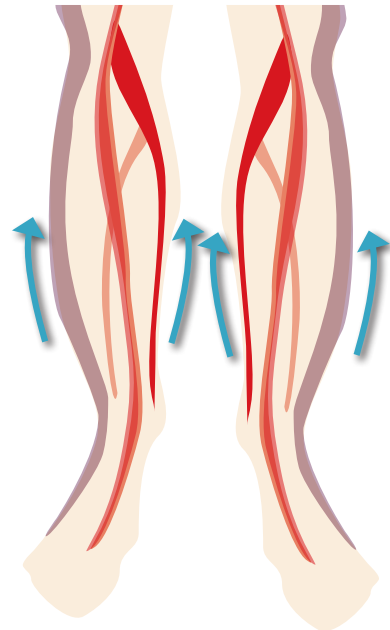


# Best Practice Statement

## Holistic Management of Venous Leg Ulceration

2016



Assessment and diagnosis

Classification of venous leg ulcers

Wound and skin management

Compression

Holistic management

Prevention of recurrence

**BEST PRACTICE STATEMENT:  
HOLISTIC MANAGEMENT OF  
VENOUS LEG ULCERATION**

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Wounds UK  
A division of Omniamed,  
1.01 Cargo Works  
1–2 Hatfields, London SE1 9PG, UK  
Tel: +44 (0)20 7627 1510  
Web: [www.wounds-uk.com](http://www.wounds-uk.com)

**Wounds** UK

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**EXPERT WORKING GROUP:**

Chair: **Jacqui Fletcher**, Independent Consultant

**Leanne Atkin**, Lecturer/practitioner/Vascular  
Nurse Specialist, School of Human and Health  
Sciences, University of Huddersfield and  
Mid Yorkshire NHS Trust

**Caroline Dowsett**, Nurse Consultant,  
Tissue Viability, East London Foundation  
Trust, London

**Alison Hopkins**, Chief Executive,  
Accelerate CIC, London

**Joy Tickle**, Tissue Viability Nurse Specialist,  
Shropshire Community Health NHS Trust

**Fran Worboys**, Clinical Director, Accelerate  
CIC, London

**Anne Williams**, Lecturer in Nursing, Queen  
Margaret University, Edinburgh, and  
Lymphoedema Nurse, The Haven Centres,  
Lanarkshire

**REVIEW PANEL:**

**Una Adderley**, Lecturer in Community  
Nursing, School of Healthcare, Faculty of  
Medicine and Health, University of Leeds

**Emma Bond**, Vascular Clinical Nurse  
Specialist, Glan Clwyd Hospital, North Wales

**Jackie Stephen-Haynes**, Professor in Tissue  
Viability, Birmingham City University, and  
Consultant Nurse, Worcestershire Health and  
Care NHS Trust

**Chris Taylor**, Vascular Clinical Nurse  
Specialist, Lancashire Teaching Hospitals  
NHS Foundation Trust

# Developing best practice

This Best Practice Statement (BPS) is written for healthcare practitioners in all care settings who are treating patients with (or at risk of developing) venous leg ulcers (VLUs). The aim of this guideline is to help ensure consistent clinical practices in relation to the assessment and management of people with VLUs. It will provide clear guidance based on relevant evidence and the experiences and opinions of clinicians, with a focus on practical, holistic and person-centred strategies.

Continuity of care is a key component to best practice. A proactive approach needs to be taken to protect at-risk patients and prevent recurrence, and for patients (and carers) to benefit from education that allows them to self-manage.

This BPS will provide relevant and useful information to guide those active in the clinical area, who are responsible for the management of patients who may be affected by, or at risk of developing, venous leg ulceration. The guidance will look at what holistic assessment should mean in practice and provide a clear treatment pathway that includes assessment, diagnosis, ongoing management and prevention of recurrence.

The key principles of best practice (listed right) ensure that clinicians have an increased awareness, allowing them to exercise due care and process to promote the delivery of the highest standards of practice across all care settings, and by all healthcare professionals.

- Best Practice Statements are intended to guide practice and promote a consistent and cohesive approach to care.
- BPS are primarily intended for use by registered nurses and the staff who support them, but they may also contribute to multidisciplinary working and be of guidance to other members of the healthcare team.
- Statements are derived from the best available evidence, including expert opinion at the time they are produced, recognising that levels and types of evidence vary.
- Information is gathered from a broad range of sources to identify existing or previous initiatives at local and national level, incorporate work of a qualitative and quantitative nature, and establish consensus.
- Statements are targeted at practitioners, using language that is both accessible and meaningful.

## GUIDE TO USING THIS DOCUMENT

Each section offers advice about best clinical practice for patients with VLUs, or patients who are at risk.

Tables are included to guide best practice and each section identifies key points. All statements are supported by key references where possible.

## Introduction: holistic management of venous leg ulceration

A VLU is defined as an open lesion between the knee and the ankle joint that occurs in the presence of venous disease and takes more than two weeks to heal (NICE, 2013). Definitions of ‘chronic’ vary with regard to time to healing, but it is essential that VLUs are diagnosed and managed as quickly as possible, so the two-week definition should be used (NICE, 2013). Particularly in patients with a history of VLUs, assessment and treatment of a new lesion on the leg should start as soon as possible.

VLUs are the most common type of leg ulcer (SIGN, 2010). Guest et al (2015) found that there were at least 730,000 patients with leg ulcers in the UK, which equates to 1.5% of the adult population having a leg ulcer; the number of diagnosed VLUs (278,000) indicates that 1 in 170 adults have a VLU.

Patients with VLUs often present with repeated cycles of ulceration, healing, and recurrence. Such ulcers can take weeks or months to heal, and 12-month recurrence rates are estimated as between 18% and 28%, so ongoing management and prevention of recurrence should be treated as a priority (Ashby et al, 2014).

VLUs have been found to have a significant impact on patients’ quality of life, with associated personal, social and psychological effects; this also has a considerable financial impact on healthcare providers, as well as a wider social and economic impact (EWMA, 2016).

### Causes and risk factors

The main cause of ulceration is venous insufficiency, which results in increased venous pressure; over time, this leads to a chronic inflammatory response, which can result in the breakdown of skin. In the presence of underlying venous disease, a minor injury or trauma (e.g. a skin tear) can result in a VLU. A number of factors can increase a patient’s risk of developing a VLU; see Box 1 for a checklist of patient risk factors (NHS, 2016). Any lower limb changes in patients at risk or showing signs of venous disease should trigger immediate action.

### MYTH

A wound must be present on the limb for at least 6 weeks to be classed as a leg ulcer and therefore treated with compression.

### TRUTH

The definition adopted by the BPS panel indicates that if the wound has been present for over 2 weeks, the patient should be assessed for suitability of compression. Immediate treatment of a lower limb wound with compression where appropriate, particularly if venous signs are present, will prevent ulcer development and reduce burden to the patient and to healthcare delivery.

