The use and acceptability of devices for compression stocking application and removal

Suzanne Kapp, Charne Miller & Lisa Donohue

ABSTRACT

The use of devices to help with the application and removal of compression stockings represents another important step to facilitating greater adherence to compression therapy and reducing the risk of venous leg ulcer recurrence. There is limited published literature regarding the use of application and removal devices.

This study presents findings regarding device use arising from a randomised controlled trial (n=100) comparing two types of compression stockings to prevent ulcer recurrence. All participants had the opportunity to trial a material or metal frame device and were given one free of charge to facilitate stocking use.

The study found that both devices were well adopted, principally for applying stockings. Only 9% of participants did not wish to use any device at all at baseline, a percentage which remained in the minority across the 13- and 26-week follow-up (34% and 37% respectively). Both devices were acceptable for use with open and closed toe stockings and across a range of stocking sizes. Device type and a range of stocking characteristics did not compromise the likelihood of adherence to the stocking. These devices were used by participants, informal care givers and health professionals, demonstrating benefit to a range of stakeholders who are invested in the prevention of venous leg ulcers.

This paper is of interest to clinicians who seek solutions to promote adherence and independence among compression stocking users, and to organisations providing support services for stocking application and removal.

Keywords: Venous leg ulcer, prevention, compression stocking, application, removal, device.

Suzanne Kapp *
BN, PGDip (AdvNsg), MNSci
RDNS Institute, Research Fellow,
31 Alma Road, St Kilda, VIC 3182, Australia
La Trobe University, School of Nursing and Midwifery
Email skapp@rdns.com.au
Tel 03 9536 5336

Charne Miller
BA(Hons)
RDNS Institute and La Trobe University,
Alfred Health Clinical School

Lisa Donohue
PhD
Monash University, School of Nursing and Midwifery

* Corresponding author

INTRODUCTION

Compression stockings are an effective treatment for venous leg ulcer prevention[1,2]. Regrettably, non-adherence to this treatment is common: 42–61% among users of high-compression stockings and 20–28% among users of moderate-compression stockings[3-5].

A range of reasons for non-adherence have been described. Intolerance of the squeeze of the stocking, poor fit, inability to apply the stocking and aesthetic factors[6], and self-efficacy as well as depressive mood, all play a role[7]. The cost of compression stockings, which are usually a self-funded lifelong commitment for the user, may also be a factor[8].

The ability to apply and remove compression stockings is an enabler of compression use, however well fitting stockings that deliver high compression are often difficult to put on and take off. The impact of chronic health conditions, reduced strength, poor dexterity, limited flexibility and cognitive impairment can make applying and removing compression stockings an insurmountable challenge. For those who assist them, such as informal caregivers, the challenges may be similar. Physical and repetitive strain may occur when applying and removing

compression stockings and is a further consideration for clients, informal carers and health care professionals[9].

There are a number of devices available that can assist with applying and removing compressions stockings; however, their usefulness has not been formally investigated. If these devices enable easier use of compression stockings, the impact on the person's ability to adhere to treatment may be significantly improved and their risk of ulcer recurrence reduced. This is pertinent as venous leg ulcer recurrence rates are reported to be as high as 69%[2]. Furthermore, the risk of personal injury to those applying the compression stockings could be minimised.

It is not known if devices to apply and remove compression stockings are useful and effective, despite a growing demand and market for this type of equipment. As people typically embark on lifelong lifestyle changes when taking up compression stocking treatment, the potential benefit of these devices for a range of stakeholders is evident.

This paper reviews the literature pertaining to stocking application and removal devices ('devices'), the function of two commonly available devices, and the perspectives and outcomes of study participants who were provided with these devices free of charge during a compression stocking randomised controlled trial. These findings will assist health professionals to provide appropriate advice to clients when selecting devices, justify the provision of human resources to use them when required, assist the person with their self-management plan and support formal and informal carers engaged in stocking application and removal.

