OXFORDSHIRE COMPRESSION HOSIERY BOOKLET

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1. Introduction

In Oxfordshire, approximately 40% of patients with healed venous leg ulcers develop recurrent ulceration. Most of these are found not to be wearing compression hosiery at the time despite it being the gold standard treatment for preventing recurrence. In addition to this, many people are at risk of developing leg ulceration due to underlying venous disease and leg oedema which has gone undiagnosed and untreated. This risk could be reduced if compression hosiery was worn. Where patients are prescribed hosiery, it is frequently not worn, with non-concordance often cited as the main reason. Anecdotally, we hear about patients being unable to apply the hosiery and commonly patients report the hosiery as painful to wear, ‘digging in’ and causing the skin to become red and sore. What fails to be identified is that in a large number of these cases, the patient has not been assessed correctly and therefore the wrong hosiery has been prescribed. With the average annual spend on compression hosiery in Oxfordshire being £135,000 it is not good use of finite NHS resources if the hosiery remains unused and the patient’s leg ulcers reoccur.

From the discussions we have had with clinicians, there appears to be a huge amount of confusion around compression hosiery both in relation to the brands available and the standard and classification required. However, assessing and choosing hosiery doesn't have to be the minefield that many clinicians think it is. With this in mind, Tissue Viability has streamlined the range of hosiery products available to clinicians and has produced this educational formulary which guides you through the assessment and prescribing process. This document should be read in conjunction with Oxford Health Leg Ulcer guidelines.

In addition, the service now runs a number of three hour hosiery workshops where clinicians will learn to:

- Carry out an assessment for hosiery
- Select the most appropriate garment for the patient’s condition
- Measure the limb correctly to ensure there is an accurate fit
- Apply the hosiery correctly
- Care for the hosiery correctly and be able to advise the patient on long term prevention management.

These can be booked via the Oxford Health Learning and Development Portal (Oxford Health staff) or by contacting the L&D team on 01865 902777 (for non-Oxford Health staff).

Practitioner knowledge has an impact on patient concordance with compression therapy. When a practitioner understands the key principles of compression, along with the selection of products available, their ability to meet the needs of the patients is enhanced and therefore the anticipated clinical outcome is achieved. We hope that this educational resource is helpful to you, and adequately supports your clinical decision making. A copy of this document and further resources to support it can be found on our website; http://www.oxfordhealth.nhs.uk/tissue-viability

If you do however have a need for further information, please don’t hesitate to contact the team by email at:

- tissueviability@oxfordhealth.nhs.uk or
- oxfordhealth.tissueviability@nhs.net

Sarah Gardner, Tissue Viability Clinical Lead for Oxford Health
2. Did you know?

In the UK it is estimated that approx. 70,000–190,000 people have a venous leg ulcer (VLU) at any time (Posnett and Franks, 2008) equating to a prevalence of 0.3/1,000 (men) and 0.5/1,000 (women) (Moffatt et al, 1992). The cost of treating these patients is estimated at around £168–£198 million annually, however, more importantly, there is a significant cost to the patient associated with lost working hours, depression, pain and reduced quality of life. Leg ulcer recurrence rates at 12-months range between 26-69%, with increased risk of recurrence for those not wearing compression (Nelson and Bell-Syer, 2012).

Unmanaged lower limb symptoms can lead to disease progression and the development of chronic oedema, skin deterioration, ulceration and infection/cellulitis (Timmons & Bianchi, 2008). Evidence indicates that 1.33 per 1000 of the U.K. population suffer from chronic oedema (Moffatt et al, 2003). The risk of developing chronic oedema increases with age with the incidence increasing to 10.3 per 1000 in those over 85. The population of over 80s is likely to double by 2030 (Cracknell, 2010). With an ageing population, clinicians need to be aware of the impact this is likely to have on their case-loads and how to minimize the risk where-ever possible through best practice, incorporating the use of appropriate compression hosiery.

Those with lower limb problems are more susceptible to cellulitis. Lower limb cellulitis is the 4th most common cause of acute hospital admission for conditions that should not normally require hospital admission (Health and Social Care Information Centre, 2013). In the financial year 2013/14 Oxfordshire CCG had 994 non-elective admissions with lower limb cellulitis to the acute trust, consisting of 3,724 bed days with a total cost of £1,095,00 (Hospital Episode Statistics, 2015). The use of compression in those with chronic oedema has been proven to reduce the incidence of episodes of cellulitis (Ko et al, 1998).
3. Cardio vascular and lymphatic systems

In order to fully understand the role compression hosiery has in maintaining healthy limbs, it is vital to understand the role of the cardio vascular and lymphatic systems and how hosiery can assist when these systems fail.

