Lower Limb Wound Management Procedure

(Tissue Viability and Wound Care (TVWC) Manual)
1. **INTRODUCTION**

This procedure offers guidance on lower limb wound management by means of initial assessment and plan of care. Improving patient outcomes. NHS England’s work steam looking at “Betty’s Story” (NHS 2017); a fictional account of a 74 year old lady, who while out walking, scratched her leg on a stile. The story then describes two distinct pathways; one following good effective leg ulcer care pathway with early intervention and the other poor care pathway. The work stream further developed the focus to encompass a wider remit of prevention and aftercare for all wounds presenting on the lower limb.

2. **PURPOSE**

The lower limb wound management procedure has been developed to direct staff within the Trust towards the principles of the effective lower limb wound management care pathway.

All staff within the Trust recognises the importance of consistent individualised care and the need to include the latest techniques and bandage regimes that are clinically effective.

- Ensure a holistic and standardised approach to assessment and management;
- To ensure that continuity of care takes place where different nurses may be called upon to meet the needs of the patient;
- To ensure a standardised approach to aims of lower limb wound management:
  - to correct the underlying cause of the ulcer where possible;
  - to create the optimum local environment at the wound site;
  - to improve all the wider factors that might delay healing;
  - to prevent avoidable complications;
  - to minimise the risk of recurrence.

3. **PROCEDURE/IMPLEMENTATION**

Person who presents with lower limb wound should have initial care with wound assessment, wound and skin care following the First Too Dress Procedure.

Lower limb wounds presenting as skin tears follow the Lower Limb Skin Tear Pathway.

**Appendices 2 Lower body skin tear pathway**

Lower limb wounds presenting with RED FLAGS:

- limb threatening ischaemia
- spreading infection of leg or foot
- red hot swelling of leg or foot
- suspected deep vein thrombosis
- suspected skin cancer
- confirmed or suspected diabetes presenting with foot wounds

Discuss with relevant specialist onward referral; to patients GP or ward doctor

Within 2 weeks leg primary site assess and identify cause of leg wound by undertaking comprehensive assessment, including clinical and psychological needs, Wound assessment documented using minimal data set. Lower limb assessment including Ankle Brachial Pressure Index (APBi) Doppler /Medi APBi.

Within 2 week foot primary site assess and identify cause of foot wound by undertaking comprehensive assessment, including clinical and psychological needs. Wound assessment documented using minimal data set. Lower limb assessment including vascular, neuropathy and biomechanical assessment

3 Leg wound

Accurate diagnosis of the underlying ulcer aetiology is the key to effective management. If the diagnosis of the ulcer aetiology is correct, the treatment is also likely to be correct

4 Venous Assessment

Include risk factors for venous disease and clinical evidence of venous disease.

Risk factors for venous disease:-

Family history of:-

- varicose veins
- venous leg ulcers

4.1 Medical History of:-

- vein trauma – leg injury, surgery, fracture, harvesting of veins for arterial bypass or IV drug use can cause permanent vein damage;
- high risk of deep vein thrombosis (DVT) – it is important to be aware that many people have silent DVTs so consider your patients overall risk of DVT e.g. due to major surgery, long distance travel, clotting disorder or prolonged immobility;
- limited ankle function – e.g. due to pain, arthritis or previous injury, reduced effectiveness of calf muscle pump;
• chronic constipation – increases downward pressure on the veins and can lead to valve failure;
• obesity – increases downward pressure on the veins can lead to valve failure;

4.2 Personal factors:
• history of standing/sitting occupation – damage to valves due to prolonged downward pressure on the veins;
• previous pregnancies – hormonal changes and abdominal pressure on the veins can lead to valve failure;
• being tall – increased height of column of pressure from legs to the heart raises venous pressure and can lead to valve failure.

Clinical evidence of venous disease – chronic venous hypertension
• Venous history:
  o DVT – leads to permanent vein damage;
  o Thrombophlebitis – indicates damage to veins;
  o Venous Ulcer – indicates underlying venous disease;
  o Vein surgery – previous varicose vein surgery is unlikely to have permanently eradicated all venous disease.

