The common but preventable problem of venous leg ulceration is painful and debilitating for patients, and expensive and time consuming for the NHS to treat (Atkin, 2019; Guest et al, 2017; Guest et al, 2015). As such, it is imperative that nurses know how to prevent lower-leg ulceration and recurrence (Atkin, 2019). Compression therapy plays a key role in prevention and should be part of a standardised approach to remove unacceptable variations in care and ensure all patients receive the same high quality of evidence-based treatment (Atkin, 2019; Atkin and Critchley, 2017; NHS England, 2017).

Primary prevention

Venous disease/venous hypertension (VH) is the main cause in over two-thirds of leg ulcers (Agale, 2013; Spentzouris and Labropoulos, 2009). Treating patients with VH should begin by reducing the risk of progressive disease, so it is vital to identify the patient’s risk factors and establish modification strategies (Atkin, 2019). The main risk factors include increasing age, being female, pregnancy, family history, occupational risk and high body mass index (BMI).

Possible interventions include:

- Lifestyle measures;
- Venous intervention;
- Compression therapy (Atkin, 2019).

The rise in obesity, with its associated comorbidities, is placing a significant burden on health services, including lower-limb services (Agha and Agha, 2017). Obesity is directly linked to venous insufficiency, as the abdominal fat mass increases intra-abdominal pressure, leading to VH (Scholl et al, 2017). This commonly results in skin changes and limb symptoms typical of chronic venous disease – discussed in part 1 of this series (Atkin, 2019) – which increase as BMI rises (Padberg et al, 2003).

As there is often no evidence of pathological venous disease – the valves and veins are often healthy – treatment should focus on weight reduction and compression therapy (Padberg, 2005).

Nurses need to encourage patients with elevated BMI to lose weight and take regular exercise in combination with a healthy balanced diet. Tools such as the NHS 12-week diet and exercise plan (Bit.ly/NHSWeight) can help by promoting and supporting safe, sustainable weight loss and healthier lifestyle choices.
Preventing recurrence

Rates of recurrence three months after healing are reported to be as high as 70% (Franks et al, 2016), with many clinicians proposing that venous ulceration should be viewed as a long-term condition (Brown, 2018). The most effective way to reduce the risk of recurrence is through health programmes that educate patients and promote engagement with self-care (Miller et al, 2014a; Miller et al, 2014b; Freeman et al, 2007; Brooks et al, 2004) (see part 3). Venous interventions (endovenous ablation) (Gohel et al, 2018; Barwell et al, 2004) and compression hosiery (Nelson et al, 2006) are also important in reducing the risk of ulcer recurrence (Atkin, 2019).

VH is often related to venous insufficiency as a result of valvular incompetence. This is potentially correctable with endovenous intervention (Santler and Goerge, 2017), so all patients with symptomatic varicose veins (pain, itching, skin changes, ulceration) should be referred to a vascular centre (Atkin, 2019; National Institute for Health and Care Excellence, 2013).

Compression therapy

Compression hosiery has a therapeutic effect on VH; it has been shown to reduce ulceration and other symptoms of venous insufficiency, such as oedema, and reduce the risk of ulcer recurrence (Lurie and Kistner, 2011; Pannier et al, 2007; Nelson et al, 2006). The higher the level of compression, the more effective it is in reducing recurrence (Nelson et al, 2006).

Compression therapy needs to be graduated, exerting an external pressure that is higher at the ankle and reduces towards the calf or thigh. Graduated compression hosiery works by compressing the superficial venous system. This aids valve function, encouraging the superficial veins to empty into the deep venous system, which reduces VH and subsequently decreases limb oedema (NICE, 2013).

Before starting compression therapy, nurses should assess patients for signs of arterial disease – a contraindication for compression therapy. Most commonly used for this is the ankle brachial pressure index test (Atkin, 2019); however, this is only one part of lower-limb assessment. Other factors to consider are:

- The patient’s medical history;
- Medication;
- Current symptoms;
- Risk factors.

This information should be combined with clinical examination of the limb, which may include pulse palpation, Doppler waveform assessment and/or toe pressures. Box 1 outlines a case study.

**Product selection**

Many different brands and types of compression hosiery are available. Factors to consider are:

- Length – knee, thigh, tights (Table 1);
- Strength – class 1, 2, 3;
- Knit – flat, circular (Table 2);
- Classification – British or European (German, RAL, French).

