

# LOWER LEG ASSESSMENT MANAGEMENT AND PREVENTION GUIDELINE

<b>Guideline Reference</b>	G420
<b>Version Number</b>	1.1
<b>Author/Lead Job Title</b>	Simon Barrett Lead Tissue Viability Nurse
<b>Date of Last Changes (This Version)</b>	August 2022
<b>Date of Next Review</b>	August 2025
<b>Ratified by: Date</b>	Physical Health and Medical Devices Group 10 August 2022

**VALIDITY – Guidelines should be accessed via the Trust intranet to ensure the current version is used.**

### CHANGE RECORD

Version	Date	Change details
1	<i>August 2021</i>	<i>New guideline Approved PHMD 11 August 2021</i>
1.1	<i>August 2022</i>	<i>Update to existing guideline. Approved at PURL 19-July-22 Summary of changes/amendments 1. 6.16 Clinical investigations amendment. 2. 6.20 Ankle Brachial pressure recording. Approved by PHMD Group (10 August 2022)</i>

## Contents

1. PURPOSE AND RATIONALE .....	5
2. OUTCOME FOCUSED AIMS AND OBJECTIVES.....	5
3. SCOPE .....	5
4. DEFINITIONS .....	5
5. DUTIES .....	5
6. PROCESS .....	6
6.1. Leg Ulcer Aetiology .....	6
6.2. Assessment of Patients with Lower Limb Ulceration .....	6
6.3. Precursors for Venous Hypertension.....	7
6.4. Key Indicators of Venous Disease.....	7
6.5. Key Clinical Indicators of Venous Disease .....	7
6.6. Key Indicators of Arterial Disease .....	8
6.7. Key Clinical Indicators of Arterial Disease .....	8
6.8. Mixed Disease .....	8
6.9. Key Clinical Indicators of Lymphoovenous Disease .....	8
6.10. Contributing Factors .....	9
6.11. Quality of Life .....	9
6.12. Age .....	9
6.13. Current Medication .....	10
6.14. Social and Psychological Issues.....	10
6.15. Nutritional Status .....	10
6.16. Clinical Investigations.....	11
6.17. Leg Measurements.....	11
6.18. Ulcer Assessment.....	11
6.19. Examination of the Wound .....	11
6.20. Ankle Brachial Pressure Index (ABPI) – the ABPI Assessment.....	12
6.21. Contra-indications for Measurement of ABPI .....	13
6.22. Factors that may lead to Erroneous ABPI Measurement .....	13
6.23. Collection of the Equipment.....	13
6.24. Preparation of the Patient.....	13
6.25. Measurement of Brachial Systolic Pressures.....	14
6.26. Interpretation of the ABPI Reading .....	15
6.27. Management of Venous Ulceration Introduction .....	16
6.28. Principles of Graduated Compression Therapy .....	17
6.29. Abnormally Shaped Legs .....	17
6.30. Alternatives to Four-Layer Compression Bandage Systems.....	19
6.31. Short-Stretch (Inelastic High Compression).....	19

6.32.	Venous Ulcer Treatment Stockings/Wraps.....	20
6.33.	Management of Arterial Ulceration .....	21
6.34.	Management of Mixed Aetiology Ulceration.....	21
6.35.	Malignancy .....	21
6.36.	Local Wound Management.....	22
6.37.	Skin Problems and Associated Management.....	22
6.38.	General Skin Care for Patients with Leg Ulceration .....	23
6.39.	Referral Criteria.....	23
6.40.	Evaluation and Reassessment Review.....	23
6.41.	Recommendations for the use of Compression Hosiery .....	25
6.42.	Compression Options.....	25
6.43.	Compression for Patients with Diabetes .....	26
6.44.	Prevention of Venous Ulcer Recurrence.....	26
6.45.	Style/Types of Compression Hosiery .....	27
6.46.	Varicose Vein Surgery .....	27
7.	CONSULTATION .....	27
8.	TRAINING AND SUPPORT .....	27
9.	MONITORING .....	27
10.	EQUALITY AND HUMAN RIGHTS ANALYSIS .....	28
11.	DOCUMENTATION AND RECORD KEEPING .....	28
12.	DISTRIBUTION LIST/DISSEMINATION METHOD.....	28
13.	REFERENCES.....	28
	Appendix 1: Pedal Pulse Locations Description and Diagram .....	31
	Appendix 2: Equality Impact Assessment (EIA) .....	32

## **SUPPORTING STATEMENTS**

This guideline should be read in conjunction with the following statements:

### **SAFEGUARDING IS EVERYBODY'S BUSINESS**

All Humber Teaching NHS Foundation Trust employees have a statutory duty to safeguard and promote the welfare of children and adults, including:

- being alert to the possibility of child/adult abuse and neglect through their observation of abuse, or by professional judgement made as a result of information gathered about the child/adult;
- knowing how to deal with a disclosure or allegation of child/adult abuse;
- undertaking training as appropriate for their role and keeping themselves updated;
- being aware of and following the local policies and procedures they need to follow if they have a child/adult concern;
- ensuring appropriate advice and support is accessed from managers and the trust's safeguarding team;
- participating in multi-agency working to safeguard the child or adult (if appropriate to your role);
- ensuring contemporaneous records are kept at all times and record keeping is in strict adherence to Humber Teaching NHS Foundation Trust policy and procedures and professional guidelines. Roles, responsibilities and accountabilities, will differ depending on the post you hold within the organisation;
- ensuring that all staff and their managers discuss and record any safeguarding issues that arise at each supervision session

### **EQUALITY AND HUMAN RIGHTS**

Humber Teaching NHS Foundation Trust recognises that some sections of society experience prejudice and discrimination. The Equality Act 2010 specifically recognises the protected characteristics of age, disability, gender, race, religion or belief, sexual orientation and transgender. The Equality Act also requires regard to socio-economic factors including pregnancy/maternity and marriage/civil partnership.

The trust is committed to equality of opportunity and anti-discriminatory practice both in the provision of services and in our role as a major employer. The trust believes that all people have the right to be treated with dignity and respect and is committed to the elimination of unfair and unlawful discriminatory practices.

Humber Teaching NHS Foundation Trust also is aware of its legal duties under the Human Rights Act 1998. Section 6 of the Human Rights Act requires all public authorities to uphold and promote Human Rights in everything they do. It is unlawful for a public authority to perform any act which contravenes the Human Rights Act.

## 1. PURPOSE AND RATIONALE

A leg ulcer is defined as the loss of skin below the knee on the leg or foot, which takes more than two weeks to heal (NICE, 2016). Patients should be offered an appropriate lower leg assessment including ABPI and commenced in optimum treatment if the ulcer remains present after two weeks.

About 1% of the population will suffer from leg ulceration at some point in their lives (SIGN, 2010). The estimated prevalence of leg ulceration in the UK is between 0.1%-0.3%% per 1000 population, this figure increases for people older than 80 years (RCN, 2006). Up to 50% of venous ulcers are due to superficial venous insufficiency and/or perforating vein incompetence alone with a normal deep venous system (NICE, 2016).

Wound care and leg ulcer management has traditionally been managed by nurses with limited medical intervention. The the responsibility for the-assessment, diagnosis and management decisions remain within community nursing services (Moffat et al, 2007). Poor recognition by health care practitioners can lead to a delay in assessment, diagnosis and subsequently can lead to long periods of ineffective or inappropriate treatment Not only does it represent a huge waste in health care resources with a conservative estimated annual cost to the NHS in the region of £8.3 billion (Guest, 2020).

There are many factors associated with delayed healing and a leg ulcer is only a symptom of an underlying problem. In order to develop an appropriate and effective treatment plan, an accurate differential diagnosis must be made.

## 2. OUTCOME FOCUSED AIMS AND OBJECTIVES

This clinical guideline has been developed and peer reviewed by members of the tissue Viability Service and the Pressure Ulcer review and Learning panel [PURL] to provide evidence based guidance in accordance with the national guideline, Leg ulcer-venous NICE, 2016. It will detail:

- Key assessment points to be recorded
- The evidence base for treatments which may be used
- Wider issues to be considered such as appropriate education for staff and patients.
- To ensure that Humber Teaching NHS Foundation NHS Trust employees implement evidence based practice for patients who present with a wound on the leg or foot which has been present for more than two weeks.
- To reduce reoccurrence rates of lower limb ulceration
- To ensure all staff are fully trained in lower limb management

## 3. SCOPE

This guideline applies to all registered health professionals employed by the Trust who are involved in the management of patients with a lower limb wound, a healed leg ulcer or an “at risk” lower limb.

## 4. DEFINITIONS

ABPI: Ankle brachial pressure index

LLA: Lower Leg assessment

## 5. DUTIES

**The Executive Director of Nursing and Allied Health Professionals** is responsible for ensuring the implementation of this guideline. This has been delegated to the Tissue Viability service.

**The Executive Director of Nursing and Allied Health Professionals** is responsible for ensuring that this document is reviewed and if required revised in the light of legislative guidance or organisational change. This process has been delegated to the Tissue Viability Service.

