

Redefining essential care in lymphoedema

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The causes, types and management of lymphoedema have been widely researched and published over recent years, with the condition being better recognised and treated with support and guidance from documents such as the Lymphoedema Framework (LF) (2006) and International Society of Lymphology (ISL) (2013). Treatment is discussed as a two-phase process of decongestive lymphoedema therapy or complex decongestive therapy for those with problem or severe oedema; or maintenance therapy for those with early or mild-to-moderate lymphoedema (ISL, 2013). In recent years, it has become apparent that there is a shift occurring in what constitutes maintenance therapy or essential care in the management of lymphoedema. While the supposed 'four cornerstones' of treatment for maintenance therapy (compression, skin care, self-lymphatic drainage (SLD) and exercise) remain at the forefront of management, clinicians are choosing to adapt care that can include many more interventions than these elements alone, and may even choose to leave out one of these cornerstones (British Lymphology Society (BLS), 2014) (Figure 1).

This article will discuss the processes and alternative

essential treatment options available in order to increase clinicians' awareness and to encourage critical thinking and decision-making in the management of lymphoedema. The article avoids going into detail on the original four cornerstones of care, and will instead focus on other areas of interest.

Assessment and diagnosis

Before the therapist can plan treatment of a patient appropriately, it is essential that a thorough assessment has taken place (Billingham, 2008). This can present as a basic assessment covering areas as detailed in Table 1 and advanced assessment as detailed in Table 2. It can be debated whether the tools used in advanced assessment are actually advanced or essential in obtaining a diagnosis for the patient. It is often easy to diagnose a patient with a dependency oedema from the clinical questioning and physical assessment, but it is much more difficult to draw a conclusion of diagnosis when the patient has a type of primary lymphoedema or questioning leads to other causes.

Developing areas of assessment

One developing area of assessment is that of genetics. Presently, 20 genes have been identified as the cause of various types of lymphoedema (Connell et al, 2009; Mansour et al, 2013), and genetic testing should be considered as a main form of assessment (if appropriate) for patients with a strong family history or following the initial history-taking. Other assessments include lymphoscintigraphy, which is not a new technique, but the imaging used is improving and assisting clinicians to understand the capacity and drainage pathways of lymphatics, which could change treatment and outcomes. Near infrared fluoroscopy is also a developing technology that is being used increasingly to assess suitability of superficial collecting vessels prior to surgery but also aids the therapist in finding possible drainage pathways to assist treatment (Giacalone et al, 2011). In addition, the use of bioimpedance devices such as the Bodystat Quadscan 4000 (Haddenham Healthcare) (Figure 2) provides accurate measurements of limb and body fluid shifts by measuring

ABSTRACT

The awareness, diagnosis and management of chronic oedema and lymphoedema is improving. The enduring treatment format for the condition has always been regarded as the 'four cornerstones' of care for maintenance therapy in the UK. However, with changes in technology, availability of additional treatments and increased research and studies, this baseline is changing. This article outlines some of the recent changes and advancement in diagnostic tools and new technologies used in diagnosing and managing lymphoedema and chronic oedema. Emerging therapies will be introduced, as will other aspects of care that may now be considered 'essential care' in the management of lymphoedema and chronic oedema.