The Heart
The heart is a hollow muscular organ lying between the lungs, slightly to the left. The function of the heart is to pump blood rhythmically round the body at 70-80 beats per minute.

Arteries
Arteries take blood away from the heart and are the strongest blood vessels, as they have to withstand the pumping action of the heart. Arterial blood is charged with oxygen and nutrients. Artery walls consist of three layers, the outside being the most elastic, the middle one being slightly less elastic but more muscular, and the inner one being very smooth. It is possible to feel a pulse where an artery passes close to the surface of the body i.e. neck, wrist, groin and feet.

Arterioles
Arteries branch into smaller vessels known as arterioles, which merge into capillaries.

Capillaries
Capillaries are minute vessels, no wider than a hair, which connect arteries to veins. The exchange of gases (oxygen for carbon dioxide) is known as tissue or internal respiration and occurs within the capillaries. A capillary wall is a semi permeable membrane and interstitial fluid moves continually between the blood capillary and the tissue.

Interstitial fluid and protein leak out of the capillaries into the tissue spaces (interstitial spaces). The rate of fluid leaking depends on several factors, including blood pressure in the blood capillaries and the concentration of plasma proteins in the tissue spaces - as protein attracts fluid.

Venules
When blood has left the tiny capillaries on its journey back to the heart, the vessels widen into venules and then into the larger vessels known as veins.
Veins
Veins take blood back to the heart. Their walls are weaker than arteries and take impure blood back to the heart as oxygen has now been exchanged for carbon dioxide in the capillaries. Veins can be classed as superficial or deep. 10% of blood travels through the superficial veins, which are situated just beneath the skin and are vulnerable to injury. The remaining 90% of blood travels through deep veins, which are found closer to the bones in the leg and are surrounded and protected by various muscles. These are the veins squeezed by the calf pump on contraction. Veins are also equipped with valves to assist the flow of blood back to the heart. The valves in the veins open in one direction, therefore helping to prevent backflow of blood. When valves are working as they should, healthy veins are divided into compartments and this helps to relieve strain on the vessel walls.

Perforator Veins
Perforator veins are so called because they perforate the deep fascia of muscles, to connect the superficial veins to the deep veins where they drain (Pierik et al. 1997). Their role is pivotal in maintaining correct blood draining. They have valves which prevent blood flowing back (reflux), from deep to superficial veins.

Blood pressure
Blood pressure is the force exerted by the flow of blood on the walls of the arteries. Pressure in the large arteries is highest when the ventricle contracts (Systolic) and lowest when the ventricle relaxes (Diastolic).

Venous pressure
It is important to remember that the circulation of the blood in the lower limb is greatly assisted by the calf and foot pump. These secondary pumps work to move blood upwards against gravity. When the calf muscle contracts it squeezes the deep veins within it, forcing blood back to the heart. The foot pump is activated by simple weight-bearing or plantar flexion/dorsiflexion to assist the circulation in the legs. Posture and positioning can also impact greatly on the circulation of the lower limb. If an individual’s legs are dependent for most of the day, pooling of blood can occur, resulting in increased venous pressure.
The lymphatic system
The Lymphatic system is a one-way drainage system that returns fluid to the vascular circulation from the tissues, via a network of lymphatic vessels and lymph nodes. Some lie deep within the body, others close to the skin. The lymphatic system has an important role to play in maintaining fluid balance, transporting fats and proteins and providing an immune response.

The lymph system produces white cells (lymphocytes) in the lymph nodes which help fight off invading bacteria. The main function of the lymphatics is to help the re-absorption of interstitial fluid into the blood circulation. Normal balance is reached when fluid and waste products are removed from the tissues as quickly as they are produced. Venous incompetence and increased capillary leakage can overwhelm the capacity of the lymphatics to drain the excess fluid, which can result in oedema.

4. Venous disease and chronic oedema

Venous disease
If the valves in the veins of the lower limbs don’t function effectively, they allow backflow of the blood and venous hypertension develops. This venous insufficiency results in the venules becoming over stretched and more porous. Fluid, red blood cells and protein are pushed out into the interstitial spaces. It is this mechanism that is responsible for many of the signs and symptoms of venous disease such as haemosiderin staining and oedema. In the long-term this triggers inflammatory processes which result in skin changes such as induration, varicose eczema and lipodermatosclerosis (Bianchi, 2013).
Oedema occurs when the lymphatic system cannot absorb the production of fluid and waste products in the tissues fast enough; more is being produced than can be dealt with via the lymphatic system. The result is an abnormal collection of fluid in the tissue spaces. Due to fluid remaining in the tissue, a number of skin changes occur, e.g. finger pressure on the skin leaves an indent (shallow pitting). This will, however, reduce on elevation.

