

# The Leg Ulcer Prevention Program: effectiveness of a multimedia client education package for people with venous leg ulcers

Kapp S, Miller C, Sayers V & Donohue L

## Abstract

The prolonged and recurrent nature of venous leg ulceration can be a source of great frustration to client and clinicians alike. Venous ulcers may have a significant effect on a person's quality of life and treatment of this condition generates a burden on healthcare systems. It is a challenge to assist people with these ulcers to adhere to treatment and to generate and maintain positive lifestyle changes so as to reduce the risk of delayed healing, ulcer recurrence and poor health.

The Leg Ulcer Prevention Program (LUPP) was designed around key elements which influence ulcer healing, promote chronic disease management, optimise recurrence prevention and, more broadly, are conducive to better health and wellbeing. The program sought to empower clients to take ownership of their chronic disease and participate in self-management activities to augment their formal care.

LUPP led to statistically significant improvements in client knowledge for ulcer aetiology, compression bandaging treatment, activity and exercise, nutrition, skin care and the need for compression stockings following healing. Statistically significant improvements in client behaviours were demonstrated in the areas of activity and exercise, skin care and compression bandaging.

The results of this research are of interest to clinicians and organisations who deliver care to people with venous leg ulcers or indeed any chronic disease. LUPP is an evidence-based resource for providing effective client education to improve client knowledge and behaviours and, in turn, promote better health and wellbeing.

*Keywords: venous leg ulcer, chronic disease management, client education, health promotion, community nursing.*

**Suzanne Kapp** \* BN, MNSci<sup>1</sup>

**Charne Miller** BA (Hons)<sup>1</sup>

**Vicki Sayers** BN, PGDip (Amb & Home Care)<sup>2</sup>

**Dr Lisa Donohue** PhD<sup>1</sup>

<sup>1</sup>Royal District Nursing Service Helen Macpherson Smith Institute of Community Health

<sup>2</sup>Royal District Nursing Service

\* Corresponding author

**Suzanne Kapp**

Clinical Nurse Consultant Wound Management and Research, Royal District Nursing Service Helen Macpherson Smith Institute of Community Health

31 Alma Road, ST KILDA, VIC 3182

Telephone (03) 9536 52336

Fax (03) 9536 5300

Email skapp@rdnx.com.au

## What is known

- Knowledge, understanding and ability to participate in self-management strategies augment formal care provided to people with venous leg ulcers.
- Uptake and adherence to compression therapy promotes venous leg ulcer healing and can prevent recurrence.

## What is contributed

- Standardised client education delivered via the LUPP improved knowledge and promoted behaviours which are conducive to healing, recurrence prevention and health and wellbeing.
- The LUPP increased uptake and adherence to four-layer compression bandaging.
- Client education in the form of a multimedia package, delivered by the home nurse via the tablet personal computer, is highly acceptable to the client.

The LUPP: effectiveness of a multimedia client education package for people with venous leg ulcers.

## Introduction

Chronic disease is escalating at such a rapid rate that it is seen by the World Health Organization as a current and future worldwide epidemic<sup>1</sup>. Australia is not exempt, with a high incidence of risk factors associated with the development of chronic disease and a population living with these conditions longer than most<sup>2</sup>. The incidence and impact of chronic disease can be minimised through health promotion programs which target risk factors across the life span and promote positive lifestyle changes.

It is suggested that 1–2% of the world's population will have an active leg ulcer at any time, 81% of these ulcers are venous and that overall prevalence, including healed ulcers, may be as high as 10–20%<sup>3</sup>. Venous leg ulcers present physical, social and psychological challenges to the individuals who suffer with them<sup>4</sup>. In Australia, venous leg ulcers are estimated to cost the healthcare system \$400–500 million each year<sup>5</sup>. Recurrence is problematic for the person with the condition and frustrating for healthcare professionals involved in their care<sup>6</sup>.

Whilst preventing peripheral vascular disease in the first instance would be ideal, managing the risk factors for chronic disease will slow the progression and impact of the condition. In relation to leg ulceration, a condition often arising from peripheral vascular disease, a reduction of the impact of risk factors can improve wound healing and reduce the risk of leg ulcer recurrence.