4.3 Venous skin changes:
• Varicose veins – assess the whole leg up to the groin, whilst the patient is standing;
• Ankle flare – tiny varicose veins on the inner aspect of the ankle;
• Atrophy blanche – venous congestion causes swollen congested capillaries, sometimes visible as tiny red “dots” under the skin. Where the capillaries cannot sustain this pressure they atrophy, leaving white “lacy” areas of avascular tissue;
• Haemosisiderin staining – a red/brown discolouration caused by leakage of haemoglobin from the engorged capillaries into the skin;
• Lipodermatosclerosis – a hard layer of fibrosis tissue below the skin’s surface caused by leakage of fibrin from the engorged capillaries. It can be localised around the ulcer, but often collects around the ankle, preventing the ankle from swelling, causing any swelling to collect in the calf and giving rise to the “inverted champagne bottle shaped leg”. In the active stage of lipodermatosclerosis it can appear red, inflamed and painful.

It can be easily confused with cellulitis and can prevent patients from tolerating compression. It may require strong analgesia and gradual introduction of compression.
• Varicose eczema – caused by irritation from blood by-products that have leaked into the skin;
• Venous oedema – tends to be pitting and to go down when the patient elevates their legs at night, may be unilateral. Should not be confused with cardiac or renal oedema which are also pitting, but will always affect both legs;
• Venous ulcers – typically occur in the gaiter region – ankle to mid calf – and are often shallow and irregular in shape.

4.4 Venous pain:

Dull pain – may develop during the course of the day due to build up of congestion. Generally relieved at night or with leg elevation;

Neuropathic pain – may occur due to inflammation of the congested capillaries and tissue. If patients report sharp, shooting stabbing sensation it is likely to be neuropathic in nature;

Venous rush pain – may occur when putting feet to floor first thing in the morning due to sudden reflux of blood through the veins.

5. Peripheral Arterial Assessment

Assessment of risk factors for peripheral arterial diseases, signs and symptoms of peripheral arterial disease.

5.1 Family history of:-

• Arterial leg ulcers;
• Arterial disease.

5.2 Past Medical History of:-

• Diabetes;
• Hypercholesterolemia;
• Hypertension;
• Angina / MI;
• Cardiac bypass/angioplasty;
• Stroke/TIA.
• Personal Factors: -
• Smoker/ex-smoker;
• Lack of exercise.

5.3 Clinical evidence of peripheral arterial disease:-

• Bypass/angioplasty;
• Ischaemic-related amputation;
• Arterial ulcer.
• Ischaemic Tissue Changes:-
The limb will feel cool to touch. The colour of the limb may range in colour from pallor, to a bluish hue to dusky red/purple otherwise known as dependent rubour. Dependent rubour may occur when the leg is in dependent position due to the capillaries dilating as much as possible in order to get as much blood to the foot as possible. However, on elevation, the foot will turn pale;

Sluggish capillary refill – press lightly on the tip of the big toe and observe how quickly it returns to its normal colour after blanching;

- Numbness/tingling;
- Hair loss;
- Trophic skin/nails – unhealthy appearance due to prolonged hypoxia;
- Muscle wasting – due to prolonged hypoxia.

5.4 Arterial Pain:-

Intermittent claudication – a cramp (‘angina in the leg’) in the calf, thigh or buttock bought on by exercise such as walking. Relieved by stopping and resting. Indicates moderate arterial disease;

Ischaemic night pain – a cramp during the night when legs are elevated in bed, due to tissue hypoxia. Relieved when the legs are hung down onto the floor and gravity improves blood flow. Indicates severe arterial disease;

Ischaemic rest pain – a cramp even when legs are dependent at rest, due to tissue hypoxia, and indicating very severe arterial disease.

6 Doppler / Medi APBi Assessment;

Assessing for Ankle Brachial Pressure Index (APBi) is a well-established, non-invasive and considered the standard tool for vascular assessment to rule out arterial involvement. It allows clinicians to establish wound aetiology and gather indicators for management and assess suitability for compression therapy.

APBi is a bedside test to exclude significant arterial disease by comparing systolic blood pressure at the ankle with the arm.

