's findings. The MBI was administered to experimental and control group District Nurses at pre-educational intervention T¹ and post-educational intervention T².

MBI results are detailed in Tables 4.4.1 and 4.4.2 below.

Table 4.4.1 Results: MBI Baseline Measurement T¹

Mann Whitney U	Emotional Exhaustion	Depersonalisation	Personal Accomplishment
Z	-.680	-.477	-.276
sig	.545	.717	.823

Results indicated that there was no statistically significant difference between experimental and control group burnout levels at baseline for categories of Emotional Exhaustion, Depersonalisation, or Personal Accomplishment.

Table 4.4.2 Results: MBI Change, T² and T¹

Mann Whitney U	Emotional Exhaustion	Depersonalisation	Personal Accomplishment
Z	-.187	-.544	-.100
sig	.877	.641	.928

Statistical Test: Mann-Whitney U Test

Furthermore, results indicated that there was no statistically significant difference between experimental and control groups in the degree of change in T² - T¹ burnout levels for categories of Emotional Exhaustion, Depersonalisation, or Personal Accomplishment.

Where results had shown statistically significant difference between experimental and control groups, value in undertaking multi-variate analysis to establish any impact of District Nurse burnout upon clinical practice was evident. However, in the circumstance where no difference was apparent, any value in undertaking multi-variate analysis to establish any impact of burnout upon clinical practice was non-evident

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Previous Development Questionnaire

The Previous Development Questionnaire was used to measure venous leg ulcer previous development experienced by experimental and control group District Nurses within the preceding two years of this study commencing and over the duration of the study period, to take account of any confounding influence that previous development might have had upon this study.

Results are detailed in Tables 4.4.3a and 4.4.3b below.

Table 4.4.3a Previous Development Questionnaire Results

Undergone Previous Development	Experimental	Control	Experimental	Control
	Time ¹	Time ¹	Time ²	Time ²
Yes	13	18	11	12
No	1	2	3	7

Results demonstrated that the majority of District Nurses had experienced similar levels of previous development.

Table 4.4.3b Results: Previous Development Change, T² and T¹

Mann-Whitney U-Test	
Z	-.639
Sig	.523

Statistical Test: Mann-Whitney U Test

Furthermore, results indicated that there was no statistically significant difference between experimental and control groups in the degree of change in T²-T¹ previous development.

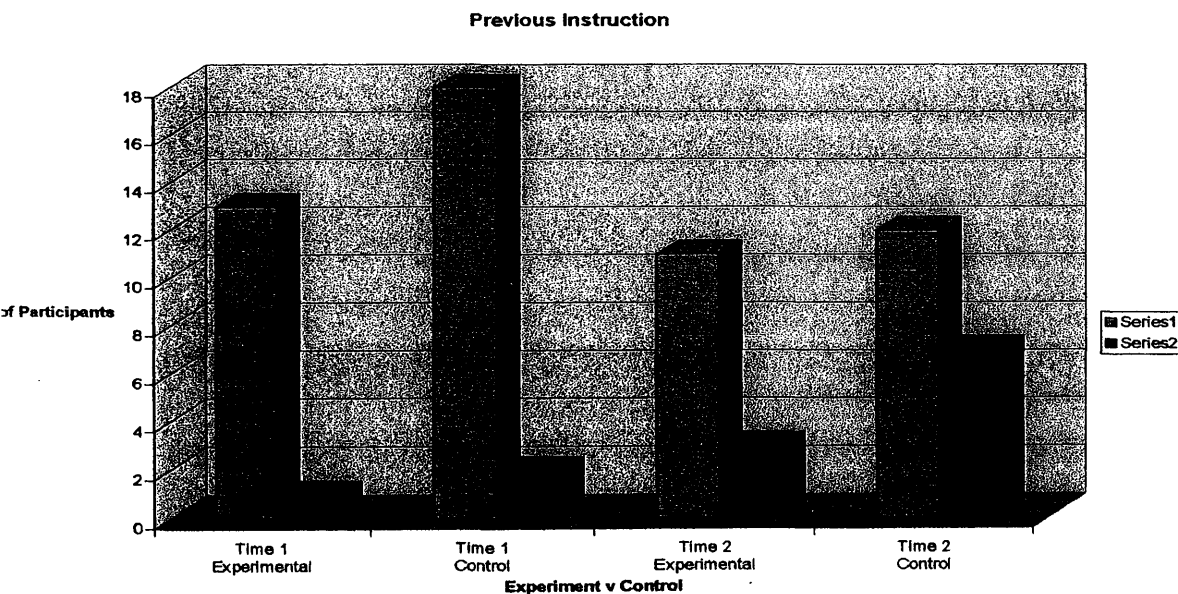
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Where results had shown disproportionate differences in T^2-T^1 previous development for experimental and control group District Nurses, value in undertaking multi-variate analysis to establish any impact of previous development upon clinical practice was evident.

However, in the circumstance where no difference was apparent, any value in undertaking multi-variate analysis to establish any impact of previous development upon clinical practice was non-evident

Graphical illustration and associated analyses are detailed in Figure 4.4.3 below.

Figure 4.4.3 Data Analysis: PDQ



The previous development questionnaire bar chart represents the number of District Nurses either having attended, or not having attended previous development. The numbers of District Nurses who had attended previous development are illustrated

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in the left column in each category. The numbers of District Nurses who had not attended previous development are recorded in the right hand column in each category.

Experimental and control categories, at pre-educational intervention T^1 and post-educational intervention T^2 , are represented by the horizontal axis. The numbers of District Nurses who had attended previous development are represented by the vertical axis.

RCN Continuing Education Examination T^2

The Royal College of Nursing Continuing Education Examination was used to measure any difference between experimental and control group T^2 - T^1 District Nurse knowledge levels.

RCNCE Examination results are detailed in Table 4.4.4 below.

Table 4.4.4 Results: RCNCE Examination, T^2 and T^1 Difference

	Mean	Std. Deviation	Mean Difference	t-value	df	sig
Experimental <i>n</i> = 14	-0.5	4.67	-2.14	0.529	32	0.60
Control <i>n</i> = 20	0.4	5.02				

Statistical Test: t-test

The results indicated that no statistically significant difference existed between experimental and control group RCNCE Examination scores between pre-educational intervention T^1 and post-educational intervention T^2 . The inference from

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this was that no statistically consistent knowledge gap existed between experimental [-0.5] and control [+0.4] groups over the study period.

Objective Structured Clinical Examination T²

The Objective Structured Clinical Examination was used to measure any difference between experimental and control group T²-T¹ District Nurse skill levels.

OSCE results are detailed in Table 4.4.5 below.

Table 4.4.5 Results: OSCE, T² and T¹ Difference

	Mean	Std. Deviation	Mean Difference	t-value	df	sig
Experimental n =14	7.75	6.13	0.65	0.37	32	0.72
Control n = 20	7.1	4.18				

Statistical Test: t-test

The results indicated that no statistically significant difference existed between experimental and control group OSCE scores between pre-educational intervention T¹ and post-educational intervention T². The inference from this was that no statistically consistent skills gap existed between experimental [+7.75] and control [+7.1] groups over the study period.

Inter-Rater Reliability/Agreement Levels

Inter-Rater Reliability/Agreement results, recorded in Table 4.4.6 below, illustrate the degree of agreement between Marker 1[the researcher] and Marker 2 [a specialist Lecturer in Wound Healing] in the marking of respective tests at pre-

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educational intervention T¹. The purpose of inter-rater comparisons was to measure the degree of reliability or agreement between Marker 1 and Marker 2 following administration of the RCNCE Examination, OSCE, Kolb's Learning Styles Inventory and Maslach's Burnout Inventory.

Table 4.4.6 Results: Inter-Rater Reliability/Agreement Level Results

	T ¹
TEST	Marker 1 v Marker 2 Agreement
RCNCE	100%
LSI	100%
MBI	100%
OSCE	86%

Agreement levels between Marker 1 and Marker 2 in respect of RCNCE Examination, Kolb's Learning Styles Inventory, and Maslach's Burnout Inventory scored 100%, which suggested Marker 1 and Marker 2 were in agreement with scores allocated against respective measurement instruments at pre-educational intervention T¹.

With regard to the OSCE, however, 86% agreement between Marker 1 and Marker 2 suggested variance in the way in which scores were allocated.

An agreement level of 86% between Marker 1 and Marker 2 was derived by dividing the total number of OSCE scores allocated by Marker 2 [$n=703$] by the total number of OSCE scores allocated by Marker 1 [$n=817$].

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The source of variance in OSCE scores between Marker 1 and Marker 2 was that the validation of OSCE-related answers required expert clinical interpretation, available only to Marker 2 [a specialist Lecturer in Wound Healing].

Table 4.4.7 provides for a more detailed analysis of inter-rater reliability/agreement results in respect of the OSCE measurement instrument.

Table 4.4.7 OSCE Inter-Rater Reliability/Agreement Level Results

Task Station	Score Availability [All Participants]	Total Scores Marker 1 [All Participants]	Total Scores Marker 2 [All Participants]
1.	170	76	61
2.	136	76	76
3.	170	33	26*
4.	170	61	55
5.	102	39	39
6.	102	74	61
7.	170	67	53
8.	272	248	215
9.	102	4	4*
10.	102	68	56
11.	34	29	24
12.	102	42	33
Total	1632	817	703

An agreement level of 86% between Marker 1 and Marker 2 required that OSCE answer sheets were scored by Marker 2 at post-educational intervention T² and that Marker 2 scores were adopted at T¹ and T² for the purpose of correct answer allocation to each District Nurse participant.

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It was deemed unnecessary that Marker 2 re-score the RCNCE Examination, Kolb's Learning Styles Inventory and Maslach's Burnout Inventory at post-educational intervention T² on the basis of 100% agreement being achieved between Marker 1 and Marker 2 at pre-educational intervention T¹.

Earlier in Sub Section 4.3 it was described that the total OSCE score available to each District Nurse ranged between 0 [minimum] and 48 [maximum]. Mean scores were 24.53 [51.1%] for the experimental group and 23.6 [49.17%] for the control group. This had indicated that a fair to moderate level of baseline skill existed for experimental and control groups.

Surprisingly, District Nurse participants generally scored inadequately for Task Station 3 [15.29%], which was concerned with venous disease awareness, and Task Station 9 [.04%], which was concerned with size measurement.

Further work was deemed necessary to establish reasons for this inadequate performance.

4.5 Results Summary

This study intended to measure the impact of two types of educational intervention on District Nurse clinical practice in venous ulceration.

Thirty-four District Nurses participated in this study that were employed within three integrated Hospital and Community NHS Trusts in South Wales who were actively engaged in the assessment and treatment of venous leg ulcers.

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Expert nurses identified an initial thirty-one assessment and treatment key tasks concerned with venous ulceration, recorded in Table 4.3.1. The same sample of expert nurses ranked ten of the thirty-one key tasks in order of perceived importance, recorded in Table 4.3.2. The design of this study was thematically based upon these ten key tasks. The ten key tasks ranged from Patient History Taking [Rank One] to Dressing Application [Rank 10].

District Nurse knowledge and skill levels needed to be identified at the outset of this study to avoid any potential influence that baseline knowledge and skill had on the outcome of the experimental and control educational interventions and to form the basis of identified training needs in experimental educational intervention design.

Knowledge levels were measured using the RCNCE Examination. Skill levels were measured using the Objective Structured Clinical Examination.

RCNCE Examination results, recorded in Table 4.3.3, established that there were similar knowledge levels between experimental and control group District Nurses at pre-educational intervention T¹.

Objective Structured Clinical Examination results, recorded in Table 4.3.4, established that there were similar skill levels between experimental and control group District Nurses at pre-educational intervention T¹.

To assist in the design of the experimental educational intervention, District Nurse training needs and preferred learning styles were identified.

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Subjects that generally scored <40% in RCNCE Examination and OSCE measurements formed the basis of identified training needs. Table 4.3.5. illustrates that from twenty-one RCNCE Examination questions and twelve OSCE Task Stations, subjects that generally scored <40% were: skin care; bandaging technique; patient history taking; venous disease awareness; arterial disease awareness; wound size measurement; and doppler application. The experimental educational intervention was designed to take account of identified training needs based upon subjects that generally scored <40%.

Kolb's Learning Styles Inventory was used to identify experimental and control group learning styles. The results, recorded in Figure 4.3.6, illustrate that the majority of experimental group learning styles fell within categories of Assimilator and Diverger. The experimental educational intervention was designed to take account of majority reported learning styles.

To measure the impact of the experimental and control educational interventions on post-educational intervention clinical practice, the clinical practice variation questionnaire was used.

Clinical practice variation questionnaire results, detailed in Table 4.3.6, illustrate that control group District Nurses surprisingly and contrary to this study's hypothesis, generally demonstrated improved clinical practice when compared to the experimental group.

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The design of this study took into account burnout and previous development as potential confounding variables upon this study's findings.

The results of Maslach's Burnout Inventory, detailed in Tables 4.4.1 and 4.4.2, illustrate that for categories of Emotional Exhaustion, De-Personalisation and Personal Accomplishment, there was no statistically significant difference between experimental and control group District Nurses at either pre-educational intervention T¹ or post-educational intervention T², suggesting similar burnout levels for each group.

Previous Development Questionnaire results, detailed in Table 4.4.3a and Table 4.4.3b, illustrate that the majority of District Nurses had experienced previous development at pre-educational intervention T¹ and post-educational intervention T², suggesting similar previous development activity for each group.

District Nurse knowledge and skill levels were again measured at post-educational intervention T² using the RCNCE Examination and Objective Structured Clinical Examination measurement instruments. The purpose of measuring post-educational intervention knowledge and skills was to establish the relationship between any improvement in experimental group clinical practice with any improvement in post-educational intervention knowledge and skills.

RCNCE Examination and Objective Structured Clinical Examination results, illustrated in Tables 4.4.4 and 4.4.5, demonstrated no statistically significant difference in experimental and control group results over T¹ and T².

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Earlier it was reported that no improvement in experimental group clinical practice was evident. In this circumstance it was considered unnecessary to attempt to establish any association between experimental group clinical practice and post-educational intervention knowledge and skills.

Inter-Rater Reliability/Agreement results, detailed in Tables 4.4.6 and 4.4.7, illustrate that RCNCE Examination, Kolb's Learning Styles Inventory, and Maslach's Burnout Inventory measurement instruments each scored a 100% degree of agreement between Marker 1 and Marker 2.

The Objective Structured Clinical Examination, however, scored an 86% level of agreement, which suggested a degree of unreliability or disagreement in the way in which marks were allocated by Marker 1 and Marker 2 in respect of answers recorded by each District Nurse, and that in such circumstances, Marker 2 scores were adopted at T¹ and T² for the purpose of correct answer allocation to each District Nurse participant.

With an understanding of this study's primary research objectives, study design, secondary research objectives, study sample, measurement instruments, procedure, ethical approval, and study results, Chapter 5 provides for discussion around this study's findings within the context of this study's hypothesis and associated literature.

