

# Development and evaluation of a hosiery selection algorithm in an acute and community healthcare NHS Trust

## KEY WORDS

- ▶ Compression
- ▶ Hosiery
- ▶ Selection

The use of compression hosiery is widespread within the community and hospital setting and is an essential component of lower limb maintenance and prevention. Compression is the cost-effective therapy that heals venous ulceration, prevents recurrence and contains chronic oedema, thus significantly affecting patient's clinical outcomes as well as financial outcomes. The knowledge and skills of the clinician are important in ensuring appropriate selection and fitting of compression hosiery. The increasing range of compression options, including the availability of European classification, has compounded the difficulty in choosing due to differences between various options. This could lead to inappropriate choice, thus providing poor clinical and financial outcomes. The development of a hosiery selection algorithm can assist the clinician in appropriate selection of hosiery for the prevention and management of lower limb ulceration.

Up to 50% of the adult population are affected by venous insufficiency (Venous Forum of the Royal Society of Medicine, 2011) and an estimated 1% will have a leg ulcer, with venous disease accounting for 60–80% of leg ulceration (Callam, 1992). In the UK, annual costs for leg ulcer care and management are conservatively estimated to be in the region of £200 million and, with age featuring as a key predisposing factor, the ageing demographic profile will result in an exponential increase in this financial burden (Moffatt et al, 2004; Person et al, 2004; Posnett and Franks, 2008).

The key factor when treating people with leg ulcers is to establish the underlying aetiology to ensure that the most appropriate treatment is prescribed and delivered (Clinical Resource Efficiency Support Team, 1998; Royal College of Nursing, 2006; Scottish Intercollegiate Guidelines Network, 2010).

## COMPRESSION HOSIERY

The main treatment for chronic venous hypertension is a firm compression bandage or stocking supporting the superficial veins and counteracting raised capillary pressure (Hafner and Junger, 2000; Amsler et al, 2009), aiding

venous return and reducing the superficial venous pressure by exerting external pressure on the interstitial tissue (Moffatt et al, 2007; World Union of Wound Healing Societies [WUWHS], 2008; O'Meara et al, 2009; O'Meara et al, 2012). Compression therapy can also assist in lymphatic function by encouraging the movement of fluid into the lymphatic capillaries, thereby preventing or reducing oedema (Lymphoedema Framework, 2006; Wounds UK, 2007; Williams, 2009).

Compression therapy is considered as one of the most significant advancements in relation to wound care in the last 50 years and now plays an important role in the treatment and prevention of venous and lympho-venous disorders (Lymphoedema Framework, 2006; Wounds UK, 2007; WUWHS, 2008).

The importance of hosiery in prevention of recurrence, healing of venous leg ulcers, and primary prevention of leg ulcers where varicose veins are present, prevention of deep-vein thrombosis (DVT), prevention of complications following DVT and maintenance of, or reduction, in oedema are discussed in the Best Practice Statement for compression hosiery (Wounds UK, 2007).

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In choosing appropriate compression hosiery, the following options made available to the healthcare professional can facilitate the best possible outcome for the patient: (i) British standard classification hosiery; (ii) leg ulcer treatment kits for leg ulcer management; (iii) European standard classification hosiery (both flat-bed knit and circular knit); (iv) made to measure hosiery; (v) size; (vi) colour; (vii) classification / compression value (mmHg); (viii) fabric stiffness; (ix) style (e.g. below knee, thigh length, tights).

Therefore, the application of hosiery fulfils the physiological needs and has the additional benefit of being tolerated by the patient, provides consistent and reproducible pressures, and is cost effective as it can be washed several times and will continue to provide effective compression therapy. Appropriate selection of hosiery would therefore present considerable cost minimisation and more importantly improved quality of life for individuals.

European classification hosiery is accepted as the most appropriate for those with chronic oedema, due to the stiffness the fabric offers alongside therapeutic compression. British standard hosiery offers less stiffness and is a cost-effective option for those without oedema (Stephen-Haynes and Sykes, 2013).

#### PREVIOUS RESEARCH

An audit of 42 tissue viability link nurses from Worcestershire Health & Care NHS Trust and Worcestershire Acute Trust was undertaken to consider formulary compliance and to identify the factors influencing decision making and choice when selecting compression hosiery for patients. The aim of this audit was to establish data to be used in the deployment of resources and to identify practitioner knowledge and identify training needs (Stephen-Haynes and Sykes, 2013).

Key data obtained from the audit are highlighted in *Table 1*. Prevention of lower leg ulcer recurrence was identified as the most common use for compression hosiery within the trust (83%). This corresponds with the consensus that not wearing hosiery is strongly associated with ulcer recurrence (Nelson and Bell-Syer, 2012).