It is important to remember that ABPi measurement should be part of a holistic assessment. ABPi alone is not an indicator that a patient is suitable for compression therapy.

ABPi assessment is not suitable for patients with: cellulitis, depending on patients pain level/tolerance, suspected deep vein thrombosis, severe ischaemia and painful circumferential ulceration.

Toe Brachial Pressure Index (TBPi) – similar to ABPi, but the cuff is placed on the hallux to obtain toe pressure and is beneficial if a cuff cannot go around the ankle e.g. due to painful ankle wound.
6.1 Interpreting Doppler Sounds

The print out of the pulse wave form and the audible pulse wave provide further information for assessment and guidance for management.

<table>
<thead>
<tr>
<th>Doppler Sound</th>
<th>Status of Vessel</th>
<th>Characteristics</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triphasic</td>
<td>Healthy</td>
<td>Sound has three parts; is pulsatile (bouncy in nature) and is heard at a higher frequency than that of a diseased vessel.</td>
<td></td>
</tr>
<tr>
<td>Biphasic</td>
<td>Vessel has become less elastic. This may be part of the normal physiological process of aging or due to stenosis</td>
<td>Sound has two parts, it is more dampened than the triphasic and heard at a lower frequency. Oedema may distort a tri-phasic sound so that it is heard as bi-phasic. If the optimum position for the probe has not been found a pulse may appear bi-phasic because the best possible location for the artery has not been determined.</td>
<td></td>
</tr>
<tr>
<td>Monophasic</td>
<td>Diseased Vessel</td>
<td>Sound has a simple component and is in the lower frequency. Sound descriptors include “Whoosy”, “roaring wind” or “soldiers marching”. In a very diseased vessel the sound can be similar to a vein which appears as an almost continuous “whoosh”.</td>
<td>Arterial sounds can be distinguished from venous as the latter modulate with the respiratory cycle by mirroring the breathing pattern.</td>
</tr>
</tbody>
</table>

6.2 Interpreting the ABPi Results

<table>
<thead>
<tr>
<th>ABPi</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.8 – 1.3</td>
<td>Normal range and requires therapeutic compression</td>
</tr>
<tr>
<td>0.5 – 0.79</td>
<td>Moderate arterial disease – mixed disease and reduced compression and follow specialist advice</td>
</tr>
<tr>
<td>&lt; 0.5</td>
<td>Urgent referral to Vascular team</td>
</tr>
<tr>
<td>&gt;1.3</td>
<td>Query calcification due to diabetes – seek specialist advice.</td>
</tr>
</tbody>
</table>

6.3 Guidance for frequency for repeating APBi

Completing of the Peripheral Arterial Risk chart in conjunction with the APBi results will give guidance for the frequency for reviewing the patient for continued use of compression bandages and/or garments.
### Peripheral Arterial Risk Chart

<table>
<thead>
<tr>
<th><strong>LOW RISK</strong></th>
<th><strong>MEDIUM RISK</strong></th>
<th><strong>HIGH RISK</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ALL</strong> the factors below MUST be present</td>
<td><strong>ABPI 0.81 -1.3 With accompanying score of 2 or more</strong></td>
<td><strong>If only ONE risk factors below is present</strong></td>
</tr>
<tr>
<td>√ if present</td>
<td><strong>Review 6 monthly</strong></td>
<td>√ if present</td>
</tr>
<tr>
<td>Review annually</td>
<td><strong>ABPI &lt;0.81 or &gt;1.3</strong></td>
<td>Review 3 monthly</td>
</tr>
</tbody>
</table>

- **ABPI 0.81 -1.3**
- Smoker
- Mobile
- Age 70+
- Good cognitive ability
- Cardiac disease
- No complications (check medium and high risk factors)
- Cerebral vascular accident (CVA)
- Transient ischaemic attack (TIA)
- Hypertension
- Patient has knowledge of early symptoms of peripheral arterial disease (PAD)
- Patient has contact number if there are any concerns
- Comorbidities (learning needs, cognitive impairment, drug/alcohol dependency, mental illness)
- TOTAL SCORE

