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The assessment, selection and benefits of made-to-measure hosiery

Compression hosiery is a vital part of the community nurse's toolkit when dealing with patients with oedema and venous insufficiency. It is most often used to prevent recurrence in patients with healed venous leg ulcers as well as maintaining reductions in limb volume in those with chronic oedema or lymphoedema, following more intensive treatment with compression bandaging. Recent study evidence also shows it can be used to effectively heal venous leg ulceration (Ashby et al, 2014).

Compression hosiery can also slow the progression of lymphovenous disease in patients showing early signs (such as varicose veins, hyperkeratosis, and mild swelling). For the community nurse, selecting hosiery that is appropriate for the patient's disease stage — and that fits correctly and is comfortable to wear — is important when encouraging compliance with therapy.

Some patients, however, will not fit into the 'off-the-shelf' ranges due to irregularities in the size or shape of their limb(s). In these cases, the use of made-to-measure hosiery should be considered before managing patients with bandages in the long-term.

WHAT IS MADE-TO-MEASURE HOSIERY?

Made-to-measure hosiery is manufactured according to the unique limb size and shape of the patient when off-the-shelf stock sizes

do not fit. Like ready-to-wear hosiery, made-to-measure garments are manufactured using either a flat-knit or circular-knit process.

Flat-knit

Flat-knit made-to-measure hosiery garments are manufactured from a flat piece of fabric, which is then stitched together. These are usually made to measure for the individual patient because any distortion in the limb shape can be incorporated into the stitching process.

Flat-knit garments are made from thicker yarns, which results in a stiff fabric able to contain the patient's swollen limbs — they are also less likely to 'cut into' the patient's skin during wear. Flat-knit garments are usually European classification (see below for explanation of European Class), again indicating their suitability for chronic oedema management.

Circular-knit

Circular-knit made-to-measure hosiery garments are manufactured as a single tube (Clark and Krimmel, 2006; Lay-Flurrie, 2011) — this results in a smooth, seamless finish. While this may make them more cosmetically acceptable and comfortable, problems such as rolling or 'digging in' can occur where there is distortion caused by the presence of oedema (Clark and Krimmel, 2006; Lay-Flurrie, 2011).

Manufacture

Similar to ready-to-wear garments, made-to-measure hosiery is standardised according to several criteria, including the type of yarn used in manufacture and the levels of compression delivered to the limb (Clark and Krimmel, 2006).

British Standard

Made-to-measure British Standard compression hosiery garments are

Off-the-shelf or made-to-measure hosiery?

What is the difference between off-the-shelf and made-to-measure garments?

- ▶ Off-the-shelf hosiery refers to garments that are mass produced to fit a range of limb sizes, similar to clothing being manufactured as S, M and L.
- ▶ Like clothing, there will be patients who simply do not fit the standard size ranges available. For these patients, made-to-measure hosiery manufactured to their unique range of measurements provides a solution, enabling the patient to benefit from the advantages of hosiery, such as wearing his or her own footwear and being able to apply and remove the garment for bathing/showering. Using made-to-measure hosiery can also avoid the need for compression bandaging, which can be difficult to sustain for both clinicians and patients.

designed to prevent and manage various venous conditions — such as varicose veins — in limbs not yet affected by chronic oedema. To help improve patient concordance with treatment, these garments are manufactured from thin, light fabric and come in a range of colours and styles (Timmons and Bianchi, 2008).

British Standard hosiery garments provide effective compression in patients whose limbs have a graduated shape and are designed to heal and maintain healing in venous leg ulcers. However, British Standard garments are not designed to manage limbs with anything other than mild oedema (Timmons and Bianchi, 2008).

European Class

In patients exhibiting moderate-to-severe oedema, made-to-measure European Class hosiery should be chosen to prevent deterioration once the limb volume has been reduced and stabilised through the use of bandaging. The greater stiffness of European Class garments means that lymphatic movement is encouraged and lymph fluid is reabsorbed (Timmons and Bianchi, 2008).

Performing an holistic assessment will enable community nurses to decide whether British Standard or European Class garments are appropriate.

HOLISTIC ASSESSMENT

When a patient presents with lower limb swelling and/or ulceration, the community nurse should perform an holistic assessment to look for factors that may point to underlying venous/lymphatic disease (JCN Learning Zone, 2014), such as a family history of leg ulceration, known risk factors such as deep vein thrombosis (DVT), or previous lower limb surgery. Contraindications to the use of compression hosiery such as ischaemia should be ruled out at this stage.

If the patient is already wearing hosiery, the community nurse should also consider whether the choice of garment could be improved. Similarly,

if the patient is currently wearing compression bandaging, the nurse should consider whether hosiery could be used instead. The assessment of a patient's suitability for hosiery garments should include the following elements (see also *Table 1*).