**Service Lead** is to support the Tissue Service, community services, mental health services and learning disability services both inpatient and community based to guarantee implementation of the guideline in a timely manner to ensure there is no delay in service delivery

This guideline will be reviewed in three years unless there is new guidance in the interim

## 6. PROCESS

### 6.1. Leg Ulcer Aetiology

A minor traumatic incident is often the initial cause of wounding however; several underlying disease processes may contribute to delayed healing and subsequent chronic ulceration. The main causes of ulceration are:

- Underlying venous disease; a venous ulcer (60-85%) Underlying arterial disease; an arterial ulcer (22%)
- Underlying arterial and venous hypertension; a mixed aetiology ulcer (10-20%)

The remaining 2-5% of leg ulcers can be attributed to other disorders such as:

- Rheumatoid arthritis/connective tissue disorders (vasculitic ulcers)
- Diabetes and other endocrine disorders
- Malignancy
- Blood disorders
- Metabolic disorders, e.g. pyoderma gangrenosum
- Trauma, e.g. radiation injuries

### 6.2. Assessment of Patients with Lower Limb Ulceration

Successful outcomes in the management of patients with lower limb ulceration are dependent upon an accurate holistic assessment that enables the practitioner to make a differential diagnosis.

Patients should be assessed by a health care professional with training in leg ulcer management. It is the responsibility of each individual clinician to ensure their practice is evidence-based and that they feel competent and confident in the practical aspects of leg ulcer management. (RCN, 2006)

Both legs should be examined even if they are not both ulcerated. This provides opportunistic screening and may help in preventing potential tissue breakdown.

Assessment is ongoing, significant changes in the aetiology of the leg ulcer can rapidly occur. General issues related to the wound bed, the surrounding skin, pain and impact of the ulcer should be reviewed weekly and more in-depth assessment at three-monthly intervals (Moffat et al 2007).

Clinicians should not rely on wound and medical history, symptoms and clinical presentation alone to determine aetiology, the Doppler assessment is an essential component to determine arterial blood flow. All patients with a chronic venous leg ulcer should have an Ankle Brachial Pressure Index (ABPI) performed prior to treatment (SIGN, 2010).

### 6.3. Precursors for Venous Hypertension

Venous disease occurs when the foot and calf muscle are unable to effectively empty the veins, often due to valve incompetence and allows blood to 'reflux' – flow backwards towards the capillaries as well as forward towards the heart. This can be due to a congenital defect, previous trauma/damage to the veins. Long term pressure in the superficial veins can lead to damage to the valves, this could be due to occupation, pregnancy and obesity.

### 6.4. Key Indicators of Venous Disease

- Family history of ulceration/varicosities/veins – venous disease can be hereditary.
- Vein surgery/injection
- Deep Vein Thrombosis – this is significant as it may have resulted in obstruction of the vein and valve damage (Vowden & Vowden 2001)
- Pulmonary emboli
- Thrombophlebitis
- Cellulitis
- History of surgery/fractures/trauma/intravenous (IV) drug use to the lower limb – previous surgery, trauma or IV drug use may have Damage to the leg veins and valves or have resulted in lack of ankle movement thereby reducing the action of the calf muscle pump.
- Reduced mobility can contribute to weight gain, calf muscle wastage and ineffective calf muscle pump.
- Pregnancies (number of)
- Steroids (topical or systemic)
- Any other relevant illnesses or investigations

### 6.5. Key Clinical Indicators of Venous Disease

- Oedema – fluid leaks into the tissues from enlarged capillaries. Plasma protein molecules in the blood encourage more fluid to filter out (Tortora & Derrickson, 2014), this would normally be reabsorbed into the capillaries but as they are already congested this does not happen. The tissues then swell and the ankle circumference increases. Assessment of oedema should include measurement of the ankle circumference. It is thought that oedema delays wound healing due to its effect on the microcirculatory system in preventing adequate perfusion and exchange of nutrients in the affected area. Cells are starved of oxygen and nutrients and levels of metabolic waste products become toxic (Hoffman, 1998). Check for other causative health conditions, e.g. heart and renal failure. If the patient has lower limb oedema as a direct result of cardiac failure and has ulceration of arterial pathology, compression therapy is **not** appropriate. The oedema should be managed following liaison with the GP. Oedema affecting one leg is more likely to be due to venous disease.
- Varicose veins – spider veins/varicosities occur in the early stages of venous disease. Bulging veins indicate potential valve incompetence and venous hypertension. As the patient stands the veins will fill, can be present in lower leg, thigh and groin.
- Varicose eczema – this can present all over the limb/below the knee as a contact dermatitis. Varicose eczema can be caused by the blood products that leak and cause irritation of the skin. Eczematous skin is often hypersensitive and many substances including dressings can cause irritation.
- Lipodermatosclerosis – hardening of the fatty subcutaneous tissues, it can be quite localised and then over years develop in the gaiter region causing the appearance of an "inverted champagne bottle", narrow ankle and wide calf.
- Ankle flare – presents as tiny varicose vein on the medial aspect of the foot and ankle due to valve incompetence.
- Staining – this appears initially as red/brown discoloration caused by leakage and breakdown of blood cells. Haemosiderin staining is usually a dark brown.
- Atrophe blanche – presents as white "lacy" areas of avascular tissue, interspersed with engorged capillaries seen as red spots. May be small or larger areas could be over the site of previous ulceration. If ulcer forms over this tissue it will be difficult to heal and more likely to be painful.

## 6.6. Key Indicators of Arterial Disease

- Myocardial Infarction/Angina/Heart Failure
- Hypertension (>160/90) Record the patient's blood pressure and details of antihypertensive medication and its effectiveness.
- Stroke/Transient Ischaemic Attack
- Peripheral Vascular Disease including any arterial surgery or amputation
- Intermittent Claudication – pain on walking
- Ischaemic Rest Pain
- Diabetes Mellitus – patients with diabetes are more likely to develop arterial disease (Scott 2005). Additional information should include; recent HbA1c, BM test results, other symptoms of disease progression.
- Rheumatoid Arthritis
- Smoking (how many per day?) is a major risk factor for the development of PAOD. Smoking will also affect wound healing potential as the cigarette smoke can contribute to tissue hypoxia brought about by vasoconstriction, reduced levels of oxygen carried by haemoglobin, platelet aggregation, and increased viscosity leading to clot formation. (Herbert, 1997)
- Ex-smoker (how many per day?)

The most common form of arterial disease is atherosclerosis, which leads to a narrowing of the lumen of the arteries which subsequently leads to a number of complications.

There are also modifiable and non-modifiable risk factors for atherosclerosis: smoking, hypertension, hypercholesterolaemia, age and family history (Moffat 2007).

## 6.7. Key Clinical Indicators of Arterial Disease

- Poor capillary refill (longer than three seconds) – depress the tip of the great toe, it will turn white and the colour gradually return pink – longer than three seconds would indicate Peripheral Arterial Obstructive Disease (PAOD)
- Cold legs and feet in a warm environment – feel for a difference of temperature between the two limbs
- Pale or blue feet – may be very pale or mottled blue due to lack of oxygenated blood.
- Pale shiny, hairless legs – atrophic shiny skin, hair loss, muscle wasting
- Dependent rubour – leg turns pale and waxy on elevation above the level of the heart and then flushes red as the blood tries to adequately oxygenate the limb. The limb will still feel cool.
- Feel for pedal pulses – palpation of pulses is insufficient to determine the presence or absence of arterial disease.
- Thickened toe nails – trophic changes

(Timmons & Bianchi 2008)

## 6.8. Mixed Disease

Patients with mixed venous/arterial ulcers may present with a combination of both predisposing indicators as described above.

## 6.9. Key Clinical Indicators of Lymphoedematous Disease

- Skin changes associated with Lymphoedema – papillomatosis; papules or nodules protruding from the skin surface giving a cobble stone appearance. Lymphangiomas damage to the deeper lymphatic system presenting as small blisters leaking lymph – lymphorrhoea
- Non-pitting oedema that does not reduce with limb elevation – press firmly for at least 10 seconds, if the indentation is present on removal this is pitting oedema
- Thickness of skin increase/skin folds present – skin creases deepen in particular at the ankle and the base of the toes.



- Hyperkeratosis – increase thickening of the stratum corneum a build-up of horny scale on the skin surface.
- Positive stemmers sign – inability to pick up a fold of skin between the toes
- History of cellulitis – common complication increased susceptibility to bacterial and fungal infections. Each episode of cellulitis potentially creating further damage to lymphatic capillaries.

(Lymphoedema Framework 2006, Timmons & Bianchi, 2008)

### 6.10. Contributing Factors

The following are factors that may increase the patient's risk of ulceration:

- Occupation – patients who spend long periods of time standing or sitting may be more at risk of developing venous ulceration due to lack of calf muscle activity and additional pressure on the venous system.
- Obesity – this may affect the patient's ability to mobilise and can again result in additional pressure on the venous system.
- Gender – ulceration is more prevalent in women. The incidence for atherosclerosis is higher in men than women under the age of 70 but similar in both sexes over 70.
- Age – the natural ageing process affects the structure and function of the skin thus it is more susceptible to mechanical damage and wound healing is slower.
- Stress bio-chemical and immune response changes associated with stress may predispose patient to atherosclerosis (Herbert 1997)

The nursing assessment should take into consideration the following factors:

### 6.11. Quality of Life

Patients with chronic leg ulceration have much in common with patients with other chronic diseases; this may include social isolation, loss of income, reduced self-esteem and lack of belief in treatment. Although not covered in this guideline these should be considered as psychosocial aspects and referred to as a factor that may affect healing, and also be a basis for discussion when negotiating care plans.

