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Quality of Life and Costs Within Decongestive Lymphatic Therapy in Patients with Leg Lymphedema: A Multicountry, Open-Label, Prospective Study

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Abstract

Background: Little is known of the impact in terms of health-related quality of life (HRQoL) and cost-effectiveness with decongestive therapy.
Objectives: To examine changes in limb volume, quality of life (QoL), and treatment cost of methods of decongestive lymphatic therapy (DLT).
Methods: Patients with chronic edema/lymphedema of the leg were invited to participate in a study of DLT in four countries (United Kingdom, France, Germany, and Canada). In each country two sites were selected. One site used their standard method of DLT in their service, including compression with multilayer bandaging with inelastic material. The other site used a system that included 3M™ Coban 2™ as the bandage treatment alongside other standard components of DLT. Patients were followed for either 2 or 4 weeks depending on the local protocols. At entry, at 2 weeks, and at 4 weeks, patients were assessed by using a health index (EQ-5D), a disease-specific HRQoL tool (LYMQOL) and resource usage was recorded over the treatment period.
Results: Of the 165 patients with cost data, 90 were treated with Coban 2 and 75 with standard care compression bandaging. There was good evidence of an improvement in EQ-5D of 0.077 ($p < 0.001$) in all patients. LYMQOL showed significant improvements ($p < 0.001$) with lower scores. There were no major differences between the two arms of the study with respect to HRQoL. The number of treatment episodes was higher in those treated with standard care (8.15 vs. 6.37), but the overall treatment cost was higher with Coban 2 (£890.7) compared with standard care (£723.0).
Conclusion: QoL improved in the standard care and Coban 2 group bandages, and there was no demonstrable difference between the care systems. Further work is required to examine the role of the individual parts of DLT that provide the greatest benefit to patients and the health systems that support them.

Keywords: cost-effectiveness, health-related quality of life, decongestive lymphatic therapy, chronic edema

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Introduction

LYMPHEDEMA IS A CHRONIC SWELLING caused by the regional accumulation of lymphatic fluid due to an insufficient lymphatic system. This may present as primary lymphedema, defined as congenital abnormality of lymphatic vessels, or secondary lymphedema, acquired from various insults to the lymphatic system, such as malignancy, trauma, surgery, irradiation, or infection.[1] The increased size and restricted mobility of the affected limb influences quality of life (QoL). Daily activities at work, home, and with personal care activities are influenced and the risk of developing anxiety and depression is, therefore, increased.[2–4]

Treatment is usually divided into an acute phase with intensive treatment from health professionals and a maintenance phase where the patient undertakes a self-management regime with minimal involvement of professionals. In the acute phase, treatment is focused on volume reduction, which aims at stabilizing the skin condition and reducing the risk of cellulitis and wounds. Decongestive lymphatic therapy (DLT) involves a combination of bandaging, manual lymphatic drainage (MLD), exercises, and skin care. Despite these recommendations, there is little standardization of DLT therapy and the recommendations that do exist are interpreted differently across the world. There is even less clarity on the most effective way to undertake self-management in this complex heterogenous population.[5,6]

Systematic reviews have confirmed the benefit of compression.[7] Meta-analysis was not performed due to the poor quality of the trials, but the authors concluded that wearing compression bandages is beneficial. The evidence suggests that bandaging plus hosiery resulted in a greater initial and sustained volume reduction than hosiery alone.

There are a variety of bandage systems available for the management of lymphedema/chronic edema, most of which have been developed in the management of venous ulceration. The Coban 2 system was initially developed for the treatment of chronic venous leg ulcers and has proven to be effective in the management of patients with lymphedema.[8]

The aim of the present study was to examine the outcomes of treatment within those patients treated for chronic leg edema within a larger study. The primary clinical outcome was the volume reduction of the affected limb over an intensive period of DLT within the clinical services examined. Patients were managed within services by using either Coban 2 as their bandage system or their standard treatment that included compression bandaging.