Vascular assessment

The community nurse should use Doppler ultrasound to confirm or exclude the presence of arterial disease in patients being considered for compression garments delivering 18mmHg compression at the ankle or above (see *Table 2*).

Limb shape

Limb shape is a key factor in compression hosiery. If the limb shape is distorted, then circular-knit hosiery is not likely to deliver accurate graduated compression.

If the limb is large/long/very thin but maintains a graduated shape, circular-knit hosiery may be appropriate for this patient.

If the limb is significantly distorted due to oedema, bandaging is recommended prior to hosiery use in order to reduce limb volume and distortion. In such cases, flat-knit hosiery would be an appropriate choice post-bandaging.

Skin assessment

Leg ulcers: with or without oedema?

Leg ulcer hosiery kits have been shown to be as effective as four-layer bandaging in healing leg ulcers in some patients (Ashby et al, 2014). These kits include two layers of compression hosiery, an understocking and an over-stockings, which when combined deliver therapeutic compression. However, they are only suitable for venous leg ulcers with low-moderate exudate volumes and minimal limb distortion due to their circular knit construction. The patient's skin condition should also have an influence on hosiery selection.

For those with stubborn fibrosis, a flat-knit garment is favorable as it can assist with softening the tissues.

Healed ulcers: with or without oedema?

Once the ulcer has healed, recurrence should be prevented by the long-term use of hosiery (Nelson and Bell-Syer, 2012). Again it is important to consider whether oedema is present, as any swelling will influence the choice of compression hosiery. It is also worth noting that any oedema may have reduced during the bandaging phase. If there is a history of chronic oedema, a European Class garment would be ideal to maintain

Table 1: Key elements of holistic assessment for compression hosiery

Vascular	<ul style="list-style-type: none"> ▶ Measure ankle brachial pressure index (ABPI) with a handheld Doppler to confirm or exclude the presence of arterial disease
Oedema	<ul style="list-style-type: none"> ▶ Is there a history of chronic oedema? ▶ If so, is the oedema soft and 'pitting'?
Limb shape	<ul style="list-style-type: none"> ▶ Is the limb shape distorted? ▶ Is there any distortion above the knee or to the foot due to the distribution of oedema?
Skin	<ul style="list-style-type: none"> ▶ Is there a wound present? ▶ Is the wound healing? Document wound size/shape for reassessment? ▶ Is the wound producing exudate — low, medium or high volume? ▶ Venous and lymphatic disease is associated with skin changes such as: <ul style="list-style-type: none"> • Ankle flare • Haemosiderin staining • Hyperkeratosis • Varicose veins • Varicose eczema • Fibrosis
Limb measurement	<ul style="list-style-type: none"> ▶ Before measuring the limb the shape of the limb should be assessed to determine if off-the-shelf hosiery would be appropriate ▶ Measurement guides are supplied by individual manufacturers ▶ Where possible, measurements should be taken in the morning to prevent gravitational filling of the tissues in the limb, potentially leading to an increase in limb circumference.

the limb reduction. If there is no history of chronic oedema, a British Standard garment should be used to prevent skin breakdown.

Mobility/dexterity

The community nurse should ensure that patients and/or carers are able to apply and remove hosiery. There are also aids available, however, it is important that the patient is fully educated in how to use them correctly to maximise the benefits of their use and promote long-term compliance (Dilks et al, 2005).

Limb measurement

Once the community nurse has completed the assessment and selected the correct type of hosiery, the limb should be measured to ensure that the patient receives a well-fitting garment that delivers therapeutic compression (Learning Zone, 2014).

Measuring for a made-to-measure garment generally involves recording more measurements than required for an off-the-shelf garment. These measurements are necessary to ensure that any bespoke garment is well-suited to the patient's irregular/distorted limb shape or size. It is important that the community nurse follows the manufacturer's guidance when measuring for a made-to-measure garment.

Reassessment

Hosiery choice should be reassessed regularly. Any changes in wound-healing status, the amount of oedema, ankle brachial pressure index (ABPI), skin condition, mobility and comorbidities may require a change in compression therapy. At this stage, community nurses may need to consider the option of made-to-measure garments.

CHOOSING THE CORRECT CLASS OF GARMENT

Once the decision has been made to use British Standard or European Class hosiery according to the presence or absence of oedema, the appropriate compression garment should be selected.

Hosiery is divided into classes according to how much compression

is delivered at the ankle (measured in mmHg), with class 1 garments delivering the least compression, and class 3 the most. However, the amount of compression delivered in each class varies, depending on if the garment is made to British Standard or European Class (Table 2).

The community nurse should select the class of hosiery according to the severity of symptoms — more severe symptoms require stronger compression. Measurement guides will be provided by the manufacturer.

HOW DO I KNOW IF MY PATIENT REQUIRES MADE-TO-MEASURE?

There are certain clinical clues that should alert the community nurse to a patient who may be considered for made-to-measure hosiery. The most obvious of these are distortion in limb shape and difficulty with measurement when considering the patient for off-the-shelf hosiery.