The use of compression hosiery is common practice for many healthcare professionals, with hosiery being used for more than one reason at

any one. The audit results showed that while staff identified maintenance of lower legs, prevention of ulcer recurrence and the management of chronic oedema as the most common uses for hosiery, staff may not be selecting the most appropriate hosiery. Although specific European classification garments with a higher stiffness index are listed on the trust's formulary as the first choice for patients with chronic oedema, it was only used by 28% of staff. Only 8% of respondents use leg ulcer treatment kits, despite 50% reporting that they use hosiery to actively treat venous leg ulceration. There may be justification to promote further use of the kits, where appropriate, in place of compression bandaging to save time and in turn to save costs (Nelson et al, 2005; Stephen-Haynes and Gibson, 2006). Leg ulcer treatment kits were not available to appropriately manage oedema at the time of the audit.

The increasing availability of a range of hosiery on prescription offers increased choice for patients, but this has been identified as heightening the confusion regarding appropriate selection. The audit identified a scope for future development, particularly in terms of hosiery selection, the management of chronic oedema and the use of leg ulcer treatment kits to manage venous leg ulceration (Stephen-Haynes and Sykes, 2013).

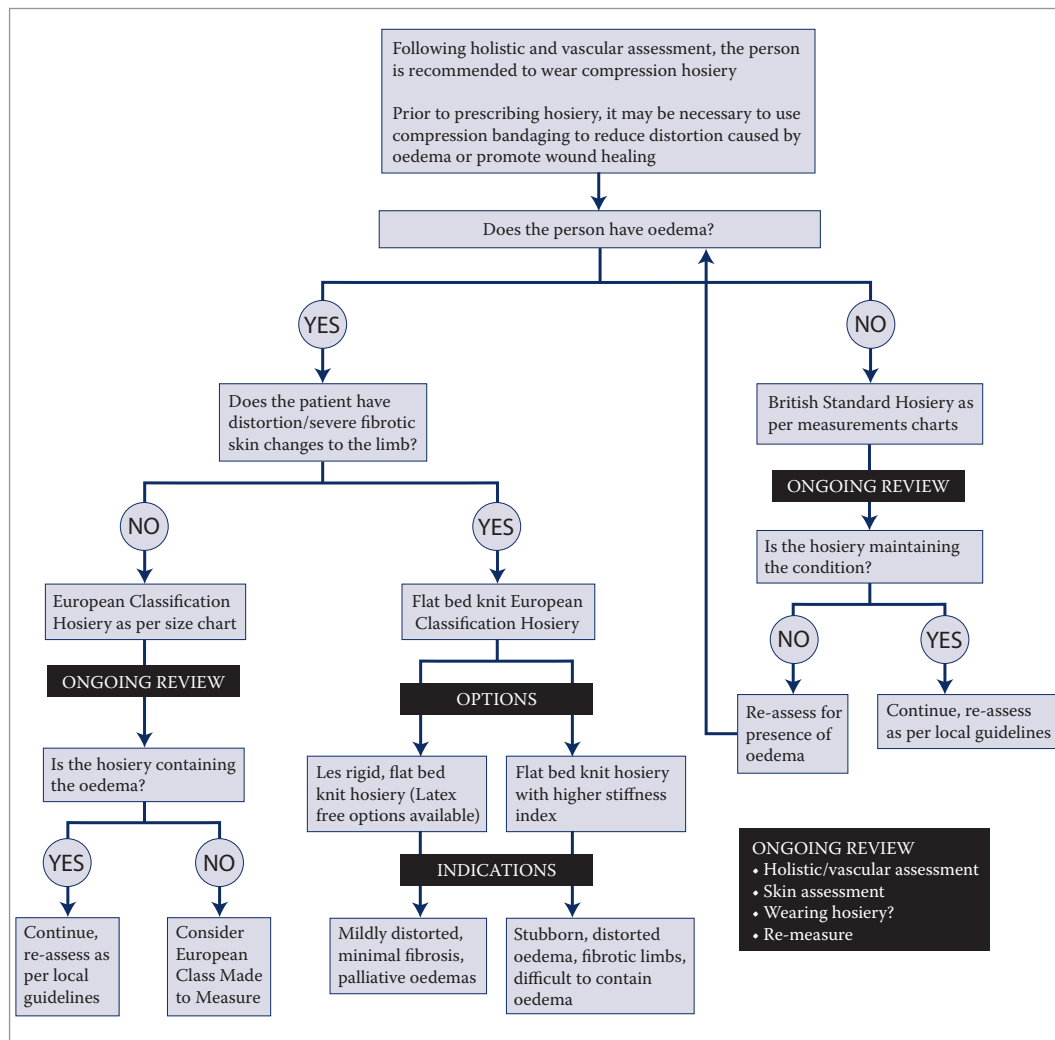
**Table 1. Results of audit on decision-making for hosiery selection.**

