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### Original Citation

Atkin, Leanne and Shirlow, K. (2014) Understanding and applying compression therapy. *Wound Care Today*, 1 (1). pp. 30-37.

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Understanding compression therapy.

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## **Abstract**

Compression therapy is widely accepted as essential competent to promote healing of venous leg ulceration. Compression therapy has been used for a number of years, originally four layer bandage system was the only options for the application of appropriate levels of compression. However, over the last decade two layer compression bandage systems and compression hosiery kits have been introduced, providing practitioners and patients a variety of options to achieve the needed levels of compression. This article will provide a brief over view of venous ulceration, explain why compression therapy is vital and discuss the options available to achieve optimum compression levels.

## **Venous Ulceration**

Venous ulceration is a break in the skin of the lower leg due to high pressure within the venous system. Venous ulceration is the most common type of leg ulceration, 60 – 80% of leg ulcers have a venous component, (SIGN, 2010). Venous leg ulcers occur when blood returning to the heart is slow or obstructed, in healthy individuals blood returns from the lower legs to the heart as a result of the calf muscle pump contracting during periods of exercise. The activation of the calf muscle pump compresses the veins which in turns squeezes the blood from the superficial venous system in to the deep system simultaneously squeezing blood from the deep venous system back towards the heart, increasing the venous return. Veins contain valves which only allows the blood to flow in one direct; back towards the heart. However, if the veins valves are damaged (incompetent) this results in back flow leading to increased pressure within the veins (venous hypertension) it is this increased pressure that is ultimately responsible for the formation of a venous ulcer.

Venous ulceration is associated with considerable costs to the patient and the healthcare system. Two large systematic reviews have been undertaken evaluating the impact of leg ulceration on a patients quality of life, both reviews reported that the presence of leg ulceration was associated with pain, restriction of work and leisure activities, impaired mobility and social isolation, (Herber, 2007; Persoon, 2004). Prevalence studies report between 1.2 to 3.2 of the population suffers from

venous leg ulceration (Graham et al, 2003), which equates to 70,000 to 190,000 individuals in the UK with a venous leg ulcer at any one time. The cost to the National Health Service of treating patients with venous ulceration, mostly through community services, is estimated to be at least 168 – 198 million per year, (Posnett and Franks, 2008).

### **Theory of Compression**

It is widely accepted that compression therapy increases the healing rates of venous ulceration, this concept has been proven through a systematic review of the evidence, (Cullem et al., 2001). Compression therapy aims to reverse the venous hypertension, compression therapy works on many aspects to achieve this. The application of direct graduated pressure on the lower limb increases tissue pressure, supports the superficial veins, encourages venous return, reduces calibre of veins by reducing the pressure and aids calf muscle pump activity. Compression therapy also helps reduce lower limb oedema as fluid is directed from the tissues back into the venous and lymphatic system.

### **Patient assessment**

Accurate assessment of every patients is vital prior to considering the application of any form of compression therapy, as considerable damage can be caused by inappropriately applying compression to patients who have peripheral arterial disease. Peripheral arterial disease can be asymptomatic so it cannot be relied on that if patients do not express pain in keeping with intermittent claudication or arterial rest pain that this indicates that there is no evidence of arterial insufficiency. Arterial insufficiency can only be ruled out by assessment of the patient. Arterial assessment should involve a combination of palpation of peripheral pulses and assessment using a hand held Doppler to measure the Ankle Brachial Pressure Index (ABPI). ABPI assessment compares the systolic pressure in the arm to that of the lower leg; these measurements are then used to calculate a ratio of pressure. It is widely accepted that when a ratio is greater than 0.8 it is safe to apply compression therapy. However, if the ABPI result is greater than 1.2 care has to be taken that these results are not falsely elevated due to arterial wall calcification, this is of particular concern in patients with diabetes. ABPI assessment is an effective tool to rule out any evidence of peripheral arterial disease but it has been shown to be unreliable when carried out by inexperienced operators and reliability can be considerably improved if practitioners have correct training, (Cullum, 1997).

Therefore practitioner must ensure they have the adequate knowledge and skills before undertaking ABPI assessments.