Objectives

- To determine the limb volume reduction during an intensive phase of treatment by using either Coban 2 or the standard bandage system used within the services.
- To determine changes in health-related quality of life (HRQoL) (EQ-5D and LYMQOL) within and between the two cohorts after the intensive treatment cycle.
- To determine the cost of care including staffing costs, disposables, and other treatment costs during the treatment period.

Methods

Overall study design

The overall design of the study and results from clinical treatment have been described in a previous publication.[9] Briefly, this was a prospective observational study in four countries (United Kingdom, France, Germany, and Canada). Each country had a principal investigator who ensured ethical approval was obtained. Each country also had two sites: one who used the Coban 2 system of bandaging and the other that used their own standard bandaging within a DLT. Sites were allowed to use either 2 weeks (10 days of treatment) or 4 weeks (20 days of treatment) according to their usual practice. The length of treatment was also determined in some centers by a clinical judgment and serial perometry measurements that indicated a stable limb volume had been achieved.

An observational design was chosen for this study to provide a broad range of patients and examine their response to treatment. To avoid cross-fertilization of practice, the two compression systems were used in separate sites within each country. To avoid recruitment and selection bias, all suitable patients were included over a 9 months period within each site.

Outcomes of treatment

Limb volume reduction. Lymphedema volume was calculated for each 4 cm segment of the limb by using the truncated cone formula.[10] Absolute changes were recorded on the affected and contralateral limbs at entry to the study, on a biweekly basis during bandaging, and at the final visit (maintenance phase). For those with bilateral disease, the limb with the largest baseline volume was selected for treatment. In the present analysis, only the patients with swelling of the leg were included.

Euroqol EQ-5D. The EQ-5D is a health index that asks five questions about the subjects' physical and mental health.[11] When transformed, the results produce a value that is on a scale, which includes 1.00 (perfect health) and 0 (death). It is possible to achieve a negative score in conditions that are considered worse than death, such as persistent vegetative states and/or extreme uncontrolled pain. To transform the results, weightings were derived from a study from multiple countries throughout Europe. This assessment was made at the start of the study, after 10 days of treatment, and finally after 20 days of treatment.

LYMQOL. LYMQOL is a disease-specific tool that is used to evaluate the impact of lymphedema on patients' lives.[12] It consists of a series of questions that examine the effect that swelling has on the patient. Each question is rated from 1 (not at all) to 4 (a lot). Similar questions are combined to produce a score for the following domains:

- Function
- Appearance
- Symptoms
- Emotion
- Overall QoL

For each domain, a higher score indicates a greater impact on QoL. The exception to this was the overall assessment where higher scores indicate better QoL.

Cost of care

Apart from the treatment group allocation, there is much to be gained from an analysis of the service delivered to patients in terms of not only both treatments given but also the cost of care delivery. This study included the following:

- Disposable product usage
- Type of care delivery; multilayer bandaging used, massage, physiotherapy, and exercise management.

The costings for this analysis were undertaken from the perspective of the U.K. National Health Service, which provides good evidence on the unit costs of disposables using the British National Formulary[13] and Drug Tariff.[14] The price of products was uprated from the initial costing from 2014 to 2021 to reflect inflation www.bankofengland.co.uk/monetary-policy/inflation/inflation-calculator. The cost estimates for health professionals were derived from data provided by the Personal Social Services Research Unit (PSSRU) U.K. 2021.[15]

Statistical methods

Initial univariate analysis comparing the two groups was performed by using the Chi-squared test. For continuous data, Student's *t*-test or analysis of variance was employed depending on the number of outcomes within the groups. For the comparison of matched data, the paired *t*-test was used.

