Use of compression hosiery in venous leg ulceration

**Summary**

Venous leg ulceration is a common problem in older people that adversely affects their quality of life. It is also a major cause of morbidity for many patients in hospital and community settings. Patients experience considerable pain and distress as a result of this condition and annual costs to the NHS are high. However, good nursing management and the correct use of compression therapy can lead to faster healing rates (Effective Health Care 1997), and reduced nursing time. This article discusses the use of compression hosiery in the prevention and treatment of venous leg ulcers.

**NURSES IN** a variety of healthcare settings will frequently encounter patients with leg ulcers. Leg ulceration might be the primary reason for requiring healthcare services or might be present in people admitted to hospital for other health problems, such as joint replacement, heart failure or diabetes. Venous leg ulcers are a major cause of morbidity (Effective Health Care 1997) and it is estimated that 1 per cent of adults experience leg ulceration at some time (Baker et al 1991).

The majority of leg ulcers are venous in origin (Fig. 1). Venous ulcers are predominantly caused by high pressure in the leg veins (venous hypertension), due to blockage or weakness of the valves in either the deep or superficial veins (Vowden and Vowden 1998). Prevention and treatment of venous ulcers is aimed at reducing the pressure, either by removing or repairing the superficial veins, or by applying compression to reverse venous hypertension. Surgery is contraindicated in patients with a blockage in the deep veins, and venous ulcers are managed with compression using a variety of systems including stockings or bandages (three-layer, four-layer or short-stretch bandages). Compression enhances venous return and reduces oedema and is the mainstay of treatment for venous ulcers (AHG 1992); surgery and medication have not yet been established as effective strategies for leg ulcer prevention (Effective Health Care 1997).

Since compression is primarily a palliative rather than a curative intervention, it needs to be applied for as long as there is evidence of venous disease, which in most cases means a lifetime (Nelson 1997). It is, therefore, important that patient education begins at the first clinical assessment so that patients have a clear understanding of the aetiology of leg ulcers and the reasons for, and effects of, compression therapy.

This is an ideal opportunity to prepare the patient for the fact that treatment needs to continue after the ulcer has healed. Compression hosiery reduces venous reflux by increasing venous pressure in the legs relative to pressure in the rest of the body (Nelson et al 2001a), and is considered the best form of treatment in the prevention of ulcer recurrence (AHG 1992, Somerville et al 1974).

It is essential that community nurses receive adequate education and training in leg ulcer management, including the assessment and application of compression therapy. Ulcer healing rates have improved significantly as a direct result of using high compression bandaging as first-line treatment by community nurses. Cullum et al (2001) demonstrated that the healing rates in venous leg ulcers range from 22 per cent to 71 per cent, and that when compression therapies are used these figures increase by 10 to 50 per cent. However, the success in healing ulcers has augmented the risk of more patients developing ulcer recurrence. Recurrence rates range from 26-69 per cent in the 12 months after healing (Monk and Sarkany 1982, Vowden et al 1997).

In the Lothian and Forth Valley study (Callam et al 1985), two thirds of the 600 patients evaluated had experienced two or more episodes of ulceration and a large percentage (21 per cent) of patients had experienced more than six recurrent episodes.

On searching the literature on leg ulcer treatment, Nelson et al (2001b) found no randomised controlled trials (RCTs) comparing the use of compression hosiery versus not using compression in ulcer recurrence. While there is a paucity of trial evidence to support the use of compression hosiery, two trials showed that people who did not wear hosiery were at much higher risk of recurrence (Franks et al 1995, Harper et al 1995), and expert opinion advocates compression as an essential component in the management of ulcer recurrence (RCN 1998). Compression hosiery is an...
important prophylactic treatment in the prevention of leg ulcers (Mayberry et al 1991) and ulcer recurrence (Jeffery and Nicolaides 1990, Moffatt and Dorman 1995), and is also used to treat varicose veins (Thomson et al 1996). Van dongen and Stacey (2000) suggest that compression stockings have a measurable beneficial effect on skin by reducing the area of lipodermatosclerosis.

Patient assessment

**Arterial supply** Patients presenting with a leg ulcer must undergo an initial assessment, which includes arterial Doppler ultrasound, to screen for arterial insufficiency. It is important to establish if arterial insufficiency is present as early as possible, as this would be further compromised by the application of compression. Applying compression to a limb with poor arterial supply could cause pressure necrosis and, in severe cases, could lead to limb amputation (Callam et al 1987, Vowden et al 1996). Systolic pressures at the ankle (using the dorsalis pedis and posterior tibial pulses) and brachial arteries are measured and the ankle brachial pressure index (ABPI) is calculated by dividing the highest ankle pressure for each leg by the higher of the two brachial pressures. Compression is contraindicated if the ABPI ratio is less than 0.8mmHg, as this suggests significant arterial disease (Vowden et al 1996).