### 6.12. Age

The formation of fatty plaques begins in adulthood therefore advancing age increases the probability for atheroma/atherosclerosis and the progression of PAOD.

### Pain

Understanding the patient's level and type of pain is a vital element of the leg ulcer assessment to help inform the aetiology, impact on the care plan decision making, and indications for further assessment and referrals. The pain associated with leg ulceration may have multiple pathologies therefore the patient should be assessed for the level, type and site of pain and situations that reduce or exacerbate pain should be established. A pain assessment tool should be used to facilitate the assessment and allow for appropriate prescription of analgesia. The effectiveness of any analgesic regime should be evaluated regularly as part of the ongoing management plan.

The presence and type of pain will give an indication to the aetiology of the ulcer. The pain described by patients with venous leg ulceration may be heaviness, throbbing and aching, whilst pain associated with arterial leg ulcers is often described as sharp, stabbing and gnawing (Murray 2004, Cullum et al 1997).

**Intermittent claudication** associated pain should not be confused with ulcer pain. Pain due to intermittent claudication is associated with exercise and is classically described as a 'cramping' of the calf, thigh or buttock muscles when the patient walks (dependent upon the location and extent of arterial disease). Pathologically, it can be equated to 'angina of the leg' and is relieved by resting the muscles.

**Night pain** occurs when the legs are elevated in bed, whilst the limb is horizontal the blood flow is compromised however, on dependency, gravity assists blood flow. The patient can describe waking in the night with sometimes excruciating pain or cramp like pain usually in the affected foot or lower leg, which is relieved by positioning the leg in the dependent position. Patients with night pain classically describe having to walk around in the night or hang their legs over the edge of the bed to gain relief. On occasion they may resort to sleeping in the chair.

**Ischaemic rest pain** occurs when the patient is sitting with their legs down and frequently involves the foot it indicates a severe reduction in arterial flow below the required for normal tissue metabolism pressure of 20-30 mmHg in the toes is often associated with rest pain (Stubbing & Chesworth 2001).

Further questioning may be required if the patient reports that they sleep in the chair, to determine if this is due to pain associated with the limb when in an elevated position. Record within the documentation rationale why patient is unable or would prefer to sleep in chair.

### **6.13. Current Medication**

The list of medication will be documented within the patients records, consideration should be given to recognise if any may have an adverse effect on the wound healing process, e.g. Corticosteroids/NSAID and Cytotoxic therapy. The list of patient medication may inform the assessment process, by clarifying the health history given by the patient.

### **6.14. Social and Psychological Issues**

It is important to give consideration to the following social and psychological issues as these can have a direct or indirect effect on ulcer healing:

- Ignorance – this may be a lack of understanding around the cause of ulceration and available treatment options
- Poverty – may impact on the patients' ability to eat a healthy diet, their ability to access appropriate care and fund prescription charges.
- Emotional state – wound healing can be delayed if the patient is anxious, stressed or depressed. Depression and anxiety could be due to pain and sleeplessness, research has shown an association between patients with clinical depression and delayed ulcer healing (Moffatt 2001).
- Attitude to treatment – does the patient understand the importance and relevance of the treatment regime and do they want the wound to heal?
- Concordance – patients are more likely to concord with a treatment regime if they find it comfortable, cosmetically acceptable and have an understanding of how it is going to improve their ulcer.
- Loneliness and Isolation – ulceration can lead to social isolation if patients cannot carry out their normal social activities. This may be due to pain, the stigma of having a wound, malodour, exudate or a combination of these factors.
- Levels of social support.
- Poor coping or maladaptive coping strategies including reliance on drugs or alcohol.
- Psychological dependence on the ulcer; It may be that they don't want their wound to heal as their only social contact is with the health care professional who manages their treatment.
- Patients with leg ulceration may face a lifelong history of recurrent bouts of ulceration.

### **6.15. Nutritional Status**

Nutrition is a key aspect of assessment as wound healing is dependent upon good nutrition. All cellular activity requires oxygen and nutrients therefore patients with wounds must be nutritionally optimised for effective wound healing to take place. Russell (2001) states that patients require adequate levels of calories, protein, vitamins and minerals to support wound healing.

The nutritional assessment tool of choice should be MUST (Malnutrition Universal Screening Tool)

## 6.16. Clinical Investigations

The following clinical tests should be performed as part of the initial assessment:

- Blood pressure/pulse – to monitor cardiovascular disease
- Capillary blood glucose measurement – as a preliminary indicator of undiagnosed diabetes mellitus.
- Doppler measurement of ankle brachial pressure index – as an indicator of peripheral arterial disease.
- Any other clinical investigations indicated by the presenting symptoms of each individual patient, e.g. Full Blood Count in suspected anaemia, temperature for any signs of infection.

## 6.17. Leg Measurements

The limb measurements could indicate:

- A difference in ankle measurements; one sided oedema,
- Disproportionate ankle to calf – bilateral ankle oedema
- A difference in calf measurements – history of DVT
- Disproportionate calf to ankle muscle wasting
- Baseline to inform compression management plan.

## 6.18. Ulcer Assessment

The origins of the ulcer on presentation will determine the diagnosis and treatment plan. It is important to collect information regarding previous episodes of ulceration as this may have an impact on the potential for healing and may also provide useful information regarding the effectiveness of previous treatment regimes. Research investigating healing indicators found that the size of the wound and the length of time it has been present had a significant impact on its potential to heal (Franks et al 1995).

The following information should be recorded in a structured format:

- How did this episode of ulceration occur
- Year of first episode of ulceration
- Site of previous ulceration
- Number of previous episodes of ulceration
- Time to healing of previous episodes of ulceration
- Time free of ulcers
- Past treatment regimes (successful and unsuccessful)

A Trust Wound Assessment chart must be completed for each wound (see wound assessment guidance).

## 6.19. Examination of the Wound

Basic clinical descriptors of leg ulcers (adapted from Dowsett 2005).

	<b>Venous</b>	<b>Arterial</b>	<b>Other</b>
<b>Site</b>	Medial malleolus (Gaiter region)	Dorsum foot, malleoli	Unspecific; beware wary if ulcer is in an unusual location and developed spontaneously without a reasonable explanation
<b>Shape</b>	Can be quite large and irregular shape	Can be round with a punched out appearance	Varied; observe for clusters of small ulcers or ones that begin as blistering and ulcers that rapidly increase in size
<b>Depth</b>	Generally	Can be deep with	Variable – may be over-

	<b>Venous</b>	<b>Arterial</b>	<b>Other</b>
	shallow	exposed underlying structures, e.g. bone, ligaments	granulated
<b>Edges</b>	Tend to be flat or gentle sloping	May be cliff-like	Observe for rolled edges or discoloured (purple) wound margins.
<b>Tissue type</b>	May be sloughy pre-treatment or healthy granulation	Probably devitalised tissue (slough and/or necrosis pale granulation – if present.	Variable observe for wounds that; bleed easily (friable) appear to scab over and break down recurrently, look healthy but do not show signs of healing.

- **Exudate** – describe the colour and viscosity as this may assist in identifying wound infection. Determine the amount by assessing for strikethrough at dressing change and observing for any maceration of the peri-ulcer skin.
- **Odour** – should be assessed from the perspective of both the health care professional and the patient. This will assist the practitioner in dressing choice/frequency and may assist in identifying the causative organisms in the presence of clinical infection.

**Important:** routine swabbing is not indicated in the management of leg ulceration. It is both costly and unnecessary. All leg ulcers are colonised with bacteria, as this is the nature of chronic wounds. Bacteriological swabbing is only necessary if clinical infection is suspected.

## 6.20. Ankle Brachial Pressure Index (ABPI) – the ABPI Assessment

All patients presenting with a leg ulcer should be screened for arterial disease by using the handheld Doppler to gain a measurement of ABPI, by staff that are trained to undertake this measure (SIGN, 2010). The test is a screening tool, not a diagnostic one, but potentially will inform the diagnosis.

In the management of leg ulcers the ABPI forms a fundamental part of the assessment. ABPI should not be undertaken in isolation but used in conjunction with a holistic assessment of the patient and clinical examination of the limb (NICE, 2016). Without a holistic approach, Doppler assessment and the calculation of an ABPI when taken in isolation are meaningless.

It used to exclude arterial disease and identify those patients who are suitable for compression and those patients with impaired arterial blood flow referral to vascular consultant for possible re-vascularisation. The findings of the vascular assessment may warrant referral to vascular services in secondary care. It should be undertaken within 28 days of the patient coming onto the case load with a lower limb wound.