Health promotion is "the process of enabling people to increase control over, and to improve their health"<sup>7</sup>. Community nursing services frequently care for people with leg ulcers and are well-placed to support people to "develop personal skills" in the management of peripheral vascular disease; one of the key areas noted in the Ottawa Charter<sup>7</sup>.

Health knowledge, education and life skills are factors of interest to care providers when considering how to prevent and manage chronic disease. For people with venous leg ulcers, the challenge is twofold: reducing the risk factors associated with peripheral vascular disease and promoting adherence to recommendations regarding wound treatment and prevention of leg ulcer recurrence. Health promotion programs are effective in chronic disease management<sup>8</sup>; however, there is no published literature on programs which combine these two aspects, and thus which specifically target individuals at risk of or who have experienced venous leg ulceration.

### What is the Leg Ulcer Prevention Program (LUPP)?

The LUPP is a client education package which utilises

e-learning technology, hard copy education materials, nurse and client activities, client diaries and nurse facilitation and monitoring to provide visual, auditory and sensory interaction. Best practice recommendations for venous leg ulcer management, as well as advice regarding general health and lifestyle factors known to be integral to chronic disease management are delivered. LUPP promotes client ownership of their wound and chronic disease and encourages participation in self-care activities. The program focuses on assisting clients to heal their wounds, prevent ulcer recurrence and to manage chronic disease risk factors to promote better health and wellbeing.

LUPP was developed by a multidisciplinary team including wound management clinical nurse consultants, researchers, allied health practitioners, e-learning experts, marketing specialists and a professional photographer. The Flesch–Kincaid Grade Level test as applied via Microsoft Word 2003™ suggests a Grade 7 readability level of the written version of LUPP.

LUPP includes six sessions, one session delivered to the client (and carer if appropriate) each week, at usual wound care visits in the home. Each LUPP session is composed of:

1. A short multimedia presentation viewed on the nurse's tablet personal computer.
2. The written version of the presentation for the client to keep.
3. A session summary sheet to reinforce each session's main messages.
4. Relevant activities.

#### *The content of LUPP addresses:*

Session one. Introduction: Focuses on the need for a joint effort by the client and healthcare providers and introduces the role of graduated compression bandaging for healing and stockings for maintenance. The activity is the review of a four-layer compression bandaging case study.

Session two. Leg ulcer treatment: Focuses extensively on the role of compression therapy in venous leg ulcer management and four-layer bandaging is promoted as the most clinically effective treatment. The activity is a review of the organisation's Wound Care Equipment Sheet/Checklist.

Session three. Getting active: Based on the Victorian state government recommendations for walking for older adults from the initiative *Go For Your Life*<sup>9</sup>, together with recommendations for exercises known to have an impact on calf muscle pump function<sup>10</sup> and leg elevation to manage oedema. The LUPP Activity Plan and Diary are reviewed and the client's bilateral ankle range of motion is measured with a goniometer.

Session four. Healthy eating: Includes recommendations for healthy nutrition, based on the *Australian Guide for Healthy Eating*<sup>11</sup>, as well as specific recommendations for nutrition whilst wounded<sup>12</sup>. A food diary is reviewed and the client's Body Mass Index (BMI) is calculated.

Session five. Looking after your skin: Presents common skin conditions and guidelines for skin care and early reporting. The activity is sampling a soap-free cleanser and moisturiser suitable for people experiencing conditions such as itch, scale and eczema.

Session six. Compression stockings and keeping your ulcer healed: This session reinforces earlier recommendations that compression is required during the post-healing phase and introduces stockings and donners. This session provides the opportunity for demonstration and trial of a metal frame and a material stocking donner.

LUPP sessions required between 20 and 60 minutes to complete (the six sessions taking a total time of three hours) which included the time required to view the e-learning presentations, all related activities and nurse administration tasks. LUPP was delivered during the nurse's home visit and prior to attending to wound care to optimise the client's attentiveness. The nurse was required to view the presentation together with the client to facilitate subsequent discussion regarding the content and recommendations and promote engagement between the nurse and the client.