### Box 1. Checklist for patient risk factors that may contribute to developing a venous leg ulcer (NHS, 2016)

- Obesity or being overweight – this increases the hydrostatic pressure in the veins of the lower limb and abdomen
- Issues with mobility and/or walking – this compromises the activation of the calf muscle pump, which aids venous return
- Previous deep vein thrombosis (DVT) – blood clots in the deep venous system can result in damage to the valves in the veins, which will affect venous return
- Varicose veins – swollen and enlarged veins caused by malfunctioning valves
- Previous injury to the leg, such as a broken or fractured bone, which may cause DVT or impair walking
- Previous surgery to the leg, such as fractures or flap surgery, which can cause damage to the veins, lymphatics, ankle mobility and gait
- Increasing age – people find it harder to move around as they get older, particularly if they suffer from arthritis
- Chronic oedema – associated with inflammatory processes, and compromises skin and tissue condition
- Familial history of VLUs
- History of intravenous drug use

## SECTION 1: ASSESSMENT

Undertaking a thorough, holistic assessment is crucial in order to obtain an accurate diagnosis and progress to appropriate management (Figure 1). However, this poses a challenge in current practice (EWMA, 2016).

Statistics illustrate that there are gaps in practice and nurses are often not fully trained in the skills required to assess patients appropriately; there is a disparity between care in the community and at specialist centres, as well as across geographical areas (EWMA, 2016).

Any patient with a lower limb wound, regardless of duration, must be assessed and treatment commenced as early as possible (see Box 1 for a list of potential risk factors and Box 2 for assessment and management of acute wounds). Any potential signs and symptoms of venous disease should be identified so that an

appropriate management plan can be started as soon as possible (Atkin and Tickle, 2016).

It is important to plan sufficient time and resources for a thorough initial assessment, which will help to optimise future treatment and management. Assessment must be a practical means of triggering action. At this point, treatment should be commenced for ALL patients, or patients should be referred on if necessary to access appropriate treatment.

Assessment should facilitate earlier intervention and treatment, resulting in effective management. The initial assessment should be formed of three parts:

- General assessment, including medical/family history, and lifestyle/psychosocial issues
- Leg assessment
- Wound/skin assessment.

### Box 2. Assessment and appropriate management of acute lower limb wounds

- Assess patients who present with acute lower limb wounds (e.g. pre-tibial laceration) as candidates for immediate compression in order to reduce the risk of chronicity.
- To prevent delays in treatment, patients can be prescribed up to 17mmHg compression (e.g. class 1 British standard hosiery) in the absence of a full vascular assessment if no risk factors for arterial insufficiency are identified.
- The BPS for compression hosiery (Wounds UK, 2015) concludes that patients who are prescribed up to 17mmHg without a full vascular assessment should have the following:
  - A diagnosis
  - Intact sensation
  - No signs of limb ischaemia
  - Appropriate build (poor shape/size of the limb can contraindicate)

If the wound then fails to heal within a 2-week period, a full holistic assessment, incorporating a vascular assessment, should be carried out, with a view to diagnosing and treating the wound as a VLU if appropriate.

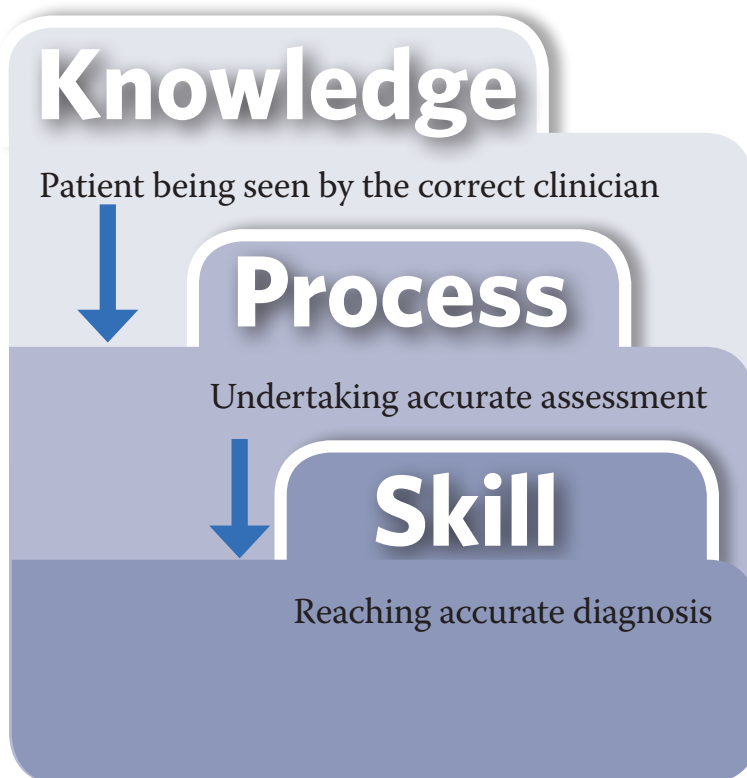


Figure 1: Essential pathway for assessment and diagnosis

### General assessment

General assessment should view the patient holistically, looking at lifestyle and overall health factors, including any underlying causes or relevant medical history.

Psychosocial and lifestyle factors are key elements in dealing with patients with VLUs, such as smoking or weight-related/nutritional issues. The patient's current quality of life and expectations of treatment may also be important issues that can be established at the stage of assessment.

Issues such as dexterity, mobility and level of ability, also knowledge of their disease and interest in engagement in terms of future self-care, may also be established at this stage and influence treatment choices when diagnosis has been established. Pain is an issue that should also be addressed and may have a knock-on effect on the patient's quality of life and their willingness to tolerate certain treatment options.

See Box 3 for a checklist for general assessment.

### Leg assessment

Assessment of peripheral perfusion is a fundamental requirement for leg ulcer management, yet in a recent study to estimate the prevalence

#### Box 3. Checklist for general assessment

##### Patient-related factors:

- Medical history – including previous limb surgery/trauma, family history, medication history
- Presence of comorbidities
- Nutrition and hydration status
- Presenting symptoms and pain
- Dexterity and mobility
- Previous treatment and outcomes
- Knowledge and understanding

##### Psychosocial-related factors

- Lifestyle
- Occupation
- Quality of life
- Social activity
- Sleep activity
- Care and social support network
- Expectations of treatment
- Weight/body mass index

## MYTH

ABPI assessment confirms the presence of a VLU.

## TRUTH

Whilst a fundamental component of assessment, ABPI assessment will not diagnosis venous disease - it will only exclude the presence of significant arterial disease - and is only a component of a full holistic assessment.

of wounds in the UK, only 16% of all cases with a leg or foot ulcer had a Doppler ankle brachial pressure index (ABPI) recorded in their records (Guest et al, 2015). Even when ABPI assessments are undertaken, this does not always lead to the correct interpretation; obtaining an accurate ABPI can be difficult in some patients, such as those with severe chronic swelling and tissue fibrosis (Guest et al, 2015).