Pressure ulcers on the foot potentially could be due to narrowing of the arteries or atherosclerosis, therefore as part of the wound assessment it would be advisable to undertake a vascular assessment to inform the optimum wound management plan.

### **Be aware that the ABPI:**

May decrease after the initial measurement. Arterial disease may develop in people with venous leg ulcers, and the ABPI will also reduce with increasing age.

May not be reliable in people with diabetes mellitus, atherosclerotic disease, rheumatoid arthritis, and systemic vasculitis. These conditions may give falsely high ABPI readings due to calcification of the blood vessels. Doppler ultrasound to measure ABPI should be conducted:

- Before commencing compression therapy
- An ulcer is deteriorating

- An ulcer is not fully healed at two weeks
- Patient presents with ulcer recurrence
- Patient is to wear compression hosiery as a preventative measure
- There is a sudden increase in the size of the ulcer
- There is a sudden increase in pain
- Foot colour and or temperature of the foot change
- Ongoing assessment

The Nursing Management of Patients with Venous Leg Ulcer  
RCN Clinical Practice Guideline (2006)

### 6.21. Contra-indications for Measurement of ABPI

There is controversy about the circumstances in which an ABPI should not be performed and robust research in this area is lacking. It has been suggested that ABPI should not be performed under the following circumstances

- If the patient has a suspected deep vein thrombosis due to the risk of emboli, unless the patient is 24 hrs post commencement of Fragmin. Please check with GP prior if unsure.
- If the patient has cellulitis as the procedure would be too painful. The Doppler assessment should be undertaken once the cellulitis has been treated effectively.
- If the patient has severe ischaemia due to the risk of further tissue damage

### 6.22. Factors that may lead to Erroneous ABPI Measurement

- Patient anxiety
- Incorrect positioning
- Inappropriate gel
- Incorrect size of sphygmomanometer cuff
- Incorrect size of Doppler probe
- Excessive pressure on blood vessel during procedure
- Prolonged inflation of the sphygmomanometer cuff or repeated inflation
- Moving Doppler probe during the procedure
- An inexperienced practitioner

(Beldon P, 2010)

### 6.23. Collection of the Equipment

- Hand held Doppler ultrasound with an 8 Mghz probe or a 5 Mghz probe if the limb is oedematous
- Headphones to detect faint pulses and to block out background noise
- Ultrasound gel (do not use any other type of gel, e.g. KY jelly, as this damages the probe)
- Manual sphygmomanometer and appropriate size cuff the bladder of the cuff should cover at least 80% of the limb
- Cling film or other waterproof layer to protect the ulcer and prevent cross infection. Padding to protect the ulcer if it is painful
- Biocide surface wipes
- Calculator or an ABPI chart

### 6.24. Preparation of the Patient

ACTION	RATIONALE
Explain procedure to the patient.  Ask the patient to remove any tight articles of clothing.  (Beldon, 2010)	To gain consent and reduce anxiety.  Tight clothing may cause pressure on vessels proximal to the site where the blood pressure is being monitored and result in inaccurate readings
Remove any dressings from the ulcers and cover with clear film, e.g. cling-film.	Reduces the risk of cross-infection

ACTION	RATIONALE
Ensure correct hand hygiene procedure is used as per WHO (2009) and repeated as appropriate throughout the procedure	
Clean equipment as per Trust policy	To prevent cross infection
Ask the patient to lie flat for a minimum of 10-20 minutes.  Beldon, (2010)	To obtain resting pressure. Standardises procedure and reduces risk of reading being falsely low due to exercise.
If the patient is unable to lie flat elevate the legs to the level of the heart. Record the position of the patient in the notes.  It is important that the patients position remains the same for subsequent ABPI assessments	To reduce hydrostatic pressure in the legs.  The position of the patient can affect the ratio of arm and leg pressures.  To standardise results obtained and allow for accurate comparison.

### 6.25. Measurement of Brachial Systolic Pressures

ACTION	RATIONALE
Place an appropriately sized sphygmomanometer cuff around the upper arm just above the elbow	If the cuff is too small the vessels will not be adequately compressed and this will result in a false reading.
Palpate the brachial pulse and apply ultrasound gel	The gel acts as a contact medium between the skin and the probe, allowing appropriate transmission of the sound waves.
Angle the Doppler probe at 45° facing towards the direction of arterial blood flow, making light contact with the skin through the gel whilst avoiding excessive pressure on the vessel.  Adjust the probe slightly to obtain the best signal	Blood flow will be detected more accurately as the artery may not lie parallel to the skin. If excessive pressure is placed on the vessel it may be occluded resulting in an inaccurate reading.  A clear sound improves the accuracy of the reading.
Inflate the cuff until the signal disappears. Deflate slowly and record the pressure at which the signal becomes audible again, taking care not to move the probe from the line of the artery	The cuff must be deflated slowly to ensure that the correct pressure is recorded.  Doppler signal provides a more accurate measurement of systolic pressure than a stethoscope.
Repeat the process for the other arm.  The higher of the two brachial pressures is used to calculate the ABPI on <b>both</b> legs (Carter 1993).	Brachial pressures can vary between left and right arms, even in people with normal circulation. Differences of more than 15-20mmHg suggest underlying arch vessel disease.  This standardises subsequent ABPI calculations.
<b>Note:</b> it is good practice to record the pressure of the patient's good limb first.	This enables the patient to experience the tightening of the cuff and often alleviates fear and anxiety.
Palpate the Dorsalis Pedis artery, which runs down the front of the foot and between the first and second metatarsal heads (see Appendix 1).	Excessive pressure may occlude the underlying artery, particularly in thin limbs.

<p>NB. The Dorsalis Pedis pulse is congenitally absent in approximately 4-12% of the healthy population. If the Dorsalis Pedis pulse cannot be located an alternative pedal artery can be used.</p> <p>Apply ultrasound gel, hold the Doppler probe at an angle of 45 degrees and locate the best signal, avoiding pressure on the vessel.</p>	
<p>Inflate the cuff until the signal disappears. Deflate slowly and record the pressure at which the signal becomes audible again.</p> <p><b>This is the ankle systolic pressure</b></p>	<p>The cuff must be deflated slowly to ensure correct pressure is recorded.</p>
<p>Repeat the procedure for the Posterior Tibial artery which can be located in the hollow behind the medial malleolus.</p>	<p>Two pedal arteries are assessed, usually the Dorsalis Pedis and Posterior Tibial, to give an indication of any peripheral arterial disease located at the posterior and anterior aspects of the limb.</p>
<p><b>Take the highest of the two ankle pressures for each leg and divide it by the highest brachial pressure.</b></p> <p><b>NB. To remember this calculation think:</b></p> <p><u>LEG</u> ARM</p>	<p>The ankle pressure normally exceeds the brachial pressure by 10-20mmHg and the resting Ankle Brachial Pressure Index should be greater than 1.0</p>

Thomas, (2010)

<p>Consider the ABPI reading in conjunction with the patient's history, holistic assessment and clinical signs.</p>	<p>To determine appropriate treatment and management of patients care.</p>
<p>Explain the meaning of the results to the patient.</p>	<p>To develop the patients understanding of their condition and its management. To encourage active participation and concordance with treatment.</p>

### 6.26. Interpretation of the ABPI Reading

Care must be taken in interpreting ABPI results in patients with heavily calcified vessels, such as in some patients with Diabetes and in advanced chronic renal failure where the results may be misleadingly high. For values above 1.3, the vessels are likely to be incompressible and the result cannot be relied on to guide clinical decisions (SIGN, 2010). Referral to the Tissue Viability service for further advice should be sought.

ABPI	Level of Disease	Bandaging
0.8 – 1.3	Providing no contraindications have been identified in the holistic assessment process, it is safe to apply compression therapy	Compression to meet individual need.  Ideally 40mmhg at the ankle reducing to 20mmhg below the knee, if safe and appropriate for the individual
0.5 – below	The arterial supply to the leg is significantly impaired	Indicates severe arterial insufficiency Avoid compression
0.5 – 0.8	May not be safe to apply high levels of compression, referral should be made to Tissue Viability service for support	May be suitable for reduced compression, e.g 10 to 20mmhg at the ankle reducing to 5 to 10mmhg

ABPI	Level of Disease	Bandaging
	should be made	below the knee
Above 1.3	In the presence of clinical signs and symptoms of arterial disease, this may indicate arterial calcification, referral should be made to the Tissue Viability service for advice and or support.  It is worth considering that recent expert opinion suggests that ABPI readings may be elevated in patients who are known to inject substances intravenously (Coull 2005).	May be suitable for compression after consultation with the TVN

### 6.27. Management of Venous Ulceration Introduction

Valid consent must be obtained before starting treatment which includes administration of medicines. If a patient is unable to consent at the time the treatment decision is made due to lacking mental capacity as per the Mental Capacity Act 2007 a best interest decision will be required in order to undertake the most appropriate action for the patient at that time. This must incorporate consideration of the known wishes, feelings, beliefs and values of the patient. For further information please refer to the Trust's Mental Capacity Act policy

NICE guidelines (RCN, 2006) state that "graduated multi-layer high compression systems, (including short stretch regimes) with adequate padding, capable of sustaining compression for at least a week should be the first line treatment for uncomplicated venous ulceration".