### **Options for compression**

Compression systems are all designed to provide graduated compression to the lower limb to improve venous return and reduce oedema. Compression systems that deliver 40mmHg pressure at the ankle have been shown to be the most effective in treating venous leg ulceration, (O'Meara et al., 2012). For many years the 4 layer system of compression therapy was thought to be gold standard treatment and 4 layer bandaging still remain a valuable tool in the management of leg ulceration. However, over the last decade there has been two new options of compression therapy introduced to the market, these being two layer bandage systems and two layer hosiery kits, both of these systems are designed to provide graduated compression with the recommended 40mmHg pressure at the ankle. Compression bandages either two layer or 4 layer systems continue to be useful in the management of ulceration especially when a patient has a high exuding ulcer or there is significant amounts of oedema that needs reducing but compression bandaging does have some drawbacks. Patients often find the bandages bulky which can restrict mobility, clothing choices and can cause difficulty wearing shoes. Additionally compression bandages need to be applied by a practitioner that is experienced and competent in their application, as poor technique can cause damage to the limb, the amount of compression delivered may be compromised, and bandages can slip causing increased discomfort all of which will increase the time to healing

Two layer hosiery kits may offer some advantages to certain patients as they are less bulky therefore does not restrict patients choice of footwear or clothing. Additionally hosiery kits provide guaranteed levels of compression, which is not practitioner dependent, this also has the major advantage of allowing the patient to self-care, if they wish to do so. Compression hosiery kits consist of two layers of stocking they are designed to provide 40mmHg at the ankle, the same as compression bandaging, the kits consist of a understocking and an over stocking, both layers need to be worn to provide appropriate levels of compression. Patients do require sufficient dexterity to be able to remove and re apply the stockings which can be a barrier to use.

A large randomised controlled multi centre study has recently been published comparing the clinical and cost effectiveness of compression hosiery versus compression bandages in the treatment of venous leg ulcers (Ashby et al, 2013). They randomised 457 patients to be treated with either compression bandages or compression hosiery kits, the study did not dictate which manufacturer of

bandage or stockings should be used, leaving this decision to the patient/ practitioner. They showed that compression hosiery were as equally effective at healing venous leg ulcers and is a viable alternative to four layer. They found similar results in both groups: median time to ulcer healing was 99 days in the hosiery group and 98 days in the bandage group and the proportion of ulcers healed was similar in both groups, 70.9% in the hosiery group and 70.4% in the bandage group. They did however report significant ( $p=0.02$ ) differences in changes in treatment, 38.3% of patients in the hosiery group changed from their allocated treatment compared to 27% in the bandage group suggesting that hosiery may not be suitable for all patients, (Ashby et al., 2012).

### **Patient concordance**

When deciding which method of compression is to be used many factors have to be taken into account these include size and shape of limb, extent of ulceration, amount of exudate, condition of surround skin, dexterity of patient, restrictions in mobility, availability of footwear and whether the patient wishes to self care. For each individual patient practitioner need to weight up the pros and cons of all options but ultimately it is the patient that should make the decision as to which system they prefer. Patient compliance with compression therapy is vital to expedite ulcer healing, giving patients choice of treatment in combination with clear explanations of why compression therapy is needed will help to improve concordance. There are many other reasons why patients may not adhere to recommended treatments and this depends on their motivation which can be affected by factors such as social isolation or treatment discomfort (Vowden and Vowden, 2012). Pain, wound size and depth and patients age has all been found to affect concordance (Miller et al., 2011). However if symptoms can be controlled via dressings or analgesia patients tolerance of compression can be improved, (Briggs and Nelson, 2012).

### **Conclusion**

Compression therapy is often used sub-optimally in practice because of a lack of knowledge and confidence in relation to assessing patient, ankle brachial pressure index measurement and the application of compression therapy, (RCN, 2006). It is vital that practitioner are competent in interpreting ABPI results and recognise the importance of adequate compression therapy to facilitate healing therefore ensuring that patients receive high quality evidence based care. There are more options of providing compression therapy than ever before, compression hosiery kits are a valuable and credible alternative for compression bandages for some patients. The choice of which method is to be used is ultimately the patients but practitioners need to have a clear understanding

of the advantages and disadvantages of each system to be able to communicate this with the patients allowing them to make informed decisions about their treatment.

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