



PATIENTS PRESENTING WITH

'RED LEGS': DIFFERENTIAL DIAGNOSIS

AND THE ROLE OF COMPRESSION



WOUNDS INTERNATIONAL BEST PRACTICE STATEMENT **2022**

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FOREWORD

Patients presenting with lower limb redness are often diagnosed with lower limb cellulitis and are frequently treated with antibiotic therapy. Cellulitis is a common condition presenting as an acute inflammation or redness of the skin and subcutaneous tissue, as a result of bacterial infection, hence the term 'red legs'. Although infection causes inflammation, it is important to acknowledge that infection is not always the cause of inflammation. Other inflammatory skin conditions may result in 'red legs' presentations, thus causing confusion when making a differential diagnosis.

This is evidenced in the literature, with cellulitis misdiagnosis rates reported in circa 30% of patients (Patel et al, 2020), resulting in unnecessary hospital admissions, inappropriate antibiotic prescriptions, misdiagnosis and misuse of finite resources. It is an important clinical problem in an era of antimicrobial resistance (AMR), where appropriate diagnosis may circumvent misuse of antibiotics, in tandem with antimicrobial stewardship (AMS), and assist with managing finite healthcare resources through admission avoidance.

The purpose of this document is to provide the information necessary for clinicians to differentiate between infective and inflammatory lower limb conditions that frequently present as 'red legs', and to determine the appropriate treatment pathway for these conditions. The foundation is based on the premise of a complete holistic assessment; therefore, incidental findings, such as lower limb skin cancers, skin diseases, and acute issues, such as suspected deep venous thrombosis (DVT), necrotising fasciitis, and peripheral arterial disease will be briefly referenced with clinical descriptors (see Appendix 2). This will support the use of correct terminology required for appropriate referral to specialist services.

Finally, the role of compression therapy in the management of both inflammatory and infective skin conditions will be addressed, with emphasis on early application of compression therapy to circumvent adverse effects of non-compression, where appropriate. The evidence suggests that missed opportunities exist pertaining to early application of compression therapy (Guest et al, 2013). It is envisaged that reaching an accurate differential diagnosis will provide clinicians with the confidence to apply compression therapy sooner to optimise outcomes for patients by treating causative factors.

QR codes will be used throughout the document to provide links to other documents that are relevant to, or that support, this best practice document.

Zena Moore (Chair)

Further background to the document

Building on existing work, such as guidelines by the British Lymphology Society (BLS) in the UK (BLS, 2022), the 'Red Leg Project' evolved when issues were identified in clinical practice pertaining to accurate diagnosis of lower limb cellulitis and the ability to differentiate it from other causes. This is a well-recognised issue in clinical practice worldwide, which has sparked much debate between clinicians as to who is best placed to manage this condition. The challenge in practice is multifactorial: for example, clinicians may not have had clinical exposure to dermatological or vascular conditions, so they may not understand the causative factors contributing to lower limb skin conditions and complications.

Irrespective of this debate, lower limb redness resulting from infection, DVT or inflammatory skin conditions is a frequent presentation to general practitioners and to emergency departments worldwide. Poor or incorrect management can result in significant repeat presentations, overuse or misuse of antibiotics, and poorer patient experience and outcomes (Patel et al, 2020). There is published data pertaining to risk factors, lack of diagnostic criteria and management; however, there is a lack of information on patients' experience and needs, or acknowledgement that clinicians may find lower limb cellulitis difficult to differentiate from other causes (Patel et al, 2020).



The BLS Guidelines
on the Management
of Cellulitis in
Lymphoedema

Further, the NHS in the UK has recognised that failure to manage lower limb conditions appropriately can lead to the development of wounds. Alarming, the numbers of non-traumatic lower limb amputations in non-diabetic patients are rising (Atkin et al, 2021). Diagnoses such as acute or chronic oedema in association with 'red legs' may be particularly complex as they have various clinical presentations at different stages (Patel et al, 2020). Patients may also present with concurrent issues, such as infection and inflammation, which may be challenging to differentiate. With no exact diagnostic tests available, clinical assessment is relied upon to reach a differential diagnosis.

To address these issues in Ireland, an expert group was established and the RATED (Rapid Assessment & Treatment in the Emergency Department) tool developed. The tool includes both descriptive and image criteria for the identification of infective (cellulitis), inflammatory (venous eczema, lipodermatosclerosis) and other common conditions such as DVT. Clinician feedback via anonymous questionnaire was positive (n=13), reporting the tool as user-friendly and helpful with differential diagnosis (O'Brien and White, 2021). Data has shown a sustained admission avoidance rates of 63% since inception of the tool (O'Brien and White, 2020). Work to further validate the tool, and to adapt it for clinicians internationally, is ongoing.

Gillian O'Brien

ASSESSMENT AND DIAGNOSIS

The importance of assessment cannot be overstated. A thorough assessment is vital, so that an accurate diagnosis can be made, and so treatment can be tailored to the individual needs of the patient, with reference to their overall health and lifestyle (BLS, 2022). Getting assessment right should be considered the cornerstone of all treatment. Without an accurate assessment, treatment is unlikely to be effective, resulting in delayed or failed healing, and adversely affecting the patient's quality of life.



BEST PRACTICE STATEMENT: All patients presenting with 'red legs' should receive a thorough and accurate assessment.

Improvements in patient assessment are urgently needed to reduce variations in practice and to improve patient outcomes (WUWHS, 2020a). See Box 1 for strategies to reduce practice variation.

Box 1. How to reduce practice variation (adapted from WUWHS, 2020a)

- Improve the assessment skills of all healthcare professionals
- Discontinue ineffective or inefficient treatments
- Implement consistently appropriate findings from research and evidence-based best practice
- Support patient engagement in the continuum of evidence-based best practice
- Share best practice and audit results with healthcare professionals and with the general public

Holistic assessment

Holistic assessment includes: looking at the whole patient, their general health, limb and skin integrity. This is important because it helps to identify underlying causes and potential barriers to healing at the point of assessment, allowing subsequent treatment to be tailored to the individual patient (WUWHS, 2020a).

A detailed history should be taken from the patient, to include:

- Past medical and surgical history
- History of limb trauma
- History of skin infection
- Medications
- Concurrent illnesses
- Family history of venous disease or limb swelling
- Ankle mobility (Stephen-Haynes et al, 2015).

Other issues such as wellbeing, quality of life and lifestyle factors should also be considered. These may include:

- Occupation
- Mobility
- Limitations to daily activities
- Psychological and social impact
- Nutrition status and weight.



Best Practice Statement:
Improving holistic
assessment of chronic
wounds



BEST PRACTICE STATEMENT: The patient's full health and skin history should be taken as part of assessment.

Diagnosis of patients presenting with 'red legs'

In addition to a holistic assessment, making an accurate diagnosis requires

- Thorough skin assessment
- Assessment of oedema
- Assessment of infection/inflammation.

Assessing the skin

Assessment of the skin should give a picture of the overall condition, as well as the affected area. It is important to look at both limbs to make a comparison and assess whether both legs are affected. It should also be noted that 'redness' may appear differently across different skin tones, and particular care should be taken in patients with dark skin where 'redness' may not be easily identified (Dhoonmoon et al, 2021). Visual cues may include dryness as well as redness, or changes in skin texture.

Touch is an important tool that should be used in skin assessment in order to gain a more accurate overall picture of the patient's skin and its condition rather than solely relying on the appearance; for example, in cellulitis, the affected skin feels different from the surrounding skin, with tightness apparent to the touch (Dhoonmoon et al, 2021).

Incidental findings of lower limb skin examinations may require urgent referral on to specialist services; for example, suspected squamous cell carcinoma (see Appendix 2 for further examples).

See Box 2 for questions to consider at assessment stage.

Box 2. Questions to consider as part of skin assessment (adapted from Dhoonmoon et al, 2021)

- What is the affected skin like in comparison to the surrounding skin?
- Are there any differences in colour?
- Does the skin feel warm/cool? Are there any changes in temperature?
- Does the skin feel spongy or firm to the touch?
- Does the skin look or feel shiny or tight?
- Is there any swelling or inflammation?
- Are there any changes in the texture of the skin and underlying tissue?
- How is the overall condition/integrity of the skin?
- Is there any pain, itchiness or change in sensation?
- What is the patient's perspective on their own skin and how they are feeling?

