Compression hosiery to reduce leg ulcer recurrence

Leg ulcer healing is an event to be celebrated and is achieved by skilled input from nurses and considerable effort by patients. However, keeping venous leg ulcers healed is a significant challenge, with recurrence rates a cause for concern.

Reported rates of leg ulcer recurrence vary. In one of the first major leg ulcer studies in the UK, Callam et al (1987) reported rates of at least 67%. In 2006, Nelson et al (2006) reported a 36% recurrence rate at five years in a study involving 300 patients, and a smaller study in 2012 found a 16% recurrence rate (Clarke-Moloney et al, 2012). Finlayson et al (2011) reported a 44% recurrence rate in a study of 80 patients where the median recurrence time was only 27 weeks. The authors of these studies suggested that high rates could be due to patients not wearing compression hosiery, or at least not for prolonged periods. Lower rates were associated with a continued level of support for patients by nurses ensuring hosiery was worn (Clarke-Moloney et al, 2012).

Hosiery and recurrence

Once venous leg ulcers have healed, the focus is on maintaining the healed state by managing the underlying venous disease. Surgical intervention can drastically reduce the likelihood of recurrence (Gohel et al, 2007). A randomised controlled trial comparing venous surgery and compression hosiery with hosiery alone found recurrence rates at four years of 31% and 56% respectively (Gohel et al, 2007). However, for many patients, surgery is not an option due to the nature or location of the venous disease, or they may decline it (Ghauri et al, 1998). If surgery is not possible, management centres on compression hosiery. Other interventions important in reducing the effects of venous disease include:

- Weight control;
- Exercise, specifically that involving calf muscle and ankle joint movement;
- Leg elevation when sitting;
- Avoiding prolonged standing;
- Keeping the skin of the lower leg in an optimal state (Moffatt et al, 2007).

All of this is supplemented by patient support from nurses. Patients should also be encouraged to report urgently any signs of deterioration, such as breaks in the skin, increased itch or ankle swelling, so that remedial action can be taken to reduce the high risk of ulcer recurrence.

Maintaining healing is inherently challenging because it relies on the willingness and ability of patients to carry out ulcer care as part of daily living. Compression hosiery is necessarily firm and can be difficult to apply, even for able-bodied people, and is a lifelong commitment (Franks et al, 2006). To health professionals, it may seem logical that the treatment will prevent the problem but patients may think differently, especially if they have already had a recurrence despite wearing hosiery.

In this article...

- Why venous leg ulcers recur
- The role of compression hosiery in preventing recurrence
- Improving patient concordance with compression hosiery
Van Hecke et al (2009a) conducted a systematic literature review to examine the perspectives of patients and nurses on adherence to treatment. Patients reported that hosiery was difficult to apply and were body image issues related to the garments. They were also concerned about advice they were given by health professionals, with conflicting information or instructions they found impossible to follow or carry out.

Nurses expressed concerns that patients had poor motivation and understanding of their condition. They recognised issues such as inadequate staff or resources as well as the setting in which patients are managed as affecting engagement. For example, adherence was lower in patients nursed at home; this may be because these patients are among the frailest and least able to manage their hosiery and other parts of their management plan alone. Van Hecke et al (2009a) concluded that nurses needed to develop a greater understanding of patients’ perspective and capabilities and develop a much more patient-focused and collaborative approach to care.

There is evidence that nurses who had experienced less successful care outcomes tended to provide less education for patients and found it difficult to encourage them (Van Hecke et al, 2009b). In addition, some nurses may be more focused on the acute stage and, after healing has occurred, are less inclined to be involved and are happy to leave ongoing care to carers who may have little knowledge of aetiology and treatment to support their role (Flanagan et al, 2001). This lack of involvement may be due to service constraints or a lack of understanding by managers of the high risk of recurrence and the need for a targeted and active approach to ulcer prevention.

Patients who do not appreciate the underlying cause of their ulcer may leave the service believing they have been “cured” (Anderson, 2012). Ideally, there should be a healed ulcer service to ensure ongoing support and health promotion (Dowsett, 2011) with the aims of reducing recurrence and associated costs.

**Level of compression**

A Cochrane review of compression hosiery concluded that compression therapy reduces leg ulcer recurrence more than no compression and that higher compression values are more effective but less likely to be worn (Nelson and Bell-Syer, 2012). It recommended that the highest rate tolerable should be used but that the minimum should be a UK Class 2 garment (see Table 1). UK standard hosiery is effective for up to three months and RAL (German Institute for Quality Assurance and Certification) standard for six months. The names refer to the testing standards that measure hosiery performance. The key differences between the two systems are the compression values in each class, the length of time they maintain their clinical effectiveness (if worn daily, UK is three months and RAL is six months) and the wider variety of sizes in the RAL (Dowsett, 2011).

Clinical effectiveness in terms of how long the hosiery can be expected to maintain compression levels will depend on the care of the hosiery. Assuming the patient has sufficient hosiery (one to wash and one to wear), a new prescription will be required at six months or one year respectively (Wounds UK, 2007). The prescription review is an ideal opportunity to reassess patients; however, given that the greatest risk period for ulcer recurrence is within the first six months (Vowden and Vowden, 2007), support should be in place to maintain healing during this time.

**Types of hosiery**

Compression hosiery applies pressure evenly around the limb to control oedema and increase the rate of venous blood return. Active venous ulcers are generally managed with compression bandages, which exert relatively high pressures to the lower limb, controlling oedema and increasing venous flow (Moffatt et al, 2007). Once an ulcer has healed, the patient is prescribed compression hosiery. If a UK Class 2 or RAL Class 2 product is used, the patient experiences less pressure than with compression bandages, and oedema could increase and venous flow slow down, increasing the risk of reulceration.