ABPI	Level of Disease	Bandaging
0.8 – 1.3	Normal	Compression
0.5 – below	Severe arterial insufficiency	No compression, refer to Tissue Viability. If critical ischaemia present, urgent referral to Vascular Surgeon is required.
0.5 – 0.8	Mild to moderate arterial insufficiency	May be suitable for reduced compression, refer to Tissue Viability for advice and/or support.
Above 1.3	In the presence of clinical signs and symptoms of arterial disease, this may indicate arterial calcification. It is worth considering that recent expert opinion suggests that ABPI readings may be elevated in patients who are known to inject substances intravenously (Coull 2005). The reason(s) for this finding are not yet clear.  Also patients with other co-morbidities such as Diabetes may also present with a raised ABPI.	May be suitable for compression  Referral to Tissue Viability for support and advice if appropriate

The patient needs to be able to tolerate the systems in place for up to a week at a time, and therefore needs to be:

- Graduated
- Conformable
- Sustained
- Comfortable



## 6.28. Principles of Graduated Compression Therapy

**Compression bandages whatever system should only be applied by those assessed to be competent and safe to do so. That could be the K-systems, multilayer or Short stretch**

For venous ulceration/hypertension the single most effective treatment is compression therapy. Compression will support the superficial veins counteracting raised capillary pressure (Amsler et al 2009).

Compression therapy is applied so that the pressure at the ankle is higher than the pressure at the knee (graduated) so that the venous blood is pushed back up the leg towards the heart. The graduated effect is underpinned by Laplace's equation (Thomas 2003).

A normal shaped leg is naturally graduated; narrower at the ankle and wider at the calf therefore, providing the bandage is applied correctly at a constant tension and overlap, the compression gradient will decrease from the gaiter to the calf. Graduated compression will be achieved and venous hypertension reduced.

## 6.29. Abnormally Shaped Legs

There are some patients who do not have a normal shaped leg, for example; patients with lipodermatosclerosis may present with the classic „inverse champagne bottle shape leg“ where the ankle is abnormally far narrower than the calf. In this situation the health care professional must apply extra wadding to the ankle/gaiter area to re-shape the leg prior to the application of compression.

In addition, some patients present with a cylindrical shaped leg, caused by calf muscle wastage secondary to long-term immobility. The health care professional must ensure that calf definition is created by the application of extra wadding to the calf area.

**Table 1: Application of Four-Layer Compressions System to Ankle Circumference of 18-25cm**

	Bandage	Function(s)	Level of compression	Method of application
1	Orthopaedic wadding, e.g. K-Soft	Protection of bony prominences  Reshaping of the leg  Absorbs exudates	None	Starting at the base of the toes, the foot can be covered in a figure of 8 method or, to reduce bulk and providing the patient has good flesh covering of the foot, a 'shawl' can be applied around the foot that protects the dorsum of the foot and the malleolar bones.  The wadding is then applied from ankle to just under the knee in a spiral with 50% overlap.  Ensure that the wadding stops approximately <b>2cm below the knee</b> allowing for free movement of the knee and preventing pressure damage behind the knee
2	Class 2a bandage, e.g. K-Lite	Provides extra absorbency and protection	None	Applied from the base of the toes to just below the knee using a spiral technique and 50% overlap
3*	Elastic, extensible bandage Class 3A,	First layer of elastic compression	20mmHg	Applied from the base of the toes as a figure of 8.  50% stretch/extension and 50%

	Bandage	Function(s)	Level of compression	Method of application
	e.g. K-Plus			overlap from ankle to just below the knee as a figure of 8.  Ensure that excess bandage is cut off rather than winding it round, under the knee, as this can cause a tourniquet of high pressure.
4*	Cohesive bandage Class 3b, e.g. Ko-Flex	Second layer of compression  Cohesive nature assists in reducing risk of bandage slippage	20mmHg	Applied from the base of the toes to just below the knee using a spiral technique.  50% stretch and 50% extension maintained from ankle to just below the knee

\* When applied appropriately in combination, layers 3 and 4 provide a sub-bandage pressure of approximately 40 mmHg

**Table 2: Modifications to the 4-layer bandage system based on ankle circumference**

Ankle circumference	Bandage regime	Rationale
Less than 18cm	Two or more orthopaedic wadding layers  To achieve an ankle measurement of at least 18cm prior to application of next layer  One crepe  One elastic conformable  One elastic cohesive	Extra orthopaedic wadding should be applied in a uniform manner from toe to knee to maintain a normal shaped leg whilst increasing the ankle circumference to the normal range (18-25cm)
18-25cm	As table 1	
26-30cm	One orthopaedic wadding layer  One high compression bandage  One elastic cohesive	The gold standard pressure of 40mmHg is achieved based on an ankle circumference of 18-25cm. An increase in ankle circumference reduces the sub-bandage pressure applied therefore the level of compression should be increased for larger ankles
Greater than 30cm	One orthopaedic wadding layer	Again, a further increase in ankle
	One elastic conformable (class 3A)  One high compression bandage (class 3C)  One elastic cohesive (class 3B)	circumference requires addition of more compression in order to achieve effective sub-bandage pressures (40mmHg at the ankle)

**NB** It is important to remember that a patients' ankle circumference may change over time with the continued application of compression therapy, particularly if their legs are very oedematous prior to application of compression.

The health care professional must ensure that the ankle circumference is re-measured at each dressing change, particularly at the first few applications, to ensure that the correct bandaging regime is applied.

Application of inappropriately high levels of compression may cause discomfort for the patient and pressure damage to the limb.

### 6.30. Alternatives to Four-Layer Compression Bandage Systems

There are many reasons why four-layer compression bandage systems may not be suitable for an individual patient. The patient may not be able to get their shoes on or may find the bandages cosmetically unacceptable. In these situations it is important to respect the patients' wishes as this will encourage concordance with the treatment regime. An alternative compression therapy regime should be considered.

Application of K2 system		
Measure ankle	To adjust the system	To determine the number of bandage required
Foot position	Ask the e patient to position the foot on a 90% flexion	
KSOFT	Apply the wool layer in a spiral from toe to knee (2cm below the knee flexure) if required  Use additional padding to shape the leg and particularly over the site of the ulcer and the malleoli.	To ensure equal distribution of pressure and compensate for abnormal leg shape

KTECH (layer start applying **KTECH** at the base of the toes by using two turns to anchor the bandage, ensuring the wadding side is in contact with the skin and the pressure indicator is at the top edge, towards the patient. Secure the heel by using a figure of eight, ensuring full coverage of the heel. Do not apply with pressure indicator at full stretch on the foot.

Spiral **KTECH** up the leg from the malleolus, stretching the bandage so that the pressure indicator (printed on the bandage) forms a circle, achieving the therapeutic pressure. A correct overlap is applied when the pressure indicator is just covered (50% overlap). Finish 2cm below popliteal

Please note – KTech applies 80% of the final compression, therefore it is vital to apply it correctly and protect the bony prominence with KSoft beneath. Please apply the bandage toe to below knee.

K-PRESS (layer] Apply **KPRESS** over **KTECH** using the same application technique as **KTECH**. For patient comfort, allow a small border of **KTECH** at the toes and knee. Once applied, press down gently on the bandage to ensure full cohesion.

Check with patient comfort. A correctly placed bandage can be The bandage may require left in situ for seven days

More frequent changes initially as oedema reduces the compression may slip.

### 6.31. Short-Stretch (Inelastic High Compression)

Short-stretch bandages are inelastic and minimally extensible therefore when firmly applied to the limb (usually at 100% stretch – refer to individual manufacturers guidelines), they cannot accommodate changes in limb circumference. Consequently, on walking, the energy produced by

the calf muscle pump rebounds off the rigid bandage wall back into the leg and exerts pressures that enhance venous return in the deep venous system (EWMA 2003).

It is therefore logical that short-stretch bandages exert low resting pressures when there is no calf muscle activity and higher peak pressures on walking. In respect of this they are not suitable for immobile patients with venous ulceration but may be safer and more comfortable for patients with mixed aetiology ulceration.

Application of short stretch bandage		
Measure ankle	To adjust the system	To determine the number of bandage required
Foot position	Ask the e patient to position the foot on a 90% flexion	
Wool layer	Apply the wool layer in a spiral from toe to knee (2cm below the knee flexure).  Use additional padding to shape the leg and particularly over the site of the ulcer and the malleoli.	To ensure equal distribution of pressure and compensate for abnormal leg shape
Short stretch bandage	Start by applying two complete turns on the foot at 50% stretch.  Take the bandage around the heel with the midline of the bandage at the midline of the heel. 50% stretch The next turn goes down below the foot in a figure of eight pattern to cover all the foot and ankle at 70-90% extension.	
	Continue up the leg from the ankle with a 50% overlap and a 90% extension on the bandage.  Do not wrap excess bandage around the top of the leg, apply the remaining bandage bringing it down the leg and secure by taping	The numbers of layers affects the level of pressure and could cause inverse pressures
	Depending on ankle size apply a second bandage system in the opposite direction	
	Check with patient comfort. The bandage may require more frequent changes initially as oedema reduces the compression may slip.	A correctly placed bandage can be left in situ for seven days

### 6.32. Venous Ulcer Treatment Stockings/Wraps

Several manufacturers now provide venous ulcer treatment hosiery kits. Each kit comprises; a liner stocking and a further stocking that together provides 40mmHg. These hosiery kits may prove a useful alternative to help aid patient concordance. They may also be used for patients who require topical applications of steroid preparations and these systems do not require the same level of skill, precision and training as the compression bandaging systems.