Chronic oedema
Chronic oedema is persistent tissue swelling caused by excess fluid that has lasted longer than 3 months. Chronic oedema is not relieved by elevation or diuretics. As the fluid and waste products accumulate in the tissues they cause the tissue to become hard, non-pitting and showing no signs of oedema reducing on limb elevation. Skin changes and the risk of cellulitis (a spreading inflammation of the tissue which usually involves infection and therefore needs antibiotics) is also greatly increased.

The term chronic oedema is an umbrella term for different types of chronic swelling. These are:

- **Dependency oedema**: Caused due to reduced mobility and subsequent lymphatic overload. If recognized early this type of oedema responds very well to gentle elevation and compression therapy.

- **Lymphovenous oedema**: Venous incompetence causes increased capillary permeability and capillary filtration. Swelling will occur when the lymphatic system is overwhelmed by the resulting excess fluid.
• **Lymphoedema:** Swelling from excess fluid accumulation in the tissues caused by a failure in the lymphatic system. There are 2 types of lymphedema; primary caused by a defect with the lymphatic system from birth; and secondary, caused by damage acquired to the system (e.g. following cancer treatment).

Unfortunately distal swelling, particularly in a dependent limb, can occur very quickly, on some occasions causing the skin to stretch and lymphorrhoea (leakage of lymph fluid) to occur. This is often known as “Wet Legs” and can be very distressing for the sufferer. Management with skin care, positioning, super-absorbent dressings and inelastic compression bandaging is indicated at this stage.

### 5. When to use compression hosiery

Compression hosiery is indicated in the following circumstances:

- To prevent recurrence of venous leg ulceration
- To heal uncomplicated venous leg ulcers – hosiery kits
- Delay the progression of lympho-venous disease
- Maintenance care in chronic oedema following de-congestion of the limb with multi-layer bandaging
- Following deep vein thrombosis

Venous and lymphatic disease both result in skin changes to the lower limb. These range from early disease signs such as mild oedema and dry skin, to varicose veins, leg ulceration and chronic oedema in the later stages. Patients at all stages of disease progression are commonly encountered in the community and compression hosiery plays a key role in the prevention and management of skin changes.

Compression hosiery can:

- Delay lower limb disease progression in patients with known risk factors for lymphatic/venous disease, e.g. a family history of leg ulceration (Bianchi, 2013; National Institute for Health and Care Excellence [NICE], 2013a)
- Delay disease progression in patients with mild skin changes that are an early sign of diseases such as mild oedema and varicose veins (Bianchi, 2013)
- Heal uncomplicated venous leg ulcers as effectively as 4-layer bandaging (Ashby et al, 2013)
- Prevent skin breakdown in patients with healed venous leg ulcers (Nelson and Bell-Syer, 2012)
- Maintain a reduction in limb volume that has been achieved with intensive bandaging in patients with chronic oedema (International Lymphoedema Framework [ILF], 2006)
- Provide support to the lymphovenous system during pregnancy (NICE, 2010)
- Prevent the development of deep vein thrombosis (DVT) in patients with reduced mobility (NICE, 2013b)
NICE recommends that compression stockings are applied within 3 weeks of diagnosis of DVT once pain has subsided sufficiently to enable application (NICE, 2013). Class 3 stockings are recommended, however, class 2 stockings may be used if class 3 stockings are poorly tolerated. They should be continued for a duration of 2 years, however people with established post-phlebitic symptoms will probably benefit from ongoing compression

**How Compression Hosiery works**
Hosiery works by compressing the lower limb so that when the calf muscle pump contracts on moving, it is met with resistance which helps to squeeze the blood in the veins of the lower leg upwards. On relaxation of the calf muscle, hosiery helps to close faulty valves in the veins, preventing blood backflow. Together, these actions improve venous return, helping to relieve congestion of blood and lymph in the lower limb, which, if left untreated, result in skin changes such as ulceration and chronic oedema (Torra i Bou and Moffatt, 2008; Bianchi, 2013).

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**6. Different types of hosiery**

Each patient’s suitability to wear hosiery must be determined during assessment, which requires an understanding of the different products available to make the right choice for the individual patient (Gray, 2013).

Both circular and flat-knit hosiery are available in the UK as either ready-to-wear or made-to-measure garments.
Circular-knit hosiery
The fabric is knitted on a cylinder with circular needles and has no seam. It can be likened to a ‘Slinky’ with concentric rings of compression. The circular knit conforms to contours and when applied to distorted limbs can dig into creases and encourage limb distortion.

The finer, seamless finish of circular-knit may make it more cosmetically acceptable and comfortable.