KEY WORDS

- ◆ Lymphoedema ◆ Essential care ◆ Advanced assessment
- ◆ Early intervention

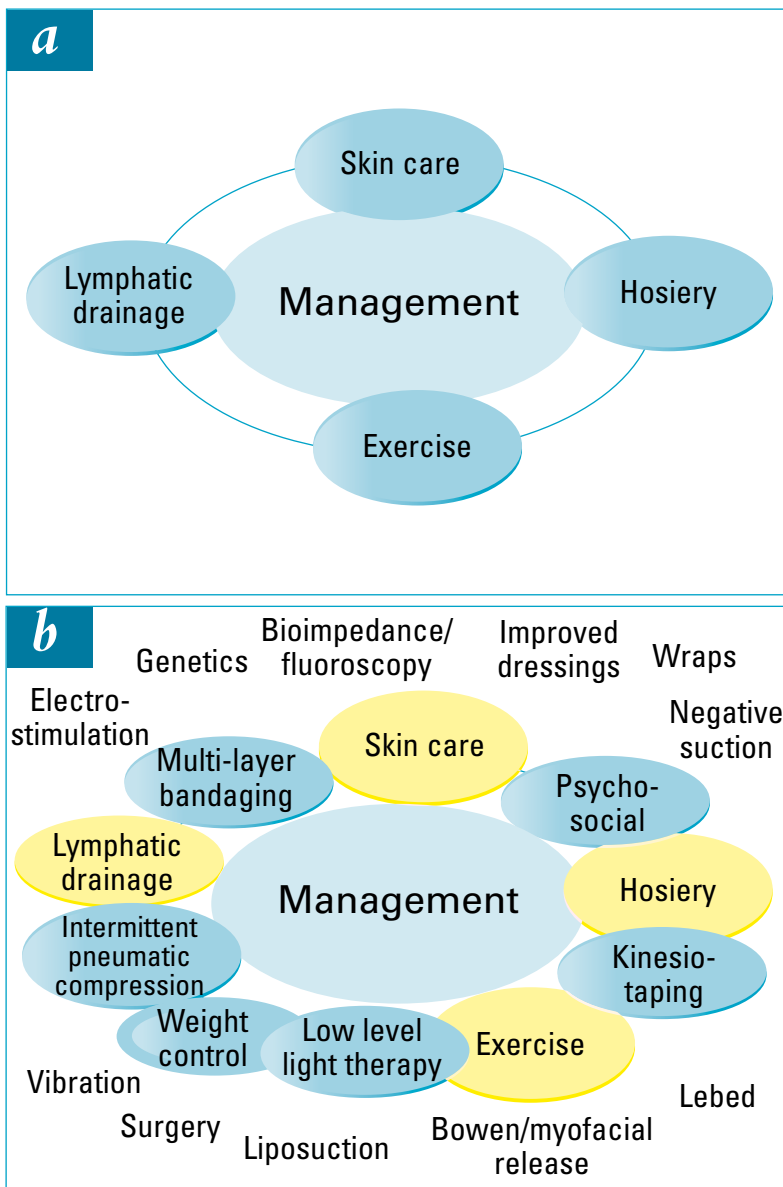


Figure 1. (a) Traditional maintenance therapy ('four cornerstones' of lymphoedema care). (b) Advanced investigation and treatment.

Table 1. Basic assessment of patient in relation to lymphoedema	
Questioning	Medical history—including medication, surgery, cancer status, family history, infection history. Predisposing factors, psychosocial assessment and goal setting. Duration, location, extent
Visual assessment and palpation	Tissue type, shape, Stemmer's signs, lymphadenopathy, scars. Skin, colour, warmth, sensation, size, neurological function, vascular assessment (as appropriate). Photographs taken
Limb volume measurements	Circumferential measurements and ratio volume
Source: Adapted from BLS (2013)	

extra-cellular fluid in addition to total body composition (TBC) analysis (Ward, 2009). TBC allows for improved goals for weight management and total cellular health, helping to identify lymphoedema early, particularly for breast-cancer-related lymphoedema (BCRL). For midline oedema assessment, the MoistureMeterD or DC (Delfin Technologies) provides accurate and reproducible measurement for trunk, head and neck, breast and genital oedema and is proven as a tool for early identification of lymphoedema in limbs (Mayrovitz et al, 2008; Johansson et al, 2013). The tape measure will always be required, but changing to a pre-tensioned measure can increase accuracy.