- **HIGH RISK**
- **Smoker**
- **Diabetes**
- **Immobile/limited mobility**
- **Small vessel disease(SVD)**
- **Angioplasty/by pass (lower limbs known peripheral artery disease(PAD))**
- **Inflammatory conditions i.e rheumatoid arthritis (RA) systematic lupus erythematous (SLE)**

*Please ensure that intermittent claudication and rest pain (pain in foot) have been checked as part of your assessment

Review –tick √ appropriate box

<table>
<thead>
<tr>
<th><strong>ABPI Determinations</strong></th>
<th><strong>Limitation</strong></th>
<th><strong>Rationale</strong></th>
<th><strong>Management Implications</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>The ABPI is a calculation of ankle pressure by determining the pressure within the major arterial vessels in the lower limb</td>
<td>It does not assess micro-vessel status. It therefore cannot assess micro-vessel disease in diabetes, vasculitis and rheumatoid arthritis.</td>
<td>Microrvascular disease occurs in diabetes, vasculitis and rheumatoid arthritis.</td>
<td>Causation with high compression bandaging and hosiery. Refer to medical history and presenting clinical symptoms. Doppler sounds may be helpful. Further investigations may be needed.</td>
</tr>
</tbody>
</table>

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6.4 Limitations of ABPI and Factors to Consider
<table>
<thead>
<tr>
<th>ABPI Determinations</th>
<th>Limitation</th>
<th>Rationale</th>
<th>Management Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevated ABPI above 1.3</td>
<td></td>
<td>The elevated ABPI may be due to incompressibility of the artery (arteriosclerosis, atherosclerosis).</td>
<td>In general proceed with caution as too high a reading; compression bandaging may not be suitable. Refer to medical history and presenting clinical symptoms and discuss with more senior colleague/TVALS</td>
</tr>
<tr>
<td>ABPI is inversely related to the patient’s blood pressure status.</td>
<td>ABPI may be calculated as low where hypotension is found.</td>
<td>Refer to medical history and presenting clinical symptoms. Doppler sounds may be helpful.</td>
<td></td>
</tr>
<tr>
<td>Practitioners Inexperience</td>
<td>Results will be affected by; deviation from the procedure, difficulties associated with carrying out the procedure and difficulties in interpreting the results.</td>
<td>If unsure, refer to a more senior colleague/TVALS</td>
<td></td>
</tr>
</tbody>
</table>

Decontamination of Cuff and Equipment - Follow Infection Control Policy for decontamination of reusable medical devices for cleaning the cuff and the Doppler probe.

7 Management of Arterial Leg Ulcers

Aim of treatment for arterial ulceration is to enhance arterial blood flow and maintain effective healing environment. Full assessment including ABPI will determine the arterial element of the leg ulcer ABPI<0.5. If there is a change in the colour of the foot and/or temperature, or symptoms suspicious of claudication such as pain in buttocks when walking short distances, referral for further vascular assessment should be processed.

Wound management for the presenting status of the wound bed in line with TIMES and wound dressing protocol/dressing formulary.

Bandages for retention of dressings only – no compression to be applied.

Arterial leg ulcers are contra-indications to full compression bandage regimes.
8 Management of Mixed Aetiology Leg Ulcer

Aim of treatment for mixed aetiology ulcers is to increase the venous return and maintain an effective healing environment. The degree of arterial insufficiency will decide whether or not it is safe to apply compression. Full assessment including ABPI will determine the arterial element of leg ulcer – APBI>0.5 but <0.8.

Reduced compression can be applied for the venous element of the leg ulcer following full vascular assessment and under supervision.

Wound management for the presenting status of the wound bed in line with TIMES and wound dressing protocol/dressing formulary.

9 Management of Venous Leg Ulcers

The aim of treatment for venous ulceration is to improve venous return by increasing velocity flow in the deep veins and to reduce any oedema by decreasing the pressure difference between capillaries and the tissue.

The first line treatment for uncomplicated venous leg ulcers (ABPI>0.8) should be graduated multiplayer compression systems or short stretch systems with adequate padding, capable of sustaining graduated compression for at least a week.