A database review of literature published from 2003 to 2013 was conducted in Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline, The Joanna Briggs Institute database and the Cochrane Collaboration Database of Systematic Reviews. A Google scholar search was also undertaken. Search terms included: stocking applicator, stocking aid, stocking donner, stocking appliance, independent butler, don, doff, Eureka On Donner and Jobst metal frame donner.

A large number of device patents were identified during the literature search; however, these are not considered in this paper. Several review articles were found that detailed the physical characteristics and perceived benefits of stocking application and removal devices[10-13]. This review, however, focuses on five articles that specifically reported a formal evaluation of outcomes relating to the use of such devices, and all reported perspectives of health care professionals.

A study conducted in Derbyshire, United Kingdom[14], involved 13 interested health professionals (occupational therapists, district nurses and other interested clinicians) conducting a single-session test of three different style stocking devices: a fabric device, a gutter (partial tube with laces attached) device and a frame device. The fabric-style device was reported to make it easier to glide the foot into the stocking, and provided ease when pulling the device out from under the stocking after application. Conversely, the fabric device could not be used with closed toe-style stockings and this type of device required the user to bend over. The gutter-style device was reported to stretch some stockings, making the entry of toes easier. The laces, which allowed the device and stocking to be slid up the leg, reduced the need to bend over. The frame device was reported to have similar positive features, stretching the stocking to ease application and minimising the need to bend over. Additionally, the frame was stable when positioned on the floor. The frame device, however, was reported to have some drawbacks: it was not adjustable with respect to size, it was hard to get the stocking on the device and sometimes a second person was required to use it successfully.

A report from Taiwan[15] detailed the perceived acceptability of a modified (wider cup) metal frame donner among people with venous leg ulcers who use compression stockings. The wider cup is suggested to ease application of the stocking over the foot by expanding the heel portion of the stocking. This device was reported to be highly acceptable to clients; however, the authors note that the design benefits may be offset by the greater force required to apply the stocking over the larger cup section of the device.

A small survey of advanced practising nurses (n=10) conducted in a home nursing setting in Victoria, Australia, found that three types of devices were commonly used among home nursing clients: metal frame devices, material devices and plastic (tubular) devices[16]. The material device was reported to be the most useful to staff and carers, and, conversely, not as useful among people with cognitive impairment who may struggle to learn and recall the steps required to use it. The metal frame device was noted to be useful for people who may not have the full range of hip flexion, and the newer plastic tubular devices were reported to be easier for clients to manipulate. Plastic bags, silk slips and rubber gloves (*Image 1*) were additional but infrequent aids reportedly used for compression stocking application. The survey was undertaken to inform the selection of the devices provided to participants in a subsequent study conducted in this setting[16].

An e-learning client education program, the Leg Ulcer Prevention Program (LUPP), considered the use of compression stockings (*Image 2*) and stocking application and removal devices in the final of six program sessions, a session that focuses on keeping venous leg ulcers healed[17]. Evaluation of LUPP found improved understanding among older people of the need for compression stockings following healing; however, the evaluation did not specifically consider the acceptability or impact of the two devices promoted in the program (the material and metal frame devices referred to in this paper) from

Image 1

the client's perspective. All nurses surveyed about this LUPP session (n=27) responded that the information provided about compression stockings and devices to prevent recurrence was either good, very good or excellent. Focus group discussion with eight nurses highly familiar with LUPP found that the opportunity to trial devices with clients was beneficial, and that additional types of sample devices would be a valuable addition to their nursing tool kit for the prevention of leg ulcers[18].

METHOD

A double-blind, randomised controlled trial was conducted in a home nursing service based in metropolitan Melbourne and the Mornington Peninsula[4]. Clients who had a venous leg ulcer which had healed in the previous week (n=100) were randomised to receive either a moderate-compression stocking (23–32 mmHg) or a high-compression stocking (34–46 mmHg). One of two stocking application and removal devices was provided to participants prior to commencing use of the randomised stocking. The two devices offered to participants in this study were the Eureka On Stocking Donner™ (Biomet, Australia) and the Jobst Metal Frame Stocking Donner™ (Smith & Nephew Healthcare, Australia) (*Image 3*). The participant, together with their treating nurse, selected the device assessed to be most appropriate for the participant. The stockings and devices were provided at no cost.