Chapter 5. Discussion

5.1 Introduction

A review of the literature had identified venous ulceration as prevalent within society. Based upon Bosanquet [1992] and Moffatt and Oldroyd [1994] estimations, between 70,000 to 100,000 of the U.K. population experience venous ulceration.

Bosanquet [1992] estimated the total cost of treating venous leg ulcers in the U.K. to be in the range of £230 million to £400 million per annum at 1991 prices with the implication that costs were likely to be higher at 2006 prices.

Bosanquet [1994] reported a growing awareness that the problem of leg ulceration is extremely expensive and that the impact of leg ulceration significantly impacted upon the nursing profession, as well as other aspects of health care.

Callam [1992] estimated that leg ulceration affects the earning capacity of 40% of this patient population, with 42% of patients with venous ulceration thought to have moderate or severe limitation in daily activities.

Franks and Moffatt [1998] concluded that leg ulceration has a major impact upon patients' quality of life as determined by the Nottingham Health Profile.

District Nurses were identified as the predominant profession engaged in treating venous ulceration within the U.K. [Cornwall, 1986; Bosanquet, 1992; Morrison and Moffatt, 1994; Moffatt and Dorman, 1995; Mallett and Dougherty, 2000].

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Limitations in District [and other] nurses' clinical practice abilities associated with venous ulceration were reported [O' Connor, 1993; Ozcan and Shukla, 1993; Bell, 1994; Jones and Moffatt, 1997; Periton, 1998; Roberts, 1998; Coulliet *et al*, 2001; Haram *et al*, 2003; Haram and Dagfinn, 2003].

Cullum *et al* [2000] reported that valuable research-based efforts have been made to establish the most effective methods of assessing and treating venous ulceration, while less is known about the design of venous leg ulcer educational interventions and the degree to which educational interventions impact upon venous leg ulcer clinical practice.

This study sought to help fill this research gap. It aimed to investigate the hypothesis that a structured educational intervention, designed around evidence-based educational principles, would positively impact upon clinical practice for District Nurses engaged in the assessment and treatment of venous leg ulcers.

To consider further the prospect of researching into educational interventions concerned with venous ulceration, a literature search was undertaken to identify and review evidence-based principles in educational intervention design.

Salas and Cannon-Bowers [2001], in a systematic review of the literature concerned with understanding educational principles in the design and delivery of educational interventions, reported that influential theories had been developed over the past decade. For example, Tannenbaum *et al* [1993] provided an integrative framework for all the variables that influence the design and delivery of training interventions.

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These included: antecedent training characteristics, including individual learner characteristics; motivation to learn; induction; training methods and instructional strategies, including specific learning approaches, learning technologies and distance learning, simulation-based training and games, and team training.

With regard to specific learning approaches, Salas and Cannon-Bowers [2001] described that traditionally, training researchers have investigated how to optimise learning and retention by manipulating feedback, practice intervals, reinforcement schedules, and other conditions within the learning process itself.

The authors further described that attention had also been focused on collaborative learning, whereby trainees are trained in groups, not necessarily to perform a team task. The idea being that there are features of group interaction that benefit the learning process [e.g. the opportunity for vicarious learning or interaction with peers].

Salas and Cannon-Bowers [2001] acknowledged, however, that one of the most important principles in educational design is the identification of training needs.

Garity [1985] described how a rich area of educational theory could be found in the literature on learning styles. The author stated, however, that little is known about the application of learning styles within nurse education, an assertion supported by a contemporary literature review undertaken by the researcher [Table 2.6.1]

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Garity [1985] argued that particularly as learning theory is empirically sound and theoretically useful, it should be adopted as a framework for on-going curriculum development in nurse education.

To further explore the concepts of identified training needs and learning styles and their applicability within the context of this study, a review of the literature was undertaken by the researcher.

The identification of training needs and learning styles were frequently cited as two recurrent evidence-based educational principles relevant to effective educational intervention design [Shepherd, 1995; Hicks *et al*, 1996; Pedder, 1998; Petty, 1998; Salas and Cannon-Bowers, 2001; Garity, 1985; Hodges, 1988; Marshall and Merritt, 1986; Filomena, 1982; Smith and Kolb, 1985; Newble and Cannon, 1987; Kenney and Reid, 1988; Anderson and Adams, 1992; Henry, 1997; Linares, 1999; Reid and Barrington, 1999; Wessel *et al*, 1999; Titiloye and Scott, 2001; Jones *et al*, 1997; Janing, 2001; Bonacci, 1999].

Despite clear evidence to indicate: high U.K. venous leg ulcer prevalence; high financial costs; causation of social impairment; potential limitations in District and Community nurse clinical practice; and the benefits of applying identified training needs and learning styles in the design of educational interventions, a paucity of studies aimed at investigating this type of educational intervention upon venous leg ulcer clinical practice was evident.

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Six primary research objectives and associated research methods were designed to investigate this study's hypothesis. Four secondary research objectives and associated research methods were designed to investigate issues of collateral interest to the full study.

The main conclusion to be drawn from this study was that the hypothesis of experimental group District Nurses demonstrating positive clinical practice over control group District Nurses was, at a statistical level, not supported.

Reasons as to why the experimental group failed to demonstrate positive clinical practice when compared to the control group required further work. However, at least three potential reasons could be suggested for this.

The first potential reason was that this study was underpowered, with the implication that the results of this study need to be treated with caution. The second potential reason was that this study was non-sensitive to capturing change in clinical behaviour between experimental and control groups. The third reason was that conditions concerned with barriers to learning and the transfer of learning to the clinical environment had presented.

Surprisingly, clinical practice questionnaire results demonstrated improved clinical practice in the control group compared to the experimental group and that in such circumstances, this phenomenon required further investigation.

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Consequences of this study's findings may also be that the theory of targeted education concerned with identified training needs and learning styles may not be borne out in practice.

Concepts of barriers to learning and transfer of learning as two potential reasons why the experimental group failed to demonstrate positive clinical practice when compared to the control group are discussed later in this Chapter.

First, however, results concerned specifically with this study's primary and secondary research objectives are discussed.

5.2 Primary Research Objectives

Key Tasks

Primary research objective No. 1 was to identify key tasks for District Nurses concerned with the assessment and treatment of venous leg ulcers. This would allow that this study be thematically designed according to key tasks considered important by a sample of perceived expert nurses in this research area.

The Delphi Technique used in this study, described by Williams and Webb [1994] as an effective method for providing consensus of expert opinion, identified ten key tasks concerned with the assessment and treatment of venous leg ulcers ranging from Patient History Taking [Rank 1] to Dressing Application [Rank 10], detailed in Tables 4.3.1 and 4.3.2.

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Whilst Williams and Webb [1994] described the Delphi Technique as an effective method of providing consensus of expert opinion, with reported qualities of high validity, the literature search had failed to identify studies relevant to venous leg ulcer key task data capture adopting the Delphi method.

Furthermore, the literature search had failed to identify studies concerned with venous leg ulcer key task data capture whereby evidence of reliability qualities were reported.

Where the literature search had failed to identify studies relevant to venous leg ulcer key task data capture, no guarantee could be given that the same key tasks recorded by expert nurses in this study would be reported by the same sample of experts on a separate occasion, or by an alternative sample of expert nurses.

Nevertheless, the results provided a useful benchmark of expert opinion [as recommended by Goodman, 1987] into District Nurse key tasks concerned with the assessment and treatment of venous leg ulcers.

RCN Continuing Education Examination T¹

Primary research objective No. 2 was to measure pre-educational intervention District Nurse knowledge [and skill] concerned with venous leg ulceration, by experimental and control group.

The purpose of measuring pre-educational intervention knowledge was to eliminate any potential influence of baseline knowledge on the outcome of experimental and

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control educational interventions. Furthermore, the purpose of measuring pre-educational intervention knowledge was to identify any gap in knowledge for the experimental group.

The examination method was earlier described as presenting in many different forms. This study used the written RCNCE Examination to measure knowledge. Whilst the examination paper was not specific to key tasks identified by expert nurses, its content was considered adequately suitable to this study because of the relevance of questions included within the examination paper to key tasks identified by expert nurses.

Table 3.5.1 detailed construct validity, reliability and practicability concepts concerned with the RCNCE Examination.

Results reported in Table 4.3.3 identified that a level knowledge baseline existed for pre-educational intervention experimental and control groups.

Each group scored fair to moderate only in venous leg ulcer knowledge, using the RCNCE Examination [experimental mean score = 16.21 [45%], control group mean score = 17.45 [48.47%]]. Total score availability by experimental and control group was 36. Experimental and control groups achieved < 50% of the total score available at the pre-educational intervention stage.

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Knowledge results for experimental and control groups in this study reflected the results reported by Jones and Nelson [1997], where the pre-educational intervention mean score was reportedly 25 [40.32%].

Similarly, knowledge results in this study reflected the results of pre-educational intervention scores reported by Luker and Kenrick [1995], where the pre-educational intervention mean score was reportedly 26 [42%] and Wong [2003], where the pre-educational intervention mean score was reportedly 10.3 [34%].

The results of this investigation supported the concerns of Haram *et al* [2003], Lorimer *et al* [2003], Coulliet *et al* [2001], Periton [1998], Roberts [1998], Dowsett [1997], Thompson [1996], Closs and Cheater [1994], and Ozcan and Shukla [1993], who each described limitations in District and Community nurse knowledge concerned with the assessment and treatment of leg ulceration.

Furthermore, the results of this investigation supported the concerns of Wong [2003], Jones and Nelson [1997] and Luker and Kenrick [1995], who each expressed great concern over poor Community Nurse knowledge relating to leg ulcer management.

Sub Section 4.4 reported that the majority of experimental and control group District Nurses had undergone educational activity over the two-year period preceding pre-educational intervention T¹ and that in this circumstance, knowledge levels may have been predictably higher at the point of pre-educational intervention T¹ measurement.

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District Nurse educational activity concerned with venous ulceration was, however, confined to limited aspects of venous leg ulcer assessments and treatments, failing to capture the majority of assessment and treatment tasks identified by the twenty-two expert nurses.

Evidence of inadequate District Nurse knowledge achievement in this study has the potential to cause concern for the nursing profession, service managers and service users.

Furthermore, evidence of inadequate District Nurse knowledge achievement in this study helped substantiate the need for continued interest in educational interventions designed to improve clinical practice [Davis *et al* 1995 and Davis *et al* 2003].

Pre-educational intervention knowledge measurement using the RCNCE Examination formed the basis for the identification of experimental group District Nurse training needs, discussed later in this Chapter.

Objective Structured Clinical Examination T¹

Primary research objective No. 2 was to measure pre-educational intervention District Nurse skill [and knowledge] concerned with the assessment and treatment of venous leg ulcers, by experimental and control group.

The purpose of measuring pre-educational intervention skill was to eliminate any potential influence of baseline skill on the outcome of experimental and control

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educational interventions. Furthermore, the purpose of measuring pre-educational intervention skill was to identify any gap in skills for the experimental group.

The literature search had failed to identify any method aimed at measuring skill concerned with the assessment and treatment of venous ulceration.

Harden and Gleeson [1979] cited the Objective Structured Clinical Examination as a procedure designed to assess the clinical competence of individuals.

Where the literature search had failed to identify any method aimed at measuring skill associated with the assessment and treatment of venous ulceration, a venous leg ulcer-specific OSCE was constructed to measure District Nurse venous leg ulcer skills in this study.

Table 3.5.3 described concepts of construct validity, reliability and practicability applicable to the specifically constructed Objective Structured Clinical Examination.

Where the literature had failed to identify reference to District Nurse skill concerned with the assessment and treatment of venous ulceration, data reported in this study is potentially unique.

Results identified in Table 4.3.4 demonstrated that a level skills baseline existed for pre-educational intervention experimental and control groups.

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Each group scored fair to moderate only in venous leg ulcer skills, using the Objective Structured Clinical Examination [experimental group mean score = 24.54 [51.13%], control group mean score = 23.6 [49.17%]]. Total score availability by experimental and control group was 48. Experimental and control groups achieved approximately 50% of the total score available at pre-educational intervention T¹.

Evidence of inadequate attainment again has the potential to cause concern for the nursing profession, service managers and service users.

Sub Section 4.4 reported that the majority of experimental and control group District Nurses had undergone educational activity over the two-year period preceding pre-educational intervention T¹.

Where District Nurses had undergone educational activity, District Nurse skills may have been predictably higher at the point of pre-educational intervention T¹ measurement.

District Nurse educational activity was, however, confined to limited aspects of venous leg ulcer assessments and treatments, failing to capture the majority of assessment and treatment tasks identified by expert nurses.

Pre-educational intervention skill measurement using the Objective Structured Clinical Examination formed the basis for the identification of experimental group District Nurse training needs, discussed later in this Chapter.

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Knowledge, Skills & Training Needs Identification

Primary research objective No. 3 was to interpret RCNCE Examination [knowledge] and Objective Structured Clinical Examination [skill] results in the form of identified training needs and to apply training needs within the context of the experimental educational intervention.

The purpose of interpreting knowledge and skill results in the form of identified training needs was to establish experimental group knowledge and skill gaps concerned with the assessment and treatment of venous leg ulcers.

The purpose of applying identified training needs within the context of the experimental educational intervention was to design a venous leg ulcer experimental educational intervention that took account of experimental group District Nurse knowledge and skill gaps.

Table 4.3.5 recorded training needs for experimental group District Nurses resulting from RCNCE Examination and Objective Structured Clinical Examination measurement.

The experimental educational intervention was designed explicit to seven out of the ten key tasks identified as scoring <40% by experimental group District Nurses using RCNCE Examination and Objective Structured Clinical Examination measurement instruments. Three out of the ten key tasks that scored $\geq 40\%$ were excluded from experimental educational intervention design due to $\geq 40\%$ being the typical pass mark in this study.

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Furthermore, the experimental educational intervention was weighted according to the importance of each of the seven key tasks identified by twenty-two expert nurses using the Delphi 2nd Round Expert [Follow-Up] Questionnaire.

Sub Section 3.5 described that the literature search had failed to identify any specific method aimed at interpreting knowledge and skill results in the form of identified training needs or applying training needs within the context of the experimental educational intervention.

This study used a purposely constructed "Knowledge and Skills Translator" to interpret knowledge and skill results in the form of identified training needs and to apply training needs within the context of the experimental educational intervention.

Kolb's Learning Styles Inventory T¹

Primary research objective No. 4 was to identify types of learning style for pre-educational intervention experimental and control group District Nurses.

Primary research objective No. 5 was to apply learning styles within the context of the experimental educational intervention.

The importance of acknowledging learning styles generally within student populations was reported by Kolb [1979], Garity [1985], Kenney and Reid [1988], Henry [1997], Reid and Barrington [1999], Wessel [1999] and Titiloye and Scott [2001].

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The literature search had identified Kolb's Learning Styles Inventory [Smith and Kolb, 1985] appropriate to the identification of District Nurse learning styles [Titiloye and Scott, 2001; Wessel *et al*, 1999; Hodges, 1988; Newble and Cannon, 1987; Marshall and Merritt, 1986; and Filomena, 1982].