When assessing the patient, the limbs should be compared to establish whether redness is unilateral or bilateral, and to compare the affected skin with the patient's baseline skin tone.



BEST PRACTICE STATEMENT: The patient's limbs should be compared to establish whether erythema or redness is unilateral or bilateral, and to compare to the patient's baseline skin tone.

Oedema and lymphoedema

Although chronic oedema and lymphoedema do not always present as a red legs condition, they can often accompany red legs skin conditions.

Lymphoedema results from a failure of the lymphatic system. Consequences are swelling, skin and tissue changes and predisposition to infection. It most commonly affects the lower or upper limbs, but may also affect midline structures such as the head and neck, trunk, breasts or genitalia (BLS 2022).

Oedema results from an imbalance between capillary filtration into, and lymphatic drainage

from, the interstitial space.

'Chronic Oedema' is a term used to describe a group of conditions characterised by the presence of swelling within tissues of the body, caused by the accumulation of excess fluid within the interstitial space of the affected area and lasting more than 3 months. It is often used interchangeably with the term 'lymphoedema'. Although the term 'lymphoedema' suggests that the oedema is caused by a lymphatic abnormality, in every case of chronic oedema there will be some impairment of lymphatic drainage, either through an underlying abnormality ('primary' or 'secondary') of the lymphatic system, or through 'lymphatic failure' because of the capacity of the lymphatics being overloaded.

The physiological changes that occur over time as a consequence of lymphatic failure mean that early recognition and intervention is always easier and more effective, rather than interventions initiated at later stages. The International Society of Lymphology (ISL) has identified the following stages of lymphoedema based on the relative 'softness' or 'firmness' of the limb (reflecting fibrotic soft tissue changes) and the outcome after elevation (see Table 1).

| Table 1. Stages of lymphoedema and the outcome after elevation | |
|--|---|
| Stages | Characteristics |
| 0 (latent/pre-clinical/at risk) | Swelling not present despite impaired lymph transport |
| I | Early presentation with visible swelling that is soft and pitting and may subside with elevation |
| II | Increased swelling and elevation alone rarely reduced oedema. Tissues becoming firm with pitting only possible with strong sustained pressure. |
| III | Severe swelling with changes in skin and tissue texture. Tissues increasingly fibrotic, no pitting. Deep skin folds. May be hyperkeratosis (thickening of skin) and/or papillomatosis (fibrosed lymph blisters) |



BEST PRACTICE STATEMENT: All patients with chronic oedema/lymphoedema should be assessed to ascertain the cause and extent of their oedema and given advice regarding skincare, exercise, weight management and compression therapy.

Infection versus Inflammation - what's the difference?

Infection and inflammation may present in similar ways, but it is important to understand the difference between the two.

Infection (cellulitis)

Lower limb cellulitis is a common, potentially serious, bacterial skin infection. The most common causative bacteria include *Streptococcus* and *Staphylococcus*, which result in a red, painful, swollen limb. An acute infection occurs when viable tissue is invaded by certain microorganisms that trigger a host inflammatory response, which manifests as classic signs of infection: inflammation, warmth, pain and swelling. The area affected may become a deeper red and increase in size as the infection spreads.

'Redness' is a term frequently used to describe erythema or inflammation; however, it is important to note that these conditions may not always present as 'redness' (Dhoonmoon et al, 2021). Further, there are different stages when a patient may present with lower limb cellulitis, making diagnosis difficult. Diagnostic accuracy has been identified as a key research priority, with an emphasis on building capacity to differentiate infection from inflammation. It is suggested that simply being aware of inflammatory lower limb skin conditions that mimic lower limb cellulitis may help improve diagnostic accuracy (Hurlow and Bowler, 2022).

Inflammation

Inflammation is the body's natural vascular response to harmful stimuli, which can be physical,



Wound Infection
In Clinical Practice:
Principles of best practice

biological or chemical in nature (Hurlow and Bowler, 2022). Inflammation in lower limb skin conditions occurs in response to a trigger causing tissue injury. For example, venous eczema/stasis dermatitis is an inflammatory response to cell damage that has occurred due to venous hypertension (Harding et al, 2015). With irritant/contact dermatitis, erythema, warmth and blistering may occur due to the inflammatory immune response to the irritant or allergen. The goal of treatment is to eradicate or reduce the effect of the harmful agent.

It is well documented that inflammatory response is similar to infection response; however, taking a holistic assessment while actively listening to the patient will furnish the necessary information to make a clinical diagnosis (WUWHS, 2020a; Fletcher et al, 2018). For example, patients presenting with lower limb cellulitis infections will describe symptoms such as general malaise or flu-like symptoms. This is not the case in inflammatory skin conditions.

For a quick visual guide to making a differential diagnosis around infection and inflammation in patients presenting with 'red legs', see Table 2.

Table 2. Red legs differential diagnosis quick guide



| Image | Presenting symptoms | Diagnosis | Treatment |
|---|--|---|---|
|  <p>Cellulitis is defined as a spreading bacterial infection of the skin and underlying soft tissue</p> | <p>Sudden onset of red, hot, inflamed painful/tender skin, swollen lower limb</p> <p>Unilateral</p> <p>Associated general malaise/fever</p> <p>Is there a portal of entry? For example, a wound, toe web intertrigo, tinea pedis/athlete's foot</p> <p>May have elevated serum inflammatory markers (WBC, CRP)</p> <p>May have pyrexia</p> | <p>Lower limb cellulitis</p> | <p>Antibiotics as per antimicrobial guidelines</p> <p>Route to be determined by degree of severity of infection and patient comorbidities</p> <p>Consider compression* as soon as pain is controlled to assist in reduction of inflammation</p> <p>Re-evaluate to ensure treatment successful</p> <p>Advise patients on symptoms of deterioration such as sepsis to attend the emergency department if their condition is worsening</p> <p>*Check patient's vascular status prior to commencing compression</p> |
|  <p>Contact stasis dermatitis or eczema, develops as a local reaction to an irritant or allergen. The reaction is triggered by a particular substance or response of the immune system, causing the skin to become dry, itchy and irritated, and sometimes the skin can crack or blister</p> | <p>Can be bilateral or unilateral, depends on exposure to irritant</p> | <p>Contact dermatitis</p> <p>Local allergic reaction</p> <p>Contact eczema</p> <p>Contact allergy</p> | <p>Investigation into potential irritant</p> <p>Application of emollients to maintain skin moisture levels</p> <p>Topical corticosteroid</p> <p>In severe cases, oral corticosteroids may be required</p> |

Table 2. Red legs differential diagnosis quick guide (Continued)

| Image | Presenting symptoms | Diagnosis | Treatment |
|--|---|---|---|
|  <p data-bbox="124 696 427 792">Dry varicose eczema manifests as itchy, dry and flaky areas of skin, which may change colour and become weepy or crusty</p> | <p data-bbox="467 349 786 479">Bilateral, may be unilateral Itchy lower limb with a history of varicose insufficiency, visible varicosities, or previous deep venous thrombosis</p> | <p data-bbox="810 349 1129 495">Dry varicose eczema, also known as: venous eczema, stasis dermatitis, stasis eczema, and gravitational eczema Skin changes directly related to chronic venous hypertension</p> | <p data-bbox="1145 349 1481 719">Application of emollients to maintain skin moisture levels Consider need for soap substitutes (e.g. emollient solution to wash the limb) Consider need for topical corticosteroid or other topical treatment such as zinc Compression therapy* to address venous insufficiency/cause of venous eczema *Check patient's vascular status prior to commencing compression</p> |
|  <p data-bbox="124 1196 427 1317">Wet varicose eczema manifests as itchy, dry and flaky areas of skin, where epithelial layer of skin is lost, resulting in leaking of serous-(straw) coloured fluid</p> | <p data-bbox="467 815 786 987">Bilateral, may be unilateral Itchy lower limb with a history of varicose insufficiency, visible varicosities, or previous deep venous thrombosis Patient may complain of a burning sensation due to wet skin</p> | <p data-bbox="810 815 1129 960">Wet varicose eczema/stasis dermatitis, also known as venous eczema, stasis dermatitis, stasis eczema, and gravitational eczema Skin changes directly related to chronic venous hypertension</p> | <p data-bbox="1145 815 1481 1196">Application of emollients to intact skin to maintain skin moisture levels Consider need for soap substitutes (e.g. emollient solution to wash the limb) Consider need for topical corticosteroid Needs suitable absorbent dressing Compression therapy * to address venous insufficiency/cause of venous eczema *Check patient's vascular status prior to commencing compression</p> |
|  <p data-bbox="124 1644 427 1792">Infected eczema Common infections include: <i>Staphylococcus aureus</i>, this is known as 'impetiginized' or impetigo Fungal infections: candida</p> | <p data-bbox="467 1339 786 1487">Pain/burning sensation Can have crusting that may be yellow in colour Can be inflamed and painful Often results in increasing amount of exudate</p> | <p data-bbox="810 1339 1129 1352">Infected eczema</p> | <p data-bbox="1145 1339 1481 1756">Application of emollients to intact skin to maintain skin moisture levels Consider need for soap substitutes (e.g. emollient solution to wash the limb) Consider need for systemic/topical antibiotic/antifungal treatments Consider need for topical steroid to address itch and inflammation Consider need for microbiology swabbing/culture of wound/skin crusts Consider compression therapy* to help exudate control *Check patient's vascular status prior to commencing compression</p> |