Image 2

Data were collected at baseline (recruitment to the RCT), 13 weeks (91 days from baseline) and 26 weeks (end of the RCT, 182 days from baseline). Participants were provided with replacement stockings during the RCT if they were found by the nurse or reported by the participant to be damaged, lost or too worn. Data were collected by the research study trained nurses according to their clinical assessments, documentation in the client care record and arising from direct consultation with the participant. Participants were provided with a custom-designed Compression Stocking Acceptability Survey and a pre-paid envelope to return the survey to the researchers if they were willing to complete it. Human Research Ethics Committee approval was obtained prior to commencement of the study and the trial was registered with the Australian and New Zealand Clinical Trials Registry ACTRN12609000416291.

The Eureka On Stocking Donner (hereafter referred to as the material device) is a flexible, material device with a plastic rod that holds the device together during stocking application. To apply a stocking using this device, the material piece is folded in half lengthwise to align the eyelets. The plastic rod is threaded through the eyelets to temporarily hold the folded device together (*Image 4*). The device is slid over the foot and up the shin and the stocking is then similarly slid over the foot and up the shin until it is positioned over the foot, ankle and lower leg (*Image 5*). Removal of the plastic rod allows the device to be pulled toward the body (out from under the stocking) for removal. To take off a stocking, the foot and lower leg can be placed inside the device through a small opening. The material is then loosely wrapped around the limb and the stocking is slid down over the device and over the foot. This device offers benefits including: reduction in the force required to apply the stocking, ability to adapt to the shape of the leg, lightweight construction and small size. The device can be used with open and closed stockings. The retail cost at the time of publication for this device was AUD$79.00.

The Jobst Metal Frame Stocking Donner (hereafter referred to as the frame device) is a non-flexible, plastic-coated device. To use this

device to apply the stocking, the top of the compression stocking is slid over and down the cup of the frame until the heel component of the stocking is positioned at the top of the cup. The foot is slid, toe first, into the stocking and once the heel of the foot is in contact with the heel part of the stocking, the heel is pushed toward the base of the device to position the stocking over the foot and around the ankle. The device can then be pulled up the leg to slide the stocking into place along the shin (*Images 6 and 7*). To take off the stocking, the calf can be placed against the cup of the device, the top of the stocking folded over the frame and the frame manipulated to help slide the stocking over the heel for easier removal. This device offers benefits including: reduced need for bending, simple use, and lightweight construction. The device can be used with open and closed stockings. The retail cost for this device at the time of publication was AUD$69.00.

Image 3

RESULTS

Compression stocking trial

Participants were 78.7 years of age on average, predominantly female (77%) and 81.7% had a history of venous leg ulcer recurrence. The main findings from this trial have been published[19].

Device selection

Most participants in the study (91%) intended to use a device at baseline. The material device was selected by 56 participants and 29 participants selected the frame device. Six participants reported they would use alternative devices: a rubber mat applicator and

Image 4

Image 5

metal frame device (n=1), a Venosan Metal Frame Donner™ (n=1), Stocking Assist™ (IAA Medical, Australia) (n=1), with missing data on device selection for three participants. Nine participants did not wish or intend to use a device at recruitment to the study.

The reasons for the selection of the device were considered. Free text responses relating to both devices were mostly non-specific (for example, "easier to use"). Regarding the material device, specific comments regarding the suitability of this device for carer use were noted by 10 participants and for the frame device, the ability to apply the stocking without the need to bend down to the foot was noted by seven participants.

Among participants who selected the material device, more requested open toe stockings (58.9%) than closed toe stockings (41.1%). Among people who selected the frame device, toe type selection was similar (48.3% open toe; 51.7% closed toe). Only one participant in each of the toe type groups reported selecting the toe type on account of the device they had selected.