A patient’s arterial supply can deteriorate over time and, therefore, it is important to reassess him or her to check that the level of compression remains safe and appropriate. It is difficult to recommend an optimal timescale to reassess arterial blood supply with a hand-held Doppler, but RCN (1998) guidelines recommend that this should be measured every three months. The authors suggest reassessment at least every six to 12 months, or more often if the last ABPI reading is below 0.9, since patients might develop arterial disease, thereby increasing the risk of pressure necrosis from compression hosiery.

**Adherence** Studies have shown that people who do not wear their compression hosiery are more likely to experience ulcer recurrence (Franks et al 1995, Harper et al 1995). However, adherence with compression hosiery is a major problem, as patients might believe that they are ‘cured’ once the ulcer has healed and might not be aware of the importance of continuing therapy (Jones and Nelson 1998).

Other factors involved in patient adherence to hosiery are the cosmetic appearance of the stockings, difficulty in putting them on, discomfort, especially in hot weather, and allergic reactions. It is important that health professionals spend time explaining to patients the use of compression and the reasons hosiery is required, and also that they explore patients’ and carers’ knowledge and understanding of the condition. Identifying any potential problems or difficulties and discussing these with each patient might help to promote improved adherence.

**Allergies** Other pertinent factors to consider during patient assessment are known allergies, as some patients have had allergic reactions to nylon, rubber and Lycra™ in the stockings (Moffatt and Dorman 1995). A trial by Franks et al (1995) showed that the incidence of stocking reactions was as high as 30 per cent in participants. Using alternative stockings or wearing a thin lining or layer of cotton stockinette underneath the stocking could minimise the risk of skin irritation. If there is any doubt regarding allergic reaction, a crude patch test should be conducted using material from a sample stocking.

**Patient involvement** Patients should be actively involved in their care and in decisions about their preferred type of hosiery, such as the colour, material, open or closed toe, below knee or thigh length. In a study on the use of post-operative compression, Travers et al (1990) found that of 32 women, 17 did not wear stockings at all, and 19 found the cosmetic appearance unacceptable. It is likely that involving the patient in the choice of stocking will increase the likelihood that stockings will be worn. Patients should also be offered health promotion advice, for example, information on diet and weight control.

Specific exercises that aid venous return should be encouraged, such as ankle flexing and foot rotation. Emphasising the need for leg elevation and the avoidance of standing for long periods is also important to promote venous return. This information could also be provided in a leaflet, which could be read at leisure to help reinforce verbal information.

**Measurement**

Patients must be measured accurately for compression hosiery as this not only aids comfort and ultimately adherence, but also reduces the risk of potential trauma and further ulceration. A stocking that fits correctly produces an effective graduated compression without forming tight
bands at the knee or below (Nelson 1996). Stockings that do not provide graduated compression are less effective at increasing venous return (Van Gerwen 1994). Ideally, the affected limb should be measured in the morning before oedema develops, as a result of poor venous return in this group of patients, or after a period of rest and leg elevation. It should also be measured again as soon as the ulcer has healed. The patient’s feet should remain flat on the floor while the following measurements are taken:

- Ankle circumference at the narrowest point of the limb.
- Calf at the widest point.
- Thigh at the widest point (thigh length).
- Foot length (closed toe/sock).
- Vertical length, from top of the stocking to the sole of the foot.

Compression hosiery can cause damage and extreme discomfort in high-risk areas, for example, bunions, crowded and deformed toes, and constricting cuffs around arthritic knees. While standard stocking sizes available on prescription will accommodate both legs are affected, each should be assessed and measured separately.

