Compression

Strong compression therapy is the gold-standard management option for LUs with a venous aetiology.[6]

- Determine suitability for and level of compression by performing a vascular assessment, including an ABPI and potentially measuring toe pressure
- In venous LUs, initiate strong compression and consider non-urgent referral for surgical intervention
- In arterial LUs, strong compression therapy is contradicted; refer urgently to a vascular specialist for revascularisation[3]
- In mixed-aetiology LUs with venous insufficiency, refer to a vascular specialist to assess predomination cause and advise between reduced compression and revascularisation
- In non-vascular aetiologies, refer to the relevant specialist for appropriate treatment.

Aetiology	Venous	Mixed	Arterial
ABPI[9]	0.8–1.3	0.5–0.8	<0.5
Compression[9]	Strong (>40 mmHg)	Reduced (≤40 mmHg)	Contraindicated, unless under vascular advice
Location[3]	Gaiter, retro-malleolus, mainly medial	Medial and lateral	Lateral and posterior leg, dorsal foot
Limb features[3]	Oedema, hyper-pigmentation, purpura, atrophie blanche	As venous or arterial	Atrophic, shiny, hair loss
History[3]	Thrombosis, varicosis, heavy legs, oedema	As venous or arterial	Cardiovascular risk factors, intermittent claudication
Assessment[3]	Venous duplex sonography	As venous or arterial	Palpation peripheral pulses, ABPI, toe pressure, doppler waveform, arterial duplex sonography

Select the most appropriate compression system according to the patient's needs.

- This should deliver therapeutic compression levels, with a high static stiffness index[12]
- Consider compression systems that improve venous haemodynamics and so reduce the ambulatory venous hypertension that generally causes ulceration[3]
- Refer to best-available evidence, such as a meta-analysis showing superior outcomes for multi-component (vs single-component or mainly inelastic), two-component (vs four-layer) and four-layer (vs short-stretch) compression systems in venous LUs[13]
- Select compression system in collaboration with the patient, taking into account their preferences and treatment goals.[12]

Holistic factors for selecting a compression system

- Ability to stay in place
- Aesthetic appearance
- Affordability
- Allergenic properties
- Anatomical fit
- Comfort
- Compatibility with footwear and gait
- Ease of application and removal
- Patient choice
- Training requirements

Monitor

The patient's and wound's progress should be re-assessed at each dressing change or every 2–4 weeks. This is to monitor the efficacy of the wound management strategy and progress towards the treatment goals of the patient and health professional.

The wound

Each wound assessment should monitor the following:

- Changes in wound bed characteristics
- Condition of the wound edges
- Lower-limb condition
- Malodour (indicative of high bioburden)
- Oedema
- Presence of undermining or tunnelling
- Tissue perfusion
- Trends in wound size and appearance.[7]

If there is no timely progression towards healing, a full holistic assessment should be undertaken. This should determine if any underlying aetiologies, risk factors and comorbidities are being effectively addressed and, with reference to national pathways, if any steps of the treatment regimen should be adapted or specialist referral is required.

Reducing risk of recurrence[3]

Healed LUs present a high risk of recurrence, but this can be significantly reduced with appropriate compression hosiery, supported by comprehensive patient information and ongoing monitoring. The risk can also be reduced with exercise, leg elevation and skin care, as well as lifestyle advice and minimally invasive venous intervention (ablation).

The patient

The effect of the LU on the patient's quality of life and general wellbeing should be regularly assessed. Ask the patient if the LU is having any of the following impacts:[11]

- Pain
- Loss of sleep
- Reduced mobility
- Diminished appetite
- Difficulty in daily activities
- Impaired social life.[1]

If the patient is using a compression system, ask how they are managing and provide any advice or practical assistance to improve adherence and resolve any problems.