This study used Kolb's Learning Styles Inventory to identify experimental and control group District Nurse learning styles prior to experimental and control educational intervention design.

The purpose of applying learning styles within the context of the experimental educational intervention was so that the intervention took account of experimental group District Nurse preferred learning styles.

The purpose of identifying learning styles for pre-educational intervention control group District Nurses was so that learning styles could be discounted for control educational intervention design.

Learning Styles Inventory results, reported in Figure 4.3.6, indicate that Assimilator [$r = 42.9\%$] and Diverger [$r = 28.6\%$] learning styles were dominant in experimental group District Nurse participants.

Where Assimilator and Diverger learning styles were dominant in experimental group District Nurse participants, these learning styles were applied in the design of the experimental educational intervention.

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Experimental group District Nurse learning styles of Accommodator [r =14.3%] and Converger [r =14.3%] were discounted for the purpose of experimental educational intervention design.

Control group District Nurse learning styles, reported in Figure 4.3.6, indicate that this group had similar learning style profiles to experimental group District Nurses. Control group learning styles were discounted for the purpose of the control educational intervention.

Rationally, the experimental intervention was designed according to 71.5% of experimental group District Nurse responses to Kolb's Learning Styles Inventory. Residually, 28.5% of responses were discounted in the design of the experimental educational intervention.

Table 3.7.1 detailed rationale for the discounting of minority learning styles in the experimental group.

Table 4.3.5.a illustrated that no significant difference existed in mean scores [knowledge and skill] for experimental group District Nurses who received the experimental educational intervention which was designed to take account of preferred learning styles compared with experimental group District Nurses who received the experimental educational intervention which was designed to discount preferred learning styles.

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Clinical Practice Variation

Primary research objective No. 6 was to measure post-educational intervention clinical practice concerned with the assessment and treatment of venous leg ulcers by experimental and control group.

The purpose of measuring post-educational intervention clinical practice was to test this study's hypothesis that a structured educational intervention, designed around evidence-based educational principles, would positively impact upon clinical practice for District Nurses engaged in the assessment and treatment of venous leg ulcers.

This study used the purposely-constructed clinical practice variation questionnaire to measure post-educational intervention clinical practice.

The reason why this study used a purposely-constructed questionnaire, rather than for example, the validated reported practice questionnaire described by Luker and Kenrick [1995], was that this study's clinical practice variation questionnaire was constructed to take into account the ten key tasks identified by expert nurses.

Results concerned with post-educational intervention experimental and control group clinical practice are reported in Table 4.3.6

Surprisingly, the control group reported improved clinical practice when compared to the experimental group. Specifically, the control group reported greater improvement in knowledge [5.4%], skill [3.8%] and behaviour [22.0%].

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No statistically significant difference existed between experimental and control groups for Knowledge [BI] and Skill [CC] categories. However, statistical significance existed between experimental and control groups for the Behaviour [CB] category.

Clinical practice variation questionnaire results therefore indicated that the control group had reported a significant change to their clinical practice at the point of questionnaire completion.

This study's hypothesis was therefore not supported. Potential reasons for this are discussed later in this Chapter.

5.3 Secondary Research Objectives

Maslach's Burnout Inventory

Secondary research objective No. 1 was to measure burnout in experimental and control group District Nurses at pre-educational intervention T¹ and post-educational intervention T².

Maslach *et al* [1996] described burnout as a syndrome of emotional exhaustion, depersonalisation, and reduced personal accomplishment, which can occur among individuals who work with people in some capacity. The authors described the Human Services Survey Maslach's Burnout Inventory [HSSMBI] as a valid and reliable measurement instrument appropriate to measuring burnout.

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Table 3.6.1 described concepts of construct validity, reliability and practicability concerned with Maslach's Burnout Inventory measurement instrument.

Results reported in Table 4.4.1 and Table 4.4.2 indicate that experimental and control groups had similar pre and post-educational intervention burnout profiles in the three categories of emotional exhaustion, de-personalisation and personal accomplishment. Where both groups had demonstrated similar burnout profiles, any confounding influence of burnout on post-educational intervention clinical practice was non-evident. Furthermore, any confounding influence between pre and post-educational intervention burnout and District Nurse knowledge and skill was non-evident.

Generally, levels of emotional exhaustion amongst experimental and control group District Nurses were high to medium according to calculations derived from the MBI Score Chart, elevating the potential for concern amongst incumbents, service managers and service users. Levels of de-personalisation were low, conceivably something to be anticipated for individuals employed in the patient care environment. Levels of personal accomplishment were low to medium, again elevating the potential for concern amongst incumbents, service managers and service users.

Levels of emotional exhaustion and personal accomplishment amongst experimental and control group District Nurses justifies further investigation.

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Previous Development Questionnaire

Secondary research objective No. 2 was to measure the level of previous development for experimental and control groups at pre-educational intervention T¹ and post-educational intervention T².

Previous development was earlier defined as some type of formal or informal training or development that had taken place over the two-year period prior to the study commencing and over the study reference period.

Results reported in Table 4.4.3a and Table 4.4.3b, and illustrated in Figure 4.4.3 indicate that the majority of experimental and control group District Nurses had undergone previous development to a comparable level.

Any confounding influence between post-educational intervention previous development and that of clinical practice between experimental and control groups was non-evident.

Furthermore, any confounding influence between pre and post-educational intervention previous development and that of District Nurse knowledge and skill was non-evident.

RCN Continuing Education Examination T²

Secondary research objective No. 3 was to compare experimental and control group District Nurse knowledge [and skill] over pre-educational intervention T¹ and post-educational intervention T².

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Results indicated that no statistically significant difference existed between experimental and control group RCNCE Examination scores between pre-educational intervention T¹ and post-educational intervention T². The inference from this was that no statistically consistent knowledge gap existed between experimental [-0.5] and control [+0.4] groups over the study period.

Furthermore, results indicated that no demonstrable change in venous leg ulcer knowledge was evident in either group. Pre-intervention and post-intervention mean scores for the experimental group were 16.21 [45%] and 15.71 [43.64%] respectively. Pre-intervention and post-intervention mean scores for the control group were 17.45 [48.47%] and 17.85 [49.53%] respectively.

Jones and Nelson [1997] and Luker and Kenrick [1995] reported on studies designed to identify pre and post educational intervention knowledge scores concerned with venous leg ulceration. However, results of these studies were reported in terms of the difference in pre and post-educational intervention scores, where scores were totalled for the sub sections on assessment, treatment and knowledge

Wong [2003] undertook a study involving forty-two Community Nurses, to examine the effect of a teaching programme on Community Nurses' knowledge of leg ulcer management. Pre and post-educational intervention knowledge scores were obtained by totalling responses to each of the four sections of the knowledge questionnaire. Knowledge scores were reported to increase from

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10.3 [34%] to 20.4 [68%] following a three-hour educational intervention. Total score availability was thirty.

The increase in post-educational intervention knowledge scores from 10.3 [34%] to 20.4 [68%] cited by Wong [2003], were not reflected in post-educational intervention knowledge scores using the RCNCE Examination measurement instrument in this study.

Potential explanations for the significant increase in post-intervention knowledge scores identified by Wong [2003] compared to post-intervention knowledge scores in this study were that Wong's study was: more representative of the District/Community Nurse population generally; study design was different to this study and was based upon interventions which took no account of identified training needs and learning styles; and Wong's study identified a pre-educational intervention knowledge score of 34%, compared to a 45% pre-educational intervention knowledge score in this study.

The implication of this being that nurse participants in Wong's study had a lower knowledge base at the pre-educational intervention stage compared to nurse participants in this study.

Caution must exist, however, in comparing values between different studies. The study by Wong [2003] by its very nature used a different scoring method to that used in this study with the consequence that like for like comparisons could not accurately be made.

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Earlier in this Chapter it was described that experimental and control group District Nurses contained similar pre and post-intervention burnout and previous development profiles. Any confounding association between pre and post-intervention burnout, previous development and knowledge was therefore non-evident.

It remained plausible that other factor[s] had emerged to limit post-intervention knowledge score achievement for experimental group District Nurse participants. Factors potentially limiting post-intervention knowledge score achievement for experimental group District Nurses are discussed later in this Chapter.

Objective Structured Clinical Examination T²

Secondary research objective No. 3 was to compare experimental and control group District Nurse skill [and knowledge] over pre-educational intervention T¹ and post-educational intervention T².

Results indicated that no statistically significant difference existed between experimental and control group OSCE scores between pre-educational intervention T¹ and post-educational intervention T². The inference from this was that no statistically consistent skills gap existed between experimental [+7.75] and control [+7.1] groups over the study period.

Objective Structured Clinical Examination results improved, however, for experimental [16.15%] and control [14.79%] groups over the study period, with

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marginal enhanced improvement by experimental group over the control group [1.36%].

One inference to be drawn from improved Objective Structured Clinical Examination results over RCNCE Examination results was that the OSCE was specifically designed to measure key tasks upon which educational interventions were designed in this study.

Conversely, the RCNCE Examination, whilst chosen for its relevance to venous ulceration, was not specifically designed according to identified key tasks by expert nurses.

No previous studies were identified to compare with the results of this study.

Earlier in this Chapter it was described that experimental and control group District Nurses contained similar pre and post-educational intervention burnout and previous development profiles. Any confounding association between pre and post-educational intervention burnout and previous development upon OSCE [skill] results was, therefore, non-evident.

Where any confounding association between pre and post-educational intervention burnout and previous development upon District Nurse skill was non-evident, it remained plausible that some other factor[s] had emerged to restrict improvement in experimental group OSCE scores to a similar level found in the control group.

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Factors potentially limiting post-educational intervention skill score achievement for experimental group District Nurses are discussed later in this Chapter

Inter-Rater Reliability/Agreement Levels

Secondary research objective No. 4 was to measure inter-rater reliability/agreement, detailing the level of agreement between scores allocated to: RCNCE Examination; Kolb's Learning Styles Inventory; Maslach's Burnout Inventory; and OSCE measurement instruments for experimental and control group District Nurses at pre-educational intervention T¹ by Examiner 1 [the researcher] and Examiner 2 [a specialist lecturer in wound healing].

Inter-rater reliability/agreement results in respect of RCNCE Examination, Kolb's Learning Styles Inventory, and Maslach's Burnout Inventory measurement instruments were predictably high. Agreement in respect of the OSCE measurement instrument was predictably uncertain.

The basis for such predictability lay in the existence of precise non-interpretative scoring methods for RCNCE Examination, Kolb's Learning Styles Inventory and Maslach's Burnout Inventory measurement instruments.

The OSCE measurement instrument, whilst designed with accompanying correct answers, was open to interpretation, requiring clinical judgement by the Marker 2 clinical expert.

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Inter-rater reliability results, detailed in Table 4.4.6 demonstrated 100% agreement between Marker 1 and Marker 2 in respect of: RCNCE Examination; Kolb's Learning Styles Inventory; and Maslach's Burnout Inventory measurement instruments.

OSCE results, detailed in Tables 4.4.6 and 4.4.7 demonstrated 86% agreement, which required that OSCE papers were again scored by Marker 2 at pre-educational intervention T¹ and post-educational intervention T² and that Marker 2 scores were adopted at pre-educational intervention T¹ and post-educational intervention T² for the purpose of correct answer allocation to each experimental and control group District Nurse.

5.4 General Discussion

This study hypothesised that a structured educational intervention, designed around evidence-based educational principles, would positively impact upon clinical practice for District Nurses engaged in the assessment and treatment of venous leg ulcers.

To test this hypothesis, the experimental educational intervention was designed to take account of District Nurse identified training needs and learning styles whereby the control educational intervention was designed to discount District Nurse identified training needs and learning styles.

Identified training needs were measured using the RCNCE Examination and Objective Structured Clinical Examination measurement instruments.

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Learning styles were measured using the commercially available Kolb's Learning Styles Inventory measurement instrument.

Burnout and previous development in experimental and control group District Nurses at pre-educational intervention T¹ and post-educational intervention T² were accounted for as potential confounding variables upon the results of this study, measured using the commercially available Maslach's Burnout Inventory and purposely constructed previous development questionnaire.

This study's hypothesis was based on the principle that RCNCE Examination and Objective Structured Clinical Examination results would improve over T¹ and T² for experimental group District Nurse participants, compared with the control group.

RCNCE Examination and Objective Structured Clinical Examination results, reported in Tables 4.4.4 and 4.4.5 indicated that no statistically significant difference existed between experimental and control group scores over T¹ and T².

Furthermore, RCN and OSCE results, reported in table 4.3.5.a indicated that no statistically significant difference existed between experimental group District Nurses who received the experimental educational intervention which was designed to take account of preferred learning styles compared with experimental group District Nurses who received the experimental educational intervention which was designed to discount preferred learning styles over T¹ and T².

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Maslach's Burnout Inventory results, reported in Table 4.4.2, indicated that no statistically significant difference existed between experimental and control groups in the degree of change in T²-T¹ District Nurse burnout for categories of: emotional exhaustion; depersonalisation; and personal accomplishment.

Previous development results, reported in Table 4.4.3b, indicated that no statistically significant difference existed between experimental and control groups in the degree of change in T²-T¹ District Nurse previous development.

Where RCNCE Examination and Objective Structured Clinical Examination scores were to indicate significant improvement over T¹ and T² for experimental group District Nurse participants, a significant improvement in clinical practice scores for the experimental group compared with the control group was predicted.

Where RCNCE Examination and Objective Structured Clinical Examination results showed no significant improvement in experimental group scores over T¹ and T², no improvement in clinical practice scores for the experimental group compared to the control group was predicted.

Clinical practice questionnaire results, reported in Table 4.3.6, indicated that control group District Nurses unpredictably demonstrated positive clinical practice when compared to the experimental group.

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This Sub Section begins with a discussion of potential barriers to learning that may have impacted upon RCNCE Examination and Objective Structured Clinical Examination scores between experimental and control groups in this study.

Further, this Sub Section considers principles of learning transfer concerned with clinical practice and the implications of study design/research limitations upon this study's findings.

Barriers to Learning

A number of studies have drawn attention to potential barriers in effective learning. Each are relevant to this study in that they offer possible explanations, either in combination or alone, as to why experimental and control group District Nurses failed to demonstrate improved knowledge between pre-educational intervention baseline measurement and post-educational intervention follow-up measurement, or why experimental group District Nurse participants failed to demonstrate improved knowledge and skill when compared to the control group.

Sullivan [1978] described that nurses, amongst other health professionals, have been tested extensively for deference using the Edwards Personal Preference Schedule. Deference is concerned with the degree to which individuals demonstrate polite respect for each other, whereby challenging and assertive encounters are generally avoided. The author suggested that deference was found to be dominant generally amongst nurses.

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The experimental educational intervention in this study was designed to be interactive and challenging. The control educational intervention was designed to be didactic. Where experimental group District Nurse deference levels were unmeasured, the ability of the experimental group to be interactive and challenging, rather than didactic and passive, remained unchallenged. The potential consequence of this being that experimental group district nurses, whose deference levels may or may not have been dominant, failed to gain maximum benefit from an interactive and challenging educational intervention.