Expected management strategy and user of device

Over half of the participants (55.6%) reported that they intended to manage their stocking use independent of any personal assistance at recruitment to the study. Nearly one-third (30.3%) expected to require informal support, 9.1% formal support and 5.1% expected to require both formal and informal supports to wear the stockings. Nearly three-quarters of clients intending to use a device (71%) expected that they would be the main user of the device. A total of 36% of participants believed their informal carer would also use the device to assist them, 9% expected the community care aide (health worker) to use it, 7% expected another formal carer and 6% expected the registered nurse to also use the device.

Device selection and stocking size

The manufacturer's stocking size selection guidelines were used to determine what stocking size participants would receive in the trial, based upon the participant's widest calf and smallest ankle circumference measurements. Of note, more than half of the sample (55.0%) were indicated for small size stockings. Medium (28.0%), large (12.0%) and extra large (5%) size stockings were assessed for fewer participants. There was no relationship between the size of the stocking indicated for participants and their selection of device at baseline [$\chi^2(2)=0.056$, $p=0.972$].

Device selection and stocking care and condition

Approximately one in five participants reported washing their stocking after every use (20.8% 13 weeks, 18.2% 26 weeks). Four in 10 participants reported washing their stocking several times a week (40.3% 13 weeks, 43.9% 26 weeks). Remaining participants washed their stocking once a week or less frequently (38.9% 13 weeks, 37.9% 26 weeks). Differences between participants using a frame device and those using a material device were observed but only reached statistical significance at the 26-week follow-up [$\chi^2(2)=7.372$, $p=0.025$]. At this time point, 82.6% of participants using a frame device reported washing their stockings more frequently than weekly, compared to 51.2% for those using a material device. No differences were found for the remaining elements of stocking care and the type of device used. The majority of participants at both the 13- and 26-week data collection were hand-washing their stockings (86.3% and 86.2% respectively) rather than machine-washing, and were air-drying their stockings (94.5% and 93.8% respectively) rather than using a clothes dryer.

The condition of the stockings were assessed at 13- and 26-week time points and at week 13 the attending nurse determined if the stockings were acceptable for ongoing use or if a replacement stocking was required for the remainder of the trial period. No statistically significant differences were found between stocking condition and the type of device used. Overall, most stockings were in an 'excellent' condition characterised as having no trauma and no wear or tear noted (53.4% 13 weeks, 42.9% 26 weeks) or 'good' condition characterised

as no trauma but with some wear and tear noted (28.8% 13 weeks, 30.2% 26 weeks). There were few stockings classified as either 'fair/poor' presenting with either minor or major trauma and wear and tear at 13 weeks (11.5%), but this number increased at the 26-week follow-up (27.0%). Fewer stockings were assessed as being acceptable for ongoing use among participants using the frame device (28.0%) compared to participants using the material device (8.3%); this difference approached significance [$\chi^2(1)=3.550$, p=0.060].

Device use:

At the 13-week data collection, one-third of participants (34.0%) were not using a device. The material device remained the most utilised at this time (33.0%) with a further one in five using the frame device (20.6%). At 26 weeks, 37.1% of participants were not using a device. There was no significant difference in the pattern of device use over the 26 weeks [Cochran Q(2)=0.333, p=.846].

Device selection and stocking adherence

Although there was a trend for higher stocking adherence among participants who had selected the material device compared to the frame device, these differences did not achieve statistical significance at either baseline [$\chi^2(1)=2.093$, p=0.148], 13 weeks [$\chi^2(1)=1.015$, p=0.314] or 26 weeks [$\chi^2(1)=1.680$, p=0.195].

Device user and stocking adherence

There were no significant differences in adherence to the randomised compression stocking and whether the intended user of the device was the study participant [$\chi^2(1)=0.450$, p=0.502], an informal carer [$\chi^2(1)=0.185$, p=0.667], or other formal support [$\chi^2(1)=0.002$, p=0.965].