## Method

The aim of the LUPP pilot study was to develop, implement and evaluate LUPP on knowledge and behaviours of clients receiving home nursing care for a venous leg ulcer. The evaluation employed a pre- and post-intervention design. The evaluation incorporated a translational research approach, the intervention based on existing evidence for effective care of people with venous leg ulcers. In this way it was viewed as a health promotion activity for the purposes of quality and client care improvements.

### LUPP site allocation

The organisation classifies the geographical areas it services as 'sites' and in this study, eight of the 16 sites implemented LUPP. Before randomly selecting the sites which would implement LUPP, two groups with eight sites in each were created by the investigators to evenly represent previous engagement in internal wound research and clinical wound management expertise. Using random number function in Microsoft Excel, one group was randomised to be the 'LUPP sites' and the other the 'Non-LUPP sites.' Data from non-LUPP sites were not collected in this study.

## Eligibility

Clients were eligible for the study if they were receiving nursing care for a medically confirmed \* venous leg ulcer at the LUPP sites and ineligible only if they did not speak English. There were no other inclusion or exclusion criteria. LUPP was considered standard practice at LUPP sites during the study therefore all existing and new clients who met the eligibility criteria during the recruitment period were expected to participate in LUPP. Nurses were not permitted to exclude clients on account of any perceptions regarding the client's capacity to participate, that is to say cognition or nurse opinion of the client's ability to adopt recommendations. Clients were able to refuse to participate in LUPP at any time.

(\* According to organisational policy all clients with chronic leg ulcers require a lower limb assessment including Doppler ultrasound and confirmation of wound aetiology by a medical practitioner. Once this is obtained and documented the client is then said to have a 'medically confirmed' leg ulcer diagnosis.)

## Implementation

To implement LUPP, 60 nurses (including Division 1 Grade 4, 3, 2 and one Division 2 nurse) completed a 90-minute training session including an overview of the background to the study, objectives, how to implement LUPP and orientation to the *LUPP Clinician Guide*. Training also included how to implement the client diaries and how to use a goniometer for measurement of ankle range of motion.

## Recruitment

Participants were recruited between March 2009 and March 2010. Screening and recruitment was undertaken and coordinated by the participating nurses. Any new or existing clients with a wound which was later diagnosed as a venous leg ulcer commenced LUPP upon diagnosis. Client screening reports derived from the organisation's electronic client data system were distributed bi-monthly to assist sites to identify all clients eligible for LUPP.

## Data collection and measures

For each participant, a pre-LUPP questionnaire (before commencing LUPP or viewing any materials) and a post-LUPP questionnaire (following completion of session six) was required. The questionnaires were designed specifically for use in this study by the research team, two clinical nurse consultants in wound management and the allied health consultants who assisted in the development of the program. Questions considered participant knowledge, behaviour, attitude and adoption and adherence to recommendations from LUPP. Questions regarding client knowledge included

multiple choice and true/false questions based on the evidence-based recommendations in the program. These questions required response from the client. Questions regarding participant behaviour were responded by the participant or the nurse. Questions regarding participant's attitudes were responded by the participant. In the post-LUPP Questionnaire, responses were sought from participants regarding satisfaction with LUPP using Likert scale responses and a free text field. Compression therapy use prior to LUPP and at each subsequent session was also collected (as recorded by the nurse) to facilitate evaluation of any changes made as a result of LUPP. For analysis and reporting, the types of compression therapy used were recoded into 'high' (i.e. short/long stretch bandages, Class 3 stocking) 'moderate' (i.e. tubular and bandage, Class 2 stocking) and 'low' (i.e. tubular bandage, Class 1 stocking) categories, with 'none' 'compression system 23mmHg' and 'compression system 40mmHg' remaining separate and exclusive categories.

Questionnaires were returned to the research team, then matched and de-identified. Data were entered by the two researchers responsible for all data entry and analysis. To check data reliability, 10% of data was double-checked with no data errors detected. The analysis was confirmed by an independent researcher.