Mackereth [1990] sought to establish whether developmental influences on nurses' motivation for continuing education existed. Ninety second-year nursing students and eighty-nine staff nurses in three London Teaching Hospitals were required to complete a questionnaire concerned with developmental influences and motivation.

The author reported that neither group was overwhelmingly enthusiastic about continuing professional development. In this study fifty-four per cent of staff nurses and students rated continuing professional development as very important.

The motivation of District Nurses to attend experimental and control educational interventions was unmeasured in this study. The potential consequence of this being that experimental group district nurses, whose motivation levels may or may not have been overriding compared to the control group, failed to gain maximum benefit from the experimental educational intervention.

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Broad and Newstrom [1992] cited Newstrom [1986], who identified barriers to knowledge and skill acquisition in the training environment, including: the existence of a non-supportive organisational culture; trainees perceptions of impractical training programmes; trainees perceptions of irrelevant training content; trainees discomfort with change and associated effort; trainees perceptions of poorly designed/delivered training; and pressures from peers to resist change. Barriers to knowledge and skills acquisition identified by Newstrom [1986] were unmeasured in this study.

The potential effects of this being that experimental group District Nurses may or may not have experienced a positive organisational culture, optimistic perceptions of training content and delivery, discomfort with change and associated effort, or pressures from peers to resist change.

It was therefore unclear as to whether any of the variables cited by Newstrom [1986] had prohibited post-educational intervention knowledge and skills acquisition either for experimental or control group District Nurses.

Stocking [1992] expressed that respect by students for those delivering the educational intervention must exist if education is to be effective in changing behaviour.

Experimental and control educational interventions were delivered by one specialist lecturer and two specialist research nurses employed from within a prestigious academic and treatment centre concerned with wound healing. Respect for the

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specialist lecturer and two specialist nurses by District Nurse participants attending experimental and control educational interventions was not measured in this study.

The potential outcome of this being that experimental group district nurses, whose respect for those delivering the educational intervention may or may not have been overriding compared to the control group, potentially failed to gain maximum benefit from the experimental educational intervention.

Chau *et al* [2001] reported on potential benefits of incorporating vignettes into educational programmes intended to maximise upon student learning through the inclusion of interactive dimensions in the student-learning environment.

A pre-test/post-test design was employed to determine the effectiveness of videotaped vignettes in promoting critical thinking skills among students. A final sample of eighty-three students completed all pre-test and post-test questions on critical thinking skills and nursing knowledge test specific to the vignette.

The findings indicated that students' post-test knowledge scores were significantly higher than pre-test knowledge scores.

This study incorporated a three-case vignette into experimental educational intervention design to assist the critical thinking abilities for experimental group District Nurses. The desired outcome being that critical thinking, partly acquired through the three-case vignette, would enhance the experimental group's learning experience with positive consequences for RCNCE Examination, Objective Structured Clinical Examination and clinical practice questionnaire results.

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Chau *et al* [2001] observed that allowing more time for students to adapt to the vignette method of critical thinking facilitation might have been beneficial to post-test critical thinking test scores compared to those of the pre-test scores for students.

Limited exposure of District Nurse participants to the vignette method in this study may have had limiting effects upon knowledge and skill acquisition as identified by Chau *et al* [2001].

Atkins [2002] described how practitioners involved in health and social care had largely overlooked emotional dimensions of learning. Emotional processes are crucial in learning since they involve the development of ownership and the ability to convert learning into clinical practice.

Atkins [2002] further described that motivation to learn can be affected by a number of factors, including: natural disposition and curiosity; anticipation of desirable outcomes; having confidence that such outcomes are attainable; having confidence in one's own learning abilities; and being able to cope with instances where unlearning may need to take place.

Amongst the many challenges for education research in health and social care is that of identifying the nature and influence of emotional factors on learners and the dispositions of individuals and groups to change. No specific methods for identifying the nature and influence of emotional factors on learners were afforded by Atkins [2002].

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The author's description of emotional influence upon learning presented potential reasons as to why experimental group District Nurse mean scores decreased from 16.21[45%] at pre-educational intervention T¹ to 15.71[43.64%] at post-educational intervention T².

Importantly, experimental group District Nurse ownership, disposition, desirability and confidence to attend the experimental educational intervention were not accounted for in this study.

Where these variables were unmeasured, experimental group District Nurse motivation to develop knowledge concerned with the assessment and treatment of venous leg ulcers in this study remained unchallenged.

Furthermore, where experimental group District Nurse ability levels to cope with instances of unlearning perhaps more familiar knowledge traits were unmeasured, motivation to develop knowledge concerned with the assessment and treatment of venous leg ulcers in this study remained unchallenged.

Underwood [2003] described that whilst there is much support for co-operative learning amongst learning theorists, not all learners exhibit the same enthusiasm for group work. A number of factors such as sex, age, group size and ability mix, subject domain, task type and organisation have been shown to influence the effectiveness of co-operative learning.

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The author described factors such as the characteristics of group members, the level and type of assessment procedures in operation, and individual differences as influencing the degree to which participants might be willing to be involved in group work.

Where experimental group District Nurse willingness to be involved in group learning was unmeasured, motivation to develop knowledge concerned with the assessment and treatment of venous leg ulcers in this study again remained unchallenged.

This study was systematically designed to take account of extensively reported evidence-based educational principles concerned with the application of identified training needs and preferred learning styles within the context of this study's experimental educational intervention. This study did not, however, take into account barriers to learning described above.

Explanation as to why experimental group District Nurse participants failed to demonstrate improved knowledge between pre-educational intervention baseline measurement and post-educational intervention follow-up measurement, or why experimental group District Nurse participants failed to demonstrate improved knowledge and skill when compared to the control group, was that extraneous barriers to learning may have presented.

Barriers and the Transfer of Learning

This study's hypothesis rested upon the prediction that RCNCE Examination and Objective Structured Clinical Examination scores would be improved between pre-educational intervention T¹ and post-educational intervention T² for experimental group District Nurses compared to control group District Nurses.

Where no comparative improvement between T¹ and T² RCNCE Examination and Objective Structured Clinical Examination scores were evident, no comparative improvement in clinical practice through transfer of learning to the clinical environment was predicted. Two reasons for reviewing literature concerned with the concept of 'transfer of learning' were, however, considered important.

First, it was considered important to review literature concerned with the concept of transfer of learning for the purpose of completeness in this study.

Second, it was considered important to review literature concerned with the concept of transfer of learning due to control group clinical practice questionnaire results partly reporting significant change in clinical behaviour when compared to the experimental group.

The relevance of control group District Nurses reporting significant change in clinical behaviour being that some degree of transfer of learning may have taken place.

Wong [1979] reported that the ability to transfer classroom knowledge to clinical practice is a common learning problem encountered by many nursing students.

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Haynes [1992] expressed the view that to understand the process of change, it is necessary to appreciate theoretical concepts concerned with the process of change.

The author cited Lewin [1951], one of the early pioneers concerned with change processes. He described three steps applicable to his theory of change:

The first step, termed 'unfreezing', concerns motivating people towards change and the unfreezing of old attitudes, ideas and beliefs. This may happen through discussion of problem areas. It is essential at this stage that trust is developed between those suggesting change and those who will implement it.

The second step, 'moving to a new level', concerns planning to implement change. Information concerning the proposed change is collected and discussed, with problems identified and solutions sought. The change can then be pre-tested and the transition period to a new level of working can begin.

The third step, 're-freezing', concerns reinforcement of new patterns in behaviour once the change is implemented. A process of positive feedback, constructive criticism and encouragement may achieve reinforcement.

Other pioneers concerned with the process of change, cited by Haynes [1992] included: Bennis [1976]; Lancaster and Lancaster [1982]; and Keyzer [1986].

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Bennis [1976] defined the process of planned change as 'a conscious, deliberate, collaborative effort to improve the operations of a human system, through the utilisation of valid knowledge'.

Lancaster and Lancaster [1982] identified two types of resistance associated with the change process: resistance due to the nature of the change; and resistance due to the misconceptions and inaccurate beliefs about what the change will mean.

Change is often perceived as a threatening event, and ritualistic practices are often adhered to so as to avoid the anxiety invoked by decision-makers. Discussing people's fears and worries about change may help to reduce resistance.

Keyzer [1986] described change as 'an attempt to alter or replace existing knowledge or skills, attitudes, norms, and styles of individuals or groups'. Change may be either haphazard, where no attempt is made to plan events or prepare for innovation, or planned in advance. Planned change is obviously ideal, but change in nursing has tended to be haphazard.

Keyzer [1986] further suggested that the most successful strategy for change is one that encourages active participation and communication. Change does not happen overnight. Successful implementation may take many years, and it is important that this is acknowledged.

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Stocking [1992] described that to improve clinical care we need to understand how people react to change and the processes and influences that can be used to bring about change.

If we want to promote change in clinical care, we need to look at the environment in which change occurs, the characteristics of change, the process of the change, and the way people behave within it.

With regard to the environment, individuals practice medicine, nursing and so on, both in a local environment and in wider professional, national, and international environments. An early lesson for many people trying to bring about change is that the local or wider climate of opinion has to be right. It may be better to concentrate on changing the wider environment before pursuing a specific change.

Local environments are important. A practitioner who runs the risk of being ostracised for undertaking a new procedure will think twice about it. However, in an environment where change is viewed positively, specific changes may be easier to get accepted.

Changes may have very different implications for different people. The author cited Rogers [1963] who highlighted characteristics of innovation that influence their adoption, each of which may be considered differently by each individual in deciding whether or not to change.

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The first characteristic is termed 'relative advantage'. If a practice is shown to be more effective than another, then that ought to give it relative advantage, although in reality it is not quite so simple. A clinical procedure may be perceived to have advantages or disadvantages well beyond the patients' health status. It may, for example, give security or reassurance to professionals, reduce time pressures, or require new skills.

The second characteristic is termed 'compatibility'. A fundamental obstacle to adopting change occurs when the change is incompatible with beliefs or working practices. This may be why research findings do not have the impact they might have. They may not be accepted because they are incompatible with long-held philosophies and practices. In terms of compatibility, changes in the environment may be necessary to alter something more fundamental before a specific new idea is acceptable.

The third characteristic is termed 'complexity'. If a change requires the involvement of disparate people and actions, then the many negotiations will be complex and each individual's prestige and influence may be affected.

Several strategies have been tried in promoting change in clinical practice, including: education; providing information about the results of research and feedback on individual practice; peer review and audit methods; person to person contact by respected peers; and financial incentives.

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Consideration must be given to developing some strategy to promote change in clinical care.

The first analysis needed is that of the particular change. Is it a straightforward addition to practice, with clear benefits? In such cases all that might be needed is dissemination by opinion leaders. Other changes may have serious obstacles, and those need to be analysed to see whether they can be overcome.

Some changes may need such a fundamental shift in beliefs and practice that widespread change may first require attention to the wider climate of opinion.

Assuming that understanding the characteristics of change suggest that practice could be influenced, what approaches would be used? Reviewers of methods conclude that using a single method to effect change is potentially less successful than a combination of approaches.

Rouiller [1993] described the development and investigation of concepts concerned with organisational transfer climate and discussed whether they influenced the degree to which trainees transfer behaviours learned in a training programme to their job situation.

The author cites Goldstein [1986], who suggested that a supportive organisational transfer climate is a critical component that should be examined. His view was that unless trainees transfer into job situations that have a climate that supports the use of the behaviours learned in training, they will not be likely to use their learned skills.

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Rouiller [1993] further described that in nearly all studies of training outcomes, the emphasis has been on identifying and examining the characteristics of training programmes and individual learners, and relating these factors to training and job performance. Importantly, this focus ignores the characteristics of the job situation and the question of whether these characteristics help to determine transferability of training behaviour onto the job.

Historically, Fleishman, Harris and Burt [1955] conducted the first study that suggested a supportive climate is a factor in the transfer of learning to the job situation. They conducted a training programme that resulted in managers being more considerate of their employees, but in a follow-up investigation, they found that the effects of the training had disappeared.

To determine why this occurred, the authors conducted a series of interviews that suggested that the effects disappeared because the supervisors of the trained managers were not supportive of the goals of the training programme.

Over a number of years, other authors [Goldstein 1986; McGehee and Thayer 1961; Marx 1982; Michalak 1981; Mosel 1967] offered views suggesting the need for a supportive organisational climate in order for learning to transfer from the classroom to the job.

Rouiller [1993] identified that through extensive reviews of the entire training literature, Baldwin and Ford [1988] and Tannenbaum and Yukl [1992] noted the

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importance of this issue, but found very few empirical efforts and virtually no understanding of what constitutes an organisational transfer climate.

The authors concluded in their study that individuals who learn more in training also perform better in transferring those behaviours. However, it also adds the idea that a positive organisational transfer climate appears to be at least as important if transfer of training behaviour is to occur.

Further research is needed on the relationship of organisational climate to transfer behaviour and job performance. If these relationships prove robust, organisational analysis assessing transfer climate should be a requirement in determining if the organisation is ready to support its training programme. It may also be the case that training members of the organisation to provide a supportive organisational transfer climate is just as important as training the trainee in the skills needed for the job.

Rouiller [1993] stated that interest has grown recently in the concept of positive transfer climate. For example, Noe [1986] developed a model specifying some motivational factors as well as other attributes and attitude factors that might affect a trainee's success in the training programme.

Noe [1986] hypothesised that trainees assess their training environments to determine whether they are responsive to their efforts. One implication of this view is that efforts to utilise learned behaviour depend upon the degree of perceived support.

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Allison [1995] studied the effects of continuing education on practical wound management. The author stated that educational programmes would not necessarily reflect changes in clinical practice, particularly where participants' attitudes and practices have been challenged with new ideas.

Allison [1995] concluded that often a number of factors impinge upon effective change in clinical practice, which include: the large number of products available, which without education and back-up support may lead to confusion; differing opinions between nursing and other clinical staff, which can lead to conflict and confusion; and that one-off courses may not be enough. On-going educational programmes should be provided. These should be backed up by consultations with wound management experts who can provide up to date information, support and encourage a problem-solving, research-based approach to wound management.

Moffatt and Dorman [1996] stated that changing clinical practice involves changing a deeply ingrained culture that extends far beyond the reaches of the professional directly providing care.

Goodman [1998] reported that the immediate positive effects of various performance feedback interventions on performance levels are well studied in organisational behaviour. It is generally found that frequent, immediate feedback benefits performance during clinical practice.

In an article by the Royal College of Nursing [1998] concerned with changing clinical practice, the importance of the nurse role in accepting and promoting change was

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discussed. Nurses need to be willing to accept new ways of working and let go of ways that are not as effective.

The use of more than one strategy for achieving change will improve the likelihood that the desired change will take place [Oxman *et al* 1995]. The nature and level of organisational support and commitment in changing clinical practice also affects the success of the change process [Kitson 1995]. Finally, the availability of a committed and skilled nurse who acts as change agent facilitates the acceptance and management of change.