Acceptability of the device

Participants were invited to complete a Compression Stocking Acceptability Survey at the 26-week data collection and a response rate of 72% was achieved. Participants most often answered the survey themselves (78.8%) with one in five answering with the assistance of a carer or other person (21.2%).

Overall, most participants (70.8%) found stocking application acceptable, 79.5% in the moderate-compression stocking group and 60.6% in the high-compression stocking group. Similarly, most participants (70.0%) found the process of removing the stocking acceptable, 78.4% in the moderate-compression stocking group and 59.4% in the high-compression stocking group. Again, the differences between the stocking classes were not statistically significant.

The role of the device specifically in applying and removing the stockings was considered. Overall nearly two-thirds of participants (65.6%) found the device useful to apply the stocking, 64.7% in the moderate-compression stocking group and 66.7% in the high-compression stocking group. One-quarter of participants in each group (25%) found the device useful to remove the stocking. One participant who had a large forefoot experienced one episode of leg bruising when using the frame device.

Image 6

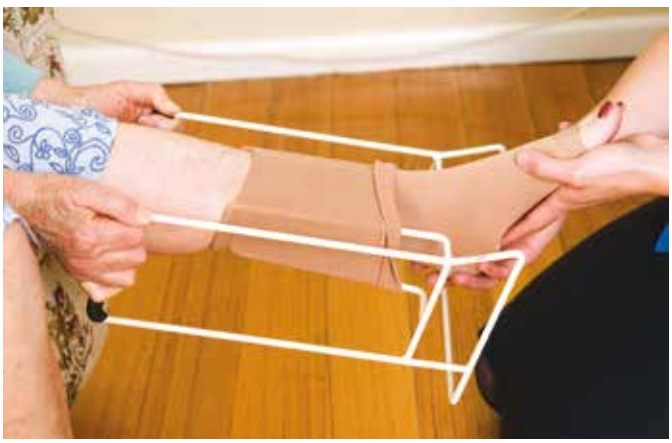

Image 7

DISCUSSION

There is limited information regarding the use of devices for stocking application and removal, despite support for their provision and use from nursing, occupational health and medical fields. This paper presents data regarding the acceptability and utility of these devices from the perspective of the compression stocking wearer and suggests they do play a valuable role in enabling people to enact their leg ulcer recurrence prevention plan.

The majority of participants accepted a device (or chose to use an alternative device) indicating interest in assistive devices to ease the task of stocking application and removal. While the material device was more sought after than the frame device, this may be due to more than half the sample expecting another person to use the device, with feedback suggesting the material device was perceived as being more suitable for this user. While device use declined slightly over the monitoring period, there was no reason found to suggest that long-term use would be more likely with either one of the provided devices. Stocking use among clients would be enabled if health care providers facilitate the opportunity for clients and their carers to learn about and practise with a material and frame-type stocking device. Given the uptake of devices in this sample, it is suggested that use of stocking application devices early, before leg ulcer healing, would permit sufficient time for the client to become familiar with the devices and to determine which is likely to suit the individual and their circumstances best.

The non-significant findings reported in this study have some practice implications. There was no clear preference for open or closed toe style stockings (and the reasons for selection of one or the other toe type were often the same) and there was no association between device selection and toe type or stocking size. There were also no significant differences between participants who chose the material and frame device with respect to adherence to wearing their compression stocking. Furthermore, adherence to wearing the stocking and whether the device was used by the participant, informal carer or other formal support was not affected by the device selected. Device type did not have an effect on the condition of the stockings over the 26-week monitoring period and most stockings were assessed to be in excellent or good condition, irrespective of device selection. While stretched or damaged stockings may be easier to apply, and therefore make device use easier, this was unable to be explored in this study. These non-significant findings suggest a comparable chance of success with either device when wearing compression stockings with either toe type, across a range of off-the-shelf sizes, and by a variety of users.