In addition, taking routine blood tests such as liver function and albumin levels will assist diagnosis of cause in addition to B-type natriuretic peptid, which can determine cardiac status and oedema impact (Todd et al, 2011). These assessment tools ensure that the patient can be more effectively assessed and therefore receives better treatment. Once assessment is achieved and a diagnosis has been obtained, the management of the oedema can be appropriately planned.

Essential care

The essentials of skin care, exercise, compression and SLD should be implemented as appropriate.

Skin care

Good skin care is essential for patients with lymphoedema in order to prevent the condition worsening and to prevent skin infections such as cellulitis and lymphangitis (Morgan and McGuckin, 2013). Many advances have taken place over the last decade in wound technology, allowing for improvements in care to treat lymphoedema skin-related problems such as lymphorrhoea, hyperkeratosis and skin maceration. Many dressings now have specialist technology, such as layers that lock moisture away from the skin (suitable for lymphorrhoea), and barrier creams can also be used, allowing macerated tissue to stay protected. This reduces the need for regular dressing changes but does not replace the necessity of daily washing and moisturising of the skin. This is particularly important where there are high levels of hyperkeratosis, dryness or skin sensitivity (LF, 2006).

Exercise

Exercise is an essential component of care for patients with oedema. Exercise increases the muscle pump to encourage venous and lymphatic drainage in addition to maintaining or improving a range of movement (LF, 2006). Group activity is being used increasingly to assist with motivation, compliance and to increase self-esteem. Exercise programmes such as Healthy Steps (Lebed), Tripudio and yoga are proving successful for lymphoedema patients and improving quality-of-life outcomes (Sandel et al, 2005; Douglas et al, 2012; Loudon et al, 2012).

Compression garments

The concept of compression has altered over recent years. Improved technology in garment production allows lighter

yet stronger and stiffer fabrics such as the Star Cotton and Goldpunkt hosiery ranges (Haddenham Healthcare) for controlling oedema. Velcro fastenings/straps and zips can also be added to flat-knit garments, which eases application and allows for dressings to be applied underneath, for mild-to-moderate exuding wounds (Lee and Wigg, 2013).

The use of wrapping systems such as FarrowWrap Classic and Lite allow for 'supervised self-management' of lymphoedema and the patient becoming involved in their care (Wigg, 2009a). They also assist in saving resources and provide donning and doffing solutions. Where multi-layer lymphoedema bandaging was previously indicated, this is now sometimes not necessary. If patients cannot tolerate bandaging or wrapping systems, a made-to-measure flat-knit garment such as Goldpunkt (Haddenham Healthcare) hosiery with straps may be suitable due to the thickness and rigidity of the material ensuring a high working pressure. Alternatively, for more fragile tissue, Pertex light (Haddenham Healthcare) hosiery may be suitable due to its soft, conforming properties. In certain circumstances many clinics advocate the double layering of garments to increase compression or rigidity or the wearing of garments for 24 hours a day. The latter method reduces the effect of rebound oedema following volume reduction with multi-layer lymphoedema bandaging and maintains stubborn chronic lymphoedema.

Multi-layer lymphoedema bandaging

Multi-layer lymphoedema bandaging is indicated when patients have extreme shape deformity or where there are wounds, lymphorrhoea, skin problems with thickening/fibrosis or an excess limb volume of more than 40% (LF, 2006, 2012). This method is widely used where clinicians would hope to achieve a reduction in limb volume over a short period of time, but it does involve the patient being bandaged daily, for 2–3 weeks, so that manual lymphatic drainage (MLD) and skin care can be provided. This is not always possible where there are constraints within lymphoedema clinics and community settings. Certain aspects of treatment are often forgone in an attempt to effectively manage large caseloads of patients. In contrast, it is widely documented that there is a lack of skill and knowledge when it comes to applying safe, effective multi-layer bandaging (Todd, 2011). Bandages can slip or become uncomfortable if left in place for longer than 24 hours due to the reduction in limb volume that usually occurs 2 hours after application (Partsch, 2007). The introduction of 2-layer bandaging systems have assisted clinicians in reducing the number of visits to clinic, or home visits by community staff, as they are usually applied 2–3 times per week. However, this has reduced the amount of skin care and MLD that is provided to the patient. The introduction of FarrowWrap (Haddenham Healthcare), a velcro wrapping system based on short-stretch bandaging technology, has resulted in clinicians being able to reduce the amount of time spent bandaging as well as reduce the number of visits required within the community setting. This in turn