Flat-knit hosiery
Describes the process of producing a garment as a flat piece of fabric, which is then stitched together (Clark and Krimmel, 2006; Lay-Flurrie, 2011). Most made-to-measure garments are flat-knit because distortion of limb shape, e.g. in patients with severe chronic oedema, can be accommodated during the stitching process. Flat-knit garments are made from a thicker yarn than circular knit, resulting in a stiffer fabric that is better for distorted limbs and therefore less likely to cut into the skin during wear.

Hosiery standards
Hosiery garments are classified or categorised by the type of yarn used in construction and the level of compression delivered (Clark and Krimmel, 2006).

The two main standards of compression hosiery used in the UK are:

<table>
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<th>British Standard</th>
<th>European Standard</th>
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<td>British standard compression garments are made from fine, light fabrics and are circular knit. In limbs with a graduated shape, British standard compression garments provide effective compression to prevent ulceration, heal venous leg ulcers and prevent recurrence. However, they are only suitable for patients without oedema.</td>
<td>If oedema is present, European standard compression hosiery can be used. European standard hosiery is also circular knit but delivers a greater level of compression (mmHg) and is made from a stiffer fabric than British Standard circular knit hosiery. It can be used to prevent ulceration, heal venous leg ulcers and prevent recurrence in a limb with oedema. It can also be used to manage chronic oedema in a limb that has previously been decongested with multi-layer bandaging.</td>
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**Different classes of hosiery**

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

Compression hosiery is divided into classes according to how much compression it delivers 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 whether the garment is British standard or European standard compression hosiery. The class of hosiery should be selected according to the severity of symptoms, with more severe symptoms requiring a higher class of compression.

<table>
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<th>Class</th>
<th>British Standard</th>
<th>European Standard</th>
<th>Class</th>
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<tr>
<td>1</td>
<td>14–17 mmHg</td>
<td>18–21 mmHg</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>18–24 mmHg</td>
<td>23–32 mmHg</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>25–35 mmHg</td>
<td>34–46 mmHg</td>
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**Hosiery kits**

Hosiery Kits comprise of a liners and a stocking which together deliver around 40 mmHg. Each kit comes with 2 liners and one stocking. This is the equivalent to the pressures achieved with full compression bandaging. A recent VenUS IV randomised control study (Ashby et al, 2013) found hosiery kits to be a viable alternative to compression bandaging for the treatment of venous leg ulcers. The study found lower rates of ulcer recurrence. Patients appeared to become more used to wearing hosiery and were more likely to wear it as maintenance treatment.

The layering of hosiery also helps patients get their compression on independently as the liner stocking helps the top stocking to glide on smoothly. This is also a useful option to protect delicate skin during application. For those with sufficient dexterity to apply the hosiery over dressings they support an option for self-care. They are particularly useful in the latter stages of ulcer healing, if the dressing allows, to transition into maintenance.

**Layering of hosiery**

Compression liners can be used to provide higher levels of compression by layering:

- Activa compression liner (10 mmHg) + compression liner (10 mmHg) = 20 mmHg*
- Activa compression liner (10 mmHg) + British standard class 1 (15.5 mmHg*) = 25.5 mmHg*
- Activa compression liner (10 mmHg) + British standard class 2 (21 mmHg*) = 31 mmHg*

OR

- Activa compression liner (10 mmHg) + Actilymph class 1 (19.5 mmHg) = 29.5 mmHg

*mean average

This can be useful if patients find the application of hosiery difficult to manage independently or the application process uncomfortable.
7. Assessment

All compression-related decisions should only be made following a thorough patient assessment. Both limbs should be assessed for hosiery and not just the affected limb.

Vascular assessment

Before making any decisions regarding hosiery choice, it is recommended that all patients should receive a lower limb assessment (LLA, form available on our website) including Doppler ultrasound. LLA should be used to confirm or exclude the presence of arterial disease in patients, especially those who are being fitted with any Class 2 compression garments or above.

The use of compression on patients with arterial disease can lead to significant damage or even loss of limb. Patients with an ankle brachial pressure index (ABPI) of less than 0.8 or greater than 1.3 should not be put in to compression hosiery without specialist advice being sought. If the presence of oedema or other factors prevent an effective Doppler ultrasound being carried out, a lower limb assessment should be completed and specialist advice gained before applying compression (Timmons and Bianchi, 2008).

Limb shape

The limb should be measured in a series of circumference measurements (see later section on limb measurements). Limb shape is a key factor in determining the patient’s suitability for compression hosiery. The limb should be graduated from ankle to below knee for compression to be effective. If the limb shape is distorted, hosiery will not deliver adequate compression and may result in damaging the limb. In such cases, made-to-measure garments should be recommended. In severe cases, it is recommended that bandaging (with padding to obtain a graduated shape) should be attempted first in order to optimise the limb shape prior to hosiery.