European classifications tend to be stronger or have a higher compression value than British ones, and are often manufactured using stiffer fabric. This has advantages for managing oedema, as it provides a stiffer structure around the limb to prevent pooling. Differences between compression strengths/classes/types can also vary according to the manufacturer/product.

The level of pressure required depends on the severity of the condition; the optimum level to reduce ulcer recurrence is 25-35mmHg Class 3 hosiery (Brown, 2018). However, nurses must consider the patient’s ability to apply/remove the hosiery due to arthritis in his hands.

Mr Taylor requires below-knee compression hosiery (ideally class 3) to treat his venous hypertension (VH) but his arterial status must be assessed with an ankle brachial pressure index (ABPI) test to check for arterial disease and his suitability for compression. The nurse must also establish whether he has any difficulty applying or removing hosiery.

Further assessment reveals no signs, symptoms or indication of peripheral arterial disease (ABPI = 0.95) and he is suitable for strong (class 3) compression. However, Mr Taylor is concerned about his ability to apply/remove the hosiery due to arthritis in his hands. He is given information to ensure he understands the need for ongoing compression therapy and its role in preventing further ulceration. He is also taught how to use applicator aids to help apply and remove class 3 stockings. If Mr Taylor continues to find application/removal difficult, he could be given a lower class of stocking, which may be easier for him, while providing enough compression to treat his VH.

The nurse asks him if he has any colour preference and if he would like open- or closed-toe stockings. His lower limb is measured in line with the manufacturer’s guidance and an appropriate size selected using measurement charts. The appropriate compression is applied and the fit checked. Mr Taylor is given verbal and written information about caring for his stocking, the reasons for wearing it and the importance of skin care. He is told he will need a repeat assessment in three months but to contact the clinic if he has any problems.

The patient’s name has been changed.

Ian Taylor* is a 65-year-old retired postmaster. A year ago he developed an active leg ulcer, which healed with the use of compression bandaging. His other medical history includes deep vein thrombosis, arthritis and recent endogenous ablation of his right leg.

Mr Taylor has returned to the leg ulcer clinic; he is generally well, but concerned about increasing itching and skin discoloration in his right medial gaiter region, the area of his previous ulceration. He is not using any compression therapy. Clinically, the limb is warm to touch and well perfused, and Mr Taylor is not complaining of any specific pain. There is evidence of haemosiderin staining, but no oedema, ulceration or skin irritation.

What treatment does Mr Taylor need?

What further assessments are required?

Mr Taylor requires below-knee compression hosiery (ideally class 3) to treat his venous hypertension (VH) but his arterial status must be assessed with an ankle brachial pressure index (ABPI) test to check for arterial disease and his suitability for compression. The nurse must also establish whether he has any difficulty applying or removing hosiery.

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**Box 1. Case study**

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The patient’s name has been changed.
none (Brown, 2018; Nelson et al, 2006). However nurses should also consider alternatives such as a combination of stockings to gain the desired compression value before downgrading (see Part 3). An example of a guide to select hosiery is given in Table 3.

Measuring correctly
Accurate measurement is essential to ensure the most appropriate hosiery and the correct fit. A stocking that fits well will produce effective graduated compression and be comfortable to wear (Anderson and Smith, 2014). As many as 17% of patients reported that inappropriate fit and the feeling of their circulation being cut off was the main reason they did not wear their compression garments (NICE, 2013).

It is best to measure patients’ legs first thing in the morning, or as soon as possible after removing compression bandages, to minimise the risk of oedema occurring, leading to inaccurate measurement of the limb. Patients should be asked to stand with their weight placed evenly on both feet – both legs should be measured as variations are common. It is important to check the manufacturer’s instructions to see which measurements are needed; there are usually three for below-knee stockings:
- Narrowest part of the ankle;
- Widest part of the calf;
- Foot/limb length.

Select the correct hosiery by checking the range into which the measurements fall; a sizing chart specific to the manufacturer should be used as sizing guides often differ. It is important to ensure the stocking fits both in width and length. For below-knee stockings, aim for the stocking to stop one finger-width below the knee crease on the back of the leg. If measurements fall outside these parameters, or the limb is an unusual shape/length, made-to-measure compression hosiery will be needed.