There are alternative bandage systems in the form of ulcer care hosiery kits (liner and stocking) Actilymph Hosiery Kit™ and adjustable compression wraps JUZO™

The compression system must be applied by a competent trained practitioner, following the Trust principles of Care and Clinical Skills Assessment tool (CCAST).

Recurrence rates vary from 26% - 69% and it has been shown that the use of graduated compression hosiery results in a reduction in recurrence rates.

Other strategies for the prevention of recurrence include the following dependent on the needs of the patient:-

- Venous investigation and surgery;
- Lifetime compression therapy;
- Follow up to monitor skin condition for recurrence;
- Follow up to monitor ABPI
- Patient education:-
- Compliance with compression hosiery;
- Skin care;
- Discourage self-treatment with over the counter preparations;
- Avoidance of accidental trauma to legs;
• Early self-referral at first sign of skin breakdown;
• Encourage exercise;

Wound management for the presenting status of the wound bed in line with TIMES and wound dressing protocol/dressing formulay.

10 Other Causes of Leg Ulceration

Assess the patient for other disorders contributing to the ulcer e.g.:-

• Inflammatory diseases (Rheumatoid Arthritis, Crohn's disease,) – practitioners should be aware that there is a link between these conditions and ulcers caused by vasculitis or pyoderma gangrenosum, though these rare types of ulcers can also appear spontaneously for no apparent reason;
  o Raynaud's Disease;
  o Haematological disorders (e.g. sickle cell, clotting disorders);
  o Skin cancers;
• Diabetes – fortunately diabetes rarely results in leg ulceration; however it is often a contributory factor and due to its potential to speed up the process of atherosclerosis can complicate treatment options. True diabetic leg ulceration known as necrobiosis lipoidica diabeticorum usually presents as thinning of the skin, with plaque and ulcer formation over the tibial crests;
• Infectious diseases (e.g. TB, tropical infection);
• Non-venous oedema. If patient presents with a positive Stemmer sign, an inability to pinch a skin fold at the base of the second toe or middle finger. If you can pinch and lift the skin, Stemmer's sign is negative. If you can't pinch and lift the skin, the sign is positive and lymphoedema is present.
• For further information check the video link; Stemmer Sign - YouTube https://www.youtube.com/watch?v=7B3pbuWRNuY

11 Chronic oedema with leaking lymphorrhoea (wet legs)

Lymphorrhoea is described as lymph leaking form oedematous tissues when breaks appear in the skin. Lymphorrhoea appears as beads of fluid on the skin surface, increasing the risk of skin damage and cellulitis.

Guidance for management is given in;

Appendix 17 Management of Chronic Oedema “Wet Leg”
Lymphorrhoea Pathway
Dressing Selection:

Dressing selection should be in line with TIMES assessment for wound healing and dressing selection. Dressings alone do not heal the leg ulcer. Diagnosing and treating the underlying cause is the key to successful treatment.

Allergies may develop at any stage. To reduce the risk of this occurring, avoid where possible: creams, adhesives, topical antibiotics, perfumed lotions and emollients, paste bandages and latex gloves.

Use, where possible, simple NA (non-adherent) dressings and non-latex gloves.

Dermatology referral will determine management regime for skin conditions associated with leg ulcer.

If the patients surrounding skin is dry only use a simple emollient to soothe and hydrate the skin. Always apply the solutions in the direction of the hair growth to avoid the risk for folliculitis.

National Patient Safety Alert number 4 (2207) identified a potential risk associated with the use of white soft paraffin. Following a patient safety incident the health and safety executive (HSE) identified a fire hazard associated with concentrations of white paraffin over 50%.

Appendix 18 Fire Hazard Poster

“Well Legs”

When the patient is healed or nearly healed consider management of the “Well leg” Provide the patient information, support and advice on how you can keep their leg(s) healed and healthy.

Healed venous ulcers, require life long compression hosiery and patients may wish to consider vein surgery. Patients should be provided with the highest class compression that they can comfortably tolerate.