The frequency of visits for bandage change was multiplied by the average cost of bandages for each patient to derive an overall cost of bandages used. The cost of health professionals' time was determined as the frequency of visits multiplied by the average time for each patient, which was then multiplied by the cost per hour of each health professional's time. This was derived from estimates published in the United Kingdom. Thus, all costings related to the U.K. NHS and were expressed as GB pounds. The protocol was approved by the Cambridge Central REC (13/EE/0154) on 8 July 2013.

Results

Patient characteristics and treatment groups

In total, 264 patients were entered into the main study, of whom 176 had chronic swelling of the leg. Of these, 165 had information on bandage type and frequency with at least one follow-up assessment. Table 1 compares the 90 patients who were treated with Coban 2 with the 75 who were managed by using the local standard care who had costs attributed to their treatment. Although most of the baseline clinical results were similar, other factors were substantially different. The prevalence of current cellulitis was greater in the patients treated with Coban 2 (10.23% vs. 0%) compared with the standard care. However, most centers would not commence treatment if an acute cellulitis was suspected. Moreover, the International Society of Lymphology severity scale showed substantially more patients in stage III in the Coban 2 group (24.44% vs. 9.33%), with this being largely counterbalanced by patients in late stage II (31.11% vs. 56.00%).

As part of the outcomes in this study, patients were evaluated in respect of the duration of treatment in the intensive phase. Of the 90 patients treated with Coban 2, 73.33% were managed over 4 weeks compared with 40.00% of the 75 patients in the standard care group.

Health-related quality of life

The effect of treatment on the patient was evaluated by comparing HRQoL at entry into the study and at the end of the intensive phase (Table 2). The paired differences for EQ-5D indicate a substantial improvement in health status, with an overall health gain of 7.7%. A similar improvement was noted in the personal health score of 8.29%.

There were similar improvements in HRQoL when evaluated by the LYMQOL questionnaire, with all domains demonstrating improvements over the treatment period (as indicated by a reduction in domain scores). The use of a scale to determine overall QoL closely mirrored that of the Visual Analogue Scale (VAS) self-assessment in EQ-5D.

The results showed a slightly greater reduction in limb volume with Coban 2 compared with the standard treatments (1.204 L vs. 1.077 L), though this did not approach statistical significance (Table 3). This result was mirrored by the EQ-5D, though the self-assessed VAS showed greater improvements in the standard care group (Table 3).

In LYMQOL, a low score indicates less impact on the patient for the given domains. From these analyses, there were similar reductions in scores (better health) in all domains of the profile between the two groups. There was no statistical difference between the two groups.

Table 4 gives the number of treatment visits and the costs of bandages used in the intensive phase by treatment. There was clear difference in the mean number of visits in the first 10 days with substantially lower Coban 2 visits, with an overall difference of 2.75 visits per patient. Between 11 and 20 days, there was greater activity using Coban 2. This was due to the larger proportion of patients on Coban 2 that continued the intensive phase beyond the initial 10 days. Overall, the number of visits was still less when using Coban 2, despite more patients being treated over the full 20 days.

The average cost of bandages over the first 10 days was lower in the Coban 2 group (£183.32 vs. £221.82), but this was reversed during the second time interval. This led to an overall average bandage cost of £272.10 in the Coban 2 group compared with £249.34 with standard care. This is perhaps not too surprising, as a larger proportion of participants on Coban 2 went for the full 4 weeks (73.33%) compared with 40.0% of the participants on standard care.

Table 5 gives the therapist cost of treatment to provide bandaging, MLD, general (non MLD) physiotherapy, and exercise management. Costs were derived by using data based on PSSRU data from 2021,[15] including direct patient contact and oncosts.

The average staffing cost per patient for multilayer bandaging was similar in both groups (Coban 2 £222.8 vs. standard £233.8). Although the standard group used more MLD treatments, they did so for a shorter time, meaning that overall costs were higher in the Coban 2 group. In addition, the Coban group used non-MLD physiotherapy more frequently. The overall cost of therapists was higher in the Coban group, with a cost per patient of £618.6 for Coban 2 and £473.7 for standard care. These results do not include certain costs from one center where 22 patients were treated as inpatients over a 10-day cycle. The addition of these to the cost would more than exceed the difference between groups.