Arterial assessment is an essential component of leg ulceration management (Vowden and Vowden, 2001). The most common of these is ABPI assessment; it is important that the clinician understands why this is being undertaken in order to appropriately interpret the results. ABPI assessment is not intended for the diagnosis of venous disease, but rather for exclusion of significant arterial disease and therefore confirmation of safe practice (i.e. to confirm that use of compression treatment is safe). Measuring ABPI provides an assessment of the patient's peripheral arterial system; however, in certain patients/situations, further or alternative investigations may be required – for examples of these, see Table 1 and Table 2.

Patients who are being managed with compression therapy should have regular vascular assessment to ensure their arterial status has not worsened. Subsequent assessments incorporating ABPI assessment should be completed at 3-, 6- or 12-month intervals, depending on initial and ongoing assessment outcomes, cardiovascular risk profile, patient needs, or according to local guidelines (NICE, 2013).



**Table 1: Investigative tools for arterial assessment**

Investigation	Purpose
Ankle Brachial Pressure Index (ABPI)	Bedside test to exclude the presence of significant peripheral arterial disease. ABPI is the calculation of the ratio of blood pressure at the ankle compared with blood pressure in the arms. ABPI <0.8 is suggestive of reduced blood supply to the legs, indicating peripheral arterial disease.
Toe Brachial Pressure Index (TBPI)	Similar procedure to ABPI but cuff is applied to great/first toe to obtain hallux pressure. This may be useful/reliable in patients where the limbs are too large to compress or where there is presence of arterial calcification (ABPI >1.3). TBPI <0.7 indicates arterial disease.
Pulse oximetry	Pulse oximetry alone is a secondary diagnostic tool to measure levels of oxygenated blood, which is unreliable in excluding peripheral arterial disease. Pulse oximetry can be used to calculate ABPI measurement; however, this should not be routine practice.
Transcutaneous oxygen tension (TcPO <sub>2</sub> )	Local non-invasive measurement to assess the amount of oxygen that has diffused from the capillaries into the epidermis. Provides useful information used to assess level of potential for healing in ischaemic wounds.
Arterial duplex scan	Non-invasive ultrasound scan of the arteries. Duplex scans capture two elements of information: used to assess the visual structure of the arteries and also to assess blood flow within the arteries. Useful investigation if peripheral arterial disease is suspected.
Computer Tomography Angiogram (CTA)	Technique for imaging larger sections of arteries. In the lower limb, CTA can be used to see the whole arterial system from below the level of the aorta. Requires the injection of contrast dye into the arteries. Useful if looking for larger inflow arterial disease or small vessel disease below the knee.
Magnetic Resonance Angiogram (MRA)	As per CTA but uses magnetic fields/radio waves to evaluate blood vessels and identify areas of abnormality or arterial disease; may be a preferable option for patients with poor renal function. Radiation doses are lower compared with CTA.
Angiography	Angiography is an invasive investigation, therefore should only be used where intervention is required and should not be used for first-line investigations. Contrast dye is injected into the arteries, then a series of X-rays is taken to examine for the presence of arterial disease or other abnormalities.

**Table 2. Investigative tools for venous assessment**

Investigation	Purpose
Venous Duplex	Non-invasive ultrasound scan of the veins. Duplex scans capture two elements of information: used to assess the visual structure of the arteries and also to assess blood flow within the arteries. Useful investigation to assess condition and functioning of veins, will assess for incompetence (failing/backflow) of both deep and superficial venous system.
Photoplethysmography	Used to assess venous refill time and investigate deficiencies of the calf muscle pump. Venous reflux time >20 indicates venous insufficiency.
Computer Tomography Venogram (CTV)	A venogram involves injecting contrast material into the veins, which then allows the veins to be imaged with a CT scanner. This allows for the assessment of obstructions, congenital issues, and provides detailed accurate assessment of the venous system.
Venogram	As CTV but images are taken using a series of X-rays. This requires continual injections into the veins, and as such is classed as an invasive investigation. Therefore, this is primarily only used for vein bypass planning or where very detailed information is required.

**Box 4. Checklist for leg assessment**

## Limb-related factors:

- Presence and distribution of oedema; oedema likely to become non-pitting with chronicity due to development of fibrotic tissue
- Limb size and shape (e.g. reduction or loss of calf muscle, inverted champagne bottle shape)
- Mobility and/or ankle movement
- Colour and condition of skin
- Temperature

## Vascular-related factors

- ABPI to check for arterial insufficiency
- Vascular history
- Limb temperature
- Erythema, pallor and/or cyanosis
- Signs of arterial insufficiency
- Signs of venous insufficiency (e.g. oedema, ankle flare, hyperpigmentation, lipodermatosclerosis, atrophie blanche, varicose eczema)

Leg assessment should also include elements such as limb size and shape, and presence of oedema. See Box 4 for a checklist for leg assessment.

**Wound/skin assessment**

Initially, it is important to establish the cause of the wound. From there, the wound and surrounding skin should be assessed using a structured assessment method such as the TIMES principle (expanded from the original TIME principle; EWMA, 2004), making specific considerations with regard to VLU treatment (Stephen-Haynes, 2007).

See Box 5 for a checklist for wound and skin assessment.

**Box 5. TIMES checklist for wound assessment**

## TIMES principles

- Tissue (non-viable or deficient) – assess tissue quality, slough and any necrotic tissue (in the case of a complex VLU – a simple VLU does not have necrotic tissue)
- Infection or inflammation – colonisation is common in VLUs; assess for signs of infection or possible biofilm
- Moisture imbalance – any exudate should be assessed in terms of colour and viscosity as well as volume
- Edge of wound – assess for signs of over-granulation, encrusted debris, rolled edges and possible malignancy (e.g. VLUs should have shallow/sloping edges; raised edges may be a red flag for malignancy)
- Surrounding skin – assess whether the skin is red/inflamed, any itching or blistering, signs of hyperkeratosis or dry skin, lipodermatosclerosis, excoriation, moisture-associated dermatitis or hygiene issues.

**Key points:**

1. All patients require a thorough, holistic assessment – this is the responsibility of the nurse
2. Any patient who presents with a lower limb wound or problem (e.g. swelling) should be assessed for risk factors of venous disease
3. Assessment should trigger immediate action: treatment or onward referral – early intervention is key



## SECTION 2: CLASSIFICATION

After initial assessment has been completed and VLU diagnosed, VLUs should be classified as simple or complex (Harding et al, 2015).

### Simple VLU

A 'simple' VLU is defined as having the following characteristics:

- ABPI 0.8–1.3
- Area <100cm<sup>2</sup>
- Present for less than 6 months.

A simple VLU should be managed in a primary care/community-based environment by clinicians who are competent in administering compression therapy (Harding et al, 2015).

### Complex

A 'complex' VLU is defined as having any of the following characteristics:

- ABPI outside of 0.8–1.3 range
- Area ≥100cm<sup>2</sup>
- Present for more than 6 months
- Controlled/uncontrolled cardiac failure
- Current infection and/or history of recurrent infections
- History of non-concordance with treatment
- Wound has failed to reduce in size by 20–30% at 4–6 weeks despite best practice
- Fixed ankle or reduced range of motion
- Foot deformity
- Unmanaged pain.