Skin assessment

The skin should be examined to look for changes associated with lymphovenous disease. Prolonged, untreated venous and lymphovenous disease causes certain skin changes. The CHROSS checker tool (Bianchi, 2013) provides a useful aid to help identify these changes (see below) It is important to identify, through these skin changes, how advanced disease has progressed in order to be able to select the correct hosiery. More advanced disease will require different hosiery.

The skin should also be inspected and assessed for hydration/dryness, hyperkeratosis, dermatitis, tinea pedis, any fragility of skin, pressure points or bruising, signs of cellulitis, scarring relating to previous surgery or trauma and any presence of itch. Any patient skin sensitivities should also be recorded.

Patient mobility/dexterity

Hosiery application can be difficult and patients and/or their carers must be able to apply and remove garments themselves. A degree of dexterity is required for this. Ankle mobility should also be checked to assess the likely effectiveness of the calf muscle pump.
8. Selecting the correct hosiery

A number of tools are available to assist the clinician in selecting the correct hosiery for the patient:

A. The CHRonic Oedema Signs and Symptoms Tool – CHROSS Checker Tool

The CHROSS checker chart (figure 1) can be used as part of the holistic patient assessment to identify skin changes that have been caused by underlying venous and lympho-venous disease. It aids selection of an appropriate compression product based on disease severity (supplies of pads of the CHROSS checker charts are available from Activa representatives).

**Step 1** - any noted signs and symptoms are ticked on the CHROSS checker chart, the lowest sign/symptom indicates the severity of the disease

**Step 2** - follow the lowest tick across the form and check for the presence of oedema

**Step 3** - follow this tick across to step 3 which recommends suitable hosiery

![The CHROSS checker form](image-url)
CHROSS checker key cards are available providing further information on each of the conditions, including a photograph of the skin change, a description of the condition, a brief explanation of its cause and on its reverse the compression management strategy recommended.

**CHROSS checker Key Card**

![Ankle flare](image)

**Ankle flare**

**Definition:**
Distension of the small veins of the foot, around the ankle

**Cause:**
Chronic venous hypertension

**Action:**
Prevention: skin care, compression hosiery

**Key card reverse**

![Hosiery recommendation](image)

**With oedema**

*ActiLymph® European Class hosiery*

Mild disease: Class 1 (16–21mmHg)

*or*

Moderate disease: Class 2 (23–32mmHg)

*If limb measurements do not match stock sizes, use ActiLymph® Made to Measure hosiery*

**Without oedema**

*Activa® British Standard hosiery*

Mild disease: Class 1 (14–17mmHg)

*or*

Moderate disease: Class 2 (18–24mmHg)

*If limb measurements do not match stock sizes, use Credelast® Made to Measure hosiery*
B. Oxfordshire Hosiery Formulary – see appendix 1

The choice for clinicians when choosing compression hosiery is vast and frequently bewildering. Experience and the literature suggest that often inappropriate choices are made. Patients are supplied with ill-fitting and inadequate garments which they are understandably reluctant to wear, resulting in poor patient outcomes and wasted costs. The Oxfordshire Hosiery Booklet aims to help clinicians understand better the different types of hosiery available to them and to be able to assess for and select more accurately the correct hosiery for their patients.

A number of companies manufacture/supply hosiery. We have selected a range offered by Activa who produce a comprehensive but, with guidance, straightforward range of garments at a reasonable cost. Our aim is to offer simple, clear choices when selecting hosiery that will meet the needs of the vast majority of patients.

c. The following algorithm can be used to assist hosiery selection

(Stephen-Haynes and Sykes 2013)
D. Tissue Viability – Further supporting information is available on our website http://www.oxfordhealth.nhs.uk/tissue-viability. If you require any additional advice and support in selection the correct hosiery for your patient please contact Tissue Viability via email tissue.viability@oxfordhealth.nhs.uk for people emailing from an Oxford Health email address, or oxfordhealth.tissueviability@nhs.net if emailing from elsewhere.

Patient preference

It is well known that patients with leg ulceration and/or chronic oedema can find it difficult to tolerate compression for a number of reasons, including reduced mobility, or social pressures, such as an inability to carry out work. Working with the patient to find a suitable garment greatly improves concordance (Gray, 2013).