Table 6 gives the average costs associated with bandages and therapist costs. The cost per patient was £890.7 for Coban 2 treated patients and £723 for those treated using standard

Table 1. Comparison of Treatment Groups at Entry into the Study in Patient with Leg Lymphedema ($N=165$)

	Coban 2		*Standard*			
	N	%	N	%	χ^2 *(df)*	p
Gender						
Male	20	22.22	14	18.67	0.32 (1)	0.57
Female	70	77.78	61	81.33		
Diabetes						
No	74	82.22	66	88.00	1.06 (1)	0.30
Yes	16	17.78	9	12.00		
Heart disease						
No	70	77.78	58	77.33	0.01 (1)	0.95
Yes	20	22.22	17	22.67		
Peripheral arterial disease						
No	88	97.78	73	97.33	0.03 (1)	0.85
Yes	2	2.22	2	2.67		
Chronic venous insufficiency						
No	83	92.22	66	88.00	0.83 (1)	0.36
Yes	7	7.78	9	12.00		
Renal disease						
No	86	95.56	71	94.67	0.07 (1)	0.79
Yes	4	4.44	4	5.33		
Osteoarthritis						
No	67	74.44	63	84.00	2.24 (1)	0.14
Yes	23	25.56	12	16.00		
Rheumatoid						
No	87	96.67	71	94.67	0.40 (1)	0.53
Yes	3	3.33	4	5.33		
Mobility						
No problems	31	38.27	35	48.61	1.66 (1)	0.20
Some problems	50	61.73	37	51.39		
Treatment weeks						
2 weeks	24	26.67	45	60.00	18.68 (1)	<0.001
4 weeks	66	73.33	30	40.00		
Classification						
Primary	35	39.33	26	35.62	0.24 (1)	0.63
Secondary	54	60.67	47	64.38		
Wound present						
No	81	92.05	67	89.33	0.36 (1)	0.55
Yes	7	7.95	8	10.67		
Cellulitis present						
No	79	89.77	75	100.00	8.12 (1)	0.004
Yes	9	10.23	0	0		
Lymphorrhea present						
No	78	88.64	68	90.67	0.18 (1)	0.67
Yes	10	11.36	7	9.33		
Cellulitis history						
No	75	83.33	61	81.33	0.11 (1)	0.74
Yes	15	16.67	14	18.67		
Body mass index (kg/m^2)						
Normal (<25)	14	16.09	17	23.61		
Overweight (25–29)	18	20.69	15	20.83	1.62 (3)	0.65
Obese (30–39)	23	26.44	18	25.00		
Morbidly obese (40+)	32	36.78	22	30.56		
Duration (years)						
<1	5	5.62	8	11.27		
1–2	10	11.24	9	12.68		
2–5	19	21.35	12	16.90	5.83 (4)	0.21
5–10	9	10.11	14	19.72		
10+	46	51.69	28	39.44		

(*continued*)

Table 1. (Continued)

	Coban 2		*Standard*			
	N	%	N	%	χ^2 *(df)*	p
ISL severity						
Stage I	4	4.44	6	8.00		
Stage II	36	40.00	20	26.67	14.28 (3)	0.003
Late stage II	28	31.11	42	56.00		
Stage III	22	24.44	7	9.33		
	Mean	*SD*	*Mean*	*SD*	t *(df)*	p
Age (years)	60.12	13.11	60.17	16.58	0.02 (163)	0.98
Initial limb volume (mL)	11,717	5030	11,408	9036	0.28 (163)	0.78

ISL, International Society of Lymphology.

care, combining this with the mean reduction in limb volume gives a cost per liter reduction of £739.7 in the Coban 2 group compared with £671.3 with standard care.