Only products that comply with British Standard 6612 on compression are available on Drug Tariff; those conforming to the Hohenstein classes (Continental Europe) are excluded (Cowan 1997). Stock sizes and made-to-measure compression hosiery are available on prescription, but each stocking is classed as a separate item on the Drug Tariff; bands at the knee or below (Nelson 1996). Stockings that do not provide graduated compression are less effective at increasing venous return (Van Gerwen 1994). Ideally, the affected limb should be measured in the morning before oedema develops, as a result of poor venous return in this group of patients, or after a period of rest and leg elevation. It should also be measured again as soon as the ulcer has healed. The patient’s feet should remain flat on the floor while the following measurements are taken:

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Application

Stockings are not applied in the same way as ordinary hosiery. Patients need to be shown the correct way to apply them – turning the stocking almost inside out, easing it over the foot so that the heel is in place, then easing it up the leg with a slight twisting motion, to finish just below the knee. Application is difficult if the stocking fabric is gathered together, as the effect of the elastic material is multiplied (Armstrong 1997). Patients can purchase an applicator frame, which is useful if they have limited mobility and dexterity in their hands, hips or ankles (Moffatt and O’Hare 1995). Cheaper options include plastic bags, a sprinkling of talcum powder on the foot and socks, which help the stocking to slide over the

### Table 1. Class of compression (Adapted from Morison 1992)

<table>
<thead>
<tr>
<th>Class</th>
<th>Support</th>
<th>Pressure at ankle</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Light</td>
<td>14-17mmHg</td>
<td>Superficial or early varices; prevention and treatment of early varices</td>
</tr>
<tr>
<td>2</td>
<td>Medium</td>
<td>18-24mmHg</td>
<td>Medium severity varices and mild oedema; treatment and prevention of venous leg ulcers</td>
</tr>
<tr>
<td>3</td>
<td>High</td>
<td>25-35mmHg</td>
<td>Gross varices and gross oedema post-phlebitic limb, severe chronic venous hypertension and treatment/prevention of venous ulcers</td>
</tr>
</tbody>
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REFERENCES


toes. Patients can also purchase a specially designed device (EasySlide™) to assist in stocking application. Wearing rubber gloves might help improve grip for some patients, but for others it might be necessary to receive help from relatives, carers or nurses. Patients whose hosiery tends to slip, which is more of a problem with thigh-length stockings, might find a roll-on, water-soluble adhesive useful. It is not advisable to use garters to keep hosiery in place, as these might impede venous return.

The manufacturers advise that stockings should be removed at night and put on first thing in the morning and, ideally, this should be adhered to. However, there are some patients for whom this would be impossible. Therefore, it would seem reasonable to suggest that, where necessary, selected patients can sleep in their hosiery. It is important that, when patients first start wearing compression hosiery, the stockings are removed every 24 hours. Frequency of removal can be reduced gradually to once a week, and the limbs should be checked for any signs of pressure damage.

**After care**

Care should be taken to follow the manufacturers’ instructions on washing and after care of hosiery; washing prolongs stocking life and improves performance by restoring shape. Patients should be supplied with an educational leaflet to reinforce any advice they have been given verbally, which should also include information on skin care using topical application of an emollient at night. The emollient recommended should not contain known sensitisers for patients with venous disease, such as stabilisers, preservatives or perfumes. It is advisable to see the patient one week after the initial assessment to check that he or she is managing to apply the hosiery correctly without any wrinkles or folds.

Arrangements should be made to review patients again in four to six months. They should be reassessed and remeasured for new hosiery, as leg sizes might have altered. It might be useful to explore the possibility of surgery for varicose veins with the patient, as surgery is an important factor in preventing ulcer recurrence (Sethia and Darke 1994). Good results have been associated with the combined use of surgery and graduated compression (Darke and Penfold 1992, Negus and Friedgood 1983), and one study showed improved calf muscle pump function when these two treatments were combined (Stacey et al 1988). It is important that patients are aware of the benefits of contacting a health professional immediately should the ulcer recur, and that they continue to wear hosiery with a simple dressing underneath until they are reassessed by a health professional.

**Conclusion**

Leg ulcer recurrence continues to be a major problem for people with venous disease, and cycles of ulceration, healing and recurrence are common (Fig. 2). Although there is a paucity of research evidence, expert opinion advocates compression as an essential component in the management of ulcer recurrence. Community nurses are in an ideal position to ensure that patients are prescribed hosiery that best suits their individual needs. Manufacturers should be encouraged to improve the appearance of and materials used in hosiery. This would help to promote patient comfort, concordance and quality of life, which are major factors in the management of venous leg ulcers.

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Fig. 2. Healing ulcer on the leg

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RCN (1998) Clinical Practice Guidelines: The Management of Patients with Venous Leg Ulcers. RCN Institute, Centre for Evidence-Based Nursing, University of York, and School of Nursing, Midwifery and Health Visiting, University of Manchester.