Davis *et al* [2003] suggested that a large gulf remains between what we know and what we practice. Not surprisingly, many attempts have been made to reduce the gap between evidence and practice. These have included educational strategies to alter practitioners' behaviour and organisational and administrative interventions. The authors explored three constructs: Continuing Medical Education; Continuing Professional Development; and [newest of the three] knowledge translation.

The authors described that Continuing Medical Education refers to education after certification and licensure. It is arguably the most complex, and clearly the largest, phase of medical education.

Continuing Professional Development embodies both professional learning and personal growth. It incorporates much of the theory and practice of adult learning, self-directed learning, reflective practice and other models. It also offers the possibility of embracing topics beyond those included in traditional medical

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education, for example, bio-ethics, business management, and communication skills, topics rarely included in Continuing Medical Education programmes.

The effects of Continuing Medical Education and Continuing Professional Development have been extensively studied. The literature shows that most passive educational activities are poor at changing clinical behaviour. The most effective strategies tend to be more active [such as reminders or educational outreach visits]. These strategies are not the staple of most providers of Continuing Medical Education and Continuing Professional Development. Furthermore, the effectiveness of such methods may be limited by the target [primarily clinicians] and settings [lecture halls].

Lauder *et al* [2003] described that transfer of learning has been seen by some educationalists as the key and unifying concept in learning and in the development of skilled nursing practice.

Bartfay *et al* [2004] described that eventually, students are expected to apply or transfer skills learned in the classroom to clinical practice. Transfer of learning occurs when a student applies a skill that is learned in one situation to a new, different or more complex situation. Effective transfer of learning depends upon how well the skills were learned in the first place.

Transfer of learning can be encouraged by making sure that the cues given to a student during a testing session are as close to the real-life situation as possible. If the testing situation is not sufficiently similar to the learning situation, students will

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not be able to make effective connections between what they know and the action that is required.

Murphy *et al* [2004] described that: time; lack of interest; lack of support; negative experiences in education; and negative experience in practice were reported to discourage the application of nursing research findings in clinical practice.

Clarke *et al* [2005] reported how evidence-based pressure ulcer prevention and treatment guidelines had been available for over a decade, though are frequently ignored in clinical practice.

The author described the challenges faced include: production of quality guidelines; characteristics of practice settings; incentives; regulations; and patient factors.

Implementation strategies must overcome these challenges by understanding the forces and variables influencing practice and by using methods that are practice and community-based, rather than didactic.

Explanation as to why control group District Nurse participants reported significant change in clinical behaviour compared to experimental group District Nurse participants in this study, may be that control group participants were exposed to transfer of learning-related conditions described above which differed in some way to experimental group exposure, however, this study provided no evidence to support this assertion.

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A review of the literature concerned with barriers to learning and transfer of learning highlighted complexities faced by practitioners engaged in the promotion of evidence-based educational design, delivery and effective clinical practice.

Study Design and Research Limitations

Chapter 3 described methods concerned with study design. Specifically, Figure 3.2.1 placed into context various stages involved in study design and data capture.

This study applied two types of educational intervention to measure the impact of experimental and control educational interventions upon clinical practice for District Nurses engaged in the assessment and treatment of venous ulceration.

Clinical practice questionnaire results, reported in Table 4.3.6, indicated that control group District Nurses unpredictably and contrary to this study's hypothesis, generally demonstrated improved clinical practice when compared to the experimental group.

Earlier in this Chapter potential confounding influences of barriers to learning and transfer of learning upon the findings of this study were discussed.

Other variables that had the potential to impact upon this study's findings included the basis upon which this study was initially designed and limitations encountered during the research process.

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This study was designed following an extensive search of the literature relevant to venous ulceration and evidence-based educational principles reported to impact upon post-educational intervention practice.

Specifically, this study was designed to measure venous leg ulcer-related knowledge and skill and learning styles, which lead to an intensive educational intervention for experimental group District Nurses.

Furthermore, this study was designed to measure pre and post-educational intervention District Nurse burnout and previous development as two potential confounding variables upon the outcome of this study's findings.

Primary and secondary research objectives were clearly identified and carefully measured using valid, reliable and practical measurement instruments aimed at capturing robust pre and post-educational intervention data concerned with this study's hypothesis.

Inter-rater reliability measures were undertaken between Marker 1 [the researcher] and Marker 2 [a specialist lecturer in wound healing] to guarantee accuracy of score allocation to each measurement instrument used in this study.

Experimental and control educational interventions were carefully constructed and delivered according to the objectives of this study.

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Ethical approval from Iechyd Morgannwg Health Authority was obtained. Each District Nurse participant was required to sign a consent form, consenting to participation in this study, prior to this study commencing.

Study design and measurement instruments used were piloted on two occasions with reference to six District Nurses employed within an alternative NHS Region in Hertfordshire.

Whilst this study was carefully constructed to test its hypothesis, a number of potentially limiting factors concerned with the design of this study were identified.

Potential factors included:

[a] This study relied on the allocation of District Nurse participants into experimental [$n=14$] and control [$n=20$] groups for the purpose of attending experimental and control educational interventions and completing the post-educational intervention clinical practice questionnaire.

District Nurse participants [$n=34$] were employed within three integrated Hospital and Community NHS Trusts in South Wales. The potential for contamination between experimental and control group District Nurse participants could not therefore be ruled out in this study.

[b] The experimental educational intervention was specifically designed according to District Nurse identified training needs and learning styles. It did

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not take account of alternative evidence-based educational principles identified through a contemporary review of the literature.

- [c] Venous leg ulcer key tasks identified by twenty-two expert nurses were not tested for reliability. No guarantee could be made that those same key tasks would be identified by the same sample of expert nurses on a separate occasion, or by an alternative sample of expert nurses.
- [d] Consensus in key tasks between the sample of twenty-two expert nurses and District Nurse participants in this study was not accounted for. No assumption could therefore be made that District Nurse participants in this study afforded face-validity to those ten key tasks identified by the twenty-two expert nurses. District Nurse enthusiasm to acquire knowledge and skills or to alter clinical practice based upon education concerned with these key tasks was not clear.
- [e] The standardised RCNCE Examination was potentially non-sensitive to measuring District Nurse knowledge in this study. Whilst it was relevant to venous leg ulcer knowledge measurement, it was not specific to the ten key tasks identified by expert nurses.
- [f] Whilst the Objective Structured Clinical Examination was carefully designed with reference to an expert panel from within an academic and treatment centre concerned with wound healing, this measurement instrument was not tested for reliability.

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- [g] A minority, yet significant number [28.5%] of experimental group learning style responses to Kolb's Learning Styles Inventory were discounted in the design of the experimental educational intervention.

- [h] Specialist staff employed from within a prestigious academic and treatment centre to deliver experimental and control educational interventions were not blind to the design of this study. Specialist staff were aware that experimental group District Nurse participants were hypothesised to change clinical practice to an improved level compared with the control group.

It was plausible that specialist staff consciously or sub-consciously communicated more effectively with control group District Nurse participants to the extent that more effective communication influenced improved post-educational intervention clinical practice.

Study design generally allowed that this study went according to plan. A number of unpredictable factors did, however, limit research capacity.

Potential factors concerned with research limitations included:

- [a] The study sample was restricted to 34 District Nurse participants as a consequence of unforeseen District Nurse unavailability to participate in this study. This study was therefore underpowered [power level = 60%] based upon sample size power calculations [Machin *et al*, 1997].

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The results of this study should therefore be treated with caution. This study did, however, provide useful insight into practical and other aspects of this research area.

- [b] Experimental and control educational interventions were each restricted to a four-hour intensive study programme. Operational pressures faced by managers of district nursing services and by District Nurse participants prevented educational interventions from being delivered over an extended time period or according to District Nurse participant choice.

Where additional time allocation had been available to deliver experimental and control educational interventions, this study could have benefited from the inclusion of educational delivery modes applicable to all four learning style types and according to District Nurse participant choice of educational programme design in the experimental educational intervention.

With recognition of this study's strengths and limitations, suggestions for future research are detailed below.

5.5 Suggestions for Future Research

A number of research findings in this study triggered suggestions for future research intended to further the understanding of the impact of educational interventions upon clinical practice. These included:

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- 1. Further research is carried out on the potential impact of identified training need and learning style-designed educational interventions upon knowledge, skill and clinical practice.**
- 2. Replicating this study to involve a powered sample of District Nurses more representative of the District Nurse population generally.**
- 3. Further research be carried out on the potential impact of educational interventions upon knowledge, skill and clinical practice where educational interventions are designed to take account of identified training needs and alternative evidence-based principles identified in the literature.**
- 4. Administering a similar Two-Round Delphi venous leg ulcer key task questionnaire used in this study to a wider sample of expert nurses concerned with venous leg ulceration to establish the level of agreement in venous leg ulcer key tasks identified by twenty-two expert nurses in this study with a wider sample of expert nurses.**

In addition to the quest for more research intended to further the understanding of the impact of educational interventions upon clinical practice, findings in this study drew attention to the value of more widely researching the consequences of high levels of burnout amongst District Nurses and any effects this may have upon clinical practice.

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This study identified issues of collateral interest to the study's main findings, detailed below.

5.6 Recommendations

Recommendations of collateral interest to this study's main findings include:

1. To draw attention to academic institutions and health-related organisations the benefits of incorporating venous leg ulcer management into pre and post-registration educational programmes.
2. That health-related organisations evaluate their education and training strategies and organisational culture to establish the effectiveness of transfer of learning to the clinical practice environment, with regard to venous leg ulcer management and more generally.
3. To establish, develop and utilise robust methods for the measurement of District and Community nurse knowledge and skill concerned with the assessment and treatment of venous leg ulcers.
4. To more widely measure knowledge and skill acquisition for District and Community Nurses engaged in the assessment and treatment of venous leg ulcers, to establish the abilities of District and Community Nurses to effectively assess and treat venous leg ulcers.

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5. To establish and maintain an accurate U.K. database with regard to venous leg ulcer prevalence and cost, whereby venous leg ulcer prevalence and cost implications are accurately reported and consistently evaluated in terms of the impact of venous leg ulcer prevalence and cost within a health and social context.

5.7 Conclusions

With evidence of the negative epidemiological and social consequences of venous leg ulcer prevalence within the U.K., potential limitations in District Nurse clinical ability to assess and treat venous leg ulceration, benefits of applying evidence-based educational principles in educational intervention design, and a paucity of studies aimed at investigating the impact of evidence-based educational interventions upon venous leg ulcer clinical practice, this study hypothesised that a structured educational intervention, designed around evidence-based educational principles, would positively impact upon clinical practice for District Nurses engaged in the assessment and treatment of venous leg ulcers.

To test this hypothesis, this study was designed so that experimental group District Nurses [$n=14$] attended an educational intervention designed around evidence-based educational principles concerned with identified training needs and learning styles, whereas control group District Nurses [$n=20$] attended an educational intervention, designed to discount evidence-based educational principles concerned with identified training needs and learning styles.

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The main conclusion to be drawn from this study was that the hypothesis of experimental group District Nurses reporting positive clinical practice over control group District Nurses was not supported.

However, clinical practice questionnaire results [behaviour category: changing practice by undertaking clinical tasks differently] reported improved control group clinical practice over experimental group clinical practice and that in such unpredicted circumstances, this phenomenon required further investigation.

Post-educational intervention knowledge results in the two studies by Luker and Kenrick [1995] and Jones and Nelson [1997] were non-distinguishable from post-educational intervention reported practice results.

The results of this study did not reflect the findings of Wong [2003] whereby significant improvement in post-educational intervention knowledge scores were reported.

With recognition that certain extraneous variables might have influenced this study's results, combined with an understanding of research limitations concerned with this study's design, conclusions drawn from this study were contrary to evidence reported in literature concerned with the application of evidence-based educational principles in educational intervention design.

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Evidence-based educational principles of identified training needs and learning styles, cited as principles reported to enhance student learning did not have a significant impact upon student learning in this study.

Potential reasons as to why experimental and control group District Nurses failed to demonstrate improved knowledge between pre-educational intervention baseline measurement and post-educational intervention follow-up measurement, or why experimental group District Nurse participants failed to demonstrate improved knowledge and skill when compared to the control group were earlier described in Sub Section 5.4.

Potential reasons as to why post-educational intervention clinical practice results [behaviour category: changing practice by undertaking clinical tasks differently] were statistically significant for post-educational intervention control group District Nurse participants were further discussed in Sub Section 5.4.

Results of this study concerned with pre and post-educational intervention knowledge, skills and clinical practice justifies further investigation.

The paucity of rigorous evaluations concerned with the impact of identified training need and learning style-designed educational interventions upon post-educational intervention venous leg ulcer clinical practice means that this subject is not well researched.

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Specifically, further research is required to establish the genuine effect of designing clinically based educational interventions, designed to take into account identified training needs and learning styles, upon post-educational intervention knowledge, skill and clinical practice.

Furthermore, benefits of further research to establish the genuine effects of designing clinically based educational interventions designed to take into account identified training needs, combined with alternative evidence-based principles in educational intervention design was evident.

The results of this study challenge the well-established theoretical framework concerned with benefits of expending individual and organisational energy and resource concerned with applying identified training needs and learning styles in the design of educational interventions.

Although this study was limited to a comparatively small District Nurse population, with results conflicting with established literature in this field, the results of this study require Human Resource professionals and others to question the value of expending energy and resource in applying identified training needs and learning styles in the design and delivery of educational interventions and to consider whether alternative evidence-based educational strategies, for example, multi-interventionist educational strategies, are more appropriate to meeting individual and organisational training needs.

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Expert Questionnaire

Initial Listings

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Thank you for agreeing to complete this Questionnaire.
Please list 10 Tasks that you consider to be most important for District Nurses in
Assessing and Treating Venous Leg Ulcers.
You do not need to list Tasks in any priority order.
You might wish to follow the example illustrated.

<i>Example</i>	Recognising infection in the wound
Task No: 1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Thank You!

Please now return the completed Questionnaire in the stamped addressed envelope provided

Expert Questionnaire
[Follow-Up]

Educational Interventions and Clinical Practice

Thank you for agreeing to complete this follow-up Questionnaire.
This Questionnaire includes those 10 most frequent responses that people listed previously
under the Expert Questionnaire issued in July 1997.
Now please follow the instructions at the bottom of the page.

ITEM	RANK ORDER
Bandaging Techniques	
Patient History Taking	
Educating Patient	
Doppler Assessment	
Skin Care	
Infection Recognition	
Venous Disease Awareness	
Arterial Disease Awareness	
Dressing Application	
Size Measurement	

Please follow these instructions in completing this Questionnaire and then return it in the stamped addressed envelope provided by 17 October 1997.

Please rank each item in order of perceived priority in the Assessment and Treatment of Venous leg Ulcer wounds, where "1" = Highest Priority and "10" = Lowest Priority. All numbers between 1 and 10 must be used. Please do not allocate the same number to more than one item.
Thank you!!

Appendix 3

Pilot Questionnaire

Pilot Questionnaire

Please complete this questionnaire as accurately as possible.