A wide variety of hosiery styles are available including:

- Open or closed toe
- Below knee
- Thigh length
- With or without silicone top bands
- Thigh length with waist attachments (only available in Actilymph made to measure MTM)
- Tights are not available. If both legs require hosiery use two thigh high stockings or two thigh high with waist attachments if MTM
- Colours - sand, black (or white for liners)

The following should be taken into consideration:

- If oedema is present hosiery should be measured to extend to just above it to allow for expansion of the oedema above the compression. This is particularly important for oedema up to the knee which will require thigh length hosiery
- Open toe hosiery is indicated for patients who require monitoring of their toes, who only have the hosiery changed weekly, have arthritic or clawed toes, have a fungal infection or have a long foot
- Closed toe hosiery is indicated for people with oedema to the dorsum of the foot

Limb measurement

Once a type and class of garment have been selected according to all assessment findings, the limb should be measured to determine which size of compression product is required. Measurement guides are provided by the manufacturer but always include ankle circumference. Be aware that different styles of hosiery have different measurements, for example Activa British standard and Actilymph, and so care should be taken to make sure you are using the correct chart for the hosiery you are using.

A video demonstrating how to measure for hosiery can be found at: http://www.activahealthcare.co.uk/videoguides/

Off-the-shelf sizing charts fit a wide range of patients and the rule of thumb is that off-the-shelf compression hosiery sizes will generally fit 80% of patients. If the limb is graduated in shape but larger than standard hosiery sizes, made-to-measure hosiery garments may be ordered to fit. Please note that only clinicians who have received training in how to measure for made to measure hosiery may do so. These are expensive garments that require specialist knowledge to ensure the correct style, size and type of garment are prescribed. This training is delivered on both the Chronic Oedema Study Day and the Hosiery Workshop.
It is always important to remember:

- Measurements should be taken as early in the morning as possible, before the patient has been standing for long periods of time.
- Measurements need to be taken next to the skin to ensure accuracy.
- Patients who require compression hosiery for each leg must have both legs measured because they may be different sizes.
- Take measurements in standing position for thigh hosiery, sitting or standing for calf & ankle.
- If sitting the knee should be flexed to 90 degrees and foot on the floor.
- Use a sheet of paper to measure the foot length.
- Check accuracy of measuring tape—old tapes stretch with time.

**Replacement hosiery**

In most cases it is recommended that compression hosiery be re-measured and replaced every 3-6 months (NICE, 2012). British standard hosiery should be replaced after 3 months wear. European standard hosiery should be replaced after 6 months wear. Limbs should be re-measured each time the patient requires their replacement pairs. A change in wound healing status, oedema, ABPI, skin condition, mobility and comorbidities or any damage to the garment, may require a change in compression therapy. Patient choice should also be included regarding style and colour.

It is the responsibility of the prescribing nurse to consider and make arrangements for ongoing vascular assessment, further supply of hosiery with further updated limb measurements. Patients with capacity can be given instructions to organize this themselves. However more dependent patients will need this coordinating by the prescriber.

**9. The Prescription**

In many cases the clinician choosing the hosiery garment will be reliant upon a GP to prescribe it. This can lead to confusion and the wrong garment being prescribed.

The prescription should specify the following details:

- Type of garment eg Actilymph OR Activa
- Compression class
- Hosiery length (European Class hosiery only) eg thigh high
- Colour
- Open or closed toe
- Quantity – the number of individual stockings NOT pairs
- The PIP code – can be found on literature provided by the company; either the Activa and Actilymph Compression Hosiery Booklet, prescriber’s guides, the Activa Hosiery Selector App, or by visiting the Activa website; select ‘Need help’ and then ‘PIP and ordering codes’

The PIP codes can be typed in to EMIS or Vision to immediately identify the correct hosiery. However this system is not 100% reliable and in some instances the PIP codes don’t work! You will need to give the GP prescriber as much clear information as possible to help them find the hosiery on the system. The following formula provides a guide of what information and in what order, to type into the system:
10. Fitting, removing and caring for hosiery

Patients should be encouraged when able to fit their hosiery themselves or identify a family member or informal carer to assist them. Hosiery can be worn 24 hours a day for up to seven days, when indicated by the prescriber.