Although not a finding of the RCT, it is worthwhile noting in relation to stocking sizes an unexpected finding was that nearly half of the sample required a small size stocking. Indeed, in preparation for the trial a greater quantity of medium and larger stockings were obtained, given that this need is consistent with the typical oedematous presentation of limbs which experience venous disease and the manufacturer's advice based on the size of stockings they typically distribute. The research team were responsible in this study for determining stocking size based upon the client's widest calf and smallest ankle measurement according to the manufacturer's guidelines; however, it should be noted that different stocking brands require measurement of different and/or additional areas of the limb to determine stocking size. A study conducted in Denmark[20] found that fewer participants fitted into a particular size stocking as more areas of the limb were measured. Future research should consider these factors during protocol development and further investigation of the practical applications of stocking selection protocols would be insightful.

More frequent stocking washing was reported by participants using a frame device. It is unclear, given the limited scope of questions in this study, the reason that differences in washing frequency emerged. Washing frequency may be one of the covariates associated with the reason that stockings used by people with frame devices were more likely to be rated as unacceptable at the 13-week follow-up. In contrast, other results from this study showed that the condition of the stockings were comparable for both devices over the 26-week period. The vast majority of participants were engaging in appropriate stocking care, including regularly hand-washing and air-drying their stockings according to the provided care instructions.

According to the Compression Stocking Acceptability Survey, the majority of participants found application and removal of the high- and moderate-compression stockings acceptable and nearly two-thirds found the devices helpful to apply the stocking. Conversely, only one-quarter of participants found the devices useful to remove the stocking. While the significance of stocking removal as a barrier to stocking use was not explored in detail in this study, experience from clinical practice suggests that this issue is not uncommon. Furthermore, if people are unable to apply stockings because they cannot reach their feet, they may be unlikely to be able to remove them for the same reason. Device developers would benefit from engaging a range of users (clients, carers and health care professionals) when developing these devices and a focus on improving the capacity of these devices to assist with stocking removal would be a welcomed refinement.

This study found that more than half of the participants required support from others to wear their compression stockings. Given compression use for recurrence prevention is typically a lifelong commitment, the impact on the person, significant others and

organisations that provide health professionals for this support is considerable. The training and development needs of all stakeholders would be a valuable area for future research and a cost benefit analysis would provide evidence to support funding for services to assist people to use their compression stockings in the long term. Exploration of occupational health and safety issues among people who apply and remove compression stockings should be evaluated.

LIMITATIONS

The results presented in this paper arise from data gathered as supplementary information in a compression stocking RCT, as such the purpose of the study was not to examine the use of stocking application and removal devices. This paper is limited by the questions that were included in the trial. This study was conducted at one community nursing service only, limiting the generalisability to other sites. Generalisability of results to a population of community nursing clients differs because although all clients were approached for inclusion in the RCT, additional eligibility criteria apply and it is likely that willingness to participate in a trial would have shaped the sample differently to those willing to participate in an alternative research design.

CONCLUSION

This study has explored the use and acceptability of two devices commonly used for compression stocking application and removal. These devices have been shown to be acceptable and helpful to older people who are endeavouring to prevent venous leg ulcer recurrence. Furthermore, these devices are suitable for use with a range of stocking characteristics without compromising the likelihood of adherence to wearing the stocking. Clinicians, their clients and carers can have confidence that both devices enable self-management among older people living at home, and that a relatively small financial investment in a device will be worthwhile for most. Future research should consider the efficacy of application and removal devices as a primary outcome. Studies involving younger people, people who have not yet experienced ulceration, and people who seek to avoid venous disease in the first instance would be beneficial. Further evaluation of devices and other approaches to remove barriers to compression stocking application and removal would be another means through which greater adherence to compression stocking use can be facilitated and ulcer recurrence reduced.