Discussion

There is good evidence from the literature that chronic edema/lymphedema has a significant impact on many aspects of HRQoL and that treatment plays a role in influencing this. Work has focused on the ability to assess HRQoL through the development of disease-specific tools,[12,16,17] often combined with generic HRQoL tools in cross-sectional[4,18] and outcome studies.[19–22] Generic tools such as EQ-5D have the additional benefit that they allow comparison with other chronic conditions. This gives the potential to gain traction about chronic edema/lymphedema in the fearlessly competitive arena of health care with spiraling health care costs and an aging population. Despite the impact on HRQoL deficits in lymphedema care, provision exists in many parts of the world with reimbursement of care as a pivotal problem contributing to this.

In this study, DLT resulted in important improvements in HRQoL in the total cohort during the intensive phase of treatment. Large changes in the health index (EQ-5D) also occurred with a rise of 0.077 and an increase in self-assessed visual analogue score of 8.29. This was closely mirrored by using the LYMQOL VAS. This indicates that even within a relatively short intervention, it is possible to improve people's lives, although less is known about how long these effects are sustained or the potential bias that may occur from people simply being included within a study that is known to have an influence. Nevertheless, the changes were seen in both a generic and disease-specific tool, indicating that these changes are important to patients and can have a positive impact on their lives.

Table 2. EuroQol and LYMQOL Scores: Paired Comparison Between Start and End of Treatment in Patients with Leg Lymphedema

	N	*Mean*	*SD*	*Mean diff*	*95% Confidence intervals*	t *(df)*	p
EQ-5D							
Start	135	0.587	0.209				
End	135	0.664	0.216	0.077	0.046 to 0.109	4.82 (134)	<0.001
Health today (VAS)							
Start	136	60.76	20.59				
End	136	69.04	19.49	8.29	5.75 to 10.83	6.46 (156)	<0.001
Function							
Start	133	17.52	6.15				
End	133	15.74	6.01	−1.79	−2.48 to −1.10	5.11 (132)	<0.001
Appearance							
Start	132	18.10	5.34				
End	132	16.48	5.92	−1.62	−2.33 to −0.91	4.53 (131)	<0.001
Symptoms							
Start	112	11.09	3.87				
End	112	9.78	3.49	−1.31	−1.87 to −0.76	4.67 (111)	<0.001
Emotion							
Start	132	11.07	4.20				
End	132	9.72	3.79	−1.35	−1.89 to −0.81	4.96 (131)	<0.001
Overall QoL							
Start	130	5.80	1.92				
End	132	6.89	1.74	1.07	0.76 to 1.37	6.93 (129)	<0.001

Only patients who completed an initial assessment and a follow-up at either 10 or 20 days were included in this analysis.
QoL, quality of life; VAS, visual analogue scale.

Table 3. Limb Volume Reduction, EQ-5D and LYMQOL Scores: Comparison of Change in Scores Between Treatment Groups in Patients with Leg Lymphedema

	N	*Mean*	*SD*	*Mean diff*	*95% confidence intervals*	t *(df)*	p
Limb volume reduction (L)							
Coban 2	90	1.204	2.201	0.127	–0.457 to 0.713	0.43 (163)	0.67
Standard	75	1.077	1.453				
EQ-5D							
Coban 2	72	0.084	0.196	0.014	–0.046 to 0.077	0.43 (133)	0.67
Standard	63	0.070	0.175				
Health today (VAS)							
Coban 2	71	7.12	14.13	–2.45	–7.54 to 2.63	0.95 (134)	0.34
Standard	65	9.57	15.86				
LYMQOL							
Function							
Coban 2	72	–1.54	3.61				
Standard	61	–2.08	4.51	–0.54	–1.96 to 2.48	0.77 (131)	0.44
Appearance							
Coban 2	71	–1.60	4.16				
Standard	61	–1.64	4.08	–0.03	–1.46 to 1.39	0.05 (130)	0.96
Symptoms							
Coban 2	61	–1.18	3.26				
Standard	51	–1.47	2.60	–0.29	–1.41 to 0.83	0.51 (110)	0.61
Emotion							
Coban 2	72	–1.19	3.47				
Standard	60	–1.55	2.67	–0.36	–1.44 to 0.72	0.66 (130)	0.51
Overall QoL							
Coban 2	69	1.01	1.53				
Standard	61	1.14	1.99	0.13	–0.48 to 0.75	0.43 (128)	0.67