Best Practice Statement:
Compression hosiery: A
patient-centric approach

Patient empowerment

During assessment, it is vital to take every opportunity to hear the patient's perspective of their own health. Clinicians should engage in active listening and follow tips for communication such as:

- Listening, as well as talking
- Using clear language and content at a level of detail appropriate for the patient
- Using open-ended questions to encourage discussion
- Using repetition when needed
- Checking understanding and summarising the relevant information (Fletcher et al, 2018).

Written information in the appropriate language, such as patient information leaflets or access to further information online, can help to reinforce verbal communication, provide reminders or provide additional resources. Information should include triggers for seeking help and the relevant contact information.

Patients should be given the chance to ask questions and should be given guidance in areas relevant to them – for example, it might be useful for the clinician to take a video of the planned treatment process so the patient can watch and learn how to do it themselves (WUWHS, 2020b).

Patients should feel able to:

- Express their needs, priorities, expectations and concerns
- Take an active role in treatment-related decisions, where possible
- Participate in care delivery
- Communicate their opinions on how care is delivered and could be adapted (Fletcher et al, 2018).

It is important to note that not all patients will want, or be able, to be involved in decision-making or participate directly in their own care, and this capacity may change over the course of treatment, but this shared decision-making should be agreed upon with the patient's involvement (WUWHS, 2020b).



BEST PRACTICE STATEMENT: Clinicians should communicate with patients in a way that enables them to be empowered and engaged, and to be as involved in their treatment as they would like or are able to be.

GETTING TREATMENT RIGHT FOR DIFFERENT CONDITIONS

Many conditions that involve 'red legs' can be particularly difficult to differentiate, but it is important that an accurate diagnosis is made so that effective treatment can be commenced. Early intervention and timely treatment, wherever possible, should be considered of paramount importance.



BEST PRACTICE STATEMENT: All patients presenting with 'red legs' should receive a differential diagnosis and any underlying cause(s) should be managed.

Cellulitis

Cellulitis is often misdiagnosed, as it is easily mistaken for other conditions such as dermatitis or eczema. However, it is important to be able to accurately differentiate cellulitis from other conditions, as urgent treatment is required to prevent it from worsening (BLS, 2022).

Any breach in skin integrity can allow bacteria to enter the skin and cause infection, which can spread and lead to cellulitis. Common causes include injuries or trauma to the skin (even if minor), fungal infections such as athlete's foot, insect bites, leg ulceration, or chronic oedema and lymphoedema. Cellulitis most commonly occurs in the lower limb, often due to oedema, or through a break in the skin due to an injury or existing leg ulcer (BLS, 2022).

Cellulitis only occurs in the presence of infection, therefore the patient should be assessed for the usual signs and symptoms of infection, such as:

- Pain or tenderness
- Acute inflammation
- Erythema (redness)
- Oedema
- High temperature
- Malaise/symptoms of fever (e.g. shivering)
- In severe cases, blistering may be present.

Deep vein thrombosis (DVT) may present as a swollen, painful leg, but will not have the painful, spreading erythema of cellulitis. It is important to remember that signs of obvious infection are not always apparent and may be overt; therefore, a careful history and examination of the patient is required (BLS, 2021). See Box 3 for important considerations to exclude cellulitis as a diagnosis.

Box 3. Important considerations when making a diagnosis of cellulitis (adapted from Beldon, 2011)

- Is the redness/erythema unilateral?
- Does the patient have cardiac failure? Have they taken their medication? Both of these factors can contribute to lower limb swelling
- Has the patient experienced a sudden onset of painful lower leg swelling? This may indicate a DVT and the patient should be urgently referred for screening to have this excluded/treated
- Does the patient have a venous leg ulcer? If so, have they been wearing their compression garment or bandaging? If the patient has not been wearing their compression, their underlying venous hypertension may cause a red/discoloured appearance on the skin, which may be mistaken for cellulitis
- Has the patient had a healed venous leg ulcer that requires compression therapy? If the patient is not wearing compression, he or she may have acute swelling and some erythema due to venous hypertension; however, in the absence of pyrexia, cellulitis can be ruled out

The presentation of cellulitis may vary at different stages of its progression, and clinicians may see the patient at different stages, so it is important to be aware of the possible changes (Patel et al, 2020).

It should be noted that cellulitis is characterised by slow resolution. Fever and inflammation often persist throughout the first 72 hours of treatment. Management should include elevation and narrow-spectrum antimicrobial therapy, along with treatment of any comorbid conditions exacerbating the cellulitis, such as oedema, diabetes and vascular disease (Sullivan and de Barra, 2018).

In patients with recurrent episodes of cellulitis, risk factors should be addressed, and the focus should be on prevention wherever possible (Sullivan and de Barra, 2018). Lymphoedema is a common cause of recurrent cellulitis, and at-risk patients may need to be prescribed prophylactic antibiotic therapy (BLS, 2022).



BEST PRACTICE STATEMENT: In all patients presenting with erythema, a diagnosis should be made of cellulitis where appropriate – or the presence of cellulitis excluded – to ensure that appropriate treatment is started as soon as possible.



Management of hyperkeratosis of the lower limb: Consensus recommendations

Eczema and infection

As skin conditions such as eczema can cause the skin to become cracked or broken, there is an increased risk of infection. Patients should be assessed for the usual symptoms of infection; however, the presence of a skin condition may cause challenges in accurate diagnosis, due to additional erythema or inflammation being present. This can result in patients with skin conditions such as eczema being misdiagnosed with cellulitis, which can result in unnecessary and ineffective treatment.

A common reason for eczema forming on the lower limb is due to venous hypertension. High pressure within the venous system leads to inflammation within the surrounding tissues, causing skin changes. Venous eczema can also be referred to as gravitational eczema, stasis dermatitis, stasis eczema, and varicose eczema.

Patients should be asked about their skin history and the presence of any skin conditions, and this should be considered at assessment stage. Patients with leg ulcers will also often experience skin problems such as eczema, which can cause issues with the periwound skin and infection (Hofman, 2010).

Eczema can be differentiated from cellulitis through factors such as:

- While both conditions are painful, cellulitis can be identified by increasing pain to touch and pressure, whereas eczema will usually be described as 'sore'
- The spread of reddened skin in eczema will be patchy, whereas the redness in cellulitis is normally more demarcated
- Cellulitis may be accompanied by fever and malaise
- In cellulitis, the skin will present as smooth, whereas in eczema it is scaly
- Cellulitis is not normally itchy, whereas typically eczema will result in irritation
- Large areas of blistering may occur with cellulitis, whereas smaller vesicles may occur with eczema
- Cellulitis is normally unilateral, whereas eczema can occur in both limbs (adapted from Hofman, 2010).



BEST PRACTICE STATEMENT: Skin conditions such as eczema should be taken into account at assessment stage, to aid accurate diagnosis.

Sepsis

Sepsis is a rare but potentially fatal condition (Fletcher et al, 2020). Recognising and treating



Best Practice Recommendations: Prevention and Management of Periwound Skin Complications



Best Practice Recommendations: Prevention and management of Moisture-associated skin damage (MASD)

infection early, before sepsis develops, is vital. If the patient looks ill, has triggered the National Early Warning Score (NEWS; see Table 3) – pulse, blood pressure, respiratory rate, oxygen levels, temperature and conscious level – or there are signs of infection, then the patient should be screened for sepsis (Royal College of Physicians, 2017).