Compression wraps could also be considered as an option to promote self-care/ shared care with the carer/family support with the right education and training. This option should be discussed with the local TVN in the first instance.

### **6.33. Management of Arterial Ulceration**

Patients with arterial ulceration require a multi-professional management approach and early specialist referral. The severity of the disease can be determined through early assessment and investigative procedures.

NICE (2012) suggest that mild symptoms can be managed in primary care.

The focus for non-medical management is concentrated on:

- Optimising any other underlying problems that could potentially delay the wound healing process, e.g. smoking cessation, optimum diabetes control.
- Managing the local wound environment,
- Preventing wound infection
- Managing other ulcer-associated symptoms such as pain or malodour.

Arterial ulcers with adequate blood supply and expected to heal should be dressed with products that support moist wound healing.

Arterial ulcers without adequate arterial blood supply must be kept dry. (Moisture provides a bed for bacterial growth if eschar or gangrenous tissue is present)

### **6.34. Management of Mixed Aetiology Ulceration**

There is little available evidence on the management of mixed aetiology ulceration yet approximately 15% of ulcers fall into this category (Stevens 2004).

EWMA (2003) also refer to ulcers of mixed aetiology as „complicated venous ulceration“, suggesting that the predominant underlying pathology is venous yet there is an extent of concurrent arterial disease. In these situations, providing there are no other contraindications, reduced compression may be applied.

The purpose of compression is to reverse venous hypertension if no clinical signs consider its effectiveness **but** if there clinical signs, i.e. oedema, staining, lipodermatosclerosis using the guidance apply reduced compression with caution.

### **Management of Ulceration caused by Other Pathologies**

Although most leg ulceration can be attributed to either venous disease, arterial disease or a combination of the two, there are over 40 known causes reported of other recognised pathologies, although rare, that contribute to chronic leg ulceration (Falanga, 2000).

Patients presenting with ulcers associated with vasculitis, rheumatoid arthritis, systemic medication, metabolic disorders or haematological disorders require specialist referral. If compression therapy is appropriate this should be applied with great care, avoiding excessive pressure over bony prominences. Particular attention should be paid to maintaining mobility, reducing pain, optimising nutritional status, keeping the skin supple with emollients and reviewing the appropriateness of the patient's footwear.

It is important to remember that once the aetiology is established healing may not be an achievable goal and management should focus more on patient comfort and wellbeing.

### **6.35. Malignancy**

Certain types of tumour can appear as skin ulcers on the leg including squamous cell carcinoma, basal cell carcinoma, Bowen's or malignant melanoma. Chronic, long-standing leg ulcers are at

increased risk of malignant changes and it is thought that 2% of chronic leg ulcers are malignant (Clarke & Grace, 2004).

All patients with suspected cancers should be referred immediately to the dermatologist for biopsy and treatment.

Skin cancer should be suspected if:

- It is not responding to treatment, i.e. compression
- Is getting larger
- Is over-granulating
- Friable –bleeds easily
- Has rolled edges or a pearly appearance

### **6.36. Local Wound Management**

Compression therapy is the most important aspect of lower limb treatment. Dressings must be simple, low adherent, low cost and acceptable to the patient (RCN 2006). There is no clear evidence that dressings will significantly impact on healing times (Bouza et al, 2004).

There are times when the wound circumstances mean that more complex dressings may be required for a short period of time. In case the following points must be considered:

- The dressing minimises pain
- The dressing is appropriate to use under compression
- The dressing manages odour
- The dressing prevents or combats infection.
- In case an antimicrobial dressing is required.
- Absorbent dressing to prevent maceration of the surrounding skin. Refer to Trust Wound Management Formulary for dressing selection.

Multi-layer compression systems provide sustained compression for up to seven days and therefore many patients with venous leg ulceration may **only require weekly re-dressing**. Patients with infected wounds may need more frequent dressings to manage the exudate levels appropriately.

Similarly, patients with gross oedema may also require more frequent re-bandaging initially as the level of oedema may reduce rapidly, increasing the risk of bandage slippage and subsequent damage to the leg.

### **6.37. Skin Problems and Associated Management**

#### **Surrounding skin**

Healthy skin provides a barrier against micro-organisms. It is the largest organ and provides regulation of temperature, excretion and secretion of waste solutes.

#### **Skin problems associated with lower limb ulceration**

- Maceration – white soggy tissue
- Excoriation – red, raw skin
- Eczema and irritation – red itchy skin with vesicles (gravitational or varicose)
- Hyperkeratosis – scaly thickened tissue
- Lipodermatosclerosis – fibrosed tissue (hardening and woody)
- Fungal Infections
- Cellulitis – infection of the skin and subcutaneous tissues usually due to *Streptococcus pyogenes* or *Staphylococcus aureus*. Treatment of cellulitis requires systemic antibiotic therapy. The wound or skin area should be swabbed. A broad spectrum antibiotic should be commenced as soon as possible and swab results checked to ensure correct antibiotic therapy once available. In severe cases of cellulitis, the patient may require intravenous

antibiotic therapy. Recurrent episodes of cellulitis are associated with an increased risk of developing secondary, chronic lymphoedema.

### **6.38. General Skin Care for Patients with Leg Ulceration**

RCN (2006). Clinical practice guidelines suggest cleansing of the affected leg should be kept simple using warm tap water and emollient. Legs should be cleansed in a container lined with a single use disposable bag. The cleaning fluid and bag should be changed for each leg. The bags should then be disposed of in line with the local waste policy.

Hyperkeratotic skin scales should be removed regularly as they provide an ideal environment for the growth of micro-organisms, which may result in further ulceration.

The legs should be moisturised in a downward motion with bland emollients.

Where possible, ointments should be used in preference to creams as they are less likely to cause sensitivity reactions.

Eczema can also be aggravated by wound care products and medicants (Morison et al 1994, Rose 1994, Young 2000).

### **6.39. Referral Criteria**

#### **Referral to GP**

- For treatment of underlying medical problems, pain control, review of medication.
- For treatment of cellulitis.
- For treatment of rheumatoid arthritis and associated pain
- If undiagnosed diabetes or hypertension is suspected following assessment.
- If patient presents with indications of poor diabetic control, i.e. erratic blood sugars or raised HbA1c.
- If patient is potentially malnourished and requires assessment by a dietician.

#### **Referral to the Tissue Viability service**

Suspected critical ischemia should be referred directly for vascular opinion. Suspected malignancy should be referred directly for Dermatology opinion. Please see ref pathway and SOP for TV service on the trust intranet Tissue Viability page.

### **6.40. Evaluation and Reassessment Review**

As with the management of any wound type, regular evaluation and reassessment is as important as initial assessment to ensure that if the ulcer is not healing as anticipated, despite the appropriate treatment regime, it is identified in a timely manner.

It is recommended that progress of the ulcer and the effectiveness of the patient management plan are formally evaluated as specified on the wound care plan or when a change in the wound is noted. This evaluation should include the following information:

- Re-tracing/mapping and digital photography [See TV policy and Photography SOP]
- Examination of the ulcer including:
  - percentage tissue type in the wound bed
  - condition of surrounding skin
  - level of exudate
  - evidence of malodour
  - signs/symptoms of clinical infection
- Consideration of pain and the effectiveness of any analgesia where appropriate
- Evidence of patient concordance/non-concordance with the treatment regime
- Compression is the single most effective treatment for the management of leg ulceration therefore assess and document if the patient has presented with the bandage in situ, correctly placed, with any evidence of skin markings that may be associated with poor

- bandage application.
- Review of the documentation to establish whether care delivery has been appropriate, in line with the prescribed treatment regime and consistent.

Based on the evidence gathered from the evaluation, a clinical decision should be made as to whether the ulcer is progressing as anticipated. If appropriate progress is evident then no change is required to the existing management plan. The management plan should be continued and re-evaluated every 2 weeks.

If the ulcer shows no signs of progress or has evidently deteriorated since initial assessment and implementation of a treatment regime, then necessary action should be taken and the management plan should be adjusted accordingly and re-evaluated within an appropriate time frame.

Evidence of evaluation should be documented in the patient's leg ulcer notes.

### **Six month review**

Formal holistic re-assessment should be undertaken within 6 months after initial assessment and initiation of treatment and every 6 months thereafter if there is an open ulcer, sooner if there has been a change in vascular status. The wound should be reassessed at each dressing change [ongoing] with a full review every 2 weeks in relation to the treatment plan.