A similar non-comparative study to this one was undertaken in Wales by Humphreys et al.[22] They examined the cost of treatment retrospectively over 3 months and a further 3 months prospective study. During the prospective phase, they demonstrated an increase in EQ-5D of 0.136 and a VAS of 14.69. Clearly, they achieved much greater improvements than in the present study. It is possible that the duration of treatment had an influence on the magnitude of the change. Moreover, the baseline EQ-5D values in the previous study were substantially lower at 0.401 compared with 0.587 in the present study. A similar pattern was seen in the VAS with a baseline score of 47.07, compared with 60.76 in the present study.

Table 4. Bandage Costs Between 0–10 Days, 11–20 Days and in Total (Values Are in Great British Pounds) Uprated to 2021 Costs

	N	*Mean*	*SD*	*Difference*	*95% Confidence interval*	t *(df)*	p
Visits 0–10 days							
Coban 2	90	4.41	1.70	–2.75	–3.35 to –2.15	9.10 (163)	<0.001
Standard	75	7.16	2.18				
Visits 11–20 days							
Coban 2	90	1.96	2.01	0.97	0.35 to 1.58	3.11 (163)	0.002
Standard	75	0.99	1.97				
Total visits							
Coban 2	90	6.37	2.94	–1.78	–2.63 to –0.94	4.15 (163)	<0.001
Standard	75	8.15	2.50				
Bandage costs							
0–10 days							
Coban 2	90	183.32	135.01	–38.50	–87.54 to 10.55	1.55 (163)	0.12
Standard	75	221.82	183.50				
11–20 days							
Coban 2	90	88.78	92.39	61.26	36.71 to 85.81	4.92 (163)	<0.001
Standard	75	27.52	60.52				
Total							
Coban 2	90	272.10	195.39	22.76	–38.38 to 83.90	0.74 (163)	0.46
Standard	75	249.34	201.18				

Table 5. Therapist Costs up to 20 Days 2021 Prices

	Treatments		*Mean time per visit (minutes)*	*Cost per visit GBP*	*Cost per patient GBP*	*Total cost GBP*
Multilayer bandaging	Total	Per patient				
Coban 2	573	6.37	36.2	35.0	222.8	20,055
Standard	611	8.15	29.7	28.7	233.8	17,536
MLD						
Coban 2	383	4.26	62.6	60.5	257.5	23,172
Standard	546	7.28	29.8	28.8	209.7	15,725
Physiotherapy (non-MLD)						
Coban 2	224	2.49	48.0	46.4	115.5	10,394
Standard	31	0.41	25.0	24.2	10.3	750
Exercise management						
Coban 2	93	1.03	22.9	22.1	22.84	2055
Standard	155	2.07	10.10	9.8	20.25	1519
Total cost						
Coban 2					618.6	55,676
Standard					473.7	35,530[a]

[a]One center managed 22 patients as inpatients for a period of 10 days. This was not included in these cost estimates.
MLD, manual lymphatic drainage.

This study was also undertaken to identify the costs of treatment for an intensive phase of lymphedema management relative to the benefits of limb volume reduction and HRQoL.

Humphreys' study examined the medical costs of lymphedema, which included a training program for practitioners (On the Ground Education Programme). Their total health care costs went from £2912.77 per patient in the 3 months before implementation to £1787 during the 3-month prospective study. The present study is not comparable with these figures, as they only relate to a short intensive treatment period in the delivery of lymphedema care, but both results emphasize the chronic nature and continuing care that is needed by these patients.