A complex VLU should be managed by a specialist service that deals with VLUs. Depending on local service provision, this may include a specialist wound management service, a community-based service (e.g. Leg Club®), or dermatology/phlebology or vascular service. This may require further investigations, such as duplex scans (Harding et al, 2015).

### Mixed aetiology ulcer

In addition, an ulcer may be classified as 'mixed aetiology', which is defined as having venous and arterial components. These may include the following characteristics:

- ABPI <0.8 or >1.3 (NB: if ABPI <0.5, no compression should be applied and urgent referral for consideration for revascularisation should be made)
- Symptoms of arterial disease – such as intermittent claudication (muscle pain that is experienced upon exercise and relieved when rested) – even if ABPI is within the normal range.

Other aetiologies include: diabetes/peripheral neuropathy; rheumatoid arthritis (vasculitic ulcer); autoimmune disease; vasculitis; sickle cell disease; uncontrolled cardiac failure.

Mixed and other aetiology ulcers may still require management with compression, however, they should be referred to the appropriate specialist for further investigation and care. Further investigations may be required, such as duplex scanning or biopsy (Harding et al, 2015).

### Measuring VLUs

Failure to respond to best practice treatment within 4 weeks automatically classifies an ulcer as complex (Harding, 2015). In order to gauge this, all VLUs should be measured at a minimum of 4-weekly intervals.

Local guidance should be followed in assessing and recording wounds for size. Photographing the wound is a useful way of ensuring objective recording of the wound. Photographs should be taken using equipment which your workplace has consented for you to use and steps taken to ensure consistency in recording (see Box 6 for tips on photographing wounds). For consistency, measurement should be made at the same point in assessment each time (i.e. either before or after debridement).

### Key points:

1. Once a VLU has been diagnosed, it should be classified as simple or complex
2. All leg ulcers should be assessed for size at a minimum of 4-weekly intervals
3. Refer complex VLUs for specialist advice

### Box 6. Top 10 tips for photographing wounds (Sperring and Baker, 2014)

1. Use a digital camera/ phone owned by your place of work
2. Set the time and date on the camera
3. Get the light right – ensuring flash is on
4. Include patient data in the first photograph (name/identification number, date of birth, location and brief clinical history) to help identify images (ensuring that appropriate patient consent has been obtained and documented)
5. Make the wound the focus – remove clutter from background and use a plain backdrop where possible
6. Standardise the views taken of the wound each time you assess and record
7. Get the angle right to record proportions accurately – the camera body should be parallel to the subject
8. Establish the wound location on the patient's limb
9. Use close-up images to establish detail, placing a ruler near the wound to give an accurate indication of size
10. Securely save and store the images

## SECTION 3: WOUND AND SKIN MANAGEMENT

In line with the protocol for wound assessment, all VLUs should be managed using a structured assessment method such as the TIME framework (EWMA, 2004; Stephen-Haynes, 2007), which has been adapted for the purpose of this document to TIMES framework. See Table 3 for a full

checklist of management according to TIMES, specifically aimed to deal with VLUs. It is important to bear in mind that patients with VLUs often develop skin problems from prolonged use of products and may have skin sensitivities that need to be managed along with their VLU treatment.

**Table 3. TIMES framework for management of VLUs**

Category	Issues	Action
Tissue	Necrotic tissue. Tissue quality issues (e.g. slough, debris).	Appropriate and thorough cleansing methods should be used as a first step. Compression will help with tissue quality issues (e.g. slough); however, if slough remains persistent, mechanical debridement is indicated for VLUs (see EWMA Document: Debridement, 2013). Care should be taken to assess the wound pre- and post-debridement. Mechanical debridement can be used in the first instance — consider autolytic debridement dressings e.g. sheet hydrogels to soften slough in between compression reapplication.
Infection	Colonisation or infection. Possible biofilm. Cellulitis.	A high proportion of VLUs will have biofilm, which should be identified and managed using disruption methods (e.g. mechanical debridement) and antimicrobial control. An appropriate antimicrobial dressing should be used for a 2-week period to manage infection and then reviewed (Wounds UK, 2013). Chronic or recurrent infection indicates a complex VLU and must be managed accordingly Differentiate infection from possible cellulitis (see Table 4).
Moisture imbalance	Oedema and associated lymphorrhoea. Exudate. Dry/desiccated wounds.	Appropriate management of oedema should be undertaken using appropriate compression systems and selection of an appropriate absorbent dressing to retain exudate effectively, to remove fluid and reduce the levels of harmful proteases. Apply moisture balance dressings to donate fluid where necessary, to rehydrate and aid autolytic debridement.
Edge of wound	Rolled edges (epibole). Encrusted exudate. Overgranulation. Possible signs of malignancy.	Rolled edges may indicate a static wound that should be reassessed. Rolled edges or encrusted exudate may require mechanical debridement to remove local barriers to wound healing. If the edge of wound raises suspicions, the patient should be referred to dermatology immediately for biopsy.
Surrounding skin	Inflammation. Hyperkeratosis/dry skin. Venous eczema (wet or dry). Oedema/exudate skin damage from excoriation and/or moisture-associated dermatitis. Lipodermatosclerosis. Fragile skin. General skin hygiene.	Establish causes of any skin issues (see action for management of oedema/exudate). Remove hyperkeratotic skin scales using cleansing and atraumatic exfoliation (see Wounds UK Hyperkeratosis Consensus Document, 2015). Treat eczema with appropriate topical steroid therapy. Monitor the skin for signs of reaction to treatment. Establish an ongoing emollient-based skin care regimen. Encourage self care; support the patient in any skin hygiene and self care issues.

Misdiagnosis and resulting inappropriate treatment can be common, particularly in differentiating venous disease from cellulitis (Wingfield, 2012). It is vital to recognise

diagnostic features of clinical presentation, of both venous disease and cellulitis, in order to ensure accurate diagnosis and correct management – see Table 4.

**MYTH**

If a wound is healing, the surrounding skin does not require management.

**TRUTH**

Outcomes associated with compression will be improved if surrounding skin is managed effectively (including safe removal of hyperkeratosis).

**Table 4. Differentiating between cellulitis and venous disease**

Cellulitis	Venous disease
May have pyrexia, general malaise	No pyrexia
Location: anywhere	Location: often lower third of legs, common on superior/medial malleolus
Painful	May be painful, but pain often not acute
Inflamed erythema to specific location	Discolouration around gaiter region
Bright red in colour (shades/intensity may differ between dark/pale skin)	Red/brown, hyperpigmentation that can appear inflamed when acute
Clearly defined edges	No sharp defined edges
Tender to touch	Minimal tenderness
Warmth to skin	Minimal/no warmth of skin
Skin can resemble orange peel	Skin may have 'wooden' appearance, with fibrosis scaly plaques, itching common
No crusting	Crusting can be present, especially with venous eczema
Oedema to the surrounding skin, often resulting in elimination of fine wrinkles or causing fibrosis	General lower limb oedema
May have portal of entry (e.g. ulceration, tinea pedis, trauma)	May have visible varicose veins
White cell count, erythrocyte sedimentation rate and C-reactive protein (CRP) may be raised	No change in white cell count, if ulceration CRP may be raised
Unilateral	Can be unilateral – commonly bilateral
Rapid onset	Symptoms develop over weeks and months

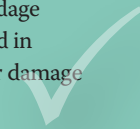
## MYTH

Superabsorbent dressings cannot be used under compression and should be used over compression if required.