### Statistical analysis

Predictive Analytics SoftWare (PASW) Statistics 18 for MS Windows Release 17.0 (SPSS Inc., Chicago, IL) was used to analyse these data. McNemar's test was used for a repeated measures comparison of binary data. A t-test was used to analyse continuous data. Pearson's chi-square analysis was used to analyse other categorical data gathered from a single point in time. Any chi-square test for which more than one cell had fewer than five cases has not been reported. An alpha level of 0.05 was used to classify the findings as significant.

## Results

The following results are from the clients involved in the study. They are client participants (for the purposes of research), but for ease of reading will be referred to from here on as 'clients' in the text.

An audit of the organisation's electronic client data system and consultation with LUPP nurses was undertaken to report the population from which participants came. It was found that 13 clients were ineligible for LUPP on account of not speaking English. A total of 41 clients with venous leg ulcers did not commence LUPP; one client was receiving palliative care, one client had intellectual disability, one client was unable to commence due to site resources, three clients had significant visual or cognitive impairment, four clients had

diagnoses which were not confirmed by a medical practitioner, a further 14 clients refused to receive LUPP, 14 clients were overlooked for the program and for three clients, the reason for not commencing LUPP was unable to be determined.

A total of 185 eligible clients commenced the LUPP program; 183 returned completed pre-LUPP questionnaires and two participants missed this data collection. The post-LUPP survey was completed by 156 participants, representing a lost to follow-up of 29 (15.67 %) who commenced the education. Of those who did not complete the follow-up data collection, 14 (48.2%) were discharged or died before they could complete LUPP, eight (27.6%) had their wound diagnosis amended whilst participating in LUPP, making it inappropriate for them to continue with the program, three (10.3%) declined to continue with the education and four (13.8%) ceased LUPP in error. Thus, the final sample which was analysed included 156 participants. In all other instances of missing data, the participant(s) excluded from that specific analysis and the sample size for each analysis is specified.

On average LUPP took 5.89 weeks to complete (SD=2.32) with a range of 0.71 to 19.71 weeks. Unavoidable factors, including client availability (clients not home, short-term discharge from the service), LUPP nurse availability and the occurrence of wound healing influenced the timing of the sessions and thus administration of the pre- and post-questionnaires.

### Client demographics

Data for 155 clients were analysed to generate a demographic profile (data for one client was missing). Clients were predominantly female (67.1%), 79.5 years of age on average (SD=10.67), typically born in Australia (76.8%), with just over one quarter requiring the support of a carer (25.2%).

### Client health knowledge

The answers to 11 multiple response questions were recoded into 'correct' and 'incorrect' categories to optimise the power in the analysis (Table 1). Baseline knowledge (client knowledge immediately prior to the LUPP education) suggests that clients were well-informed about seeking help if something went wrong with their skin (74.0%). Knowledge that compression bandaging and compression stockings were recommended therapies for managing venous hypertension was also relatively high (63.8% and 65.6% respectively) along with a definition and cause of venous leg ulceration (67.1% and 63.2% respectively). Approximately half the sample or more tended to select the correct answer for all other questions at baseline with one exception; few clients knew that a dressing should keep the wound moist (28.9%).

The proportion of correct responses for the multiple choice questions increased significantly between the pre- and post-assessments in every instance. Approximately three-quarters or more clients selected the correct answer to these questions in the post-LUPP test, with the exception of the optimal diet when wounded (68.4%) and the purpose of a dressing for which only half the sample answer the question correctly following the education (51.3%).

Responses to eight true and false response questions were sought (Table 2). Knowledge before LUPP was highest for the item indicating four-layer compression bandaging as the treatment for venous leg ulcers (81.3%), yet clients mistakenly believed that compression would 'fix' their veins, with only a quarter of respondents answering this question correctly (24.7%). Six in ten responded correctly that compression stockings would be required post-healing (60%). Other areas

which clients were well-informed about prior to receiving the LUPP included the importance of nutrition when wounded (64.3%) and the impact of medications on healing (62.1%). Knowledge pre-LUPP was lower regarding appropriate skin cleansing and the amount of activity required when living with a leg ulcer. Nearly all clients mistakenly believed that wounds needed to be cleansed at every visit (1.9%).