Shape distortion

Either ready-made or made-to-measure hosiery may be suitable for patients with minimal distortion in the shape of their limbs. However, for those with severe distortion, a period of intensive treatment with compression bandaging may be required to normalise shape before hosiery can be prescribed.

Most patients with minimally distorted limb shapes are better managed with custom-made flat-knit hosiery, which does not curl, twist or tourniquet (cut into the limb and impede the blood supply). Slippage is also a problem with poorly fitting hosiery, and this can be mitigated by using made-to-measure garments (Wounds International, 2013).

Additions such as silicone grip-tops can also be added to meet the individual needs of the patient. Flat-

knit hosiery is often stiffer and so is more likely to control any oedema.

Measurement

When measuring the patient for hosiery, a failure to fit the patient's limb into the stock sizes of the desired product will indicate that a custom-made garment may be required. Accurate measurement, as mentioned above, is important to ensure the garment fits and that it is comfortable. Badly fitting hosiery may be therapeutically ineffective, cause tissue damage, be uncomfortable, poorly tolerated and may discourage the patient from wearing hosiery in the long-term.

Measurement for hosiery should take place when any intensive therapy is near completion and the limb is in the best possible condition, with a stable limb volume. To ensure the correct fit and graduation of support required, made-to-measure hosiery requires more leg and foot measurements than are needed for fitting into standard stock sizes.

For this reason, when a decision has been made to use made-to-measure hosiery, it is important to refer to the manufacturer to ensure measurements are taken accurately for the product selected (Scottish Intercollegiate Guidelines Network [SIGN], 2010). Some manufacturers provide training in measuring and fitting made-to-measure garments.

CONCORDANCE

Patients with leg ulcers and/or chronic oedema can find it difficult to tolerate compression for a number of reasons, such as reduced mobility and poor dexterity, as well as social pressures such as employment difficulties. If the community nurse can help the patient to find a suitable compression garment, this will greatly improve concordance with treatment (Gray, 2013).

Table 2: British Standard and European Class hosiery compression classes

	British Standard	European Class
Class 1	14–17mmHg	18–21mmHg
Class 2	18–24mmHg	23–32mmHg
Class 3	25–35mmHg	34–46mmHg
Class 4	N/A	over 49mmHg

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 identify the differences between flat-knit and circular-knit made-to-measure hosiery?

Are you able to identify the differences between British Standard and European Class hosiery?

Do you understand why assessment is so important when considering made-to-measure hosiery?

Evaluate

Do you appreciate why it is important to understand the different types of hosiery and the principles of lower limb management?

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 the JCN e-learning unit on made-to-measure hosiery as part of your CPD portfolio.

Concordance is enhanced by appropriate patient education and affected by a number of practical issues. The fit, style and material used in any made-to-measure hosiery garment will influence the patient's willingness to persevere with treatment (Dilks et al, 2005). Similarly, patients must be able to wear comfortable footwear with their hosiery to facilitate mobility.

Appropriate selection of a made-to-measure garment enables the community nurse to select options that are not widely available with the normal off-the-shelf ranges. Examples include differing grip-top

widths, slant-cut foot options and ankle pads for those with severe ankle oedema.

Many of the hosiery needs of larger patients can be addressed by using custom-made garments. Grossly obese patients present a complex challenge in terms of finding hosiery that they are able to easily put on and remove, and these patients will usually require custom-made hosiery.

CONCLUSION

Compression therapy in the form of bandaging and hosiery is a recognised treatment in patients with oedema and problems with leg ulceration. The use of compression helps to reduce the amount of oedema in the limb, lessening the chance of skin breakdown and the subsequent development of ulcers. However, because of the size and irregular shape of their limbs, some patients are unable to tolerate standard sizes of hosiery and need a solution that takes into account their specific needs.

In these cases, the community nurse should consider using made-to-measure hosiery, which allows patients with irregular limb shapes to benefit from compression and the subsequent reduction in oedema. As always, assessment is crucial, and the community nurse must ensure that he or she has ruled out standard methods of compression before considering made-to-measure hosiery. **JCN**

This piece was sponsored by an educational grant from Activa Healthcare and Credenhill Ltd.

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KEY POINTS

- Compression hosiery is a vital part of the community nurse's toolkit when dealing with patients with oedema and venous insufficiency.
- Some patients, however, will not fit into the 'off-the-shelf' hosiery. Made-to-measure hosiery allows patients with irregular limb shapes to benefit from compression.
- As always, assessment is crucial, and the community nurse must ensure that he or she has ruled out standard methods of compression before considering made-to-measure hosiery.
- Performing an holistic assessment will enable community nurses to decide whether British standard or European Class garments are appropriate.
- British Standard hosiery garments are suitable for patients with graduated limb shape. European classification, flat-knit is ideal if chronic oedema and associated fibrosis or distortion is present.