## TRUTH

Super-absorbent dressings can be used under compression if the product effectively contains exudate to prevent maceration. They should not be used over compression, as sub-bandage materials and bandages soaked in exudate could result in further damage of surrounding tissues.



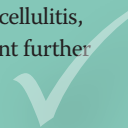
## MYTH

Compression should be stopped if the patient has cellulitis.



## TRUTH

Compression treatment should be continued as long as the patient's pain levels allow this. In the case of cellulitis, compression can help to prevent further lymphatic damage.



### Key points:

1. All VLU's should be managed according to a structured assessment method such as the TIMES framework, making specific considerations to VLUs
2. Apply the principles of wound bed preparation in order to remove local barriers to healing – appropriate cleansing and debridement should be the first step in management
3. Infection should be dealt with using an appropriate antimicrobial; in cases of biofilm, use a biofilm-based wound care regimen of debridement and antimicrobial control
4. Select an appropriate dressing
5. Refer if the patient is not responding to treatment – refer immediately in case of possible signs of malignancy

## SECTION 4: COMPRESSION

Compression should be first-line treatment to optimise healing and can benefit patients in both acute and chronic management (Wounds UK, 2015). Compression treatment should be started as early as possible: in at-risk patients, compression can prevent ulcer development.

As long as the clinician has established that compression is safe to use in the individual patient, the question should not be whether to use compression but what sort of compression to use. This depends on practical factors and patient perspective. See Table 5 for details of the various compression options.

Early management with compression hosiery should be used, including in patients with pre-ulceration risk factors (e.g. with swelling/

**MYTH**

If a wound is small, then it will not benefit from compression during the healing process.

**TRUTH**

The decision to use compression is based upon clinical suitability for compression rather than the size of the wound. Regardless of size, venous leg ulcers require compression.

**MYTH**

Reduced compression is therapeutic for VLUs.

**TRUTH**

While some compression is better than none, clinicians should always aim to use full compression systems when the vascular assessment deems it appropriate to do so, in order to prevent delays in healing through use of sub-therapeutic compression.

**Table 5: Details of the different compression systems available**

Compression system	Evidence	Advantages	Disadvantages	Patient perspective
Compression hosiery kits (first-line treatment where possible)	Multi-centre randomised controlled trial included 457 patients. Proven to be as effective as multi-component bandaging in healing venous ulceration. Additional advantage as less expensive and reduced risk of recurrence of ulceration (Ashby et al, 2014).	Does not require a high level of skill to apply. Delivers known and consistent compression levels. Allows for patient self-care. Cost-effective. Delivers compression to the foot.	Not suitable for unusual limb profiles. Not suitable for rapidly decreasing limb sizes. Exudate needs to be maintained within dressings.	Low profile – no limits to footwear/clothing. Facilitates self-care.
Compression wraps	Over 65 articles published, no randomised controlled trial relating to venous ulcer healing. Small (28 patient) comparative study showed faster healing compared to Unna Boot (DePalma et al, 1999).	Compression value adjustable – value dependent on application technique. Allows for easy adjustment as limb volume decreases. Facilitates self care. Delivers compression to the foot.	Not practical if ulcer is highly exuding.	Low profile – minimal impact on footwear/clothing. Allows self-care/family care. Can be adjusted to adapt to limb circumference changes and improve comfort.
Compression bandages	Meta-analysis of many trials including randomised controlled trials, proving that multi-component bandages are effective in the treatment of venous leg ulceration (O'Meara et al, 2012).	Adaptable so permits good anatomical fit in unusual-shaped limbs. Suitable for most limb shapes/sizes. Inelastic compression bandages can facilitate volume reduction/reshaping. High-stiffness systems (e.g. inelastic bandages) produce the greatest improvements in venous blood flow (Harding et al, 2015). Elastic component systems incorporate useful sub-bandage pressure level guides.	Compression value dependent on application technique – high level of skill required to apply. Some bandage systems do not involve compression from the foot upwards to prevent pooling of oedema in the foot, impacting on mobility and potentially delaying healing of wounds around the malleolous.	Can be bulky – may limit footwear and clothing. Does not facilitate self-care.



pain, changes in lower limb) for prevention of ulceration (Wounds UK, 2015). When treating VLU, clinicians should aim to use full compression whenever the vascular assessment deems it appropriate, in order to achieve therapeutic benefit to prevent delays in healing.

**Compression options**

In view of the strength of evidence, the cost economic benefits and the potential positive implications for the patient, hosiery kits should be used as the first compression option except in those patients who do not meet the criteria for hosiery kit use.

Different compression options may be suitable for different patients, depending on the clinical challenges present:

- Oedema
- Exudate
- Limb shape
- Pain management
- Post-thrombotic changes
- Height of the individual
- Obesity
- Psychosocial or lifestyle issues.

See Table 6 and Table 7 for a guide to which compression options are suitable for different patients depending on the clinical scenario – e.g. exudate levels or distorted limb shape may affect the choice of compression system.

Practical issues should be taken into consideration, such as:

- Reusable systems (e.g. hosiery kits) should be used where possible, as healing rates are comparable to compression bandaging and they provide a cost-effective option (Ashby et al, 2014)

- Staff and patient skill levels need to be considered
- Availability may need to be taken into account.

Patients who have compromised arterial circulation (ABPI <0.8) will need lower levels of compression (modified compression) to avoid the risk of pressure damage. Those with an ABPI of >1.3 should receive a specialist referral for vascular assessment due to potential calcification. Patients with ABPI <0.5 should not receive compression therapy (unless advised by specialist vascular team) and should be referred to a vascular specialist. All patients should be assessed for factors that may contraindicate compression therapy (NICE, 2012).

Patient preference should also be taken into account, in terms of psychosocial and lifestyle issues as well as practical considerations (Wounds UK, 2015).

**Compression for patients with diabetes**

While compression therapy should be used with caution in people who have diabetes, because of the possibility of microvascular disease (Thomas, 1997), compression should still be considered unless risk factors are identified in the vascular assessment.

The following recommendations are made:

1. All patients with diabetes should have their feet tested to ensure sensation is intact prior to compression therapy.
2. Where ‘diabetic’ complications have already been recognised (e.g. reduced sensation, microvascular disease), an MDT approach is required. This can involve input from Diabetes Specialist Nurses, Tissue Viability, Vascular, Endocrinology and Podiatry.

**MYTH**

Inelastic bandages are not suitable for immobile patients.

**TRUTH**

Inelastic bandages can be used on both mobile and immobile patients, as fluctuations in pressure can be achieved even with small or passive movements to facilitate venous return.