<p>A. RCN Continuing Education Paper</p> <p>[1] Were the instructions on how to complete this paper clear to you?</p> <p>Comments:</p> <p>[2] Would you have wanted any additional information/clarification before completing the RCNCE Paper?</p> <p>Comments:</p>	<p>Yes/No</p> <p>Yes/No</p>
<p>B. Objective Structured Clinical Examination [OSCE]</p> <p>[1] Were the instructions on how to complete the OSCE clear to you?</p> <p>Comments:</p> <p>[2] [a] Would you have wanted any additional information/clarification before completing Task Station One?</p> <p>Comments:</p>	<p>Yes/No</p> <p>Yes/No</p>

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<p>[b] Would you have wanted any additional information/clarification before completing Task Station Two?</p> <p>Comments:</p>	<p>Yes/No</p>
<p>[c] Would you have wanted any additional information/clarification before completing Task Station Three?</p> <p>Comments:</p>	<p>Yes/No</p>
<p>[d] Would you have wanted any additional information/clarification before completing Task Station Four?</p> <p>Comments:</p>	<p>Yes/No</p>
<p>[e] Would you have wanted any additional information/clarification before completing Task Station Five?</p> <p>Comments:</p>	<p>Yes/No</p>
<p>[f] Would you have wanted any additional information/clarification before completing Task Station Six?</p> <p>Comments:</p>	<p>Yes/No</p>
<p>[g] Would you have wanted any additional information/clarification before completing Task Station Seven?</p> <p>Comments:</p>	<p>Yes/No</p>
<p>[h] Would you have wanted any additional information/clarification before completing Task Station Eight?</p> <p>Comments:</p>	<p>Yes/No</p>

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<p>[i] Would you have wanted any additional information/clarification before completing Task Station Nine?</p> <p>Comments:</p> <p>[j] Would you have wanted any additional information/clarification before completing Task Station Ten?</p> <p>Comments:</p> <p>[k] Would you have wanted any additional information/clarification before completing Task Station Eleven?</p> <p>Comments:</p> <p>[l] Would you have wanted any additional information/clarification before completing Task Station Twelve?</p> <p>Comments:</p>	<p>Yes/No</p> <p>Yes/No</p> <p>Yes/No</p> <p>Yes/No</p>
<p>C. Maslach's Burnout Inventory [MBI]</p> <p>[1] Were the instructions on how to complete the MBI clear to you?</p> <p>Comments:</p> <p>[2] Would you have wanted any additional information/clarification before completing the MBI?</p> <p>Comments:</p>	<p>Yes/No</p> <p>Yes/No</p>

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<p><i>D. Learning Styles Inventory [LSI]</i></p> <p>[1] Were the instructions on how to complete the LSI clear to you?</p> <p>Comments:</p> <p>[2] Would you have wanted any additional information/clarification before completing the LSI?</p> <p>Comments:</p>	<p>Yes/No</p> <p>Yes/No</p>
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**Royal College of Nursing
Continuing Education**

**Examination Paper
&
Answer Sheet**

**Please attempt to answer all 21 questions listed
using the answer sheet provided .
Time allocated: 30 mins**

Questions 1-7

Questions 1-7 must be answered by selecting one or more of the numbered boxes from the Geomatrix array overleaf. You will see that the boxes are numbered 1-30 and that on the Answer Sheet for questions 1-7, you have 30 boxes to choose from. You should bear in mind with these questions, some require just one selection, and not all responses are relevant for questions 1-7.

The Geomatrix is only for questions 1-7.

1. The clinical signs of venous insufficiency are:
2. Which therapies/interventions form a combination treatment for venous leg ulcers?
3. Which item(s) should not be used on a patient with a venous leg ulcer?
4. Patients with signs of clinical infection should be treated with:
5. Which compression therapy(s) requires removal at night?
6. Dry scaly skin around a leg ulcer should be treated with:
7. Compression should not be applied to the limb if the patient has:

*Source: Article 358. Cameron, J. (1996) Venous Leg Ulcers. Nursing Standard. 10, 25, 48-52
(Reproduced with kind permission of Ms Cameron and RCNCE Department.)*

Geomatrix

Questions 1-7 only must be answered by selecting one ore more of the numbered boxes from this Geomatrix array.

1. Foot pulses	2. Corticosteroid ointment	3. Elevation	4. Topical antibiotics
5. Lanolin	6. Class II stocking	7. Compression therapy	8. Arterial disease
9. Short stretch bandage	10. Four layer bandage	11. Adhesive tape	12 Induration.
13. Eczema	14. Diabetes	15. Staining above medial malleolus	16. Ankle flare
17. Oedema	18. Class III stocking	19. Rheumatoid arthritis	
20. Ankle pressure index > 0.9		21. Systemic antibiotics	22. Emulsifying ointment
23. Corticosteroid cream	24. Blue line elastic bandage	25. Exercise	
26. Contact sensitivity	27. Tubigrip	28. Paste bandage	
29. 50/50 paraffin mix	30. Ankle pressure index < 0.8		

Questions 8-12

Questions 8-12 are based on a particular situation. You should select only one response to each of these questions.

Mrs Smith has a heavily exuding ulcer, about the size of a 50 pence piece, above her medial malleolus. The immediate surrounding skin is macerated, although the rest of her skin is dry and flaky and she has been applying a cream she bought at the chemist. She is an active lady, inclined to be on her feet all day, and has not been wearing any compression. You have determined that her ankle pressure index is 0.95.

8. Which of the following would you apply to protect the surrounding skin from wound exudate?
- (a) White soft paraffin
 - (b) Lanolin
 - (c) Zinc oxide paste
 - (d) Aqueous cream
 - (e) Emulsifying ointment
9. Which emollient will you use for her dry skin?
- (a) Lanolin
 - (b) Aqueous cream
 - (c) White soft paraffin mixture
 - (d) Emulsifying ointment
 - (e) Zinc oxide cream
10. You have determined that Mrs Smith has an adequate blood supply and applied a compression bandage. When would you arrange to see her next?
- (a) The next day
 - (b) In two days
 - (c) In three days
 - (d) In five days
 - (e) In a week
11. Which of the following would you advise Mrs Smith to avoid doing?
- (a) To walk about rather than stand still
 - (b) To elevate her legs as much as possible
 - (c) To use the cream she has been applying to her dry skin
 - (d) To continue to wear her compression
 - (e) To eat a sensible diet

12. Following healing, which of the following will Mrs Smith need to wear?
- (a) A compression bandage
 - (b) Prescribed compression hosiery
 - (c) Tubigrip
 - (d) Does not need anything now she is healed
 - (e) Over the counter light support stocking

Questions 13-21

The remaining questions are 'general'. You should select only one response to each question.

13. Which of the following ulcer sites is associated with venous insufficiency?
- (a) Dorsum of foot
 - (b) Front of shin
 - (c) Medial malleolus
 - (d) Lateral malleolus
 - (e) Toes
14. Which of the following will not give a graduated compression?
- (a) Elastic bandage
 - (b) Class I compression stocking
 - (c) Tubigrip
 - (d) Class III compression stocking
 - (e) Class II compression stocking
15. Which of the following characteristics is not true in relation to venous ulceration?
- (a) Staining above the medial malleolus
 - (b) Eczema around ulcer
 - (c) Ulcer has 'punched out' appearance
 - (d) Ulcer above medial malleolus
 - (e) Ankle flare
16. Compression therapy should not be applied if the patient has an ankle pressure index of:
- (a) 0.9
 - (b) 0.85
 - (c) 0.8
 - (d) 0.75
 - (e) 1.00

17. Which of the following treatments is not suitable for a patient with a venous ulcer?
- (a) Elastic bandage
 - (b) Paste bandage and elastic bandage
 - (c) Four layer bandage
 - (d) Compression stockings
 - (e) Tubigrip
18. Which of the following statements does not describe the role of a paste bandage?
- (a) Soothing to the skin
 - (b) Sleeve for elastic bandage
 - (c) Forms a rigid cast to immobilise the leg
 - (d) Can stay in place for a week
 - (e) Used in the treatment of venous leg ulcers
19. Which of the following does not apply to a class II compression stocking?
- (a) Controls oedema
 - (b) Must always be removed at night
 - (c) Improves the function of the calf muscle
 - (d) Reduces pigmentation with continued wear
 - (e) Gives graduated compression
20. In the first three months following complete healing of the ulcer, how often should a patient be checked?
- (a) Each week
 - (b) Each month
 - (c) Every two months
 - (d) Every six months
 - (e) Does not need checking
21. Which of the following statements is not correct advice for patients following complete healing?
- (a) To take regular exercise
 - (b) To continue daytime wear of their compression stocking
 - (c) To remove a class III stocking at night
 - (d) Class I and class II stockings must be removed at night
 - (e) To continue to elevate their legs when at rest

ANSWER SHEET **CE**

ROYAL COLLEGE OF NURSING INSTITUTE
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Instructions: Please use an HB pencil to complete this form. Erase any mistakes thoroughly. Make marks like this [] NOT like [x]. You should write your confidential Personal Number in the relevant box. You do not need to write your name on this paper.

Confidential Personal Number

Venous Leg Ulcer Assessment

Pre Intensive Study Programme Intervention

Question 1

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30]

Question 2

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30]

Question 3

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30]

Question 4

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30]

Question 5

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30]

Question 6

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30]

Question 7

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30]

Q.8 [A] [B] [C] [D] [E]

Q.9 [A] [B] [C] [D] [E]

Q.10 [A] [B] [C] [D] [E]

Q.11 [A] [B] [C] [D] [E]

Q.12 [A] [B] [C] [D] [E]

Q.13 [A] [B] [C] [D] [E]

Q.14 [A] [B] [C] [D] [E]

Q.15 [A] [B] [C] [D] [E]

Q.16 [A] [B] [C] [D] [E]

Q.17 [A] [B] [C] [D] [E]

Q.18 [A] [B] [C] [D] [E]

Q.19 [A] [B] [C] [D] [E]

Q.20 [A] [B] [C] [D] [E]

Q.21 [A] [B] [C] [D] [E]

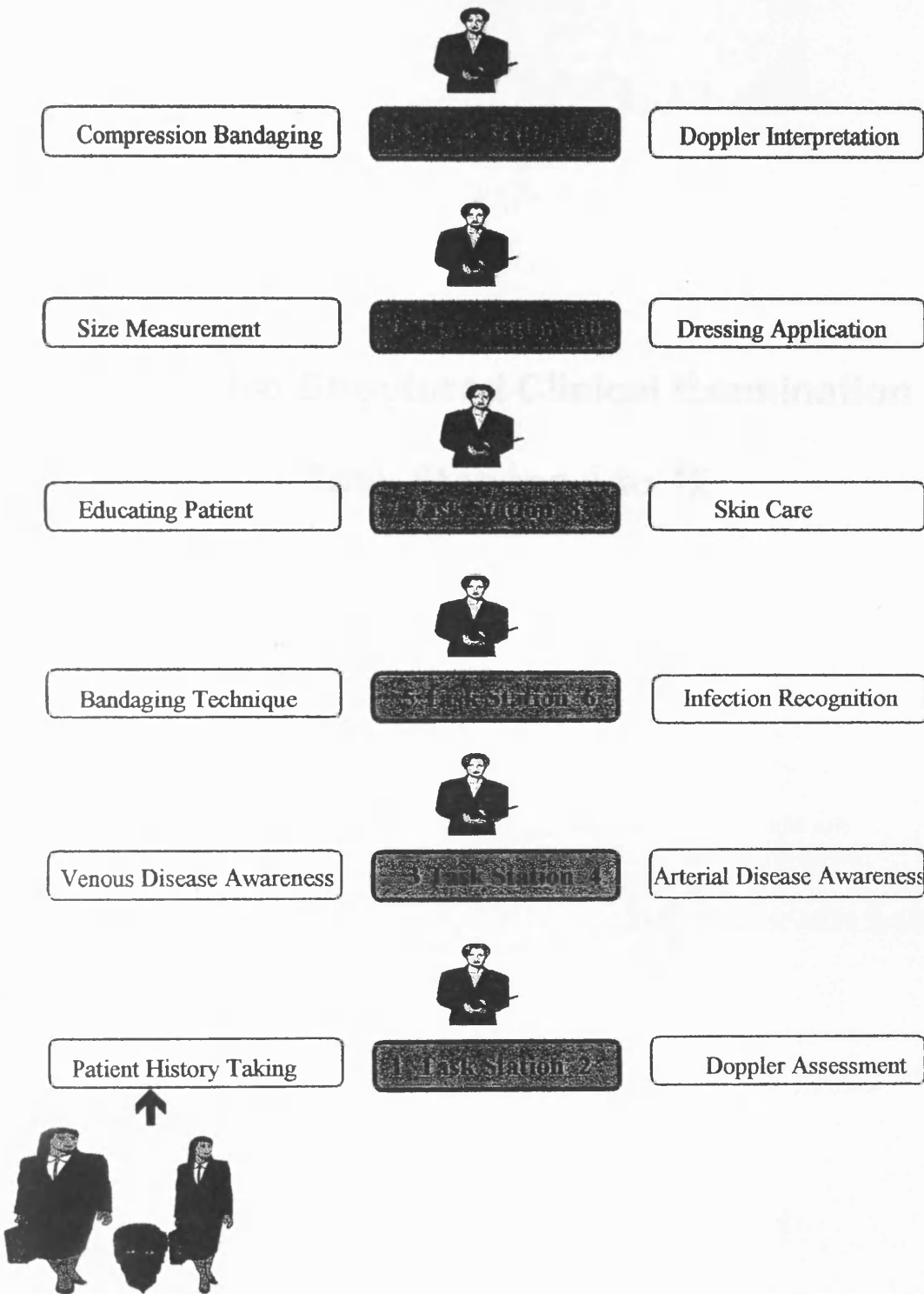
Appendix 5

Objective Structured Clinical Examination

Procedural Design

OSCE Procedural Design

Appendix 6



Experimental and Control Group District Nurses

Appendix 6

Objective Structured Clinical Examination

Task Stations 1 to 12



TIME ALLOWED: 5 MINUTES

CASE STUDY ONE

You are asked to visit a patient who you have never met before and for which there are no nursing or medical records available.

On arrival at her home, she greets you complaining of pain to her lower left limb. Upon inspection, you notice she has a leg ulcer condition.

Using the answer sheet provided, list 5 key questions you would ask of her in helping you to form a diagnosis of her condition.

Do not forget to include your Confidential Personal Number in the top right corner of the answer sheet.



CASE STUDY ONE - ANSWERS

Duration of Leg Ulcer

History of Previous Leg Ulcers

History of Deep Vein Thrombosis (DVT) and/or Varicose Veins

Previous Surgery to Legs

Description and type of pain in ulcer bed

History of Disease Processes

History of Smoking

Experience of pain in calves at night

Confidential Personal Number



TIME ALLOWED: 5 MINUTES

CASE STUDY ONE - ANSWER SHEET

(Please list your 5 answers in the spaces provided)

- (1)
.....
- (2)
.....
- (3)
.....
- (4)
.....
- (5)
.....