Responses (n=42)†	N (%)
Reasons for hosiery use	
Prevention of ulcer recurrence	35 (83)
Management of chronic oedema	30 (71)
Prevention of venous leg ulceration	24 (57)
Active treatment of leg ulceration	21 (52)
Management of varicose veins	13 (31)
Variety of hosiery being used	
British standard compression	41 (98)
British custom-made compression	15 (38)
European standard compression	12 (29)
Leg ulcer treatment kits	3 (7)
Factors affecting nurses' selection	
Patient concordance	36 (86)
Level of compression	36 (86)
Sizing/fit	35 (83)
Local wound management formulary listing	27 (64)

†Respondents were able to select multiple responses to each question.

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Figure 1. Hosiery selection algorithm.



Following a review of the audit results and discussion with the participants, various changes were made to the way training related to compression hosiery was delivered. For example, training relating to the use of compression therapy for the management of chronic oedema was previously delivered at the end of full-leg bandage training, resulting in little time being allocated for such an important learning need. Stand-alone hosiery training, with an emphasis on chronic oedema management, is now offered to underpin trust guidelines and facilitate appropriate use of formulary items.

**HOSIERY SELECTION ALGORITHM**

Following discussion with the Worcestershire Health & Care NHS Trust and Worcestershire

Acute Trust participants, a hosiery selection algorithm was developed in accordance with national and local guidelines (Figure 1).

Further audit was then undertaken by 30 members of the Worcestershire Health & Care NHS Trust County tissue viability link nurse team within their clinical practice to ensure the algorithm was effective. The algorithm was then evaluated by 78 delegates at the annual Leg Club® Conference 2012 by healthcare professionals attending the hosiery workshop.

**Methods**

Clinical governance approval was given within the Worcestershire Health & Care NHS Trust for the county link nurses to review the algorithm

Table 2. Results of the algorithm usage questionnaire.

Question	Yes (%)	No (%)
1. Did you find the algorithm easy to follow?	100	0
2. Do you think it will facilitate appropriate hosiery selection for your patient?	100	0
3. Do you think that you would select a different type of garment than you would have without using the algorithm?	78	22
4. Do you think it would be worthwhile using this algorithm with supporting guidelines Trust-wide?	100	0

within their clinical practice. Permission was also granted by the Leg Club to undertake an evaluation of the hosiery selection algorithm at the hosiery workshop during the annual Leg Club Conference. Delegates attending the hosiery workshop were invited to take part and those who agreed were shown the algorithm and asked to complete a pre-prepared questionnaire comprising the four questions listed in *Table 2*. Following completion of the questionnaire, delegates were invited to discuss the algorithm and its clinical use.

## Results

Responses of the 78 participants to the questionnaire are shown in *Table 2*. More than two-thirds of respondents reported that they would have select a different type of garment had they not used the algorithm, and all found it easy to follow and worthwhile for Trust-wide use.

## Discussion

Discussion relating to consideration for publication and increasing the validity of the work with professorial colleagues led to the suggestion that the algorithm should be subject to peer review and presented at a national conference. The algorithm was presented at the annual Tissue Viability Society conference in April 2013 and submitted for publication in August 2013.


## Research strengths and limitations

External validity refers to the extent to which findings can be generalised and the representativeness of the sample, which also reduces artificiality (Oppenheim, 2000). The authors believe that the high number of healthcare professionals involved in the original

audit (on compression hosiery usage;  $n=40$ ), the review by primary care link nurses ( $n=30$ ) and the review by qualified healthcare professionals attending the Leg Club hosiery workshop ( $n=78$ ) contributes validity of this study.

A limitation of this study is the potential of bias that may occur when a researcher is undertaking research that is known to the participants; this may give rise to the Hawthorne effect, where participants alter their behaviour as a result of being part of an experiment or study (Landsberger, 1958). Although this may have been negated by the participation of the Leg Club Conference attendees, the authors fully acknowledge this limitation.

## CONCLUSIONS

The hosiery selection algorithm was evaluated as easy to follow and assisted in appropriate hosiery selection both locally and at a national conference. The algorithm has been implemented locally to assist with appropriate hosiery selection and a submission was made to a national conference to aid dissemination. A further audit will be undertaken in 12 months to ensure it is fully implemented and is supporting appropriate compression hosiery selection. 

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