Table 2. Advanced assessment of patient in relation to lymphoedema

Questioning	Perometry Bio impedance Tissue dielectric constant analysis Water displacement Ultrasound CT/MRI
Visual assessment and palpation	Lymphoscintigraphy MRI contrast lymphography Near-infrared fluoroscopy
Limb volume measurements	Routine bloods including liver function tests B-type natriuretic peptide Genetic screening and testing



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Figure 2. Bodystat QuadScan 4000 gives measurements of limb and body fluid shifts by measuring extra-cellular fluid in addition to total body composition.

has enabled better management of the patient's condition, as the velcro straps can be tightened as the limb reduces, improving patient outcomes (Wigg, 2012; Belgrado et al, 2013). Patients are able to remove and reapply FarrowWrap to enable daily skin care and monitoring of skin conditions. Even where community staff continue to visit patients, the length of visits are reduced as FarrowWrap can be applied much quicker than a multi-layer bandage allowing for cost-effective, timely treatment of patients with wounds, leaking legs or other skin conditions. Wrapping systems also ensure that patients and carers can focus on the provision of daily skin care where, when bandages are left in place for longer, skin integrity is compromised and infection risk increases.

Problems can also occur where toe bandaging is left in place or if applied by an untrained practitioner. This can

form a tourniquet around the toes due to movement of bandages causing skin damage, and is often omitted due to the need for daily reapplication, which in turn results in fluid being pushed into the toes (Todd, 2011). The introduction of toe gloves has reduced the risk of tissue damage caused through toe bandaging and has achieved greater concordance from patients as garments are more comfortable and less likely to cause trauma. When applied, they reduce the risk of oedema being pushed into the toes. Using a flexible Microfine Trim-to-Fit glove (Haddenham Healthcare) assists and can be used when bandaging, using FarrowWrap or with open-toe hosiery (Hobday and Wigg, 2013).

SLD

SLD is included as a cornerstone of lymphoedema care and is advised to be implemented twice daily. SLD was introduced as a simplified version of manual/medical lymphatic drainage (MLD), although traditionally it does not involve contact with the affected limb itself and finishes where the garment begins (Macmillan, 2014). However, from the authors' experience of speaking to clinicians, SLD is rarely applied in its traditional manner and is more commonly provided as modified MLD, with the aim of the patient carrying out a much more detailed and therapeutic SLD involving the limb. In addition, many therapists only advocate modified MLD where indicated (e.g. for breast oedema), and instead of the suggested twice-daily drainage will prescribe modified MLD as often as required with a reducing plan until the issue has been resolved. This is often 5 times per day, reducing to monthly eventually. Psychologically, modified MLD and traditional SLD are useful for obese patients to help them understand their body, their size and the realisation that it's 'all them', although it may not have an enhanced therapeutic effect (Thomas et al, 2014). The therapist should consider where SLD belongs in their treatment plan—and whether it is essential for every patient.

Other essential care

Modern techniques introduce treatments such as kinesiotaping, low level laser therapy (LLLT), intermittent

pneumatic compression therapy and deep oscillation therapy (Hivamat).

LLLT

LLLT works by treating the cells themselves, thereby treating the cause of the symptoms in addition to the symptoms themselves (Figure 3). There is large amount of research that shows that LLLT facilitates wound healing, improves lymphatic function, improves the effects of MLD, in addition to reducing inflammation, pain, scar tissue and improving mobility (Lee et al, 2013). By delivering red or near-infrared light to cells, the cells absorb the light, re-energising them and allowing them to function better. Clinicians now use this as first-line treatment in conjunction with other treatment modalities such as MLD/intermittent pneumatic compression, compression bandaging, hosiery or kinesiotaping.