TIME ALLOWED: 5 MINUTES

CASE STUDY TWO

The patient in front of you has a leg ulcer and has consented to you assessing him/her with the use of a Doppler Machine.

You are asked to demonstrate to the Assessor your ability to:

- (a) Prepare the Patient**
- (b) Position the Probe Correctly**
- (c) Calculate the ABPI**

The Assessor will record your actions/findings on his/her Assessment Sheet. In doing so, they will ask you for your Confidential Personal Number which will be recorded in the top right hand corner of their Assessment Sheet.

TIME ALLOWED: 5 MINUTES

CASE STUDY TWO - ASSESSMENT SHEET

Scores are allocated against the under mentioned categories using the OSCE Assessor Card below.

1. Prepare the Patient

- (a) Patient seated or lying with leg elevated*
- (b) Generally apply the machine to the patient's leg*

2. Position Probe and Cuff Correctly

- (a) Position the probe and cuff correctly (location and angle) on the leg surface*

3. Calculate the Patient's ABPI

- (a) Produce an accurate calculation of the patient's ABPI*

Confidential Personal Number:

**OSCE Assessor Card
Task Station 2
Doppler Assessment**

A. Please ask the District Nurse to write their Confidential Personal Number in the top right hand corner of this Assessor Card before the assessment begins.

B. Please allocate the appropriate score for ability to:

1. Prepare the patient

[a] Patient seated or lying with leg elevated

Score Guide: The District Nurse should arrange that the patient is seated or lying with Leg elevated to receive a Score of 1, otherwise the District Nurse Scores 0.

Score:

[b] Generally apply the machine to the patient's leg

Score Guide: The District Nurse must demonstrate that the Doppler machine is generally applied to the patient's leg to receive a Score of 1, otherwise the District Nurse Scores 0.

Score:

2. Position probe and cuff correctly

[a] Position the probe and cuff correctly [location and angle] on the leg surface

Score Guide: The District Nurse must demonstrate that the probe and cuff are positioned correctly [location and angle] on the leg surface to receive a score of 2.

A score of 1 is allocated if either probe or cuff are positioned correctly [location and angle], with 0 allocated for incorrect positioning of both probe and cuff.

Score:

3. Calculate the patient's ABPI

[a] Produce an accurate calculation of the patient's ABPI

Score Guide: The District Nurse must demonstrate the ability to accurately calculate the patient's ABPI to receive a Score of 1, otherwise the District Nurse scores 0.

Score:



TIME ALLOWED: 5 MINUTES

CASE STUDY THREE

The picture in front of you illustrates the lower limb of a patient with a typical Venous Leg Ulcer condition.

Using the answer sheet provided, list a total of 5 clinical features of the limb and ulcer that point to Venous Disease in the patient.

Do not forget to include your Confidential Personal Number in the top right corner of the answer sheet



CASE STUDY THREE - ANSWERS

Varicose Veins
Lipodermato Sclerosis (LDS)
Champagne Leg
Site of Ulcer
Shape of Ulcer

Confidential Personal Number



TIME ALLOWED: 5 MINUTES

CASE STUDY THREE - ANSWER SHEET

(Please list your 5 answers in the spaces provided)

(1)

.....

(2)

.....

(3)

.....

(4)

.....

(5)

.....



TIME ALLOWED: 5 MINUTES

CASE STUDY FOUR

The picture in front of you illustrates the lower limb of a patient with a typical Arterial Leg Ulcer condition.

Using the answer sheet provided, list a total of 5 clinical features of the limb and ulcer that point to Arterial Disease in the patient.

Do not forget to include your Confidential Personal Number in the top right corner of the answer sheet



CASE STUDY FOUR - ANSWERS

Site of Ulcer
Punched Out Shape of Ulcer
Hairlessness of Leg
Shiny Complexion of Leg
Pale Complexion of Leg

Confidential Personal Number



TIME ALLOWED: 5 MINUTES

CASE STUDY FOUR - ANSWER SHEET

(Please list your 5 answers in the spaces provided)

(1)

.....

(2)

.....

(3)

.....

(4)

.....

(5)

.....



TIME ALLOWED: 5 MINUTES

CASE STUDY FIVE

The patient in front of you has a Venous Leg Ulcer condition and has consented to you applying a bandage to his/her lower limb.

Using the bandage available, you are asked to demonstrate to the Assessor your ability to:

- (a) Apply the bandage to the patient's limb**

The Assessor will record your actions on his/her Assessment Sheet. In doing so, they will ask you for your Confidential Personal Number which will be recorded in the top right hand corner of their Assessment Sheet.

TIME ALLOWED: 5 MINUTES

CASE STUDY FIVE - ASSESSMENT SHEET

Scores are allocated against the under mentioned categories using the OSCE Assessor Card below.

- 1. Apply the compression bandage from toe to knee, achieving a 50% overlap**
- 2. Achieve 'extension of bandage' in accordance with manufacturer's instructions (provided)**

Confidential Personal Number:

**OSCE Assessor Card
Task Station 5
Bandaging Technique**

A. Please ask the District Nurse to write their Confidential Personal Number in the top right hand corner of this Assessor Card before the assessment begins.

B. Please allocate the appropriate score for ability to:

1. Apply the bandage to the patient's limb

[a] Apply the compression bandage from toe to knee, achieving a 50% overlap

Score Guide: The District Nurse should demonstrate the ability to apply the compression bandage from toe to knee, achieving a 50% overlap, to receive a Score of 1, otherwise the District Nurse Scores 0.

Score:

[b] Achieve 'extension of bandage' in accordance with manufacturer's instructions [provided]

Score Guide: The District Nurse must demonstrate the ability to achieve the extension of bandage in accordance with the manufacturer's instructions to receive a Score of 1, otherwise the District Nurse Scores 0.

Score:



TIME ALLOWED: 5 MINUTES

CASE STUDY SIX

A patient has presented to you complaining of increased pain and heat around the site of her Venous Leg Ulcer. The result of a swab test is available for your interpretation.

Using the Answer Sheet provided, list your response to the following:

- (1) One probable cause of increased pain to the site of her ulcer.**
- (2) Two interventions to help reduce the cause of increased pain and heat.**

Do not forget to include your Confidential Personal Number in the top right corner of the answer sheet.



CASE STUDY SIX - ANSWERS

- (1) Infection**
- (2) Antibiotics to Counteract Infection**
 - More frequent Dressing Changes**
 - Apply alternative dressing (e.g. Inadine/Kaltostat)**

Confidential Personal Number



TIME ALLOWED: 5 MINUTES

CASE STUDY SIX - ANSWER SHEET

(Please list your answers in the spaces provided)

(1)

.....

(2) **(a)**

(b)



TIME ALLOWED: 5 MINUTES

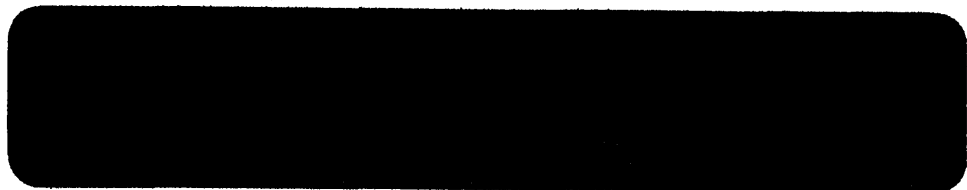
CASE STUDY SEVEN

A 60 year old female shop assistant with a history of leg ulceration presents with a Venous Leg Ulcer.

5' 4" tall and weighing 12 stone, she is reluctant to comply with any advice that you offer her.

You draw-up a plan to encourage her compliance. Using the Answer Sheet provided, list 5 ways in which you can help ensure she complies with your advice.

Do not forget to include your Confidential Personal Number in the top right corner of the answer sheet

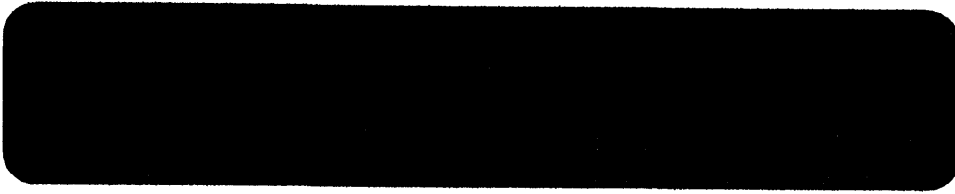


CASE STUDY SEVEN - ANSWERS

(SAMPLE ONLY)

- Giving of written messages (where appropriate)**
- Continuous reinforcement of messages**
- Stressing importance of messages**
- Giving of relevant messages**
- Close monitoring of patient compliance with advice offered**

Confidential Personal Number



TIME ALLOWED: 5 MINUTES

CASE STUDY SEVEN - ANSWER SHEET

(Please list your answers in the spaces provided)

- (1)
.....
- (2)
.....
- (3)
.....
- (4)
.....
- (5)
.....



TIME ALLOWED: 5 MINUTES

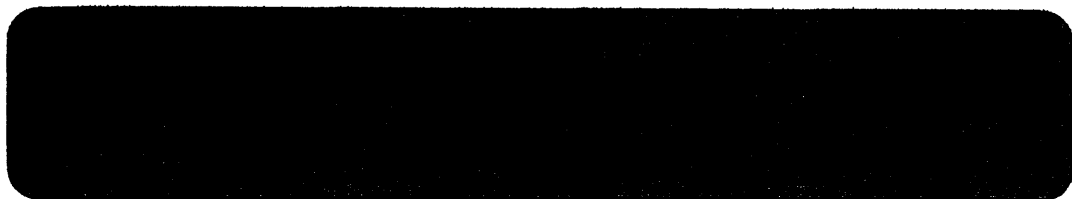
CASE STUDY EIGHT

A male patient enters your caseload with a Venous Leg Ulcer condition. His ulcerated limb is pictured in front of you.

You assess the patient and set about establishing a care plan. You should refer to the picture in helping you decide upon this care plan.

From the Answer Sheet, pick out 8 from 12 most appropriate interventions for inclusion in this gentleman's care plan.

Do not forget to include your Confidential Personal Number in the top right corner of the answer sheet



CASE STUDY EIGHT - ANSWERS

- Avoid long periods of standing**
- Applying Compression Bandaging**
- Treating the Eczema condition**
- Practice leg and foot exercises when sitting**
- Applying contact dressing to maintain moist environment**
- Raising legs above waist level when sitting**
- Moisturising leg to keep skin scale-free**
- Walking for 30 minutes at least twice per day**

Confidential Personal Number

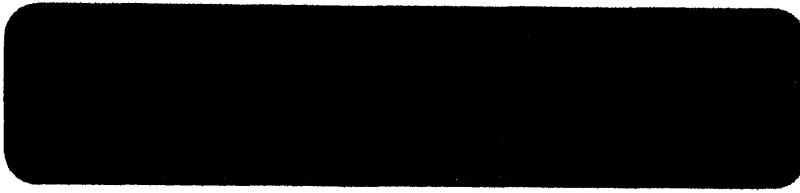


TIME ALLOWED: 5 MINUTES

CASE STUDY EIGHT - ANSWER SHEET

(Please ✓ 8 from 12 most appropriate interventions)

- Keep the leg dry**
- Treat any Eczema condition**
- Practice leg and foot exercises when sitting**
- Avoid removal of the scales**
- Reinforce message to patient about importance of general hygiene**
- Moisturising leg to keep skin scale-free**
- Walking for 30 minutes at least twice per day**
- Soak the leg for 3 hours per day**
- Applying contact dressing to maintain moist environment**
- Raising legs above waist level when sitting**
- Avoid long periods of standing**
- Applying Compression Bandaging**



TIME ALLOWED: 5 MINUTES

CASE STUDY NINE

Using the simulated limb and ulcer provided, you are required to measure and record on the Answer Sheet, the area of the ulcer in mm's, adopting the acetate tracing method

Do not forget to include your Confidential Personal Number in the top right corner of the answer sheet



CASE STUDY NINE - ANSWERS

Length:

Breadth:

Area: **4.1 cm² + or – 15%**

3.48 cm² to 4.72 cm²

Confidential Personal Number



TIME ALLOWED: 5 MINUTES

CASE STUDY NINE - ANSWER SHEET

Length: **mm's**

Breadth: **mm's**

Area: **mm's²**



TIME ALLOWED: 5 MINUTES

CASE STUDY TEN

You make a planned visit to an elderly patient's house to find that the condition of his Venous Leg Ulcer has deteriorated since your previous visit.

There are symptoms of redness and swelling to the area surrounding the ulcer, with traces of exudate within the ulcer boundary.

The gentleman is complaining of pain in his lower limb. He has no previous history of any allergies/reactions.

From the selection of Wound Dressings available, choose the most appropriate Dressing for this gentleman's condition.

Please record your choice on the Answer Sheet provided.

**Do not forget to include your Confidential Personal Number
in the top right corner of the answer sheet**



CASE STUDY TEN - ANSWERS

Wound Dressing:	Inadine	Scores 3 Points
	Kaltostat	Scores 2 Points
	Lyofom	Scores 1 Point
	Intrasite	Scores 0 Points
	Paratulle	Scores 0 Points

Confidential Personal number



TIME ALLOWED: 5 MINUTES

CASE STUDY TEN - ANSWER SHEET

Wound Dressing:
.....



TIME ALLOWED: 5 MINUTES

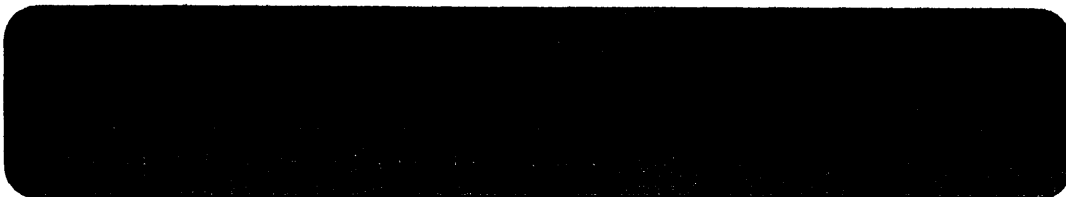
CASE STUDY ELEVEN

Your colleague asks you to take over responsibility for the management of a patient's Venous Leg Ulcer. You agree to this and decide to undertake a full assessment of the patient's condition.

When you call to make the assessment, you note that the original care plan requires frequent changes of the wound dressing. Although the care plan requires you to use a combination of items, please choose the most important item for the on-going care of this patient, from the 6 items presented.

Please record your choice on the Answer Sheet provided.

**Do not forget to include your Confidential Personal Number
in the top right corner of the answer sheet**



CASE STUDY ELEVEN - ANSWERS

Compression Bandage Only (Setopress)

Confidential Personal Number



TIME ALLOWED: 5 MINUTES

CASE STUDY ELEVEN - ANSWER SHEET

(Please list 1 of the 5 options available to you)

Choice:

.....



