Compression therapy can play a vital role in improving the quality of life for those with chronic venous insufficiency, chronic oedema and lymphoedema (Lymphoedema Framework, 2006; World Union of Wound Healing Societies [WUWHS], 2008). In particular, compression bandaging can facilitate wound healing and oedema reduction in the treatment phase of management, before further healing and maintenance with compression hosiery.

Compression bandaging is particularly suited to those for whom compression hosiery would be unsuitable, for example individuals with highly exuding wounds or those with moderate-to-severe chronic oedema and associated limb distortion (Learning Zone, 2015).

The aim of compression bandaging is to facilitate wound healing and oedema management by (Partsch and Moffatt, 2012; Whitaker et al, 2015):
- Improving venous return
- Encouraging lymphatic drainage
- Softening tissues and maintaining skin integrity.

**LAWS OF COMPRESSION**

It is essential that the community nurse has a full understanding of the way in which the different bandage materials work, the laws of compression and how this can be applied to deliver best practice when applying compression bandaging.

Based on Laplace’s law (named after the French scholar Pierre Simon Laplace who first worked out an equation for the principle of surface tension), the pressures exerted by a compression bandage are influenced by the following factors (Thomas, 2014):
- Bandage tension
- Number of layers applied
- Circumference of the limb
- Width of the bandage.

Altering any of the above will have an impact on the level of compression applied to the limb, therefore it is important that nurses know how to apply compression bandages consistently and competently.

**TYPES OF COMPRESSION BANDAGING**

There are an array of compression bandage systems available and these can be categorised in a variety of ways. As regards to extensibility, they can be placed into one of two categories:
- Elastic (often referred to as long-stretch)
- Inelastic (often referred to as short-stretch).

The elasticity of a product has an impact on the way in which compression is delivered to the limb — however a full holistic assessment is essential as it will determine the patient’s suitability for any system.

**Elastic compression**

Although application at 50% stretch is generally recommended for elastic compression, the bandages are, in reality, much more extensible than this, having the capacity to stretch to up to 120% of their original length. This therefore means that a high level of skill is required to apply them appropriately to avoid the risk of under- or over-compression (Ashby et al, 2014; Elwell, 2015).

Unlike inelastic compression, there is little difference between the pressures exerted when patients are resting compared to when they are moving (Williams, 2012).

**Inelastic compression**

Inelastic compression bandages do not contain elastic fibres and are therefore much less extensible than elastic bandages. They are applied to the leg at 100% stretch to provide a consistent pressure (Pierrepont, 2014). The application of inelastic bandaging creates a rigid cuff, which does not yield even when the limb expands, for example due to the presence of swelling or during muscular activity (Todd, 2011).

Thus, during periods of immobility such as lying down, low resting pressures will be exerted; whereas if the patient mobilises higher therapeutic ‘peaks’ of pressure will be exerted, mimicking the action of a healthy system (Muldoon, 2010; Todd, 2011).

Many patients find inelastic compression bandages more tolerable as, when they are resting (e.g. during the night), the level of compression is
Unlike elastic systems, Actico® gives you low resting pressures at night - making bedtime a lot more tolerable.[1,2]

lower, reducing the risk of pain that can be associated with night-time compression (Todd, 2011).

**Options**

Inelastic compression bandages are available in cotton or in specially produced cohesive materials. Cohesive bandages are made from material that has been coated with natural latex or another synthetic substance that enables the bandage to adhere to itself without sticking to the patient’s skin or clothing. The use of cohesive inelastic compression bandages reduces the risk of bandage slippage.

Cotton bandages can be re-used in some situations where washing is appropriate, providing they have not become soiled due to lymphorrhoea (leakage of lymph fluid) or exudate. However, cotton bandages may need to be re-applied more frequently due to the potential for slippage.

**Indications**

Inelastic compression bandages are indicated for the management of the following conditions:
- Venous leg ulceration
- Chronic oedema
- Mixed aetiology leg ulcers (under specialist supervision and ongoing review).