Table 3. The NEWS scoring system

| Physiological parameter | Score | | | | | | |
|--------------------------------|-------|--------|-----------|---------------------|--------------------|---------------------|------------------|
| | 3 | 2 | 1 | 0 | 1 | 2 | 3 |
| Respiration rate (per minute) | <8 | | 9-11 | 12-20 | | 21-24 | >25 |
| SpO ₂ Scale 1 (%) | <91 | 92-93 | 94-95 | >96 | | | |
| SpO ₂ Scale 2 (%) | <83 | 84-85 | 85-87 | 88-92 >93 on air | 93-94 on oxygen | 965-96 on oxygen | >97 on oxygen |
| Air or Oxygen? | | Oxygen | | Air | | | |
| Systolic blood pressure (mmHg) | <90 | 91-100 | 101-110 | 111-219 | | | >220 |
| Pulse (per minute) | <40 | | 41-50 | 51-90 | 91-110 | 111-130 | >131 |
| Consciousness | | | | Alert | | | CVPU |
| Temperature (°C) | <35 | | 35.1-36.0 | 36.1-38.0 | 38.1-39.0 | >39.1 | |



BEST PRACTICE STATEMENT: If the patient looks ill, has triggered the National Early Warning Score (pulse, blood pressure, respiratory rate, oxygen levels, temperature and conscious level), or there are signs of infection – then the patient should be screened for sepsis.

Patients and their carers and/or families should be made aware of the symptoms of sepsis so that they can seek urgent medical attention (Box 4). In the case of sepsis, urgent action includes immediate, high-level resuscitation with fluids, oxygen and systemic antibiotic therapy (IWII, 2016).

Box 4. Symptoms of sepsis

- Slurred speech or confusion
- Extreme shivering or muscle pain
- Passing no urine (in a day)
- Severe breathlessness
- It feels like you're going to die
- Skin mottled or discoloured.



BEST PRACTICE STATEMENT: Care should be escalated and/or urgent medical help sought if that patient develops any of the signs of sepsis.

Antibiotic use

Judicious use of antibiotics is of paramount importance. Due to the growing crisis of antimicrobial resistance (AMR), all treatment plans should now take an approach based on antimicrobial stewardship (AMS; Fletcher et al, 2020). Early identification of infection and infection risk is an integral part of AMS and the reduction of antimicrobial use (Sandy-Hodgetts et al, 2020).

An AMS-based approach should also encompass the following principles (Fletcher et al, 2020):

- To prescribe the appropriate antimicrobial treatment when therapy is indicated, minimising the unnecessary use of antimicrobials, overly broad-spectrum treatment regimens and the use of antibiotics where infection is not present
- To prescribe the appropriate antimicrobial duration, at an optimal dose, administered through the most appropriate route for the indicated condition and patient status.

Inappropriate or overuse of antibiotics is one of the biggest causes of antibiotic resistance, making accurate diagnosis of paramount importance (Fletcher et al, 2020). Patients presenting with erythema may be particularly likely to be prescribed antimicrobial or antibiotic treatment ‘just in case’; however, an accurate differential diagnosis needs to be made before any treatment is commenced. Patients who are treated for cellulitis when they do not have the condition are in danger of receiving unnecessary antibiotic treatment while their true condition is neglected (Beldon, 2011).

If cellulitis is diagnosed, and the patient has no known allergies, narrow-spectrum penicillin, targeting *Streptococci* and *Staphylococci* (in the case of purulent infection) should be the focus of antimicrobial therapy (Sullivan and de Barra, 2018). Whether the patient is treated in hospital or at home should be decided based on the individual, but monitoring is essential (BLS, 2022).

| Table 4. Patient groups at risk of skin frailty (adapted from Beekman et al, 2020) | | |
|---|--|---|
| Patient group | Skin changes | Potential problems |
| Older adults | Becomes thinner, loses elasticity, reduced blood supply, subcutaneous fat decreases, skin hydration decreases, reduction of the dermal-epidermal layer (diminishing adherence of epidermis on dermis; Moncrieff et al, 2015; Levine, 2020) | Skin tears, pressure ulcers, infection, inflammation, dryness/flaking, itching, cellulitis, diabetic ulcers, possible nutrition issues; possible issues relating to dementia, lymphoedema |
| Individuals with mobility issues/paralysis | Alterations to vascular supply, temperature control, maceration/moisture, loss of collagen, lack of muscle/atrophy, impaired sensation due to damaged nerves in the skin (Rappl, 2008) | Skin tears, pressure ulcers, infection, inflammation, lymphoedema |
| Children/neonates | Immature skin; intrinsic changes due to pressure duration, shear and friction, poor perfusion and maceration (Inamadar and Palit, 2013) | Nappy/diaper dermatitis, skin tears, pressure ulcers |
| Individuals with spina bifida and cerebral palsy | Decreased skin perfusion, cutaneous reaction to drugs, perineal dermatitis and inflammation due to incontinence (Inamadar and Palit, 2013) | Pressure ulcers; possible incontinence-associated dermatitis, lymphoedema |
| Bariatric patients | Altered epidermal cells, increased water loss, dry skin, maceration, increased skin temperature, and reduced lymphatic flow and perfusion (Shipman and Millington, 2011). | Pressure ulcers, skin tears, diabetic ulcers, psoriasis, moisture lesions, intertrigo, lymphoedema |
| Oncology patients | Radiation leads to inflammation, epidermis damage, decreased perfusion (NHS, 2010) | Pressure ulcers, reduced wound healing, skin infections, cellulitis, radiodermatitis, lymphoedema |
| Chronic illness and other issues | Skin changes due to chronic illnesses - e.g. renal, liver, cardiovascular; medications; malnutrition; stomas and devices; psychosocial issues (Wounds UK, 2018) | Skin tears, pressure ulcers, infection, inflammation, moisture lesions; other related issues, lymphoedema |



BEST PRACTICE STATEMENT: An accurate differential diagnosis needs to be made before any treatment is commenced, particularly antimicrobial or antibiotic treatment.

Skin integrity

At the assessment stage, all patients found to have fragile or at-risk skin should be given a skin care regimen to help to reduce the risk of skin damage (or further damage). Table 4 describes patient groups at increased risk of skin frailty.

The benefits of moisturising to treat specific skin conditions are well recognised, but in patients at risk of skin breakdown, this should also be used as part of a full everyday skin care routine (Wounds



UK, 2018). Regular moisturising should be viewed as a vital part of skincare in all patients with frail skin, in order to promote general skin health and reduce the risk of skin damage (Wounds UK, 2015). This can help to restore the barrier function of the skin, reduce itching, and increase the level of hydration (Beeckman et al, 2020).



BEST PRACTICE STATEMENT: A regular moisturising regimen should be viewed as a vital part of skincare in all patients with fragile or at-risk skin to reduce the risk of skin damage.

The use of suitable products should be incorporated into a standardised approach to skincare. Using liquid body wash, or an emollient-based wash product, instead of soap for cleansing can help to protect and hydrate vulnerable skin at risk of damage (Wounds UK, 2018). A full skincare plan is recommended for suitable individuals, which includes the use of a combination of soap-free wash products, as well as 'leave-on' creams and ointments (Wounds UK, 2018).

In the case of cellulitis, it is a myth that the patient should not wash their legs, and leg washing with a suitable product should still be incorporated into the patient's skin care regimen.



BEST PRACTICE STATEMENT: In suitable patients, a full skincare plan should be developed, incorporating emollients and soap-free products.

In suitable individuals, moisturising can be incorporated into the individual's own daily routine: for example, they can be instructed to apply emollients or moisturisers themselves (or increase an existing moisturising routine) and optimise their own bathing regimen to incorporate suitable skincare measures that will reduce risk of damage.



BEST PRACTICE STATEMENT: Suitable patients should be given a self-care plan that includes their skincare regimen and skincare products.

The importance of reassessment

If an assessment and diagnosis has been made and treatment commenced, but the patient's condition has not improved or is deteriorating, it is important to make a full reassessment of the patient. It is vital to address any barriers to healing and underlying causes that may have been missed, and to make a new treatment plan.

If an initial diagnosis of cellulitis has been made, but the patient's condition has not improved after 7 days of treatment with antibiotics, the diagnosis should be reconsidered. Patients with lymphoedema should be treated for a minimum of 14 days (BLS, 2022).