TIME ALLOWED: 5 MINUTES

CASE STUDY TWELVE

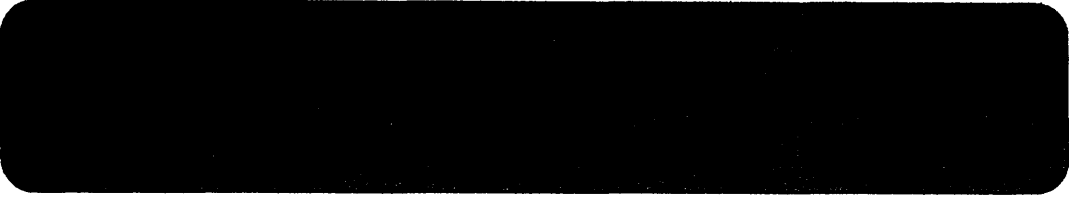
A patient presents with a small punched out ulcer on the left malleolus. He has a history of coronary heart disease and diabetes. The Doppler reading in front of you is taken from this patient.

In interpreting the reading, describe the following:

- (1) The type of disease present in the patient**
- (2) The period in either hours/days/weeks/months/years when you should next re-measure the ABPI, bearing in mind the current reading**
- (3) How you account for this Doppler reading in a patient with this condition**

Please record your choice on the Answer Sheet provided.

Do not forget to include your Confidential Personal Number in the top right corner of the answer sheet



CASE STUDY TWELVE - ANSWERS

(1) Type of Disease: Arterial

(2) Re-measure the ABPI: Every 6months

**(3) Account for Doppler Reading: Arterial Sclerosis
Arteries Calcified
Poor Blood Flow**

Confidential Personal Number



TIME ALLOWED: 5 MINUTES

CASE STUDY TWELVE - ANSWER SHEET

(Please list your answers in the spaces provided)

(1) Type of Disease:

(2) Re-measure the ABPI:

.....hours/.....days/.....weeks/.....months/.....years

(3) Account for Doppler Reading:

.....
.....

Appendix 7

Kolb's Learning Styles Inventory

LEARNING-STYLE INVENTORY

___ I like to deal
with my
feelings

___ I like to watch
and listen

___ I like to think
about ideas

___ I like to be
doing things

res
nn

Column 1

Column 2

Column 3

Column 4

CLINICAL BEHAVIOUR VARIATION QUESTIONNAIRE

Details of your study and/or research are available on the internet. You will be asked to complete a questionnaire which will be used to assess your clinical behaviour. The questionnaire is confidential and your responses will be kept confidential. It is important that you complete the questionnaire and return it to me in a timely manner.

The Clinical Behaviour Variation Questionnaire is designed to identify any variation to your clinical behaviour in the assessment and treatment of venous leg ulcers since attending our study session.

1. Please insert your Confidential Personal Number in the box below. If you can't remember this, then please contact me on 07967 816593.

2. Have you undergone any training relating to venous leg ulcers, formal or informal, in the last 18 months, other than the session arranged by us?

 Yes No Please ✓

3. If you ticked 'Yes' to number (2) above, please describe

- a. The type of training _____
- b. Whether it was formal or informal _____
- c. Approximate date of training _____

4. Have you been actively involved in assessing/treating patient(s) with a venous leg ulcer since our study afternoon on venous leg ulcers?

(It is essential to ✓ 'Yes' where you have been involved please)

 Yes No Please ✓

NOTE: Please answer each of the following questions, bearing in mind only venous leg ulcer patient(s) you have assessed/treated since the study afternoon.

If you have not been involved in the assessment/treatment of venous leg ulcers since the study afternoon, then please answer question (a) only under each section.

Section:

1. (a) I am better informed about selecting/applying emollients/wound dressings.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(b) I have consciously changed the way in which I select/apply emollients/wound dressings.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(c) Please indicate if you have consciously changed your behaviour by avoiding using any of the following items:

- ✓ topical antibiotics
- ✓ lanolin
- ✓ adhesive tape

(d) Please indicate if you have consciously changed your behaviour by using any of the following items:

- ✓ topical corticosteroid steroids
- ✓ emulsifying ointment

2. (a) I am better informed about selecting/applying wound dressings to patient(s) with exuding venous leg ulcers.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(b) I have consciously changed the way in which I select/apply wound dressings to patient(s) with exuding venous leg ulcers.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(c) Please indicate if you have consciously changed your behaviour by not applying the following item to protect the surrounding skin from wound exudate:

- ✓ Zinc Oxide

3. (a) I am better informed about applying Graduated Compression System(s).

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(b) I have consciously changed the way in which I apply Graduated Compression System(s).

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(c) Please indicate if you have consciously changed your behaviour by stipulating the following:

- ✓ Graduated Compression System(s) must not be removed from the patient's leg at night.

4. (a) I am better informed about selecting/applying emollients/wound dressings to patients with dry and flaky skin.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(b) I have consciously changed the way in which I select/apply emollients/wound dressings to patients with dry and flaky skin.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(c) Please indicate if you have consciously changed your behaviour by applying the following:

- ✓ 50/50 mixture of liquid soft paraffin and white soft paraffin
- ✓ Diprobase

5. (a) I am better informed about applying Compression Therapy.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(b) I have consciously changed the way in which I apply Compression Therapy.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(c) Please indicate if you have consciously changed your behaviour by declining to do the following:

- ✓ Applying Compression Therapy where the patient had an ABPI of 0.75.
- ✓ Applying Compression Therapy where the patient had Arterial Disease, Diabetes or Rheumatoid Arthritis.

6. (a) I am better informed about giving appropriate advice to patients following complete healing.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(b) I have consciously changed the way in which I give advice to patients following complete healing.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(c) Please indicate if you have consciously changed your behaviour by choosing to do the following:

- ✓ Instructing patient(s) to remove Class I and Class II stockings at night following complete healing.

7.

(a) I am better informed about the clinical signs of venous insufficiency.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(b) I have consciously changed the way in which I assess patient(s) under my care.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(c) Please indicate if you have consciously changed your behaviour by considering any of the following as a clinical sign of venous insufficiency:

- ✓ Induration
- ✓ Eczema
- ✓ Staining above medial malleolus
- ✓ Ankle flare
- ✓ Oedema
- ✓ Ankle pressure index > 0.9

8. (a) I am better informed about the frequency with which I assess patients wearing a compression bandage.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

(b) I have consciously changed the frequency with which I assess patients wearing a compression bandage.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

(c) Please indicate if you have consciously changed your behaviour by arranging to visit a patient the next day after applying the compression bandage, where the patient has adequate blood supply?

- Yes No

9. (a) I am better informed about the frequency with which I assess patients in the first three months following complete healing of the ulcer.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

(b) I have consciously changed the frequency with which I assess patients in the first three months following complete healing of the ulcer.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

(c) Please indicate if you have consciously changed your behaviour by arranging to visit a patient of this nature every month following complete healing?

- Yes No

10. (a) I am better informed about which therapies/interventions form a combination treatment for venous leg ulcers.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(b) I have consciously changed the way in which I treat patients under my care.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(c) Please indicate if you have consciously changed your behaviour by including one or more of the following therapies/interventions in the care plan:

- ✓ Elevation
- ✓ Exercise
- ✓ Compression Therapy

11. (a) I am better informed about the way in which I measure venous leg ulcers.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(b) I have consciously changed the way in which I measure venous leg ulcers.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(c) Please indicate if you have consciously changed your behaviour by adopting one or more of the following techniques:

- ✓ Allocating numerical values (e.g. 1cm or 0.5cm) to each square (from the acetate tracing grid) within the traced area of the wound to derive the wound area measurement
- ✓ Measuring the maximum length, and width (perpendicular, at right angles) to the length to derive the wound area measurement.

12. (a) I am better informed about the way in which I help ensure patient compliance through the advice that I give.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(b) I have consciously changed the way in which I help ensure patient compliance through the advice that I give.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(c) Please indicate if you have consciously changed your behaviour by adopting one or more of the following techniques:

- ✓ Giving of written messages (where appropriate)
- ✓ Continuously reinforcing messages
- ✓ Stressing importance of messages
- ✓ Giving of relevant messages
- ✓ Closer monitoring of patient compliance with advice offered

13. (a) I am better informed about the way in which I consider which clinical features of the limb and ulcer point to venous disease.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(b) I have consciously changed the way in which I consider which clinical features of the limb and ulcer point to venous disease.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(c) Please indicate if you have consciously changed your consideration by taking into account one or more of the following:

- ✓ Varicose veins
- ✓ Lipodermatosclerosis
- ✓ Champagne leg
- ✓ Site of ulcer
- ✓ Shape of ulcer

14. (a) I am better informed about the way in which I consider which clinical features of the limb and ulcer point to arterial disease.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(b) I have consciously changed the way in which I consider which clinical features of the limb and ulcer point to arterial disease.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(c) Please indicate if you have consciously changed your consideration by taking into account one or more of the following:

- ✓ Site of ulcer
- ✓ Punched out shape of ulcer
- ✓ Hairlessness of leg
- ✓ Shiny complexion of leg
- ✓ Pale complexion of leg
- ✓ Blue/dusty pink complexion of leg

15. (a) I am better informed about the way in which I interpret a Doppler reading.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(b) I have consciously changed the way in which I interpret a Doppler reading.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(c) Please indicate if you have consciously changed your behaviour by being more able to accurately identify one or more of the following:

- ✓ Type of disease present in the patient
- ✓ The appropriate time-scale for next measuring the patient's ABPI

16. (a) I am better informed about the way in which I assess a patient with the use of a Doppler machine.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(b) I have consciously changed the way in which I assess a patient with the use of a Doppler machine.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(c) Please indicate if you have consciously changed your behaviour by adopting one or more of the following:

- ✓ Preparing the patient in a seated or lying position with leg elevated
- ✓ Positioning the probe and cuff correctly (location and angle)
- ✓ Accurately calculating the patient's ABPI

17. (a) I am better informed about taking a patient's history in helping me to form a diagnosis of the patient's condition.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(b) I have consciously changed the way in which I take a patient's history in helping me to form a diagnosis of the patient's condition.

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(c) Please indicate if you have consciously changed your behaviour by asking patient(s) one or more of the following key questions:

- ✓ Duration of leg ulcer
- ✓ History of previous leg ulcers
- ✓ History of Deep Vein Thrombosis (DVT) and/or varicose veins
- ✓ Previous surgery to legs
- ✓ Description and type of pain
- ✓ History of disease processes
- ✓ History of smoking

18. (a) I am better informed about recognising infection in patient(s).

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(b) I have consciously changed the way in which I recognise infection in patient(s).

- ✓ Strongly Agree
- ✓ Agree
- ✓ Disagree
- ✓ Strongly Disagree

(c) Please indicate if you have consciously changed your behaviour by taking into account one or more of the following:

- ✓ Recognising infection as one probable cause of increased pain and heat to the site of the ulcer
- ✓ Patient requiring systemic antibiotics to counteract infection
- ✓ Changing the wound dressing(s) more frequently to help counteract infection

Appendix 9

Maslach's Burnout Inventory
Human Services Survey

Time Allowed: 5 Minutes

The following is an extract from the full MBI (HSS) only.

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The purpose of this survey is to discover how various persons in the human services or helping professions view their jobs and the people with whom they work closely. Because persons in a wide variety of occupations will answer this survey, it uses the term recipients to refer to the people for whom you provide your service, care, treatment, or instruction. When answering this survey, please think of these people as recipients of the service you provide, even though you may use another term in your work.

[Below] ... are 22 statements of job-related feelings. Please read each statement carefully and decide if you ever feel this way about *your job*. If you have never had this feeling, write a "0" (Zero) before the statement. If you have had this feeling, indicate how *often* you feel it by writing the number (from 1 to 6) that best describes how frequently you feel that way. An example .. [precedes the 22 statements] ..

Example:

HOW OFTEN:	0	3	6
	Never	A few times a ...	Every day

HOW OFTEN
0 - 6 Statement

_____ I feel good at work

If you "never" feel good at work, you would write the number "0" (Zero) under the heading "HOW OFTEN". If you rarely feel good at work (a few times a year or less), you would write the number "1". If your feelings are fairly frequent (a few times a ... , but not ...) you should write a "3" etc.

HOW OFTEN:	0	3	6
	Never	A few times a ...	Every day

HOW OFTEN
0 - 6 Statements:

- 1. _____ I feel from my work
- 17. _____ I can easily create a my recipients
- 22. _____ I feel recipients blame

Appendix 10

Previous Development Questionnaire

Appendix 11

**Local Research Ethics Committee
Approval Letter**

Iechyd Morgannwg Health

41 High Street, Swansea SA1 1LT
41 Stryd Fawr, Abertawe SA1 1LT
Tel/Ffôn: (01792) 458066
Fax/Ffacs: (01792) 655364
WHTN 1780

98.102

Your ref / Elch cyf:

Rebecca
Our ref / Ffôn: **Rebecca**
Extension 7420

Enquiries to / Holwch:

Ext no. / Rhif est:

Mr M A Seeley
Student
117 Cathedral Road
Cardiff
CF1 9PH

09/12/1998

Dear Mr M A Seeley

98.102 The Impact of Specific Interventions on Wound Treatments and Outcomes

Thank you for the amended patient information sheet as requested by the Committee and I write to advise that this has now been granted Chairman's Action approval and registered. I enclose a signed copy of the approved submission. Please quote the registration number in any future correspondence. Please also note :

- 1 The enclosed document is confidential and not for publication
- 2 Any publication resulting from the Protocol must define how subjects were chosen and to what extent they were volunteers.
- 3 That the form of consent must be read and signed by each subject or, if oral consent has been approved by the Committee, that the consent of each subject must be appropriately recorded. In either case, forms and records must be kept for subsequent examination, if required, by the Committee
- 4 That changes to the Protocol as approved must be referred to the Committee
- 5 Ethical approval does not imply acceptance of materials and drug costs by the Authorities or provider units
- 6 Any untoward incident which occurs in connection with this Protocol must be reported back to the Chairman of the Committee **without delay**.

Yours sincerely



ALAN WILLSON - DIRECTOR OF PATIENT CARE DIRECTORATE & SECRETARY TO THE LOCAL RESEARCH ETHICS COMMITTEE

Chairman/Cadeirydd: Mr D Hugh Thomas C.B.E., C St J, DL, MA
Niel Executive/Prif Weithredwr: Mrs Jan Williams BA, MA, MBA, FHSM, Cert Health Econ.
Director of Public Health/Cyfarwyddwr Iechyd y Cyhoedd: Dr Peter Donnelly MPH, MBA, MB, ChB, FFFHM
Director of Finance/Cyfarwyddwr Cyllid: Mr Eifion Williams BSc, MSc, IPFA, Cert Health Econ.
Director of Contractor Services/Cyfarwyddwr Gwasanaethau Contractwyr: Mr George Plunkett C.Eng, MIEE
Director of Patient Care/Cyfarwyddwr Gofal Cleffion: Mr Alan Willson B Pharm, MR Pharm, MR Pharm S, Msc.

Working to secure better health
Yn gweithlo i sicrhau iechyd gwell



IECHYD MORGANNWG HEALTH WELCOMES CORRESPONDENCE IN WELSH AND ENGLISH
IE IECHYD MORGANNWG YN CROESAWU GOHEBIAETH YN GYMRAEG AC YN SAESNEG