Intermittent pneumatic compression

Traditional pneumatic compression pumps have been used in lymphoedema for many years, but new machines such as the Hydroven 12 with the unique 'LymphAssist' cycle can be used instead of MLD. Modern intermittent pneumatic compression can reduce limb volume, soften tissue and re-establish lymphatic pathways, with no evidence of causing genital oedema and working in a similar way to MLD (Wigg 2009b, 2013; Furnival-Doran, 2012). A machine costs approximately £2000 but can be supervised by a specialist practitioner and carried out by the trained health-care assistant, encouraging the best use of resources. The LymphAssist cycle is based on the Leduc Method® MLD sequence and will reduce fibrosed tissues. Intermittent pneumatic compression is used as a mainline treatment in the United States and is cited as routine care within the ISL consensus document (2013).

Kinesiotaping

Developed by Kenzo Kase in the 1990s as an alternative to sports taping, kinesiotaping has been increasingly used for lymphoedema. Although initially seen by the first author at the Dutch Lymphoedema Network conference in 1999, the concept has taken some time to become mainstream. Kinesiotape is particularly useful for difficult-to-control areas where garment fitting is a problem (Finnerty et al, 2010). Kinesiotape works by lifting the skin, increasing the surface area to allow for increased drainage. It is also thought to assist with the opening of the anchoring filaments of the initial lymphatics to facilitate drainage (Bosman and Piller, 2010). There is a wealth of worldwide lymphoedema expert anecdotal evidence for kinesiotape's use, but publications on the subject are still lacking.

Health and wellbeing

Another component of essential care is dietary advice, weight management and wellness. Lymphoedema is a chronic condition with associated chronic illness challenges (Hardy, 2006; Morgan et al, 2012), and patients require



Figure 3. Thor LLLT treatment device.

support to cope with this lifelong condition. Several assessment tools are available to assist with this process and the development of the Lymphoedema Quality of Life (LYMQoL) tool has ensured that outcome tools can be focused for lymphoedema (Keeley et al, 2010).

Weight gain and sustained obesity will have a detrimental effect on lymphatics, which can become obstructed with heavy abdominal fat and impair drainage. Fat layers also reduce the amount of compression exerted upon the lymphatics, reducing the therapeutic effect. Furthermore, the application of compression to obese limbs with an altered shape obviously proves difficult. It has been reported that up to 75% of patients attending a specific specialist service were obese, demonstrating a need for specialist equipment and a need to increase pressure on budgets (Morgan et al, 2012; Moffatt, 2014).

When coping with a long-term condition, the setting of goals and revisiting them is also key to success. The BLS has recently published treatment guidelines to assist the therapist in managing this problem group (BLS, 2014).

Prevention and early intervention

The early detection and identification of lymphoedema considering at-risk groups will allow for early treatment (Table 3). The earlier the treatment is initiated, the less likely the patient is to develop some of the long-term side effects associated with chronic oedema, such as skin changes and fibrosis, weight gain, limb distortion, trunkal oedema and psychosocial and mobility issues. Initiating early intervention can involve simple treatment such as applying the initial four cornerstones of care (skin care, exercise, SLD and garments). Even prior to the need for this, education of risk factors, reducing the burden on the lymphatics from weight gain, limb care, safe exercise and many other factors may prevent the condition from worsening (BLS, 2013). The application of the early intervention of LLLT could reduce adhesions to the axilla in BCRL, or MLD can be used to prevent the build-up of oedema and re-establish pathways.