The following should be considered with the holistic 6 monthly assessment:

- All aspects that are considered at each two-weekly evaluation
- Is the ulcer healing? This can be determined by a review of documented progress over the previous 6month period.
- Is there evidence of any new medical problems or existing underlying pathologies that may have deteriorated?
- A repeat Doppler assessment should be carried out to screen for the potential development of arterial insufficiency, particularly if compression therapy is to be continued

If there are indications that the ulcer has deteriorated or not showing signs of healing, despite appropriate treatment and for no apparent reason, consider;

- Could the original diagnosis be inaccurate, is the aetiology correct?
- Is the treatment being delivered appropriately and correctly?
- Are symptoms such as pain control being effectively controlled?
- Have any concurrent health problems been identified and controlled where possible?
- Should any other treatments be considered, e.g. debridement?
- Does the patient require urgent referral to the multidisciplinary team?

The patient should be referred for specialist opinion and further investigation.

### **Sudden deterioration**

This should trigger an evaluation; Review of assessment:

- Is the aetiology correct?
- Is there a deterioration in patient general health?

Appearance of limb prior to redressing:

- Was the bandage in place correctly?
- Are there high levels of exudates, strike through on bandages?
- Indication of pressure damage, due to tight bandage or bandage slippage

Clinical signs of infection:

- Increase exudate, maceration to surrounding skin [see Antimicrobial stewardship pathway]



Clinical signs of infection; Swab wound:

- Commence antibiotics immediately if multiple clinical signs of infection see Trust Antimicrobial stewardship pathway
- Consider an antimicrobial dressing, e.g. iodoflex, silver product etc. (see Trust wound formulary available on the trust intranet under the Tissue Viability page)
- Consider deterioration in patient's arterial status. In summary consider:
  - Managing pain
  - Managing infection
  - Bandaging skills
  - Stopping compression – short-term until symptoms resolved
  - Plan to review of assessment including a Doppler assessment, as soon as possible
  - Referral to TV service

#### **6.41. Recommendations for the use of Compression Hosiery**

Before undertaking an assessment, all practitioners should have knowledge and awareness of different types of compression hosiery, aids to help application and the anticipated risks and therapeutic benefit.

Practitioners should also have the ability, knowledge and understanding to explain the principles of compression hosiery to the patients.

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

#### **6.42. 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.

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).

#### 6.43. 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:

- All patients with diabetes should have their feet tested to ensure sensation is intact prior to compression therapy.
- 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.

#### 6.44. Prevention of Venous Ulcer Recurrence

The mainstay of preventing venous ulcer recurrence is continued use of compression hosiery and there is some evidence to demonstrate that Class 3 compression hosiery reduces recurrence rates at 3-5 years post-healing (RCN 2006). Failing this the patient should wear the highest level of compression that they will tolerate. Dowsett (2011) identified a reduction in reoccurrence of leg ulceration from 18-20% to 5.8% following the introduction of RAL (European standard) hosiery in a UK primary care trust.

Prior to assessing a patient for compression hosiery, it is important that health care professionals have knowledge and awareness of the following:

- The purpose of the different levels of compression and the potential risks and therapeutic benefits
- The different sizes/types/styles of compression hosiery and the aids that are available to assist in application
- When to measure a limb
- How to accurately measure a limb
- How to measure for custom made (made to measure) hosiery
- Individual patient needs, requirements, wishes and potential difficulties in managing a preventative treatment regime

Table 1: British Standard/European Classification of compression hosiery

British Standard	European Class
<b>Class One: 14-17mmHg</b> <b>Light compression</b> Indications: Early varices; Pregnant women; Prevention of DVT on flights [Activa]	<b>Class One 18-21mmHg</b>
<b>Class Two: 18-24mmHg</b> <b>Medium compression</b> Indications: Medium varices; Mild oedema; Prevention of recurrence; Post Sclerotherapy [Activa]	<b>Class Two 23-32mmHg</b>
<b>Class Three: 25-35mmHg</b> <b>Strong compression</b> Indications: Gross varices; Gross oedema; Prevention of recurrence of ulcers [Activa]	<b>Class Three 24-46mmHg</b>

For patients with ulceration that is predominantly venous but there is evidence of concurrent arterial insufficiency (mixed aetiology ulceration), a stocking that reflects the level of compression the patient has tolerated in terms of bandaging should be prescribed, i.e. Class 1 compression hosiery.

#### **6.45. Style/Types of Compression Hosiery**

Compression hosiery is available in the following styles as standard sizes or made to measure:

- Below-knee stockings
- Thigh-length stockings
- Socks
- Tights
- Compression garment

They are available in a variety of colours and may be open or closed toe. In addition there are manufacturers who make below knee stockings in two lengths, accommodating the longer leg length. With regard to colour and toe style, preference is determined by the patient.

Below knee stockings are recommended as gold standard for prevention of venous ulcer recurrence and there is no evidence to suggest that compression above the knee is any more effective in correcting the underlying pathology.

It is also important to consider the material the stocking is made from. Some stockings have higher cotton content and are therefore more suitable for patients with allergies to nylon, Lycra, elastane or other elastic materials.

#### **6.46. Varicose Vein Surgery**

Patients who have symptomatic varicose veins, i.e. veins found in association with troublesome lower limb symptoms such as pain, NICE (2013) suggest referring to Vascular services for possible surgical intervention.

## **7. CONSULTATION**

This guideline was developed, and peer reviewed by members of the Tissue Viability Service and Pressure Ulcer Review and Learning panel [PURL].

## **8. TRAINING AND SUPPORT**

Trust employees will be expected to act at all times in such a manner as to safeguard and promote the interests of patients and clients. Registered Health Professionals must have knowledge and skills and effective practice; recognise and work within limits of personal competence (Nursing and Midwifery Council, 2015).

All employees must be aware of the organisational guidelines before commencement in post, as part of their local induction process. Elements of this guideline have been incorporated into the development of the theoretical training and is available as an online training module, supported by a competency document. This training is available to all clinical staff involved in the Management of Leg Ulcers.

## **9. MONITORING**

Audit of this guideline will be undertaken as per the Trust locality audit plan for individual services.

## 10. EQUALITY AND HUMAN RIGHTS ANALYSIS

An Equality and Diversity Impact Assessment has been carried out on this guideline using the Trust-approved EIA.

## 11. DOCUMENTATION AND RECORD KEEPING

Accurate documentation provides a clear rationale to support clinical decision making, linking assessment to treatment or referral (Murray 2004).

The assessment should be recorded on the trust wound template on S1, which allows for a structured approach to facilitate a holistic assessment (Vowden 1996). A thorough assessment is essential to reduce the risk of misdiagnosis, ineffective or potentially detrimental treatment.

If care is to be transferred between different care settings it is vital that arrangements are made to ensure that the relevant details are transferred with the patient to ensure continuity of care.

Documents to support Lower limb assessment and management should be completed on System 1 on the wound care template.

## 12. DISTRIBUTION LIST/DISSEMINATION METHOD

Once approved, by the relevant group and networks, this guideline will be added to the trust policies on the intranet site.

## 13. REFERENCES

Amsler F, Willenberg T, Blattler W, (2009), In search of optimal compression therapy for venous leg ulcers. A meta-analysis of studies comparing diverse bandages with specifically designed stockings. *Journal of Vascular Surgery* 50: 668-74

Best Practice for the Management of Lymphoedema (2006)

Bouza C, (2004), Efficiency of modern dressings in treatment of leg ulcers – A systematic review. *Wound repair Regen.* 13:218-29

Cameron J, (1995a), Contact sensitivity and eczema in leg ulcer patients. In: Cullum N, Roe B, eds. *Leg Ulcers Nursing Management*. Seutan Press, London 1012

Cameron J, (1995b), The importance of contact dermatitis in the management of leg ulcers. *Journal of Tissue Viability* 5(2): 52-5

Carter S A, (1993), Clinical measurement of systolic pressure in limbs with arterial occlusive disease. *Journal of the American Medical Association* 207 (101) 1869-1874.

Clarke M, Grace P, (2004) Understanding the underlying causes of chronic ulceration *Journal of Wound Care* 13 (6) 215-218.

Coull A, (2005), Changing trends in leg ulcer management. *Wounds UK Summer Conference*. June 2005.

Dowsett C, (2011), Treatment and prevention of reoccurrence of venous leg ulcers using RAL hosiery. *Wounds UK* (1) 115-9

European Wound Management Association, (2003), Position Document: Understanding Compression Therapy Medical Education Partnership Ltd, London

Falanga V, (2000), Text Atlas of Wound Management, Martin Dunitz, London.

Franks PJ, Moffatt C J, Connolly M, Factors associated with healing leg ulceration with high compression. Age Ageing 1995 24(5): 407-10

Guest

Herbert, L, (1997), Caring for the Vascular Patient, Churchill Livingstone, London.

Hoffman D, (1998), Oedema and the management of venous ulcers. Journal of Wound Care 7(7) 345-348.

International Consensus Document for Best practice for the Management of Lymphoedema, (2006), Medical Education Partnership (MEP) Ltd. made available at: [www.mepltd.co.uk](http://www.mepltd.co.uk).

Moffat C, Martin R, Smithdale R, (2007), Leg Ulcer Management Blackwell publishing, Oxford.