ACKNOWLEDGMENTS

Thanks are extended to the Department of Health Victoria and the Angior Family Foundation who provided funding for the compression stockings and stocking application devices provided to participants of this study. Home and Community Care Services provided by the organisation are jointly funded by the Victorian and Australian governments.

REFERENCES

1. Australian Wound Management Association Inc. and New Zealand Wound Care Society Inc. Australian and New Zealand Clinical Practice Guideline for Prevention and Management of Venous Leg Ulcers, 2011. 30/07/2012. Available from: http://www.awma.com.au/publications/2011_awma_vlug.pdf.
2. Nelson EA, Bell-Sayer, SE & Cullum NA. Compression for preventing recurrence of venous ulcers. Cochrane Database Syst Rev 2000; (4):CD002303.
3. Franks PJ, Oldroyd MI, Dickson D, Sharp J & Moffatt CJ. Risk Factors for Leg Ulcer Recurrence: A Randomized Trial of Two Types of Compression Stocking. Age Ageing 1995; 24:490–4.
4. Kapp S, Miller C & Donohue L. The Clinical Effectiveness of Two Compression Stocking Treatments on Venous Leg Ulcer Recurrence: A Randomized Controlled Trial. Int J Low Extrem Wounds [Internet] 2012.
5. Nelson AE, Harper DR, Prescott RJ, Gibson B, Brown D & Ruckley VC. Prevention of recurrence of venous ulceration: Randomised controlled trial of class 2 and class 3 elastic compression. J Vasc Surg 2006; 44(4):803–8.
6. Moffatt CJ. Factors that affect concordance with compression therapy. J Wound Care 2004; 13(7):291–4.
7. Finlayson K, Edwards H & Courtney M. The impact of psychosocial factors on adherence to compression therapy to prevent recurrence of venous leg ulcers. J Clin Nurs 2010; 19:1289–97.
8. World Union of Wound Healing Societies. Reimbursement of dressings: A WUWHS Statement; 2006.
9. Sturman-Floyd M. Moving and handling: assessing the handler. Nursing and Residential Care 2013; 15(2):98–101.
10. Davies R. Dispelling myths concerning the humble compression stocking Br J Comm Nurs 2007; 12(5):S23–S5.
11. Johnson S. Compression hosiery in the prevention and treatment of venous leg ulcers. J Tissue Viabil 2002; 12(2):67–74.
12. Stephen-Haynes J, Lindsay E & Muldoon J. Easing compression hosiery application: ActiGlide. Br J Comm Nurs 2006; 11(9):S21–S2.
13. Wassall A. Compression Hosiery: donning aids and garment removal. Br J Comm Nurs 2007; October Suppl.:S1–S16.
14. Dilks A, Green J & Brown S. The use and benefits of compression stocking aids. Nurs Times 2005; 101(21):32–4.
15. Jih-Shiuam W, Chih-Hung H, Bao-Chi C & Shyh-Jen W. An assistive device for donning compression stockings Ostomy Wound Manage 2007; 53(9):34–7.
16. Kapp S & Sayers V. Preventing venous leg ulcer recurrence: a review. Wound Practice and Research 2008; 16(2):38–47.
17. Kapp S, Miller C & Donohue L. The Leg Ulcer Prevention Program. Nurse perspectives of a multimedia client education program for people with venous leg ulcers. Wound Practice and Research 2010; 18(2):91–9.
18. Kapp S, Miller C, Sayers V & Donohue L. The Leg Ulcer Prevention Program: Effectiveness of a multimedia client education package for people with venous leg ulcers. Wound Practice and Research 2010; 18(2):80–90.
19. Kapp S, Miller C & Donohue L. The clinical effectiveness of two compression stocking treatments on venous leg ulcer recurrence: a randomised controlled trial. Int J Low Extrem Wounds 2013; DOI: 10.1177/1534734613502034.
20. Norregaard S, Bermarki S & Gottrup F. The influence of the measuring systems for selection of ready made compression stocking below knee. Copenhagen, Denmark: European Wound Management Association, 2013.