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JWC journal of wound care

proactive wound healing

A GUIDE TO IMPLEMENTING THE WOUND HYGIENE PROTOCOL OF CARE FOR LEG ULCERS

Wound Hygiene

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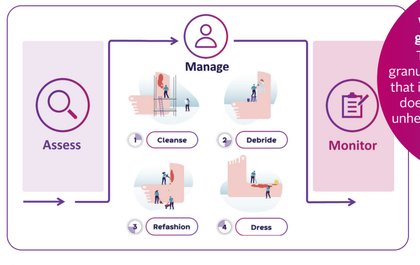
Leg ulcers (LUs) harm patients' overall quality of life in several ways. They often cause considerable pain, as well as malodour and exudate, all of which can undermine emotional and social wellbeing.[1,2] This can negatively affect mobility, independence and ability to perform activities of daily living, with a consequent financial burden.[3]

Consequently, LUs incur a high health-economic burden. In the UK, the estimated mean annual cost to the NHS of treating hard-to-heal LUs is £3.6 billion.[4] Most other evaluations of the economic burden of leg ulceration concern wounds with a venous aetiology. A recent literature review found that, across Australia, France, Germany, Italy, Spain, UK and US, the direct medical costs of managing wounds caused by deep venous disease is approximately $10.73 billion per year.[5]

LUs are often complex wounds that can take a long time to heal and frequently recur after closure.[3] However, health professionals can use the Wound Hygiene framework to help them holistically asses the patient, manage their wound to reduce biofilm and monitor long-term healing outcomes.[6,7] This will support a safe and effective management strategy, guided by diagnosis of the underlying aetiology, and reflecting the patient's goals and holistic needs, if possible, to facilitate supported self-care. This is a guide to using Wound Hygiene to assess, manage and monitor LUs to promote healing.

Understanding biofilm[6]

Hard-to-heal LUs are likely to contain biofilm, which is resistant to treatment and so delays healing. Biofilm is especially prevalent in necrotic, sloughy and/or unhealthy granulation tissue, compared with the healthy granulation tissue and epithelial tissue found in less severe wounds.[6] However, all wounds contain some level of biofilm[7] and have the potential for deterioration, and thus LUs should always be treated as hard to heal, using Wound Hygiene's proactive antibiofilm strategy.



What is unhealthy granulation tissue?
This term describes granulation tissue in a wound that is failing to progress but does not necessarily look unhealthy. It is typically dark red and friable.[8]

The information included here is for general guidance only, and health professionals must also refer to their local policy and guidelines

Assess

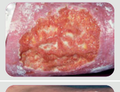
Assess the wound, lower limb and whole patient to diagnose the underlying aetiology and so determine the safest and most effective management strategy,[3] in reference to national pathways.

- Name the wound by type and aetiology (e.g., leg ulcer, venous)[7]
- LUs are usually venous (50%), arterial (10%) or mixed (20%), with 20% having other causes[3] (although evidence suggests too many LUs have no recorded diagnosis[4])
- Assess the patient and their needs as a whole person
- Set objectives to monitor the healing trajectory[6] with both clinical (wound closure, reduction rate and healing time) and patient-centred outcomes.[3]

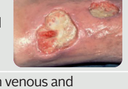
Aspects of a holistic assessment	
Wound	Aetiology, pain level, location, tissue type, edges, exudate, signs of infection
Lower limb	Skin condition/changes, oedema, leg shape, ankle circumference and flexion, foot pulses, arterial flow via ankle brachial pressure index (ABPI), venous function
Patient	Medical history, mobility, nutrition, quality of life, understanding of condition and treatment, treatment goals, concerns

Characteristic presentation[9]

Venous LU: Flat, open lesion on medial lower limb, with irregular, sloping wound edges



Arterial LU: Lesions on the distal limb, with well defined, punched out wound edges



Mixed LU: Signs of both venous and arterial insufficiency

Identify tissue types on the wound bed to inform management decisions.

- Necrotic tissue, slough and unhealthy granulation are likely to contain more biofilm and require more aggressive cleansing and debridement[6]
- Necrotic tissue is uncommon in venous LUs and may require differential diagnosis[9]
- Steep edges are indicative of a non-healing wound and may be related to arterial disease,[9] pressure or poor care
- Document the wound over time, using a tool such as the Leg Ulcer Measurement Tool.[7,10]

Tissue types		
Necrotic tissue		Black or brown; can be adherent (hard, dry or leathery) or soft and wet
Slough		Yellow or white; usually wet, sometimes dry and adherent; thick patches or thin coat
Unhealthy granulation tissue		Typically dark red; often bleeds when touched; can be friable
Healthy granulation tissue		Newly formed tissue; bright red, moist and shiny; cobblestone-like[7]
Epithelial tissue		Pale pink or white; migrates across wound surface from the edges; initially, can be fragile

Manage

Manage the ulcer, guided by information from the holistic assessment, and following the four steps of Wound Hygiene (cleanse, debride, refashion and dress) through the healing trajectory.[7]

Implementing Wound Hygiene[6,7]

Cleanse

Cleanse both the wound bed and surrounding skin.

