A leg ulcer is defined as a loss of skin below the knee, which takes more than six weeks to heal [1] [Fig 1]. Venous leg ulcers are caused by sustained high pressure within the venous system of the leg. Over half are caused by progressive venous reflux that begins as varicose veins, and the remainder develop after a deep vein thrombosis [2]. The key to effective management is accurate assessment of risk factors to enable the appropriate diagnosis to be made and the use of compression therapy to reduce the venous hypertension. In order to achieve this there are a number of important factors to consider.

1 Holistic management: When managing venous leg ulcers, a holistic approach should be taken. This ensures that all relevant factors are taken into account. Vowden et al [3] identified five key factors that should be considered in relation to the progression of healing:

1. Wound-related factors
2. Patient-related factors
3. Skills and knowledge of the healthcare professionals
4. Resources and treatment-related factors
5. Environmental factors

2 Assessment of risk factors: For any patient that presents with a new or recurring leg ulcer, the UK Royal College of Nursing (RCN) guidelines [4] suggest that a full clinical history together with a physical examination is conducted. It is important to use a structured assessment tool based on the risk factors identified. Family history of venous disease or history of varicose veins or deep vein thrombosis can increase the risk of developing venous ulcers. Any history of phlebitis, trauma or surgery, which may have damaged the veins, also increases the risk as can prolonged standing, obesity and multiple pregnancies. Robust risk assessment can lead to a more accurate diagnosis, which, in turn, supports effective management.

3 Skin assessment: Skin changes are often found on the lower leg as a result of a rise in venous pressure over a prolonged period of time [Fig 2]. These skin changes aid diagnosis and lead to appropriate management. Brown/pink pigmentation can be caused by leakage of red blood cells and deposits of haemosiderin. The skin can become very dry and itchy and, as the pressure rises, more leakage of waste products from the veins occurs, resulting in an eczematous reaction known as gravitational eczema. The tissue around the gaitor area can become thickened as fibrous tissue is deposited in the dermis and fatty layers of the skin. The leg shape subsequently changes appearance and over time can take on the look of an inverted champagne bottle.

4 Vascular assessment: A thorough patient and skin assessment can lead the practitioner to a venous ulcer diagnosis, however, it is important that a Doppler assessment or Duplex scan is performed prior to the application of compression

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bandaging or hosiery to exclude the presence of arterial disease. This involves measuring the blood flow in the arteries of the lower leg compared to that in the upper arm and is recorded as the ankle brachial pressure index (ABPI). In the absence of arterial disease, the systolic blood pressure should be equal to or exceed that in the arm, giving an ABPI of at least 1\(^{10}\). Anyone undertaking this procedure should be suitably trained in the technique as management regimens are often based on ABPI results, although not in isolation from risk and skin assessments.

5 **Ulcer management:** There is no evidence to support the superiority of any dressing type over another when applied under compression bandaging\(^{11}\); therefore, it is recommended that, where possible, a simple non-adherent dressing should be used. Remember that it is the treatment of the underlying cause through the use of compression therapy that will ultimately heal the leg ulcer. If the ulcer is clinically infected then appropriate antimicrobial dressings may be of benefit in the short term and if the wound is highly exuding, more absorbent dressings or an increase in the frequency of dressing change would prevent the skin from becoming macerated. Attention should be given to the causes of the symptoms in the first instance.

6 **Elastic compression therapy:** The mainstay of venous leg ulcer treatment is compression therapy, which aims to reverse venous hypertension. This can be achieved through the application of compression bandages or hosiery. Elastic or long-stretch bandages, of which the four-layer system is an example, provide a pressure profile of between 35–40mmHg at the ankle. This pressure can be sustained for a week as the bandages have an ability to accommodate changes in limb shape and movement\(^{11}\). It is important to measure the ankle circumference prior to bandage selection and most bandages are developed to apply the correct amount of pressure for an ankle circumference between 18–25cm\(^{12}\).

Training is required before applying multi-layered compression bandages, both in the theory of compression therapy and its practical application. The shape and size of the limb are important factors in achieving the appropriate compression levels to heal venous ulcers. Bandages that are inappropriately applied can lead to pressure necrosis, skin breakdown and increased pain if too tight, and slow ulcer healing if the pressure is too light. Competence can be improved and maintained through practising the technique repeatedly on willing subjects. Some patients find that applying four-layers of bandages is not practical because they cannot wear their normal shoes, therefore, staff should be mindful of this when making a bandage selection.

7 **Inelastic compression therapy:** These type of bandages are known as short-stretch and, as such, have little extensibility, forming a tube around the leg rather than a graduated compression from the ankle to the knee. Pressure is exerted against the bandage when the leg or foot is exercised through movement of the calf muscle and the pressures can range between 30–60mmHg. Low resting pressures and high working pressures are achieved using this system and, therefore, are suitable for patients with mixed aetiology ulceration and chronic oedema, under supervision. Many staff find short-stretch bandages easier to apply than the four-layer system and they are generally less bulky for patients.

The bandage should be applied by rolling it around the leg and ‘tugging’ as it passes around the back of the leg to ensure full stretch. It is important to remember that when used on oedematous legs, the fluid can reduce rapidly and, therefore, the bandages should initially be renewed more frequently in order to control the oedema.

8 **Compression hosiery:** The range of compression hosiery has significantly increased over the past 10 years, with stockings, socks and tights now available in

References

Quality of Life: Many patients with venous leg ulceration go through a cycle of ulcer healing and recurrence, which can influence their quality of life. When managing a patient with venous leg ulcers it is important to explore quality of life issues that may be influencing this cycle and introduce measures to improve and sustain changes where possible. Consideration should be given to pain, both at the dressing change and throughout the day.

The effects of leaking and odour from a leg ulcer should also not be underestimated and increasing dressing changes and treating infection can make a difference to quality of life. Social isolation can also have a major impact on a person’s life and an important part of managing leg ulceration should focus on the psychosocial aspects of living with a venous leg ulcer[10].

CONCLUSION
Venous leg ulceration is a significant and complex problem for clinicians to manage, as well as having a potentially dramatic effect on patients’ quality of life.

Managing all of the holistic factors detailed in section one will ensure the patient, the wound, the environment, the resources and the clinician’s skills are all taken into account when managing patients with venous leg ulcers.

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