BEST PRACTICE STATEMENT: Patients should be reassessed regularly, and their diagnosis and treatment plan should be reconsidered if their condition is not improving.



BEST PRACTICE STATEMENT: Any patient who has been diagnosed with cellulitis should have a clinical review and treatment efficacy assessed.

THE ROLE OF COMPRESSION



Best Practice Statement:
Ankle brachial pressure
index (ABPI) in practice

Compression therapy has long been recognised as the standard treatment in venous and lymphatic diseases (Rabe and Pannier, 2021). It is also recommended for use in acute DVT (Rabe and Pannier, 2021) and in the management of and prevention of further episodes of lower limb cellulitis (Ligi et al, 2016; Eder et al, 2021; Webb et al 2020 ; Webb et al 2022).



BEST PRACTICE STATEMENT: Compression should be considered the gold standard in the management of lower limb oedema, where there are no clinical contraindications identified on holistic assessment.

How compression works

There are two main principles underpinning how compression therapy works to alleviate chronic venous insufficiency (Wounds International, 2013; Vowden et al, 2020):

- Creation of an enclosed system that allows internal pressures to be evenly distributed in the leg
- Variation of interface pressures according to limb shape and tension of bandage applied, which will be influenced by the bandage.

Compression therapy assists venous return from the lower limb by exerting external pressure. This is achieved by the components of the compression therapy system forming a semi-rigid sleeve around the lower leg (Harding et al, 2015).

Compression of leg tissues reduces oedema by opposing leakage of fluid from capillaries into tissues and by encouraging lymphatic drainage. It also improves venous return by increasing the speed of venous blood flow, which may reduce local inflammatory effects. It therefore helps to reduce the effects of chronic venous insufficiency by reducing venous ambulatory hypertension, reducing oedema and improving skin blood flow, and aiding healing (Harding et al, 2015).

Types of compression

Compression treatments usually consist of:

- Compression bandaging
- Compression wraps
- Compression hosiery kits
- Compression hosiery.

Compression bandaging, applied by a healthcare professional, may be suitable for patients with active ulceration, particularly in patients who cannot tolerate compression garments (Ousey et al, 2021). When treating 'red legs', bandaging may be used as a first-line treatment in the acute phase, including a wound or lymphorrhoea, to reduce limb size, ease congestion and overcome acute symptoms; then the treatment may be stepped down to a hosiery option when the patient's leg is more comfortable, and self-care may be more appropriate.

Compression hosiery options vary in stiffness, levels of compression delivered, fabric, colour, size, length, and whether they are closed or open-toe (Fletcher et al, 2021). Compression hosiery consists of either a single or two-piece garment and can be selected off-the-shelf or made-to-measure for the individual (Ousey et al, 2021).

Selection of appropriate compression modes and materials will depend on the results of the individual assessment. Findings from a holistic patient assessment should include assessment of the underlying vascular status and suitability for compression, in addition to other elements such as limb shape and size, presence of oedema, size of the ulcer and patient capability and willingness to engage in their own care (Wounds International, 2022).

Other factors to consider for successful compression therapy are the aetiology of the underlying disease and the patient's ability to tolerate and use compression effectively as part of their daily routine. Taking into account patient comfort and exudate management are also important factors to be aware of (Wounds International, 2022).

See Table 5 for more information on compression therapy options and when they may be used when treating patients with conditions associated with 'red legs'.

Table 5. Compression options and when they may be used in practice (adapted from Ousey et al, 2021)

| Compression hosiery | Compression hosiery kits | Compression bandaging | Compression wraps |
|--|---|--|---|
| Useful in controlling symptoms of venous hypertension and oedema, and can be used for primary prevention or prevention of recurrence. Comes in a range of different classifications and fabrics. | Useful in the management of patients with active ulceration, and designed to provide 40mmHg compression at the ankle. | Most often used to treat active ulceration, significant oedema, limb distortion, or for patients who are deemed unsuitable for compression hosiery | Adjustable compression device that provides an alternative to bandaging |
| Suitable for self/family care | Suitable for self/family care | Needs to be applied by a person deemed capable | Suitable for self/family care |
| Suitable for ongoing treatment of oedema, risk of lower limb issues and to control symptoms of venous hypertension | Can be used to treat active ulceration where higher compression is required | Suitable for initial control of symptoms (oedema reduction, ulcer healing, limb reshaping) but should not be used as first-line treatment for prevention of recurrence | Suitable for ongoing treatment of oedema and risk of lower limb issues |



Demystifying mild, moderate and high compression systems – when and how to introduce “lighter” compression

Prior to the application of any compression therapy, the patient should be assessed for red flags in line with a framework such as the UK's National Wound Care Strategy Programme (NWCSP). If no red flags are present, up to 20mmHg of compression therapy can be applied. Before application of compression therapy greater than 20mmHg, a vascular assessment (including ankle brachial pressure index or toe brachial index) is required to rule out any significant arterial disease, ensuring that strong compression therapy is not contraindicated.

After an accurate diagnosis has been made, there are treatment guidelines and pathways that can help to direct care, and provide support in clinician decision-making, for specific conditions that are associated with 'red legs'. Compression therapy should be considered in the treatment plan for all 'red leg'-related conditions, as they may be related to venous insufficiency and lead to worsening symptoms if left untreated.



Consensus Document: Wound Exudate, effective assessment and management

Where oedema is present, compression therapy should be considered as part of the treatment plan. For the effective management of oedema, depending on the patient's individual condition, compression therapy may be needed for the full limb from toe to thigh, as required.



BEST PRACTICE STATEMENT: Compression therapy should be considered in the treatment plan for 'red leg'-related conditions as they may lead to venous insufficiency or worsening symptoms.



BEST PRACTICE STATEMENT: Compression therapy should be considered in the treatment plan for effective management of oedema, treating the full limb from toe to thigh as required.

The effect of high stiffness

A high stiffness compression system produces greater fluctuations in pressure in the lower leg during walking than a low stiffness system. High stiffness systems therefore produce the greatest improvements in venous blood flow from the lower leg. However, low stiffness systems will generally produce a higher resting pressure (Harding et al, 2015).

The effect of stiffness has two implications for clinical practice:

- Patients may find a high stiffness compression therapy system more comfortable, as it will offer a lower resting pressure than a low stiffness compression system
- Changes in calf diameter (e.g. due to muscle contraction during exercise like walking, or due to passive movement of the ankle) are important for the fluctuations in pressure necessary to improve venous outflow (Harding et al, 2015).

It should be noted that the terminology surrounding the use of layers can be confusing and should not be used to make assumptions about pressure levels. An understanding of the different components used is a better way to determine whether the system will function as a high stiffness system. Multi-component compression therapy systems (either two or four) are preferable to single component bandaging because they generally have high stiffness: the higher the stiffness, the better the outcome for the patient (Cullum et al, 2001; Harding et al, 2015).

See Box 5 for the attributes of the ideal compression therapy system (Harding et al, 2015).

Box 5. Attributes of the ideal compression therapy system (from Harding et al, 2015)

- Delivers therapeutic compression and has high stiffness (i.e. the pressure generated is effective during mobilisation and is well tolerated during test)
- Permits good anatomical fit
- Stays in place (i.e. does not slip)
- Comfortable
- Allows patients to wear their own shoes and to maintain normal gait
- Easy to apply and remove
- Requires minimal training in fitting and application
- Non-allergenic
- Aesthetically acceptable
- Affordable and/or reimbursed
- Offer patient choice

Red legs pathway

The British Lymphology Society's Red Legs Pathway is specifically designed to enable prompt and effective management and improve patient experience in patients with bilateral red legs in combination with lymphoedema (Elwell, 2020). The pathway also focuses on reducing inappropriate use of antibiotics and potential negative consequences for patients with lymphoedema.

Once an accurate diagnosis has been made, the pathway provides treatment options and next steps for patients presenting with red legs, including guidance on compression therapy options for the individual patient.

Chronic oedema and lymphorrhoea

For patients with chronic oedema and lymphorrhoea, the Chronic Oedema 'Wet Leg' Pathway has been developed (Thomas et al, 2021). The evidence-based pathway provides clinicians with clear guidelines to support prompt, efficient and effective management of all patients with chronic oedema and lymphorrhoea. The benefits of timely active treatment for patients include decreasing



For more information,
visit the British
Lymphology Society
(BLS)

pain and improving mobility and daily activities; other benefits include reducing the risk of cellulitis and the development of wounds (Thomas et al, 2021).