- Remove dead skin scales and calluses
- To avoid cross-contamination, do not reuse cleansing cloths
- Use cleansing solutions with surfactants and, in suspected or confirmed infection, antimicrobials
- Consider cleansing up to the knee[6]
- Avoid disturbing stable, hard, dry necrotic tissue in presence of significant arterial disease, unless infection suspected or instructed by the vascular team
- Be mindful of any pain caused by vigorous cleansing and patient tolerance of this.

Tissue type	Cleansing methods
Necrotic, sloughy and/or unhealthy granulation tissue	Vigorous cleansing (with gauze, soft pad, pH-balanced or surfactant solution)
Healthy granulation tissue	Moderate or gentle cleansing[7]
Epithelial tissue/intact skin	Gentle cleansing[7]

Debride

Debride non-epithelialising tissue with appropriate vigour to remove biofilm and promote growth of healthy tissue.[6,7]

- Select method based on qualification and confidence, with more agressive methods requiring more training and experience
- Agitate the wound edges until pinpoint bleeding occurs[6,7]
- In patients with poor perfusion or autoimmune disorders, debride with caution and only with specialist agreement
- After debridement, cleanse the wound with an antiseptic solution to avoid contamination by exposed microbes
- Remove any periwound callus hyperkeratosis with debridement cloths or pads.[9]

Tissue type	Vigour	Debridement methods
Necrotic, sloughy and/or unhealthy granulation tissue	Vigorous	Surgical, sharp (curette, scalpel, scissors or forceps), larval (not on dry necrotic tissue), ultrasound or mechanical (pad, gauze or wipes)
Healthy granulation tissue	Gentle	Mechanical (gauze, soft pads or wipes)[7]
Epithelial tissue/intact skin	None	None

Refashion

Refashion the wound edges, where the primary cells that facilitate epithelialisation are located. Biofilm is most active here, where it promotes cell senescence (loss of cells' power to divide and grow), preventing the migration of new, healthy tissue.[7] Refashioning the edges to remove necrotic, sloughy and/or unhealthy granulation tissue (and therefore biofilm) will promote healing.[6,7]

- Aim to make the edges the same height as the wound bed
- This should remove areas that can harbour biofilm[6]
- Select a method, from a soft debridement pad or gauze to a blade, based on skill level
- Consider any pain caused by refashioning and patient tolerance of this.

Refashioning strategy by edge type			
	Steep (cliffs)		Agitate the wound edges to achieve pinpoint bleeding[6]
	Shallow (beaches)		Gently and selectively rub the wound edges in a circular motion[7]

Dress

Dress a hard-to-heal ulcer to proactively disrupt and destroy biofilm or to manage residual bacteria to prevent colonisation and, therefore, biofilm reformation.[6,7]

- This should also promote a healthy wound environment
- Dressing selection should be based on the predominant tissue type, wound depth and its likely exudate volume.

Selecting a dressing

Cleansing and debridement help prepare the wound for dressing.[11] Depending on its properties, a dressing can prevent or reduce biofilm re-formation, but it should always promote the moisture balance needed for healing to occur. The choice of dressing will depend on the wound's position in the healing trajectory:

- LUs likely to contain significant amount of biofilm (characterised by the presence of necrotic, sloughy and/or unhealthy granulation tissue, as well as excess exudate) will require an antimicrobial dressing with antibiofilm properties; its absorbency should reflect the exudate volume and consistency.[3,6,7]
- When the LU has improved, with healthy granulation tissue formation and/or epithelialisation present, stepping down to a non-antimicrobial dressing will maintain a moist environment conducive to healing. As even healing wounds are thought to contain some biofilm,[7] Wound Hygiene should continue to be implemented at every dressing change.[6,7]

The LU should be assessed at each dressing change, and the dressing's effectiveness should be reviewed every 2–4 weeks.[6]

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