Early intervention and recognition of treatment can require the specialist equipment of bioimpedance or the MoistureMeter DC (Delfin Technologies) (Ward et al, 2010; Mayrovitz, 2011; Johansson et al, 2013) but can reduce the long-term consequences of lymphoedema and save resources, thereby returning the reader to the importance of specialist assessment. Early intervention is increasingly considered as surgery. Advances in technology have led to developments in lymph node transfers and the reintroduction of lymphovenous anastomosis, which has better outcomes when carried out early (Ramsey et al, 2013). It is still rare for a therapist to consider surgery as a first-line treatment option, but could lead to better outcomes for patients the earlier it is instigated. The use of liposuction is used in patients with chronic lymphoedema where the tissues have become fibrotic. For patients undergoing lymph node transplants, the additional use of growth factors introduced at operation also offers exciting

Table 3. People at risk of developing oedema

Upper limb/trunk lymphoedema	Lower limb lymphoedema
<ul style="list-style-type: none"> ◆ Surgery with axillary lymph node dissection, particularly if extensive breast or lymph node surgery ◆ Scar formation, fibrosis and radiodermatitis from postoperative axillary radiotherapy ◆ Radiotherapy to the breast, or to the axillary, internal mammary or subclavicular lymph nodes ◆ Drain/wound complications or infection ◆ Cording (axillary web syndrome) ◆ Seroma formation ◆ Advanced cancer ◆ Obesity ◆ Congenital predisposition ◆ Trauma in an 'at risk' arm (venepuncture, blood pressure measurement, injection) ◆ Chronic skin disorders and inflammation ◆ Hypertension ◆ Taxane chemotherapy ◆ Insertion of pacemaker ◆ Arteriovenous shunt for dialysis ◆ Air travel ◆ Living in or visiting a lymphatic filariasis endemic area 	<ul style="list-style-type: none"> ◆ Surgery with inguinal lymph node dissection ◆ Postoperative pelvic radiotherapy ◆ Recurrent soft tissue infection at the same site ◆ Obesity ◆ Varicose vein stripping and vein harvesting ◆ Genetic predisposition/family history of chronic oedema ◆ Advanced cancer ◆ Intrapelvic or intra-abdominal tumours that involve or directly compress lymphatic vessels ◆ Orthopaedic surgery ◆ Poor nutritional status ◆ Thrombophlebitis and chronic venous insufficiency, particularly post-thrombotic syndrome ◆ Any unresolved asymmetrical oedema ◆ Chronic skin disorders and inflammation ◆ Concurrent illnesses such as phlebitis, hyperthyroidism, kidney or cardiac disease ◆ Immobilisation and prolonged limb dependency ◆ Air travel ◆ Living in or visiting a lymphatic filariasis endemic area
Source: Lymphoedema Framework (2006)	

outcomes (Saaristo et al, 2011). Anecdotally, the authors have become aware this year of increased numbers of patients selecting lymphatic surgery as a treatment option than at any other time previously.

Conclusion

The question therefore remains as to what constitutes essential care for lymphoedema. Do all patients require the four cornerstones? Essentially, all patients require skin care and education of care of the limb. Not all patients require exercise (this is difficult for breast and genital oedema), or SLD and not all require garments. A combination of care and treatment offered to patients to fit their lifestyle is essential. Maintenance therapy is essentially what the patient needs to manage their lymphoedema within their lifestyle, and can be a combination of any of the treatments discussed above. This may involve the use of LymphAssist

(Haddenham Healthcare) and garments (or no garments), or kinesiotope and SLD.

Redefining essential care for people living with lymphoedema involves taking the patient's needs and lifestyle into account and balancing it with available tailor-made treatments to provide the best outcomes, regardless of resources.

BJCN

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Box 1. Distribution of products

Haddenham Healthcare is the exclusive distributor for

Bodystat Quadscan 4000
Delfin MoistureMeter/DC
Kinesiotope tape
LymCalc4 database
Thor LX2 Light Unit
Rian Corp 904 laser

KEY POINTS

- ◆ Accurate assessment and diagnosis will lead to improved treatment
- ◆ Early intervention will prevent oedema worsening
- ◆ Essential care should be tailored to the patient's needs