Tips for fitting, or donning hosiery:

- Ensure hosiery is put on first thing in the morning before the legs are too swollen
- Use a foot powder to help slide the hosiery over the feet. Avoid using ordinary talcum powder, which can clump to form balls if the feet are damp
- Wearing rubber gloves may help fingers to grip the hosiery

How to apply hosiery – by clinician/carer

1. Place hand inside stocking and grip heel sack with finger and thumb, turn stocking inside out leaving foot part still tucked in
2. Fold foot part of stocking 1" (2.5 cm) back
3. Place wearer’s heel onto your lap or onto fitting stool
4. Cover toes, if necessary, with application aid
5. Place first two fingers of each hand inside the foot part of the stocking, stretching it outwards and slip it over the foot
6. Unfold the one-inch fold (2.5 cm), ensuring heel is in correct position
7. Now gather up remaining stocking until you have reached the toes
8. Turn your wrists so that your fingers are pointing towards you and slide stocking over foot, ankle and leg (Do not drag stocking on leg)
9. Return to foot and gradually draw remainder of stocking over foot and leg. Ensure stocking does not constrict circulation
10. The stocking now needs to be stretched up leg, start easing stocking up leg 2” (5 cm) at a time. Try not to force it
11. Below knee stockings have to be pulled up as far as the bend at the back of knee. Thigh length garments need to be positioned at mid-thigh
12. Check that the stocking is evenly stretched on the leg.
13. Check that the toe section is not restricted in any way

A video demonstrating the application of hosiery can be found at:
http://www.activahealthcare.co.uk/videoguides/

**Application aids**
A number of devices are available to assist in either self or carer fitting (Wounds UK, 2015). Application aids can be fabric or rigid:
- Fabric aids are usually sliding devices that make it easier to slide the stocking over the foot and leg. Patients still need to be able to reach their toes to use this themselves
- Rigid aids tend to provide a frame that patients can step into without having to reach their toes

Aids should be chosen according to each patient’s physical needs and whether they can purchase themselves or require a device on drug tariff (Wounds UK, 2015).

**The following devices are available on drug tariff:**

**Actiglide** (Activa Healthcare)
- PIP Code 284-5196
- £14.47
- Can be used to apply open or closed toe hosiery
- One size – two can be joined together for a larger limb
- Small and easy to fold away
- Can be used independently by a patient or carer

A video demonstrating the use of the Actiglide can be found at:
http://www.activahealthcare.co.uk/videoguides/

**Magnide** (Credenhill)
- £14.17
- Can be used to apply open or closed toe hosiery
- Medium (PIP code 380-7534) and large (PIP code 380-7526) sizes
- Small and easy to fold away
- Can be used independently by a patient or carer

A video demonstrating the use of the Magnide can be found at:
http://www.credenhill.co.uk/our-products/easy-slide-range/
Sockaid (Urgo medical) PIP code 319-4016 £13.04

- For open or closed toe hosiery
- Can be used in or out of bed

A leaflet of instructions for use can be found at:

Easy Fit (Juzo) £33.90

- For open or closed toe hosiery
- Reduces need for bending down
- Aids patients with poor dexterity or grip strength
- Comes in two sizes:
  - Large – for ankle circ. <26cm (PIP 393-9066)
  - Ex-large – for ankle circ. >26cm (PIP 393-08990)

A video demonstrating the use of the Easy Fit can be found at:
https://www.youtube.com/embed/oErYmaUsNNE

Application by formal carers

In cases where the patient is unable to apply the hosiery independently and there is no relative, friend or informal carer available to assist, an application can be made to the Shared Care Team within the Continuing Care department for carers to take on this task.

Referral to the Shared Care Team is via a Delegated Health Care Tasks form. If the application is successful the shared care team will source and fund the care. A referral should be made even if there is an existing care package, as carers will need the funding and the time allocated to deliver this care. The referrer will be responsible for providing the training to the carers and for ongoing monitoring of the care.

The Shared Care Team can be contacted:
- By phone on 01865 904201
- By fax on 01865 261754
- By email: shared.care@oxfordhealth.nhs.uk

Removal

Advise patients to remove hosiery daily (or as often as possible) to inspect the skin for changes. When removing, or doffing the hosiery, it is important to gently peel off the garments and not to roll them.

Caring for compression hosiery

It is important to follow the manufacturers wash and care instructions closely. Avoid drying the hosiery on a heat source (radiator, tumble-dryer) as this can degrade the elastic components in the stockings. Many garments are now machine washable.
If compression hosiery is washed, dried and stored correctly, it can be used for three (British Standard) to six (Actilymph) months, or 100 – 200 washes. Patients are sometimes prescribed two pairs of hosiery, allowing one pair to be washed while the other pair is worn. This means that both pairs will need replacing after six or twelve months respectively.

Patients and their carers should be advised to regularly check hosiery for signs of wear or damage that may affect its compression. They should also look out for foot problems, such as rough skin or sharp toenails that could cause damage to the hosiery. Any jewelry that may catch on the hosiery during donning and doffing should be removed first.

11. Skin Care

Skin care should be considered part of hosiery management and the overall treatment plan, rather than a discreet condition to be managed on its own (Wounds UK, 2015). Patients should be educated on what healthy skin looks like and what a healthy skin regimen should include.