The proportion of correct responses for the true and false response questions increased significantly between the pre- and post-LUPP assessments in all instances with the exception of two items. Compression bandaging 'fixing' the veins was a misconception which clients maintained following the education, as was the false perception clients had that their wounds necessarily required cleansing at every dressing change. Statistical analysis of the latter could not be pursued due to low cell sizes; however, a review of cross-tabulation

Table 1. Multiple response knowledge questions in the pre- and post-LUPP questionnaires.

%		Pre-test (% correct)	Post-test (% correct)	p=	
	Most common cause of leg ulcers is ... [poor veins]	n=152	63.2	80.9	.000
	A leg ulcer is best described as ... [a break in the skin that takes more than 6 weeks to heal]	n=152	67.1	77.6	.029
	A dressing should ... [keep the ulcer moist]	n=152	28.9	51.3	.000
	The most important treatment for a leg ulcer is ... [compression bandaging]	n=152	63.8	88.8	.000
	The most important activity I can do to support my leg ulcer is ... [walking]	n=153	54.2	80.4	.000
	I should elevate my legs ... [3–4 times a day]	n=155	57.4	76.1	.000
	An optimal diet ... [includes all major food groups]	n=152	54.6	68.4	.009
	Most people should drink ... [8 or more glasses of water each day]	n=155	48.4	72.3	.000
	I should check the skin on my legs ... [every day]	n=154	58.4	77.3	.000
	If something goes wrong with the skin on my legs I should ... [contact my doctor or nurse immediately]	n=154	74.0	91.6	.000
	The best way to avoid another venous leg ulcer is ... [wear compression stockings]	n=154	65.6	94.8	.000

Table 2. True and false knowledge questions in the pre- and post-LUPP questionnaires.

%		Pre-test (% correct)	Post-test (% correct)	p=	
	Compression will fix the problem with my veins (False)	n=154	24.7	18.8	.188
	Wounds should be cleansed at every dressing change (False)	n=155	1.9	6.5	n/a *
	While I have a leg ulcer it is important that I rest and not be too active (False)	n=155	36.1	55.5	.000
	My diet needs to be more nutritious than usual when I have a leg ulcer (True)	n=154	64.3	77.9	.003
	Some medications will slow the healing of my ulcer (True)	n=153	62.1	73.9	.022
	Soap and water is the best way to clean my skin (False)	n=155	29.7	50.3	.000
	Four-layer compression bandaging is the best bandaging treatment available for venous leg ulcers? (True)	n=155	81.3	92.9	.001
	After my ulcer heals I will need to use compression stockings for the rest of my life (True)	n=155	60.0	89.7	.000

\*=Not reported as 50% of cells had fewer than 5 cases.

demonstrates that the education failed to make substantial inroads in these two areas.

#### *Client health behaviours*

There were no significant differences in nutrition before and after the LUPP education (Table 3). Though self-reported consumption of fluids was generally less than the recommended eight glasses or more a day for approximately two thirds of participants (64.9% in both pre-test and post-test), more than three-quarters of respondents rated their fluid intake and diet as adequate in both pre- and post-tests. Recommendation to use and actual intake of either nutritional supplement or multivitamin was low with less than a quarter of clients supplementing their diet with either product. The average number of glasses of either tea or coffee (caffeinated) or alcohol drunk each day by study participants prior to the LUPP education was 3.84 glasses (SD=2.18); there was no significant difference in the post-LUPP assessment (Ave=3.66, SD=1.81)].

With respect to physical activities which assist healing or prevent ulcer recurrence, changes to behaviours were observed after LUPP (Table 4). Prior to the LUPP education only one quarter of clients (26.5%) reported that heel raises and leg squats had been recommended to them and few clients actually did these exercises regularly (14.9%). After LUPP, almost all clients were recommended to do heel raises and squats (95.5%) and two thirds of clients (66.2%) reported regularly engaging in this behaviour. This increase was statistically significant. Leg elevation was one health practice already established prior to the LUPP education with nine in 10 clients previously recommended by a health professional to elevate their legs when sitting or resting (91.0%). This increased to almost all clients after LUPP (99.4%). Most clients were actually practising the elevation of their legs both before LUPP (72.1%) and after LUPP (83.1%). There was no

significant difference in the pre- and post-LUPP assessments for either measure.