Moffatt et al (2003) conducted a randomised controlled trial comparing the use of four-layer (elastic) compression bandages with inelastic cohesive compression bandages. Similar healing rates were achieved with both systems, however potential benefits associated with the use of inelastic compression were identified, including:
- Reduced bulk: increasing the wearer’s ability to wear shoes
- Application at 100% stretch: reducing the risk of applying uncomfortably high pressures to the limb.

The authors concluded that inelastic compression bandages are a viable alternative to four-layer compression bandages.

In particular, inelastic bandages are favoured for the management of chronic oedema, including lymphoedema, due to the rigid cuff the bandages create around the limb. This aids oedema reduction as the bandages do not yield when the limb expands due to the increased volume of fluid (Williams, 2009; Todd, 2011; International Lymphoedema Foundation (ILF), 2012). The working and resting pressures exerted by the bandages have a positive effect on both the venous and the lymphatic systems, achieving safe and rapid reduction of oedema as well as reshaping the limb (Whitaker et al, 2015). Thigh-length application is appropriate for those with oedema above the knee.

Due to the intermittent pressures exerted by inelastic compression bandages, they are also recommended for the management of mixed aetiology disease (ankle brachial pressure index [ABPI] range of 0.5–0.8) by the WUWHS (2008). However, this must be carried out following assessment and ongoing review from a clinical specialist (Prytherch, 2010).

**ASSESSMENT**

A full holistic assessment, incorporating a Doppler assessment, is essential before using any compression bandaging system in order to ensure it is suitable for the patient (Bianchi et al, 2012; Jones, 2014). When carrying out a vascular assessment it is important that the nurse considers the venous, arterial and lymphatic system, in order to
establish the most appropriate form of compression to use. Cohesive inelastic compression bandages are appropriate in cases of venous and lymphatic incompetence. In cases of severe arterial insufficiency the use of compression bandaging is not indicated. It is advised that community nurses follow local and national guidance when selecting compression, based upon a full holistic assessment.

A full holistic assessment should include the patient’s past medical and family history as well as the presenting condition in order to determine the underlying disease process that has caused the lower limb problem (i.e. chronic venous/lymphatic disease) (Learning Zone, 2015). Taking into account patients’ psychosocial as well as physical needs will also assist nurses in selecting the most appropriate form of compression (Jones, 2014). For example, patients who wish to continue wearing their usual footwear will benefit from a system with low bulk, particularly around the foot (Figure 1).

**APPLICATION**

Inelastic cohesive compression can be applied below the knee for venous leg ulceration, or to the full leg if there is oedema present to the knee or above. For some patients, this can prevent long-term complications, such as increased limb distortion, which can make hosiery use in the maintenance phase of treatment challenging. It is important that nurses refer to the manufacturer’s guidance on application.

When the management of venous ulceration is a priority, the nurse can either use individual components (i.e. bandages) or a latex-free two-component kit. Both options are low profile, allowing the patient to wear normal footwear and clothing if the limb shape and size permit (Figure 1).

Padding is applied to protect the limb and provide re-shaping. The bandage is then applied with tension to the foot to reduce the risk of exacerbating foot oedema. The bandage is then continued from the ankle, up the leg, at 100% stretch. Unlike elastic compression bandages, inelastic cohesive compression at 100% stretch assists consistency in application and reduces the risk of over- or under-compression.

As with most compression bandages, inelastic compression bandages can remain in situ for up to seven days. However, wear time should be based upon a full holistic assessment and the individual needs of the patient. For those with chronic oedema or highly exuding wounds the bandage may need to be changed more frequently due to the potential for exudate strike-through, or reduction in limb size due to the rapid reduction in oedema that can occur with inelastic compression (Whitaker et al, 2015).

**Static stiffness index**

The static stiffness index (SSI) is the difference between the working and resting pressures exerted on a patient’s limb while he or she is wearing a compression bandage (Whitaker et al, 2015). Due to the way in which inelastic compression bandages are applied, they deliver a higher SSI than elastic systems, helping to facilitate venous and lymphatic return (Lymphoedema Framework 2006; Todd, 2011).