Improved HRQoL and cost-effectiveness was also found in a study designed to implement and evaluate a system of care that would provide for patients within a geographical area of London (Wandsworth), United Kingdom.[23] A prospective cohort design was made with the intervention of a new service design after a 6-month baseline period. A stratified random sample was drawn from all patients, and an implementation strategy was developed. Clinical assessment combined with questionnaires evaluated clinical, patient, and health service outcomes at 6-month periods. In all, 312 patients were identified in community and acute services giving a crude ascertainment rate of 1.16 per 1000 population. The random sample of 107 was mostly female (82%), with a mean age of 72.9 years in men and 68.6 years in women. Mean reductions in limb volume achieved statistical differences at 6–12 months after implementation (difference [d] = 115 mL, $p = 0.0001$). The incidence of cellulitis dropped from 41.5/100 patient years at baseline to zero at 6–12 months. QoL showed greatest improvements between baseline and 6 months post-implementation, with the largest differences being in role physical ($d = 32.7$, $p = 0.0001$) and role emotion ($d = 24.0$, $p < 0.0001$). EuroQol increased after implementation by a mean score of 0.05 ($p = 0.007$). There was a reduction in 6-monthly health care costs from £50,171 per 100 patients at baseline to £17,618 between 6 and 12 months.

There is increasing concern about the additional costs that patients have to cover themselves in countries where total care or no care is covered by the health care system. In an observational cross-sectional study ($n = 348$) in patients with lymphedema and combined lipo-lymphedema, Gutknecht et al.[24] found that the total costs per patient per year were €5784, of which €4445 (76.9%) were direct costs and €1338 indirect costs. Within the direct medical costs, €3796 were accounted to the statutory health insurances and €649 for patient costs, mainly linked to payment for manual decongestive therapy and managing their disability.

Limitations

The present study has some limitations. The observational nature means that it is not possible to directly prove the individual benefits of the treatments in DLT. DLT is a complex intervention with several components, including bandage treatment together with MLD, exercise, and skin care, all of which contribute to the improvement in patient outcomes. The results indicate that although compression bandaging was used in all patients, other elements such as exercise and MLD were used in different proportions in the centers. In this study, it is not possible to determine with any accuracy the relative contribution of each component to the changes in HRQoL scores. Clearly, a randomized factorial clinical trial could address this, though the logistics of this design would make this challenging. Moreover, the application of bandages and use of MLD is highly operator dependent and difficult to standardize.

Table 6. Total Cost per Patient and Cost per Liter Reduction in Limb Volume

Cost per patient	*Bandages*	*Health professional*	*Total*	*Volume reduction*	*Cost per liter reduction*
Coban 2	272.10	618.6	890.7	1.204	739.7
Standard	249.34	473.7	723.0	1.077	671.3

In addition, the evaluation of costs in this study has been undertaken by using U.K.-based costing procedures. There will be a difference in the costs applied to care in different countries and this will also be affected if patients are admitted as inpatients or managed in an outpatient or primary care setting.

Although this study allowed for intensive treatment up to 4 weeks in duration, in the reality of clinical practice the length of treatment episodes varies hugely with some centers required to have a fixed treatment episode as short as 1 week whereas others have a longer period with treatment stopping when the clinician judges it to have reached the potential benefit intended. No international standards exist to guide this decision making.

Conclusion

The study supports existing research that shows that chronic edema/lymphedema causes major deficits in all aspects of QoL, whether assessed by using a generic tool such as EQ-5D or a disease-specific tool (LYMQOL). The evidence we have presented here supports the use of DLT in reducing limb volume and improving QoL within a relatively short period of time. Although there were some differences between the outcomes between treatment groups, these were small in comparison to the overall benefits of treatment within the combined population. The study highlights the complexity of undertaking real-world cost-effectiveness studies in multiple countries with different health care systems.

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