The pathway includes assessment, washing the leg and providing either level 1, 2 or 3 support/compression, with the goal of treating symptoms as well as managing moisture. By actively treating symptoms, rather than simply mopping up the leaking lymphorrhoea, this pathway demonstrates value-based health care by reducing waste, harm and variations in care (Thomas et al, 2021).



BEST PRACTICE STATEMENT: For those without a concerning compromised vascular status, compression should be seen as pivotal for management of lymphorrhoea to manage the symptoms effectively.

Compression in cellulitis

It is a common myth that compression does not have a role in treatment for cellulitis. Even in the acute phase of cellulitis, weeping or wet legs can benefit from compression therapy where appropriate.

Further recurrence of cellulitis is common; therefore, it is necessary to address potential causes of cellulitis, such as chronic oedema. Research suggests that prescribing compression as an adjunct to antibiotics when treating lower limb cellulitis is beneficial (Webb et al, 2020; Cox, 2006; Chlebicki and Oh, 2014). The principal consideration should be first that the patient's underlying vascular status is such that they may be prescribed compression, then it is crucial that the patient is administered analgesia appropriate to their pain levels so that compression therapy can be tolerated. Communication with the patient and education around the benefits of compression are vital.

In all cases, patients should be assessed for their understanding of the role of compression therapy in their treatment, the need to engage with compression therapy in the long term and how they will apply/remove their compression garments, as engagement with the treatment is critical to good outcomes (Stephen-Haynes et al, 2015; WUWHS, 2020b).



BEST PRACTICE STATEMENT: Compression therapy should be considered in patients with cellulitis as appropriate to their underlying vascular status, with consideration given to the patient's pain levels and whether they can tolerate compression.



BEST PRACTICE STATEMENT: If the patient is already established in compression therapy and develops cellulitis, compression therapy should not be stopped and should instead be continued at the highest level that the patient can tolerate.

REFERENCES

- Beeckman D, Campbell KE, Le Blanc K et al (2020) Best practice recommendations for holistic strategies to promote and maintain skin integrity. *Wounds International*
- Beldon P (2011) The assessment, diagnosis and treatment of cellulitis. *Wound Essentials* 6: 60-8
- British Association of Dermatologists (2021) Describing erythema in skin of colour. Available at: <https://www.bad.org.uk/healthcareprofessionals/inclusivity-and-representation/erythema-in-skin-of-colour> (accessed 20.06.2022)
- British Lymphology Society (2021) British Lymphology Society position paper for the management of people with lymphoedema in the presence of deep vein thrombosis (DVT). Available online at: <https://www.thebls.com/documents-library/british-lymphology-society-position-paper-for-the-management-of-people-with-lymphoedema-in-the-presence-of-deep-vein-thrombosis-dvt> (accessed 21.10.2022)
- British Lymphology Society (2022) Guidelines on the management of cellulitis in lymphoedema. Available online at: <https://www.thebls.com/documents-library/guidelines-on-the-management-of-cellulitis-in-lymphoedema> (accessed 21.10.2022)
- Chlebicki MP, Oh CC (2014) Recurrent cellulitis: Risk factors, etiology, pathogenesis and treatment. *Curr Infect Dis Rep* 16: 422
- Clinical Resource Efficiency Support Team (2008) Guidelines for the diagnosis, assessment and management of lymphoedema. Available online at: https://www.lymphoedemasupportni.org/sites/default/files/crest_guidelines_on_the_diagnosis_assessment_and_management_of_lymphoedema.pdf (accessed 6.07.2022)
- Cox NH (2006) Oedema as a risk factor for multiple episodes of cellulitis/erysipelas of the lower leg: a series with community follow-up. *Br J Dermatol* 155(5): 947-50
- Cullum N, Nelson EA, Fletcher AW, Sheldon TA (2001) Compression for venous leg ulcers. *Cochrane Database Syst Rev* (2): CD000265
- Dhoonmoon L, Fletcher J, Atkin L (2021) Best Practice Statement: Addressing skin tone bias in wound care: assessing signs and symptoms in people with dark skin tones. *Wounds UK*
- Eder S, Stucker M, Lauchli S, Dissemond J (2021) Is compression therapy contraindicated for lower leg erysipelas? Results of a retrospective analysis. *Hautarzt* 72(1): 34-41
- Elwell R (2020) Production of the electronic British Lymphology Society Red Legs Pathway. *Br J Community Nurs* 25(Sup10): S32-5
- Fletcher J, Atkin L, Bolton L et al (2021) Best Practice Statement. Compression hosiery: A patient-centric approach. *Wounds UK*
- Fletcher J, Edwards-Jones V, Fumarola S et al (2020) Best Practice Statement: Antimicrobial stewardship strategies for wound management. *Wounds UK*
- Fletcher J, Fumarola S, Haycocks S et al (2018) Best Practice Statement: Improving holistic assessment of chronic wounds. *Wounds UK*
- Guest JF, Fuller GW, Vowden P (2020) Cohort study evaluating the burden of wounds to the UK's National Health Service in 2017/2018: update from 2012/2013. *BMJ Open* 10: e045253
- Guest JF, Vowden K, Vowden P (2017) The health economic burden that acute and chronic wounds impose on an average clinical commissioning group/health board in the UK. *J Wound Care* 26(6): 292-303
- Harding K, Dowsett C, Fias L et al (2015) Simplifying venous leg ulcer management: Consensus recommendations. *Wounds International*
- Hofman D (2010) Managing eczema in patients with leg ulcers. *Wounds International* 1(4): 15-6
- Hurlow J, Bowler PJ (2022) Acute and chronic wound infections: microbiological, immunological, clinical and therapeutic distinctions. *Journal of Wound Care* 31(5): 436-45
- Inamadar AC, Palit A (2013) Critical care in dermatology. Jaypee Medical Publishing, Delhi
- International Society of Lymphology (2009) The diagnosis and treatment of peripheral lymphoedema. *Lymphology* 42: 51-60
- International Wound Infection Institute (2016) Wound infection in clinical practice. *Wounds*
- Johnson S (2002) Compression hosiery in the prevention and treatment of venous leg ulcers. *J Tissue Viability* 12(2): 67, 70, 72-4
- Levine J (2020) Clinical aspects of aging skin: Considerations for the wound care practitioner. *Adv Skin Wound Care* 33(1): 12-9
- Ligi D, Croce L, Mannello F (2016) Inflammation and compression: state of the art. *Veins Lymphatics* 5: 5980
- Moncrieff G, Van Onselen J, Young T (2015) The role of emollients in maintaining skin integrity. *Wounds UK* 11(1): 68-74
- Muldoon J (2011) Assessment and monitoring of oedema. *J Community Nurs* 25(6): 26-8
- National Health Service (2010) Skincare of patients receiving radiotherapy. NHS Quality Improvement Scotland
- National Wound Care Strategy Programme (2020) Lower limb: Recommendations for clinical care. Available online at: <https://www.ahsnetwork.com/wp-content/uploads/2020/11/Lower-Limb-Recommendations-20Nov20.pdf> (accessed 06.07.2022)
- O'Brien G, White P (2021) The Red Legs RATED tool to improve diagnosis of lower limb cellulitis in the emergency department. *Br J Nurs* 30(12): S22-9
- O'Meara SO, Cullum N, Nelson AE, Dumville JC (2012) Compression for venous leg ulcers. *Coch Sys Rev* 11: CD000265
- Ousey K, Atkin L, Conway B et al (2021) Compression therapy for pharmacy teams. *Wounds UK*
- Patel M, Lee SI, Levell NJ et al (2020) An interview study to determine the experience of cellulitis diagnosis amongst health care professionals in the UK. *BMJ Open* 10: e034692
- Rabe E, Pannier F (2021) Risks and contraindications of medical compression therapy. *Phlebology* 28(1): 14-8
- Rappl LM (2008) Physiological changes in tissues denervated by spinal cord injury tissues and possible effects on wound healing. *Int Wound J* 5: 435-44
- Royal College of Physicians (2017) National Early Warning Score (NEWS) 2 Standardising the assessment of acute-illness severity in the NHS. Updated report of a working party. RCP, London
- Sandy-Hodgetts K, Conway B, Djohan R et al (2020) International Surgical Wound Complications Advisory Panel Best Practice Statement for the early identification and prevention of surgical wound complications. *Wounds International*
- Shipman AR, Millington GWM (2011) Obesity and the skin. *Br J Dermatol* 165(4): 743-50
- Stephen-Haynes J, Atkin L, Elstone A et al (2015) Best Practice Statement: Compression hosiery. *Wounds UK*
- Sullivan T, de Barra E (2018) Diagnosis and management of cellulitis. *Clin Med* 18(2): 160-3
- Thomas M, Morgan K, Lawrence P (2021) Introducing the new Chronic Oedema Wet Leg Pathway. *Br J Community Nurs* 26(Sup10): S16-21
- Timmons J, Bianchi J (2008) Disease progression in venous and lymphovenous disease: The need for early identification and management. *Wounds UK* 4(3): 59-71
- Vowden P, Kerr A, Mosti G (2020) Demystifying mild, moderate and high compression systems - when and how to introduce "lighter" compression. *Wounds International*
- Webb E, Bissett B, Neeman T et al (2022) Compression therapy is cost-saving in the prevention of lower limb recurrent cellulitis in patients with chronic edema. *Lymphat Res Biol*. Available online at: <https://www.liebertpub.com/doi/full/10.1089/lrb.2022.0029> (accessed 07.09.2022)
- Webb E, Neeman T, Bowden FJ et al (2020) Compression therapy to prevent recurrent cellulitis of the leg. *N Engl J Med* 383: 630-9
- World Union of Wound Healing Societies (2020a) Strategies to reduce practice variation in wound assessment and management. *Wounds International*
- World Union of Wound Healing Societies (2020b) Optimising wound care through patient engagement. *Wounds International*
- World Union of Wound Healing Societies (2020c) Demystifying mild, moderate and high compression systems - when and how to introduce 'lighter' compression. *Wounds International*
- Wounds International (2013) Principles of compression in venous disease: a practitioner's guide to treatment and prevention of venous leg ulcers. *Wounds International*
- Wounds International (2022) 3M™ Kerramax Care™ Super-Absorbent Dressing and 3M™ Coban™ 2 Two-Layer Compression System case series supplement. *Wounds International*
- Wounds UK (2015) All-Wales guidance for the prevention and management of skin tears. *Wounds UK*
- Wounds UK (2018) Best practice statement: Maintaining skin integrity. *Wounds UK*