**MYTH**

Hosiery kits are only for self-caring patients.

**TRUTH**

Hosiery kits can be applied by the patient, carer or healthcare professional. In each of these scenarios use of a hosiery kit facilitates time efficient care delivery as well as potential quality of life improvements.

**Table 6. Components of elastic and inelastic bandages**

Elastic bandages	Inelastic bandages
<ul style="list-style-type: none"> <li>■ Elastic materials contain elastomeric fibres that are able to stretch by over 100% of the original length.</li> <li>■ Elastic bandages are generally applied at 50% stretch (see manufacturer’s instructions).</li> <li>■ Elastic bandages have a low static stiffness index, therefore exert a more constant pressure with little change in pressure on movement.</li> <li>■ Multi-layer elastic systems can function in a similar way to inelastic systems due to the number of layers.</li> </ul>	<ul style="list-style-type: none"> <li>■ Inelastic (or short-stretch) materials contain few or no elastic fibres, increasing when stretched by considerably less than 100%.</li> <li>■ Inelastic bandages are commonly applied at 100% stretch (see manufacturer’s instructions).</li> <li>■ Inelastic bandages have a higher static stiffness index, generating higher working pressures on movement and lower resting pressures.</li> </ul>



**Table 7. Appropriate compression options depending on the clinical scenario**

Scenario	Hosiery kits	Adjustable wraps	Compression bandages
Normal leg shape	✓	✓	✓
Low to moderate exudate	✓	✓	✓
Self-caring patient	✓	✓	✗
Carer involvement	✓	✓	✗
Distortion due to oedema	✗	✓	✓
High exudate	✗	✗	✓
Deep skin-folds	✗	✗	✓

## MYTH

The compression system used determines the frequency of reapplication required.

## TRUTH

The decision as to how frequently the limb needs to be reviewed should not depend on the compression system, rather the patient and the presentation. TIMES principles should be considered in decision making, as factors such as tissue condition, presence of biofilm, potential for oedema reduction and surrounding skin condition should all be taken into account. Lifestyle factors should also be considered where possible, utilising self-care solutions to enable frequency of change and improve quality of life.

### Self-care solutions

The issue of patient self-care is now more relevant than ever, as it is easier for patients to manage their own care using compression kits than it used to be solely with bandages, and ongoing self-care can reduce recurrence rates and associated complications (Guest et al, 2015). The NHS Five-Year Forward View makes patient empowerment and involvement a priority, with a specific directive to ‘support people to manage their own health – staying healthy, making informed choices of treatment, managing conditions and avoiding complications’ (NHS, 2014).

Self-care should be encouraged in suitable patients, but not forced – the patient must be able and willing to be involved in their own care (e.g. depending on skill level, dexterity and mobility). The patient should be prescribed a compression system that fits both their clinical

and personal needs; family and carer involvement should also be taken into account.

Application technique and the skill of the practitioner is a key driver in tolerance of compression, and concordance should be maximized as much as possible using the ‘six Cs’ of nursing (NHS, 2012):

- Care
- Compassion
- Competence
- Communication
- Courage
- Commitment.

Communication and trust in the clinician are key factors in achieving the optimum results of compression treatment, as are providing information and support. If patients are unable to tolerate compression therapy due to pain, they should be appropriately referred.

**Treatment pathway**

A structured treatment pathway should be used in the management of all VLU (see Figure 2). The pathway aids diagnosis and triggers commencement of appropriate treatment.

Within the pathway, hosiery kits are recommended as first line for VLU management. This challenges traditional treatment pathways, where compression bandaging has been the first line approach. This recommendation is underpinned by the VenUS IV trial (Ashby et al, 2014). Hosiery kits can form part of the solution by ensuring patient safety, improving patient experience, releasing nursing time and increasing effectiveness of care (Atkin and Tickle, 2016).

Hosiery kits hold a number of advantages over bandage systems; these include ease of use, consistent compression values (which are non-practitioner dependent), enabling patients to wear their own footwear and aiding self-care. A recent study also suggests that hosiery kits are less restrictive in terms of range of movement than compression bandages (Atkin et al, 2016). The VenUS IV study showed that compression hosiery kits are a viable alternative in terms of cost and healing compared with compression bandaging (Ashby et al, 2014).

However, it is important to remember that a variety of compression types are required to respond to the varying need of the patient population. Therefore the treatment pathway should be used to facilitate decision-making to best meet the individualised needs of each patient.

A number of factors should be considered in selecting a compression system, including:

- Results of holistic assessment (including comorbidities, past medical history and underlying conditions)
- Results of leg assessment (presence of oedema, condition of skin, limb shape and size)
- Results of wound assessment (location, exudate level, pain)
- Compression system properties (stiffness,

pressure, number of layers cohesiveness, elasticity)

- Assessment of patient’s lifestyle and psychological issues.

**Treatment monitoring and review**

VLU should be reviewed and reassessed at four-weekly intervals (Harding et al, 2015). The patient should also be monitored at each dressing change and patient outcomes should be assessed at each intervention. Formal review of the patient and their VLU every four weeks is essential, regardless of any other interventions.

At each review, the appropriateness and effectiveness of the current system should be assessed against the following aims, as well as any specific patient-agreed objectives:

- Ideally 30–40% reduction in size (Harding et al, 2015)
- Reduction in pain
- Improvement in mobility
- Improvement in general skin condition
- Improvement in patient-reported outcomes
- Improvement in patient’s overall quality of life
- Success in managing infection/exudate/oedema if appropriate.

The longer the wound is present, the greater the risk of complexity – so it is important that the treatment plan is reassessed and changed if objectives are not being met, or the patient is referred if necessary.

Triggers for reassessment should include:

- Inability to tolerate compression therapy
- Compression therapy applied but not delivering improvement
- Wound deteriorating
- Wound remaining static despite treatment
- Deterioration of general skin condition or maceration and exudate damage
- Increase in wound size
- Increase or change in pain
- Decrease in mobility
- Malodour
- Depression or patient quality of life issues
- Inability to deliver consistent management.

**MYTH**

Compression should not be applied to the foot.

**TRUTH**

Moderate to high compression must be applied to the foot to prevent foot oedema. Where there is little compression to the foot, the high compression to the gaiter region can create an oedematous foot and toes, thereby causing additional issues. The use of toe garments is recommended to aid oedema reduction.