Applying hosiery
The clinician should apply the hosiery first to ensure an appropriate fit (Coull and Clark, 2005). When applying and adjusting the stocking, take time to instruct the patient – for example, on how to avoid creases. If using open-toe hosiery, ensure it does not roll up over the dorsum of the foot; this hosiery is recommended for patients with neuropathy, especially diabetic neuropathy, as it allows for daily foot inspection and does not compress the toes together, which may increase the risk of foot ulceration. Box 2 gives advice on applying below-knee hosiery.

Guided reflection
Think about a patient you have nursed who required compression hosiery to manage venous insufficiency.
- How would you explain the benefits of compression?
- What advice would you give your patient about applying their hosiery?
- What should patients do if they experience problems applying hosiery at home?

Conclusion
Compression therapy plays an important role in preventing and managing lower-limb problems resulting from chronic venous disease/VH, and the benefits of long-term compression therapy for patients at risk of venous leg ulcers have been well documented. Nurses’ ability to achieve the right hosiery selection and fit, and ensure patients can apply it is crucial to the therapy’s effectiveness in helping to resolve patients’...
symptoms and reduce the risk of ulceration. Giving patients some degree of choice and ensuring the selected product is comfortable will also help establish daily use. This will be covered in more detail in part 3.

References


Miller C et al (2014b) Sustaining behaviour changes following a venous leg ulcer client education program. Healthcare (Basei); 2: 3, 323-337.


Table 3. Selecting appropriate compression hosiery

<table>
<thead>
<tr>
<th>Conditions</th>
<th>With oedema</th>
<th>Without oedema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary prevention</strong></td>
<td></td>
<td></td>
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<tr>
<td>Tired, aching, heavy legs</td>
<td>European class hosiery: Class 1 (18-21mmHg)</td>
<td>British Standard hosiery: Mild: Class 1 (14-17mmHg)</td>
</tr>
<tr>
<td>Spider veins</td>
<td>Class 2 (23-32mmHg)</td>
<td>Moderate: Class 2 (18-24mmHg)</td>
</tr>
<tr>
<td>Ankle flare</td>
<td></td>
<td>Severe: Class 3 (25-35mmHg)</td>
</tr>
<tr>
<td>Mild/moderate hyperkeratosis</td>
<td></td>
<td>40 mmHg British Standard hosiery kit</td>
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<tr>
<td>Mild/moderate varicose veins</td>
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<td></td>
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<tr>
<td>Hyperpigmentation</td>
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<td></td>
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<tr>
<td>Venous dermatitis</td>
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<td></td>
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<tr>
<td><strong>Ongoing maintenance and early/medium intervention</strong></td>
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<tr>
<td>Varicose eczema/contact dermatitis</td>
<td>European class hosiery: Moderate: Class 2 (23-32mmHg)</td>
<td>British Standard hosiery: Moderate: Class 2 (18-24mmHg)</td>
</tr>
<tr>
<td>Atrophic blanche</td>
<td>Severe: Class 2 (34-46mmHg)</td>
<td>Severe: Class 3 (25-35mmHg)</td>
</tr>
<tr>
<td>Severe varicose veins</td>
<td>40 mmHg European Class hosiery kit</td>
<td>40 mmHg British Standard hosiery kit</td>
</tr>
<tr>
<td>Moderate hyperkeratosis</td>
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<tr>
<td>Healed ulcer</td>
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<tr>
<td>Recurring ulcer</td>
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<tr>
<td>Cellulitis</td>
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<tr>
<td>Chronic oedema (toes, feet legs)</td>
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<tr>
<td><strong>Intensive management</strong></td>
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<tr>
<td>Acute or chronic lipodermatosclerosis</td>
<td>European class hosiery: Consider period of inelastic compression bandaging/inelastic Wrap system to reduce and limb distortion prior to using hosiery</td>
<td>British standard hosiery: Severe: Class 3 (25-35mmHg)</td>
</tr>
<tr>
<td>Severe hyperkeratosis</td>
<td>Moderate: Class 2 (23-32mmHg)</td>
<td>Severe: Class 3 (34-46mmHg)</td>
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<tr>
<td>Skin folds</td>
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<td>Papillomatosis</td>
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<td>Lymphangioma</td>
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<td>Lymphorrhoea (wet legs)</td>
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<tr>
<td>Lymphoedema/lipoedema</td>
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Source: Adapted from Timmons and Bianchi (2008) and the CHROSS checker assessment tool (Bit.ly/CHROSSChecker).