Tips for good skin care:

- Apply skin care products in the evening after removing hosiery for bed, or at hosiery changes
- Check skin daily (or as often as possible) for changes including on the legs, toes, nails and between toes
- Gently elevate legs when resting to reduce pooling of oedema which can result in skin damage
- Keep physically active to the fullest extent possible depending on each patient's specific situation
- Don hosiery 1st thing in the morning when oedema is at its lowest levels to help avoid skin damage and limb expansion (Wounds UK, 2015)
- Thorough washing and drying in-between toes is important to prevent tinea-pedis
- Use a soap substitute to wash the skin and a cream based emollient as a leave on emollient. Hydromol ointment is NOT suitable as a leave on emollient under hosiery

(Please refer to the emollient section of Oxfordshire Wound Care formulary for advice on appropriate emollient therapy).

12. Trouble Shooting

**The patient complains the compression hosiery is too small.**
Generally this means they have difficulty putting it on. If necessary, re-measure the patient. If they are in the correct size, suggest a hosiery applicator and explain hosiery has to fit snugly to do its job.

**The patient complains the hosiery is too tight.**
Re-measure the leg to make sure they have the correct size garment. Has the correct standard and class of hosiery been prescribed? If the limb has oedema, British standard or too low a class stocking will not manage the oedema. The limb can swell causing the stocking to be too tight. Educate the patient about compression and how it works and the need for the garment to be firm and supportive to the limb. If the patient can understand why the stocking needs to be firm they are more likely to find it easier to accept.
The compression hosiery is digging in at the knee and swollen above it.
Consider a thigh length garment to go up above the swelling. Also use a European hosiery garment (Actilymph) with the fabric stiffness to control swelling/oedema.

The patient finds it difficult putting the compression hosiery on.
The patient may find it useful to apply the hosiery first thing in the morning before getting out of bed, wearing rubber gloves to grip the hosiery. For those who need an additional helping hand, an application aid is recommended to ease the hosiery into position effortlessly.

If you have any further issues you want us to trouble shoot, please don’t hesitate to contact the team by email at:
tissueviability@oxfordhealth.nhs.uk or oxfordhealth.tissueviability@nhs.net
13. Glossary of terms

- **ABPI Ankle Brachial Pressure Index** - which is a way of assessing blood flow through the arteries in the leg
- **Anti-embolism** - Against an embolism
- **Calf pump** - Muscular activity of calf that promotes venous flow towards the heart
- **Chronic oedema** - The aetiology of chronic oedema may be complex and a number of different factors may predispose an individual to develop swelling
- **Compression profile** - The extent of the compression value as it decreases from the ankle to thigh
- **Diastolic** - The period during the normal beating of the heart in which the chambers of the heart dilate and fill with blood
- **Embolism** - Any foreign particle i.e. clot, fat globule, etc. in a blood vessel
- **Foot pump** - Muscular activity of foot that promotes venous flow towards the heart
- **Interstitial fluid** - Liquid found between the cells of the body that provides much of the liquid environment of the body
- **Ligation Damaged** - vein knotted and tied and left to wither away
- **Lymph nodes** - Small, rounded structures along the small vessels of the lymphatic system that produce disease-fighting white blood cells and filter out harmful microorganisms and toxins from the lymph
- **Lymphoedema** - Swelling from excess fluid accumulation in the tissues caused by a failure in the lymphatic system
- **mmHg** - Millimetres of Mercury - the measurement used to determine the compression value
- **Oedema** - Swelling
- **Perforators Vessels** - which connect the deep and superficial veins
- **Peripheral neuropathy** - Damage to peripheral nervous system which can affect sensation in the extremities
- **Phlebitis** - Inflammation of vessel walls
- **Post thrombotic** - After a thrombosis
- **Prophylactic** - Protection
- **Prophylaxis** - Prevention
- **Sclerotherapy** - Injection of a fluid which sets and blocks the damaged veins
- **Stiffness index** - This refers to the resistance or stretch of hosiery when a limb tries to expand within it
- **Stripping** - Surgical removal of damaged veins
- **Systolic** - The period during the normal beating of the heart in which the chambers of the heart, especially the ventricles, contract to force blood into the aorta and pulmonary artery
- **Thrombosis** - Blood clot within the vein
- **Varices** - Varicose veins
- **Varix Latin** - A swollen vein
- **Varicose eczema** - Form of dermatitis usually to the gaiter area as a result of venous hypertension
- **Varicose ulcers** - Breakdown of the skin, normally in the gaiter area as a result of venous hypertension
- **Venous** - Of veins
14. References


Health and Social Care Information Centre (2013) *CCG Outcomes Indicator Set; Emergency admissions*. From http://www.hscic.gov.uk


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