APPENDIX 1: THE ADAPTED RATED TOOL FOR DIAGNOSIS

Date: _____ Patient Name: _____ MRN: _____

NGH Red Legs **RATED** (Rapid Assessment & Management Tool)

| Please Tick (✓) Yes or NO | YES | NO |
|--|-----|----|
| Is there sudden & progressive onset of red, hot, inflamed painful & tender area of skin? | | |
| Is it unilateral? (<i>Cellulitis Rarely Bilateral</i>). | | |
| Are there blisters or skin necrosis? | | |
| Does the patient report symptoms such as fever, chills, general malaise? | | |
| Is there portal of entry (insect bite/wound/toe web intertrigo, Tinea Pedis etc.)? | | |
| Does the patient have a temperature? | | |
| Are inflammatory markers e.g. (CRP) and/or (WCC) elevated? | | |

If there are 3 or more Yes's consider diagnosis as cellulitis & follow the cellulitis treatment plan.

Cellulitis



Blistering Cellulitis



Clinically assess and decide if patient is to be treated as an inpatient or an outpatient.

Lower Limb Cellulitis **Not** Requiring Admission to Hospital

Criteria for Discharge Home on oral antibiotics:

- Mild non-purulent cellulitis –no purulent drainage or pustules
- No systemic signs of infection (see SIRS criteria national guidelines no 6 Sepsis Management)
- <http://www.thehealthwell.info/node/870292>
- No uncontrolled chronic conditions such as morbid obesity, diabetes mellitus, peripheral vascular disease, immunosuppression
- No lymphangitis
- No previous failed oral antibiotics

Meets criteria for discharge

- Refer to GP for reassessment within 72hrs
- Advise the patient to return to ED if they experience the following: further skin changes (e.g. advancement of redness, blisters or necrosis, increasing pain or unresolved fever)
- Provide patient with cellulitis information leaflet

Criteria for Referral to OPAT/VHI Services:

- Ensure consultant is signed up to the relevant service
- Review OPAT / VHI referral forms inclusion exclusion criteria accessible via portal.opat.ie or vhihomecare.ie
- If referring to OPAT/VHI administer 1st dose of IV antibiotics as per Antibiotic Guidelines (Table 6 Skin & Soft Tissue in AMNCH /Naas Adult Medicines Guide)
- Bleep Liaison Nurse NGH 332 to arrange OPAT or VHI referral or contact OPAT Service Office **01 4276000** or VHI Service 086 7728850 or email cnmgroup@vhihomecare.ie to accept the patient

APPENDIX 1: THE ADAPTED RATED TOOL FOR DIAGNOSIS (CONTINUED)

Date: _____ Patient Name: _____ MRN: _____

Criteria for admission to hospital:

- Systemic signs of infection (see SIRS criteria national guidelines no 6 Sepsis Management page 76 <http://www.thehealthwell.info/node/870292>)
- Not safe to discharge home due to social/psychological circumstances
- Not suitable for OPAT/VHI services & requires IV antibiotics (Review OPAT/VHI referral form inclusion exclusion criteria accessible via portal.opat.ie or www.vhihomecare.ie)
- Patient with chronic uncontrolled/complex conditions e.g. morbid obesity, diabetes mellitus, peripheral vascular disease, cardiac, renal/ liver failure, immunosuppression, may be generally well or unwell
- Presence of skin changes e.g. lymphangitis blisters skin necrosis
- Requires surgical intervention
- Patient failed to respond to oral course of antibiotics

Care pathway non-purulent cellulitis

(No purulent drainage, exudate or abscess)

- Mark the area of redness
- Elevate limb
- Analgesia
- Administer IV antibiotics as per Antibiotic Guidelines (Table 6 Skin and Soft Tissue) in AMNCH /Naas Adult Medicines Guide
- Reassess for response to treatment e.g. has the redness regressed, is the pain improving, is the fever resolving, is CRP reducing?
- If failing to resolve contact microbiology
- Treat contributing factors e.g. Tinea Pedis, toe web intertrigo, untreated venous disease, skin barrier disruption, wounds or other dermatological conditions
- Consider tetanus (human/animal bites)
- Refer to RANP Tissue Viability

Care pathway purulent cellulitis





(Purulent drainage or exudate in the absence of a drainable abscess)

- Mark the area
- Elevate limb
- Analgesia
- Administer IV antibiotics as per Antibiotic Guidelines (Table 6 Skin and Soft Tissue) in AMNCH /Naas Adult Medicines Guide
- Reassess for improvement – has the redness regressed, is the pain improving, is the fever resolving, is CRP improving
- If failing to resolve contact microbiology
- Treat contributing factors e.g. Tinea Pedis, toe web intertrigo, untreated venous disease, skin barrier disruption, wounds, or other dermatological conditions
- Consider tetanus (human/animal bites)
- Refer to RANP Tissue Viability & dress as per Naas General Hospital Wound Care Guidelines
- Surgical referral for debridement if required



APPENDIX 1: THE ADAPTED RATED TOOL FOR DIAGNOSIS (CONTINUED)