Morison M and Moffat C J, (1994), A Colour Guide to the Assessment and Management of Leg Ulcers (2nd Edition), Mosby, London.

Murray J, (2004), Leg ulceration part 1: Aetiology and Pathophysiology, Nursing Standard 19 (1) 45-52

Nelson A, (1995), The art and science of bandaging cited in Cullum N & Roe B, Leg Ulcers Nursing Management a research-based guide, London; Scutari press 75-88

National Institute for Health and Care Excellence, (2016), Leg Ulcer-venous, Available at <http://cks.nice.org.uk/leg-ulcer-venous>

National Institute for Health and Care Excellence, Varicose veins in the legs. The diagnosis and management of varicose veins issued July 2013, Available at [www.guidance.nice.org.uk/cg168](http://www.guidance.nice.org.uk/cg168)

National Institute for Health and Care Excellence. Lower limb peripheral arterial disease: diagnosis and management issued August 2012. Available at [www.guidance.nice.org.uk/og147](http://www.guidance.nice.org.uk/og147).

Nursing and Midwifery Council, (2008), The Code of professional Conduct NMC, London.

Nursing in Practice, (2013), Improving patient outcomes in the management of chronic venous ulceration, December 2013, London

Rose L, (1994), Leg ulcers: A guide to successful treatment, Modern Prescribing 1994. p1.

Royal College of Nursing, (2006), Clinical Guidelines for the Management of Venous Leg Ulcers RCN, London

Russell L, (2001), The importance of patients' nutritional status in wound healing British Journal of Nursing 10 (6) (Supplement) S42-S49

Scottish Intercollegiate Guidelines Network (2010) Management of chronic venous Leg Ulcers, SIGN Publication No. 120.

Stevens J, (2004), Diagnosis, assessment and management of mixed aetiology ulcers using reduced compression Journal of Wound Care 13 (8) 339-343.

Stubbing N, Chesworth J, (2001), Assessment of patients with vascular disease. Vascular disease nursing and management. S. Murray edition Whurr publishers Ltd, London. P96-136.

Thomas S, (2003), The use of Laplace's equation in the calculation of sub bandage pressures. EWMA Journal 3(1):21-23

Thomas S, (2010), compression bandaging in the treatment of venous leg ulcers, World Wide Wounds, Vol 5,

Timmons J, Bianchi, J. (2008), Disease progression in venous and lymphovenous disease: The need for early identification and management. Wounds UK, Vol 4 no 3 59-71

Tortora GJ, Derrickson B, (2014), Principals of anatomy and physiology. Wiley,

Vowden K, Vowden P, (1996), Hand held Doppler assessment for peripheral arterial disease Journal of Wound Care 5 (3) 125-128

Vowden K, Vowden P, (1997), Vascular assessment in compression therapy Professional Nurse 12 (7) (Supplement) S3-S6

Vowden K, Vowden P, (2001), Venous disorders: Vascular disease, nursing and management. Whurr, London 168-99

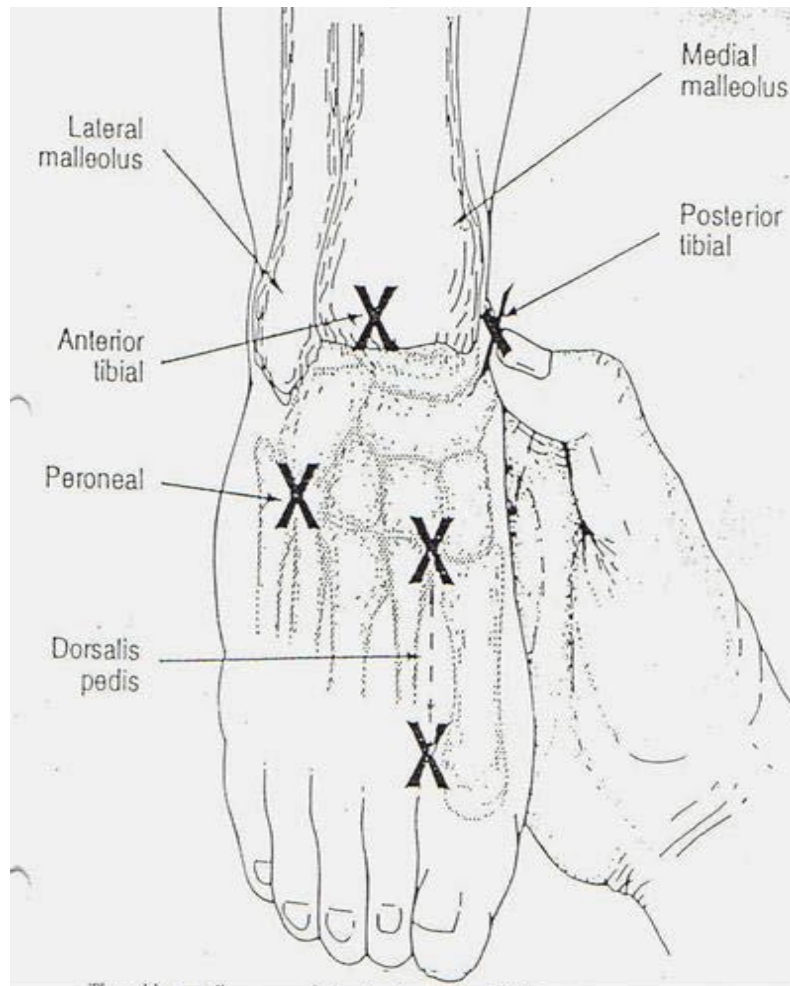
Vowden p, (2005), pathways for the diagnosis in leg ulceration. LUF journal Issue 19 7-12 Autumn 2005)

WHO (2009), World Health Organisation guidelines on hand hygiene in health.

Young, T. (2000) Assessing possible allergies to wound care products.

## Appendix 1: Pedal Pulse Locations Description and Diagram

- The dorsalis pedis runs down the front of the foot.
- Palpable in the midline of the foot, above the arch of the foot.
- Runs between the first and second toes
- The posterior tibial pulse runs down the back of the leg behind the medial malleolus.
- It can be palpated at a point halfway between the point of the heel and the medial malleolus



## Appendix 2: Equality Impact Assessment (EIA)

### For strategies, policies, procedures, processes, guidelines, protocols, tenders, services

- Document or Process or Service Name:** Lower Leg Assessment Management and Prevention Guideline
- EIA Reviewer (name, job title, base and contact details):** Simon Barrett – Tissue Viability service lead and specialist nurse. [simon.barrett3@nhs.net](mailto:simon.barrett3@nhs.net). Tel 07919544938
- Is it a Policy, Strategy, Procedure, Process, Tender, Service or Other?** Guideline

#### Main Aims of the Guidance

The guideline is aimed at providing the staff with the information and guidance to work with the patients within Humber Teaching NHS Foundation trust in providing the most appropriate evidence based care, for lower limb wounds

Please indicate in the table that follows whether the document or process has the potential to impact adversely, intentionally or unwittingly on the equality target groups contained in the pro forma

Equality Target Group	Is the document or process likely to have a potential or actual differential impact with regards to the equality target groups listed?	How have you arrived at the equality impact score?
1. Age	Equality Impact Score Low = Little or No evidence or concern (Green) Medium = some evidence or concern (Amber) High = significant evidence or concern (Red)	a) who have you consulted with
2. Disability		b) what have they said
3. Sex		c) what information or data have you used
4. Marriage/Civil Partnership		d) where are the gaps in your analysis
5. Pregnancy/Maternity		e) how will your document/process or service promote equality and diversity good practice
6. Race		
7. Religion/Belief		
8. Sexual Orientation		
9. Gender re-assignment		

Equality Target Group	Definitions	Equality Impact Score	Evidence to support Equality Impact Score
<b>Age</b>	Including specific ages and age groups: Older people Young people Children Early years	Low	Discussed at PURL
<b>Disability</b>	Where the impairment has a substantial and long term adverse effect on the ability of the person to carry out their day to day activities: Sensory Physical Learning Mental Health (and including cancer, HIV, multiple sclerosis)	Low	Discussed at PURL
<b>Sex</b>	Men/Male Women/Female	Low	Discussed at PURL
<b>Marriage/Civil Partnership</b>		Low	Discussed at PURL
<b>Pregnancy/Maternity</b>		Low	Discussed at PURL
<b>Race</b>	Colour Nationality Ethnic/national origins	Low	Discussed at PURL
<b>Religion or Belief</b>	All Religions Including lack of religion or belief and where belief includes any religious or philosophical belief	Low	Discussed at PURL
<b>Sexual Orientation</b>	Lesbian Gay Men Bisexual	Low	Discussed at PURL
<b>Gender re-assignment</b>	Where people are proposing to undergo, or have undergone a process (or part of a process) for the purpose of reassigning the person's sex by changing physiological or other attribute of sex	Low	Discussed at PURL



<b>Summary</b>	
Please describe the main points/actions arising from your assessment that supports your decision above	
The Guideline was discussed at PURL in respect to all of the above statements. There are no actions to following review.	
EIA Reviewer – Simon Barrett	
Date completed: 22.07.22	Signature SA Barrett