# Leg ulcer treatment algorithm

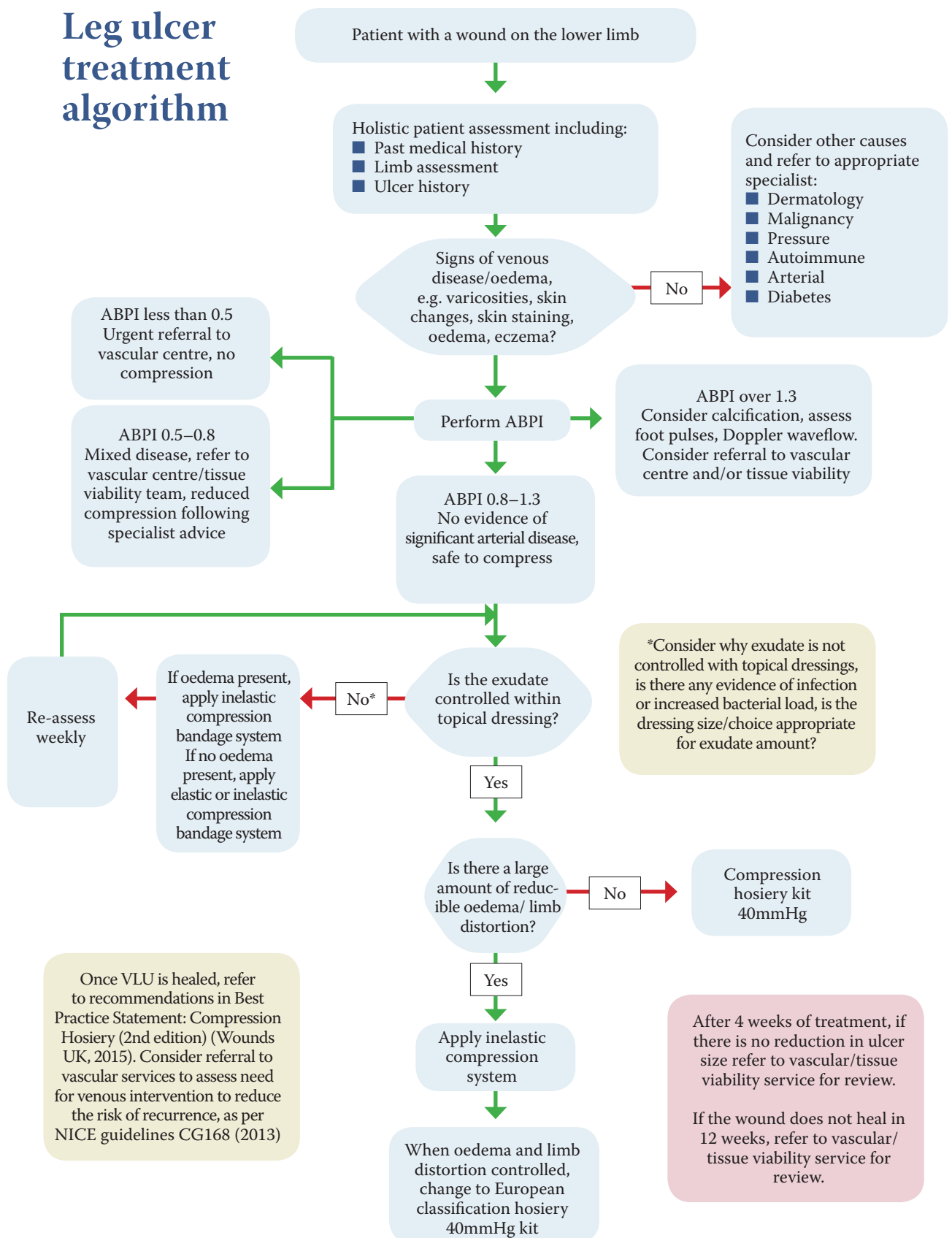


Figure 2: Leg ulcer treatment algorithm (Atkin and Tickle, 2016).

It is important to explore why the treatment may not be working, involving the patient in the decision-making process and investigating possible concordance issues or other causes. The issues should be resolved by developing an action plan and offering the patient alternative options if possible. It may be necessary to try a different method of compression treatment – i.e. don't just change the dressing options.

If the wound is not progressing, it is necessary to trigger multidisciplinary discussion and involvement. If the VLU has not healed after a maximum of 12 weeks of treatment, the patient should be referred to an appropriate specialist.

### **Responsibilities and continuity of care**

Continuity of care is vital to successful outcomes of treatment; the patient's care plan should be the responsibility of a named clinician. All practitioners involved in VLU care should have undergone appropriate education and training in relevant skills – it is the practitioner and their organisation's responsibility to ensure this.

When the multidisciplinary team is involved, competencies and responsibilities should be set according to local guidelines. Patients should be referred to a specialist wherever necessary.

### **Key points:**

1. Compression therapy should be started as early as possible on all suitable patients
2. The process of assessment and diagnosis must trigger action of the structured treatment pathway in the management of all VLUs
3. Wherever possible, select an option that facilitates patient involvement and self-care
4. The patient's care plan should be the responsibility of a named clinician and all practitioners involved with VLU care should have undergone appropriate education and training
5. Patients should be monitored on a four-weekly basis
6. Treatment options should be reassessed if the VLU is deteriorating or remaining static, or is not healed within a maximum of 12 weeks of treatment

## SECTION 5: HOLISTIC MANAGEMENT

Compression should be used as first-line treatment, but it is important that treatment is optimised by being used in conjunction with a holistic approach and that underlying challenges are addressed. A person-centred approach in this respect is crucial.

### Mobility

Patient mobility is key to optimising compression therapy and helps to minimise complications (Harding et al, 2015). It is important to encourage patients to be as mobile as possible within their individual capabilities. Evidence suggests that hosiery kits are favourable to bandaging in terms of not restricting mobility (Atkin et al, 2016). Walking if possible, maintaining ankle flexibility, and selecting a compression system that allows patients to wear their own shoes will help patients to remain active – see Box 7.

### Nutrition

Nutrition plays an important role in the prevention and treatment of VLU (Johnston, 2007). It may be an issue if patients are either overweight or underweight, and malnutrition can impair the wound healing process. Consuming a healthy and balanced diet and maintaining a suitable weight can reduce the risk of developing several conditions that predispose an individual to ulcers, as well as encouraging healing in patients with existing wounds. Obesity or being overweight increases the risk of developing a VLU and can add to the complexity of existing ulceration, but the patient receiving the correct dietary nutrients regardless of weight status is also a vital issue in healing (Johnston, 2007).

Nutritional status has a direct influence on the health of body tissue and its ability to heal. During the healing process, the body needs increased amounts of calories, protein, vitamins A and C, and sometimes the mineral zinc (Food Standards Agency, 2002).

It is the role of healthcare professionals to promote a healthy lifestyle that includes eating a healthy, varied diet, which should include at least five portions of fruit and vegetables daily, and should be (Food Standards Agency, 2002):

- High in fibre
- Low in salt

- Low in refined carbohydrates
- Low in fat (especially saturated and trans fats).

In some cases, it may be necessary to refer patients within the multidisciplinary team to deal with nutrition and weight issues. However, patients dealing with VLUs may benefit from general nutritional advice – see Box 8.

#### Box 7. Tips for patient mobility

- Try to keep active by walking regularly if possible
- Encourage venous return by regularly exercising your legs – moving your feet up and down, and rotating them at the ankles
- Avoid sitting or standing still with your feet facing downwards – elevate your feet at least every hour
- Whenever you're sitting or lying down, keep your affected leg elevated – ideally with your toes level with your heart.