A moderate proportion of the sample reported walking frequently and keeping active before LUPP (56.8% and 69.0% respectively). Although both proportions increased in the post-LUPP assessment, only the number of respondents keeping active increased significantly to almost four in five clients (79.4%).

Significant differences were found in the area of skin care (Table 4). Prior to the introduction of LUPP, few client care plans specified the use of a soap substitute (24.5%) though more recommended the use of a moisturiser (73.1%). Both increased significantly following the LUPP education, with more than two thirds of nurses recommending a soap substitute (70.3%) and most recommending a moisturiser (92.9%). Clients were also significantly more likely to use both soap substitute and moisturiser after the education proportions increasing from 30.3% and 83.1% respectively in the pre-test to 67.7% and 92.9% respectively in the post-test.

#### *Client compression therapy use*

All clients participating in the LUPP education had one or more venous leg ulcer and were therefore suitable for compression therapy. A quarter required compression bandaging on both legs (26.5%), with remaining clients requiring compression bandaging on one leg only (42.6% left leg; 31.0% right leg). The compression therapy used immediately prior to and during the education was gathered in the post-LUPP questionnaire. These results have been combined in the presentation of frequency data with data representing all instances (legs and not clients) where compression therapy was indicated for a leg (Table 5).

Parametric analyses were pursued to assess whether changes in compression therapy use across the sessions of LUPP were

Table 3. Nutrition behaviours in the pre- and post-LUPP questionnaires.

%		Pre-test (% correct)	Post-test (% correct)	p=
Nutrition. Usual food intake pattern (Adequate/Excellent)	n=153	83.7	86.9	.473
Fluid. Water, juice, flavoured water. (About 8 glasses/>8 glasses)	n=154	35.1	35.1	1.000
Client recommended to take nutritional supplement	n=155	16.8	23.2	.184
Client takes nutritional supplement	n=156	17.9	22.4	.337
Client recommended to take multivitamin	n=156	22.4	21.2	.868
Client takes multivitamin	n=156	23.7	17.3	.052
Client believes they are eating a well-balanced diet	n=155	87.7	92.3	.167
Client believes they have been drinking plenty of fluids	n=155	76.8	78.7	.736

significantly different; however, there remained too many cells with too few cases to permit any interpretation of the results with confidence. These are, therefore, not reported.

Use of compression systems 40mmHg (four-layer bandage system) before the LUPP education was low (13.6%). A variety of compression treatments were in use, though notably one third of legs (33.5%) for which compression therapy was indicated at the commencement of LUPP used no compression therapy. The proportion of legs receiving no compression therapy treatment decreased to 13.8% after the LUPP education, with greatest use of compression system 40mmHg (42.3%) observed over this time. Compression system 23mmHg (three-layer bandage system) was next most frequently used (11.6%).

Nurses were asked to indicate if any changes in compression therapy use were, in their opinion, the result of the LUPP education. The change to the treatment was believed to be brought about by the LUPP education for 54.9% of LUPP participants. For 30.7% the change was reported to be

unrelated to LUPP. The remaining 14.4% of LUPP participants did not change their compression regime during LUPP. When a change was prompted by LUPP, the change tended to be towards a 40mmHg compression system (67.9%) rather than another compression treatment (32.1%). In contrast, when the change was not prompted by LUPP, it was less likely to be to a 40mmHg compression system (27.7%) with other compression treatments being introduced (72.3%). There was a statistically significant difference in the type of compression treatment that was changed to and whether the change was brought about by the LUPP education ( $\chi^2 (2)=41.291, p<0.000$ ].

Awareness of compression bandaging recommendations and actual compression bandaging use prior to the LUPP education was examined. Clients who knew compression bandaging was "the most important treatment for a venous leg ulcer" were less likely to wear no compression (25.0% left leg; 26.7% right leg) compared to clients who answered this question incorrectly (48.7% left leg; 48.1% right leg). They

Table 4. Activity and skin care behaviours in the pre- and post-LUPP questionnaires.