Young patients can usually manage British Standard Class 3, but elderly patients may need to be fitted with British Standard Class 2 or British Standard Class 1 (these could be layered to increase the level of compression). Patients whose legs swell or break down even in a British Standard Class 3 should be considered for European Standard Hosiery, which is stronger – as a rough guide a European Class 2 is equivalent to a British Standard Class 3, and a European Class 3 is even stronger.

European Class Compression Values for Hosiery:

- Class 1 18-21mmHg
- Class 2 22-32mmHg
• Class 3 34-46mmHg

**British Standard Class Compression Values for Hosiery:**

• Class 1 14-17mmHg
• Class 2 18-24mmHg
• Class 3 25-35mmHg

Other treatment option are the is use one of the Ulcer Care Hosiery Kits, which include a liner and an over-stocking and provide the maximum amount of compression (40mmHg).

Also the use of adjustable compression wraps **JUZO™** which are short stretch compression bands secured using Velcro. They are applied at near end stretch to achieve graduated compression.

All patients should be advised to persevere with other conservative preventative measures such as elevating their legs, ideally higher than their hips and keep up regular exercise such as walking every day (unless they have severe arterial disease or have been advised otherwise by their GP or consultant). Patients should also be aware of how to continue a good skin care regime and whom to notify if they develop a new wound on their leg.

### Foot ulcers

A foot ulcer is an open wound on the foot; it can be a shallow wound involving only the surface skin or a deep wound extending through the full thickness involving tendons, bones and other deep structures.

Foot wounds are any breaks in the skin and therefore include any of the following cause’s skin to be lost or open:

• Cuts
• Grazes
• Blisters
• Cracked skin
• Loss of skin following a corn or callus treatment
• In grown toenail pressing against surrounding skin

The risk of foot ulceration is increased where there is an underlying aetiology:

• Peripheral neuropathy – nerve damage to the feet or lower leg. Diabetes being a common cause of peripheral neuropathy
• Circulatory problems
• Abnormalities in the bones or muscles of the feet
• Atherosclerosis
• Raynaud’s phenomenon
14.1 Management of Foot Ulcers

Principles of wound management are guided by the presenting state of the wound bed in line with TIMES and wound dressing protocol/dressing formulary. When wound healing is complete there is a need for education on skin and foot care.

Provision of suitable footwear and if appropriate referral to Orthotic services

Referral to Podiatry services for management of corn, callus and in grown toenail

Referral to Diabetic Podiatry services for patients with diabetes.

Awareness of RED FLAGS and urgent referral

15 Pressure Ulcers

Where there is evidence of sustained unrelieved pressure, shear and or friction the diagnosis of a pressure ulcer is appropriate.

Guidance for detection, management and reporting are to be found in Trust Pressure Ulcer: Detection, Prevention and Management Procedure of the offloading and positioning to relieve pressure, management and reporting process.

16. LINKS TO OTHER TRUST PROCEDURAL DOCUMENTS

- Tissue Viability and Wound Management Manual
- Trust Infection Prevention and Control Manual
- Latest Version of British National Formulary
- Latest Version of Royal Marsden Clinical Procedures

17. REFERENCES

- Best Practice Statement (2016) Holistic Management of Venous Ulceration Wounds UK
- Best practice Recommendations (2018) For the implementations of a Diabetic Foot Ulcer Treatment Pathway. Wounds UK
- Best Practice Statement (2018) Improving holistic assessment of chronic wounds Wounds UK
- Best Practice Statement (2019) Ankle brachial pressure index (ABPi) in practice Wounds Uk
- Best Practice Statement (2019) Addressing complexities in the management of venous leg ulcers Wounds UK
• British Lymphology Society (2018) Position Paper for Ankle Brachial Pressure Index (ABPi)
• Furlong W (20015) Recommended frequency for ABPi review for patients wearing compression hosiery. Wounds UK poster
• Lymphoedema Network wales (2017) The Chronic Oedema “Wet Legs” (Lymphorrhoea) Pathway

18. **Appendices**

*All appendices can be viewed and downloaded from the [Tissue Viability and Wound Care Manuals homepage](#)*

Appendix 2 – Lower body skin tear pathway
Appendix 17 – Management of Chronic Oedema “Wet Legs” Lymphorrhoea
Appendix 18 – Fire Hazard Poster