In recent years, a wealth of new materials and products designed to offer more choice and more effective compression profiles have been developed. An effect of this has been a greater understanding of the way in which materials perform.

Key determinants of hosiery performance are referred to as resting and working pressures, and static and dynamic stiffness. When a patient is lying down, the pressures within the leg are relatively low and compression will exert a pressure determined by the class of hosiery and the circumference of the leg. When the patient stands up, the pressure in the leg rises and there is more of a push against the hosiery as the leg circumference increases.

Material with a low stiffness index will exert less pressure on the leg as the material will give or stretch. There will be less investment in material with a high stiffness index and therefore greater oedema control (Partsch and Partsch, 2007). This performance is tested by measuring pressures at a set point on the leg where the Achilles tendon changes into the calf muscle, which is referred to as point B1 (Partsch and Partsch, 2007). The stiffness index is determined by measuring the increase in interface pressure (between the hosiery and the leg) due to the increased circumference at the B3 point in the supine and standing position. A small increase will indicate a high stiffness as the hosiery is controlling the ability of the leg to increase in circumference.

Products may have similar resting pressures but their performance when patients stand up and move will depend on their stiffness. This is important to consider when products are selected as it may have significant implications for reducing and controlling oedema and venous reflux (Partsch et al, 2006; Van Geest et al, 2000).

**Making use easier**

There are now many colours and styles of compression hosiery, including below-knee and full-leg garments as well as socks. To make application easier, hosiery can be supplied in a kit with two stockings – a liner exerting low interface pressures, and a second higher pressure outer layer. The inner layer is relatively easy to put on and acts as a smooth surface to ease the application of the outer layer (these include Mediven made by Medi UK, and a leg ulcer hosiery kit made by Activa). There is also a type of hosiery that is zipped from the back of the calf to the back of the knee.

There are many aids to make application and removal easier (Table 2). Manufacturers of stockings may have aids available, many of which can be prescribed.

**Conclusion**

There is clear evidence that ulcer recurrence rates reduce when compression

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**TABLE 1. UK AND RAL HOSIERY VALUES**

<table>
<thead>
<tr>
<th>Hosiery</th>
<th>Compression value (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK Class 1</td>
<td>14-17</td>
</tr>
<tr>
<td>UK Class 2</td>
<td>18-24</td>
</tr>
<tr>
<td>UK Class 3</td>
<td>25-35</td>
</tr>
<tr>
<td>RAL Class 1</td>
<td>18-21</td>
</tr>
<tr>
<td>RAL Class 2</td>
<td>23-32</td>
</tr>
<tr>
<td>RAL Class 3</td>
<td>34-46</td>
</tr>
<tr>
<td>RAL Class 4</td>
<td>49</td>
</tr>
</tbody>
</table>
### TABLE 2. EXAMPLES OF APPLICATION AND REMOVAL AIDS FOR COMPRESSION HOISERY

<table>
<thead>
<tr>
<th>Application aid</th>
<th>Open/closed toe garment</th>
<th>Manufacturer</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubber gloves</td>
<td>Ordinary fine household gloves, as used for glass cleaning and so on</td>
<td>The gloves allows a better grip on the hosiery. Latex-free may be necessary</td>
<td></td>
</tr>
<tr>
<td>Slippie</td>
<td>Generic name for a silky/nylon garment that sits on the foot to allow the hosiery to slide over the foot</td>
<td>Open</td>
<td>Nylon slipperette that fits over the foot to help the hosiery slide over the surface. The material is then pulled out through the open toe</td>
</tr>
<tr>
<td>ActiGlide</td>
<td>Both</td>
<td>Activa</td>
<td>Slippy fabric that allows hosiery to be pulled over it. Handles allow the fabric to be pulled from under the stocking</td>
</tr>
<tr>
<td>Mediven 2 in 1</td>
<td>Both</td>
<td>Medi UK</td>
<td>Helps with application and removal of hosiery. To apply the hosiery, the barefoot is placed on the foot diagram and the fabric is tucked between the first and second toe; the hosiery then slides across the slippery fabric. To remove the hosiery, the foot is slipped into the pocket of the Mediven 1 in 1. The hosiery is then folded over the aid and, as the slippery fabric is pulled off, the hosiery comes with it</td>
</tr>
<tr>
<td>Slippie Gator</td>
<td>Both</td>
<td>Juzo</td>
<td>Kit including a pad for the floor to slide the stocking on to the foot. Slippery fabric enables the hosiery to be slid onto the leg and gloves smooth the hosiery in place. The floor pad can be used alone to help slide hosiery and socks onto the foot</td>
</tr>
<tr>
<td>Frame</td>
<td>Both</td>
<td>Various, including Medi UK and Jobst</td>
<td>Plastic-coated frame. The hosiery is fitted over the frame and the foot slides in. Handles are used to pull the hosiery up the leg. Larger sizes are available. The frame can be useful when the hip cannot be flexed, for example, after hip replacement (Dilks and Green, 2005)</td>
</tr>
</tbody>
</table>

Note: Most manufacturers provide video clips on their websites.

hosiery is worn and, for this to happen, patients need education and support as well as practical solutions. If nurses are aware of the types of compression available and devices to help with its use, they are more likely to engage with the care patients require. NT

### References