#### Box 8. Patient tips to aid compliance with dietary advice

- Set SMART goals: Specific, Measurable, Achievable, Realistic, Time-specific, e.g. 6–12kg weight loss over 3–6 months
- Offer praise and encouragement
- Review diet regularly
- Change diet gradually
- Offer consistent messages from all healthcare professionals
- Enlist social support – e.g. family, friends and carers
- Use a multidisciplinary approach.

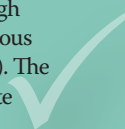
### MYTH

Venous leg ulcers are not painful.



### TRUTH

In a study examining pain in venous leg ulcers, a high proportion (64%) patients with ulcers of purely venous aetiology reported severe pain (Hofman et al, 1997). The presence of severe pain does not necessarily indicate arterial disease or infection.



## Pain management

The pain level experienced by a patient should be monitored and documented regularly at each dressing change, ideally using a simple and objective system such as a visual analogue scale (Harding et al, 2015). Compression therapy may help pain levels to decrease, as issues such as oedema and inflammation are resolved and venous return improves.

However, some patients may find tolerating compression therapy difficult due to pain. Therefore, it is vital that pain is managed appropriately, to improve the likelihood of patient tolerance as well as improving patient wellbeing and quality of life (Harding et al, 2015). Nurses need to ensure that pain is not exacerbated by poor compression application techniques, and neuropathic pain management may be essential for compression to be tolerated.

As VLU patients are frequently painful, pain management using analgesia and/or dressings with pain-managing properties is likely to be required (SIGN, 2010). Ensure the effect of the analgesia is also monitored: ask the patient what their pain level is after taking analgesia, as well as their pain level at the current time. Pain in VLU patients has been found to fluctuate and may be difficult to control (Flanagan et al, 2006) so selecting appropriate pain management strategies will depend on the individual patient.

### Box 9. Tips for patient education and involvement

- Involve patient in decision-making process
- Use positive language
- Explain treatment and rationale at all stages, establishing patients' and carers' long- and short-term expectations
- Use information leaflets and resources
- Telemedicine (e.g. online video calling, apps, smartphone support)
- Suggest patient help and support groups where appropriate
- Involve friends, family and carers where possible
- Ongoing review of progress
- Continuity of care with consistent messages

## Patient engagement and patient education

Patient engagement is key to concordance with treatment – in order to achieve positive outcomes, the patient must be actively involved. Lack of concordance is a major issue in compression therapy, and encouraging education and self-care may improve outcomes.

Following diagnosis, the patient's view should be considered and discussed, establishing objectives and priorities with the patient and taking into account their choices and expectations.

When a treatment regimen has been agreed with the patient, agreed outcomes should be recorded and measured in order to track treatment and progress and involve the patient in their own care – e.g. evaluating progress with the patient such as reduction in wound size, pain, exudate levels or oedema.

As treatment progresses, it is important that the patient is informed and involved at all stages in the rationale behind the treatment and the progress that is being made – see Box 9 for tips on encouraging patient involvement and promoting concordance.

### Key points:

1. Compression is the gold standard treatment for VLUs and should be used for all patients, but must be used in conjunction with a holistic, person-centred approach
2. Patient mobility must be encouraged in order to optimise treatment and reduce complications
3. Nutritional and weight issues should be addressed in order to optimise treatment
4. The patient should be involved at all stages of treatment and educated on treatment rationale



## SECTION 6: PREVENTION OF RECURRENCE

When the VLU has healed, maintenance and prevention of recurrence is vital. As soon as the patient has healed, the maintenance phase of management should be commenced.

### Maintenance compression

The patient should be maintained in compression hosiery wherever possible, and educated on the risk of ulcer recurrence to optimise their ongoing self-care – compression should be a lifelong option for those patients at risk. Compression wraps are available to improve self-management where necessary.

The VenUS IV Study (Ashby et al, 2014) found that participants who become used to wearing hosiery as an ulcer treatment would be more likely to wear it as a maintenance treatment after healing and therefore reduce their risk of ulcer recurrence. Facilitating this includes managing patient expectation and optimising concordance from the beginning of treatment into the maintenance phase.

Good protocol and appropriate maintenance makes recurrence less likely, therefore it is important to work with the patient to devise options for them that are feasible in the long term and will suit the patient's ongoing lifestyle. The ideal maintenance system needs to be simple and practical to use on an ongoing daily basis (see Wounds UK Best Practice Statement on Compression Hosiery, 2015).

### Surgical correction

All patients with a VLU that has healed in compression should be assessed for suitability of corrective venous surgery to reduce the risk of recurrence (NICE, 2013). The Eschar study proved that varicose vein surgery reduced the risk of recurrence from 28% to 12% (Barwell et al, 2004). Minimally invasive vein surgery is undertaken as a day case under local anesthetic and should be considered for all patients to reduce risk of recurrence.

### Ongoing review and monitoring

The patient should be reviewed again at 3, 6 and 12 months, and annually when the maintenance phase has begun. Depending on the patient's level of risk, reassessment may include a review of ABPI (Harding et al, 2015). At review, it is also important to gauge how the patient is coping with the maintenance phase of

treatment, and re-prescribe/resupply compression therapy as required. It is important to bear in mind that during the maintenance period, patients and carers will have responsibility for keeping compression hosiery in good condition, so it is critical that they receive effective education in order to maximise the life and effectiveness of a garment until the next prescription (Wounds UK, 2015).

Patients should also be educated on keeping vigilant for any signs that they need to contact their clinician for reassessment – e.g. further trauma or changes to the lower leg; concerns about DVT or oedema.

In such cases, the patient should be reassessed within two weeks. The patient should be referred due to any concerns that require further support.

### Ongoing holistic care

Promoting ongoing self-care (daily hygiene plus regular skin care) is a key determinant of positive outcomes (Wounds UK, 2015). The maintenance phase presents a great opportunity for the patient, their carer and/or family member, to take ownership of any aspects of the skincare regimen they feel comfortable with. Patient education helps patients to adhere to their treatment and can increase their confidence to take on additional components of management.

A simple skincare regimen, along with maintenance compression and exercise, will help to maintain skin integrity and prevent recurrence. Where possible, this should form part of the patient's daily care plan, emphasising the importance of washing, cleansing and emolliating the skin. Prescribing emollients, both as leave-on skin treatments and soap substitutes, will help to maintain overall skin integrity. In the case of hyperkeratosis (see Wounds UK Consensus Document, 2015), maintenance debridement may be required to prevent build-up of plaques/scales.

An ongoing simple exercise regimen should also be maintained if possible for the patient – e.g. staying as active as possible, walking if the patient is able, simple stretches/ankle exercises.

### Key points:

1. Patients should be encouraged to see compression treatment as a lifelong commitment
2. Patients should be reassessed at 3, 6 and 12 months (and annually once in a maintenance programme); if there is cause for concern in the interim, patients should be seen within two weeks
3. An ongoing self-management plan, including exercise and a basic skincare regimen (plus ongoing maintenance debridement if required), should be implemented

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