%		Pre-test (% correct)	Post-test (% correct)	p=
<b>Activity. Degree of physical activity</b>				
(Walks frequently)	n=155	56.8	61.3	.337
Client believes they have been keeping active	n=155	69.0	79.4	.014
Client usually crosses legs when sitting	n=156	17.9	14.7	.442
Client recommended to do heel raises and squats	n=155	26.5	95.5	.000
Client regularly does heel raises and squats	n=154	14.9	66.2	.000
Client recommended to elevate legs when sitting/resting	n=155	91.0	99.4	n/a *
Client usually elevate legs when sitting/resting	n=154	72.1	83.1	.012
Care plan includes use of a soap substitute	n=155	24.5	70.3	.000
Soap substitute is being used	n=155	30.3	67.7	.000
Care plan includes use of a moisturiser	n=156	73.1	92.9	.000
Moisturiser is being used	n=154	83.1	92.9	.004

\*=Not reported as 50% of cells had fewer than 5 cases.

Table 5. Compression bandaging use prior to and during LUPP %.

%	Pre-LUPP	Session 1	Session 2	Session 3	Session 4	Session 5	Session 6
	n=151	n=150	n=150	n=149	n=149	n=149	n=149
Compression system 40mmHg	13.6	44.2	45.3	46.0	43.4	42.3	42.3
Compression system 23mmHg	3.7	8.4	9.5	9.5	9.5	12.2	11.6
High	5.2	4.2	3.2	3.7	4.2	4.2	4.8
Moderate	10.5	5.8	7.4	7.9	7.9	7.4	8.5
Low	33.5	22.1	20.5	19.0	20.6	19.0	19.0
None	33.5	15.3	14.2	13.8	14.3	14.8	13.8

were also more likely to wear four-layer compression systems (15.6% left leg; 18.3% right leg) compared to those answering this question incorrectly (5.1% left leg; 11.1% right leg). Analysis to determine if these differences were significant could not be pursued due to the number of small cell sizes.

### Client satisfaction with LUPP

Clients responded to a number of statements about the LUPP education. Clients overwhelmingly agreed that LUPP improved their understanding of venous leg ulcers (99.3%), increased their knowledge of how to avoid a leg ulcer (98.0%), and that they received information they did not know prior to receiving LUPP (95.4%). Clients also agreed that the LUPP activities were helpful (95.4%), the use of the nurse's computer to provide the education was excellent (96.7%) though it was valuable to have the nurse available (100.0%), and that the presentation was clear (96.1%). Overall, most clients agreed with the statement that the LUPP education was excellent (99.3%).

### Discussion

Prior to LUPP, clients had good knowledge of venous leg ulceration and the role of compression therapy. Knowledge in the areas of nutrition and activity and exercise was fair. Post-LUPP, knowledge had improved in all but one area and most changes were statistically significant suggesting LUPP addressed its intention to improve client knowledge in the areas most important when providing educating to people with venous leg ulcers. The findings that participants mistakenly believed compression fixed veins and also mistakenly believed that wound cleansing is necessarily required, both before and after LUPP, may reflect that the LUPP failed to communicate the correct messages, or that the measure in these cases was problematic. Regarding compression fixing veins, this finding may reflect that LUPP was unable to achieve sufficient differentiation between the role of compression supporting the veins and actually *fixing* the problem. Regarding wound cleansing, the reasons may be more complex and may reflect ingrained beliefs of the client or nurse regarding this practice. Given the average age of clients in LUPP was 79.5 years, recent evidence about wound cleansing is in stark contrast to the information these clients would have received during most of their life.

In the area of skin care, all recommendations promoted by LUPP were shown to generate statistically significant changes in behaviour. Skin moisturising was at the onset quite common with cleansing less so. As sample products were provided to participants to trial in LUPP, it may be that by experiencing the benefit without outlaying the expense motivated clients to invest more in their skin care products, particularly the cleanser.