Date: _____ Patient Name: _____ MRN: _____

If Not Cellulitis Consider the Following Differential Diagnoses
(Tick (✓) the Applicable Diagnosis)

| | |
|---|--|
| <p>Varicose Eczema/Stasis Dermatitis</p>  <div style="text-align: right; margin-top: 10px;"><input type="checkbox"/></div> | <p style="text-align: center;">Descriptor:</p> <p>Bilateral (may be Unilateral) redness with crusting, scaling, itchiness of the lower leg with a history of varicose veins or deep venous thrombosis.</p> <p>NB : Patients may report pain in Infected Varicose Eczema (Impetigisation)</p> |
| Care Pathway for Varicose Eczema/Stasis Dermatitis | |
| <p>Dry Varicose Eczema/Stasis Dermatitis</p>  <div style="text-align: right; margin-top: 10px;"><input type="checkbox"/></div> | <ul style="list-style-type: none"> Apply a potent topical steroid ointment (e.g. Betnovate 0.1%™ oint) for 2/52 Use emollients (e.g. Silcocks Base™) as a soap substitute and for moisturising Refer to ANP Tissue Viability for ABPIs +/- compression hosiery Provide patient information leaflet |
| <p>Wet Varicose Eczema/Stasis Dermatitis</p>  <div style="text-align: right; margin-top: 10px;"><input type="checkbox"/></div> | <ul style="list-style-type: none"> Use potassium permanganate soaks (Permitabs™ 400mgs) for 3 days then reassess Apply a potent topical steroid cream (e.g. Betnovate 0.1%™ cream) for 2/52 Use emollients (e.g. Silcocks Base™) as a soap substitute and for moisturising If required apply dressing as per NGH wound care guidelines Refer to ANP Tissue Viability for ABPIs +/- compression hosiery |
| <p>Infected Varicose Eczema/Stasis Dermatitis</p>  <div style="text-align: right; margin-top: 10px;"><input type="checkbox"/></div> | <ul style="list-style-type: none"> Potassium permanganate soaks (Permitabs™ 400mgs) for 3 days then reassess Apply potent topical steroid cream (e.g. Betnovate 0.1%™ cream) for 2/52 Use emollients (e.g. Silcocks Base™) as a soap substitute and for moisturising Swab crusted lesions as may require antibiotics orally (Usually staph infection) If required apply dressing as per NGH wound care guidelines Refer to ANP Tissue Viability for ABPIs +/- compression hosiery |



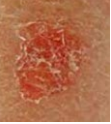




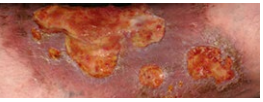

APPENDIX 1: THE ADAPTED RATED TOOL FOR DIAGNOSIS (CONTINUED)

| If Not Cellulitis Consider the Following Differential Diagnoses (Tick (v) the Applicable Diagnosis) | |
|---|--|
| <p style="text-align: center;">Acute Lipodermatosclerosis</p> <div style="display: flex; justify-content: space-between; align-items: center;">  <div style="text-align: center;"> <input type="checkbox"/> </div> </div> | <p style="text-align: right; color: #0070c0;">Descriptor:</p> <p>Acute Lipodermatosclerosis presents like cellulitis. It is an inflammatory condition not infective. The name is given to the skin changes that occur in venous insufficiency. It comes in an acute and chronic form. The acute presentation is an inflamed, warm and tender lower leg. It can be unilateral but is often bilateral. Compression therapy will assist in relieving the symptoms.</p> |
| <p>Care Pathway for Acute Lipodermatosclerosis</p> <ul style="list-style-type: none"> Refer to ANP Tissue Viability for ABPIs +/- compression hosiery & reassessment of response Consider topical steroids twice daily Dermovate™ in the acute phase Analgesia is vital to address pain Elevate as tolerated when resting to reduce inflammation Provide patient information leaflet | |
| <p style="text-align: center;">Deep Venous Thrombosis (DVT)</p> <div style="display: flex; justify-content: space-between; align-items: center;">  <div style="text-align: center;"> <input type="checkbox"/> </div> </div> | <p style="text-align: right; color: #0070c0;">Descriptor:</p> <p>Deep vein thrombosis (DVT) mainly affects the large veins in the lower leg & thigh. Patients present with pain, tenderness (particularly in calf), redness & elevated D-dimers.</p> |
| <p>Care Pathway for Deep Venous Thrombosis</p> <ul style="list-style-type: none"> Confirm with ultrasound and treat as per Section 11.2 Therapeutic Anticoagulation <i>AMNCH Naas Adult Medicines Guide</i> <input type="checkbox"/> Complete and send a Naas General Hospital pharmacy referral form for patient education on oral anticoagulants <input type="checkbox"/> | |

Clinician's Name: _____ MCRN/NMBI number: _____

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APPENDIX 2. ASSESSMENT FINDINGS THAT MAY REQUIRE REFERRAL TO SPECIALIST SERVICES

| Image | Symptoms | Diagnosis | Potential treatments |
|--|---|--|--|
| <p>Deep vein thrombosis</p>  | <p>Patient presents with acute onset of pain, tenderness (particularly in calf), and redness</p> | <p>Deep venous thrombus (DVT) Confirmed on Doppler ultrasound WELLS scores and D-dimer</p> | <p>Anticoagulant Analgesia Consider compression as soon as anticoagulated</p> |
| <p>Sepsis syndrome/necrotising fasciitis</p>  | <p>Acute onset erythema and blistering may rapidly spread Pain is a major factor</p> | <p>Consider sepsis syndrome/ necrotising fasciitis</p> | <p>Urgent emergency care Antibiotics as per microbiologist May require urgent imaging CT/MRI Urgent debridement in theatre Analgesia Plastic surgery Compression</p> |
| <p>Suspicious malignant skin lesions for referral to Dermatology</p> | | | |
| <p>Bowen's disease</p>  | <p>Bowen's disease looks like a red scaly patch on the skin. It is caused by abnormal growth of cells on the outer layer of the skin called keratinocytes. It is diagnosed on histological examination post-biopsy. It is often referred to as Bowen's disease or squamous cell carcinoma in situ (SCCIS). Treatment usually involves prescription and application of topical applications or surgery.</p> | | |
| <p>Basal cell carcinoma (BCC)</p>  | <p>A BCC can start as a reddish patch or irritated area that may crust or develop into a shiny bump or nodule that can be pearly, pink, clear, red or white. It can also be black, tan or brown in dark skin tones. It may or may not cause itch, pain or discomfort. Tiny blood vessels may be visible, but this is less evident on darker skin tones. Diagnosis is made on histological reports from biopsy and excision is undertaken to fully remove.</p> | | |
| <p>Squamous cell carcinoma (SCC)</p>  | <p>SCC is usually as a result of UV ray damage on sun-exposed sites and is frequently found on the lower limb. It is a slow-growing skin cancer that can appear as thick, rough, scaly patches that may crust or bleed. They can also be sore or painful to touch. They can also resemble an open sore that never fully heals. Sometimes they can look like a small volcano with raised edges and a depression or hole in the centre. They are not life-threatening but can be aggressive and, if not excised, they can grow quite large and spread to other parts of the body. Diagnosis is confirmed on histology from either a biopsy or excision. Further excision is required post-biopsy to ensure it has been fully removed.</p> | | |
| <p>Malignant melanoma</p>  | <p>Malignant melanomas present as raised or flat lesions with irregularly shaped borders, sometimes on an existing or a new mole. They can be brown, black, blue and even white, often a shade darker than a person's normal skin tone. Undetected, they can metastasise to the lymph nodes, liver, brain, lungs and, less commonly, the bone. It can be cured if caught early, but is the most invasive skin cancer with the highest risk of death if undetected. Patients with melanoma require extensive excision, scanning +/- treatments with regular screening.</p> | | |
| <p>Atypical lower limb skin diseases</p> | | | |
| <p>Bullous pemphigoid (BP)</p>  | <p>BP starts as a red rash before turning into blisters that are large and filled with clear fluid but can contain blood. Biopsy may be taken to confirm diagnosis, but treatment consists of topical steroids, mainly ointments or creams if the skin is very wet, as this helps heal the skin and prevent new blisters from appearing. Itch is a common complaint. Lower limbs can ulcerate if not recognised or treated appropriately and require compression therapy to heal lower limb ulcerations.</p> | | |
| <p>Autoimmune diseases (e.g. Pyoderma gangrenosum)</p>  | <p>Pyoderma gangrenosum (PG) is an extremely painful inflammatory skin disorder that is characterised by small, red bumps or blisters (papules or nodules) that eventually erode to form swollen open sores (ulcerations). The size and depth of the ulcerations vary greatly, and they are often extremely painful. PG can occur secondary to disorders such as inflammatory bowel disease or inflammatory arthritis. The exact cause of PG is unknown but is considered to be an autoimmune disorder.</p> | | |
| <p>Vasculitis</p>  | <p>Vasculitis is thought to be an autoimmune disease. It can occur after having an infection, which damages the blood vessels, resulting in a red-purple raised rash on the legs. Certain medications can also trigger vasculitis. Treatment depends on the extent of the disease and may include corticosteroids and immunosuppressant. A biopsy is required to confirm diagnosis, and blood tests and other studies may be required. If vasculitis is limited to the skin, compression therapy helps manage the inflammation.</p> | | |