The pressure peaks exerted while wearing the bandages have a massaging effect and mimic the peaks that would be achieved by healthy circulation in the lower limb. This effect assists in stimulating the movement of blood and lymph fluid against gravity (Damstra et al, 2008; WUWHS, 2008).

**Mobility**

Using inelastic cohesive compression bandages can deliver highly successful outcomes for both mobile and immobile patients (Campbell and Coulter, 2008; Damstra et al, 2008). Those who are less mobile will still experience some pressure peaks while wearing inelastic compression bandages due to gentle movement that can be either passive or active (e.g. during repositioning or passive exercise).

While the pressure peaks achieved are proportional to the amount of mobility, even small peaks will have a positive effect on venous and lymphatic return, facilitating wound healing and reduction of oedema.

Regardless of the type of compression used, mobility remains an important factor — particularly when the treatment goals include wound healing and oedema reduction — as it encourages venous and lymphatic return. It is important that the bandage system does not unduly restrict the patient’s mobility due to discomfort and/or bulk (ILF, 2012).

**WHAT’S YOUR NEXT STEP?**

To use the knowledge that you have gained from this article to inform your continuing professional development (CPD), you should take the following steps before logging onto the website (www.jcn.co.uk/learning-zone/) to take the learning zone test:

**Reflect**

Are you able to explain when compression bandaging should be considered?

Do you understand the difference between elastic and inelastic compression bandages?

Do you understand why a patient’s mobility has an effect on the effectiveness of compression bandaging?

**Evaluate**

Do you appreciate why a ‘step-down’ approach to compression may facilitate getting patients into hosiery sooner?

**Act**

Read the article when you have a spare few minutes in the day. Make some notes on what you have learned, then visit the online test (www.jcn.co.uk/learning-zone/) to complete this subject. The whole test, which involves reading this article and answering the online questions, should take you 90 minutes to complete.

Finally, download your certificate to show that you have completed this JCN e-learning unit as part of your CPD portfolio.

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Where these factors could be an issue, inelastic compression bandages would be an ideal choice as they offer a low-profile comfortable treatment option.

**USING HOSIERY AS PART OF A ‘STEP-DOWN’ APPROACH**

A recent randomised controlled trial stated that there are drawbacks to the use of four-layer elastic compression bandages for the management of venous leg ulceration. The use of hosiery — in the form of hosiery kits — was found to be a viable alternative, combining similar healing times and rates with reduced risk of recurrence and lower costs (Ashby et al, 2014).

In view of the strength of evidence, hosiery kits should be considered as a first-line approach for leg ulcer management whenever possible. For some, however, hosiery would be inappropriate, for example those with highly exuding wounds or limb distortion linked to oedema.

For such patients an initial compression bandaging regimen could be considered as a short-term approach, before the patient is ‘stepped-down’ into a leg ulcer hosiery kit to continue healing.

Inelastic cohesive compression would be an ideal choice in this scenario, as its ability to rapidly reduce oedema and manage exudate enables the patient to move into hosiery sooner and continue the healing process (Tickle, 2015).

**CONCLUSION**

For the community nurse, understanding the properties of different types of compression bandages is essential. Compression bandages can be classified as either elastic or inelastic, which determines the way in which compression is delivered to the limb.

Following a full holistic assessment and as part of a holistic programme of care, inelastic compression bandages are an effective option for the management of venous leg ulceration and chronic oedema. They are applied at 100% stretch, which encourages safe application and delivers therapeutic high-working pressures and tolerable low-resting pressures to the patient’s limb.

They can be used in any patient for whom compression bandaging is indicated, including both mobile and immobile patients, as the pressures exerted on the limb are influenced by the patient’s level of activity.

For those patients who cannot be treated with a leg ulcer hosiery kit following initial assessment, using inelastic compression bandages can facilitate rapid oedema and exudate reduction, enabling the patient to move into hosiery sooner and continue the healing process.

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**REFERENCES**