The impact of LUPP on behaviours associated with activity and exercise varied. All areas improved; however, only some did so significantly. Leg elevation was a behaviour already well-recommended and practised, suggesting LUPP reinforced this recommendation. Heel raises and squats were new activities for most clients and the finding that nearly all were recommended to do these exercises and that two thirds were doing them regularly suggests a very pleasing impact of LUPP. There remained some areas for improvement after the LUPP education: pre-LUPP, two thirds of participants believed incorrectly that resting and low levels of activity was appropriate and post-LUPP, this increased to only just over half the participants. Whilst elevation is helpful and is well-adopted by this group, the benefit of regular exercise balanced with elevation needs to be found and people with venous ulcers require clarity about the role and importance of both activities.

LUPP did lead to changes in the area of nutrition; however, none which were significant. The finding that more than three-quarters of participants believed they had good nutrition habits and reported acceptable food intake prior to LUPP suggests that either there was little room for improvement on these measures or that the measures used were limited. Malnourishment, or risk of, has been shown to occur among people receiving domiciliary care<sup>13</sup>. Further work is required to better understand the difference between what has been reported in this study and what is considered in the literature to be much more problematic.

Improving the uptake of compression bandaging and promoting clinically effective treatment were key objectives of LUPP. Awareness of the need for compression therapy was relatively high prior to the LUPP education and yet many participants were not using any compression or were using low levels of compression. It may be that participants who did not have a confirmed diagnosis on admission to the service were assessed as unsuitable for compression or it may be that conservative levels of compression were prescribed prior to diagnosis confirmation. LUPP made a sizable impact on compression therapy use and specifically increased the use of four-layer compression systems. Few clients emerged from the education wearing no compression therapy at all and the majority were aware of the need for compression for healing and recurrence prevention.

In addition to these satisfying improvements in client knowledge and behaviour change, participants also reported high satisfaction with LUPP. Rated well was the novel use of the nurse's computer to deliver a multimedia education package. The nurses who implemented LUPP during this study already used tablet personal computers for work and,



for the first time, used them to interact with their clients for the purpose of health promotion.

In this study, data from clients at non-LUPP sites were not collected. This eliminated the potential for a comparison group and is a limitation of the study. As such, caution is warranted when assessing the results as this design does not exclude the possibility that contextual or situational factors caused the outcomes observed. LUPP was implemented as a pilot study and future research is planned that will address this methodological limitation. The timing of the post-LUPP questionnaire ensured participant perspectives of the program were current; however, the timing may have inflated the knowledge change that would be seen in the longer term, especially for the content of the latter sessions. It is thought that most behaviour changes, if they were going to occur, would occur quickly. The longevity of these behaviour changes requires evaluation over a longer period of time. The pre- and post-LUPP tools were designed by the research team and though they permitted evaluation of the specific aspects of program, they were not validated instruments.

A favourable outcome occurring concurrent to those reported here, was that LUPP allowed transference of best practice principles to the nurses using it. Not only did LUPP contribute to standardising nursing care, but also to the nurse's confidence to deliver client education and their ability to engage with clients for this purpose. The reader is referred to a separate publication for the results of the nurse survey and focus group undertaken to explore the nurse's experiences of LUPP<sup>14</sup>. Further insights as to the effectiveness of LUPP will be reported in 2011 once a related study, a compression stocking RCT, is completed. In this trial, a comparison between participants who received LUPP or usual care will be possible assessing ulcer recurrence and stocking adherence 26 weeks after healing.

## Conclusion

LUPP achieved a standardised means of ensuring each and every client received an education program based on best practice principles of venous leg ulcer management. LUPP was successful at improving client knowledge and behaviours in areas integral to venous leg ulcer healing and recurrence prevention and central to health and wellbeing. Participants were highly satisfied with the multimedia education package delivered by the nurse's tablet personal computer. This evaluation of LUPP has identified a number of areas for refinement to optimise the capacity of LUPP to educate clients and encourage positive self-management practices. These areas include aspects of knowledge which remained poor after LUPP, behaviours associated with activity and exercise where more improvements may be made and the

impact of nutrition on this client group including the ways in which this is measured and addressed in the future. Further research is required to investigate whether LUPP does impact favourably on healing outcomes and recurrence prevention. Evaluating these factors will be the focus of the next phase in assessing the merit of the LUPP package.

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