

ORIGINAL ARTICLE

Compression therapy – cross-sectional observational survey about knowledge and practical treatment of specialised and non-specialised nurses and therapists

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Key words

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Abstract

Knowledge about methods and materials and their correct usage is the basis for compression therapy. This study compares knowledge and practical skills of participants with further training with those who had no training. This comparison provides information on whether further qualifications have an impact on knowledge and practical skills.

In seminars for compression therapy, data on specific and non-specific expertise were acquired. A practical test determined the participants' skills for creating a compression bandage in a pressure value range of 50–60 mmHg.

In total, 1338 participants with specific expertise and 138 participants with non-specific expertise took part. Knowledge evaluation showed that 7.9% of the specific expertise group had knowledge regarding padding, 10% regarding multi-component systems and 13.6% regarding ulcer stocking systems. In the practical test, 12.3% of all participants achieved the target range.

The majority of users in both groups is not familiar with the different compression materials or their appropriate usage. In the non-specific expertise group, knowledge concerning up-to-date materials and methods is one-third lower. The practical test showed major deficits on both sides. Appropriate exercises, for example, with pressure-measuring devices, should be mandatory for all professional groups who perform compression bandaging.

Introduction

With a fraction of 37–80%, venous ulceration is the most common type of chronic leg ulcerations (1–3). The most severe clinical manifestation of venous insufficiency are venous leg ulcers (VLU). Between 0.1% and 0.2% of the German population suffers from VLU (3,4). In international published studies, the prevalence of VLU in England, US and Sweden ranges between 0.2% and 2.5% (5–7).

Therapy focuses on the reduction of ambulatory hypertension and oedema. Compression therapy is an important cornerstone for VLU treatment, and the chance of wound healing is significantly lower without it. The higher the level of mobility of a patient, the more effective the compression therapy (8,9). This treatment expedites the healing of VLU and lowers the rate of

Key messages

- knowledge concerning appropriate methods and materials and their correct usage is the basis for successful compression therapy, and only a few studies examine knowledge and practical skills of users and their practical skills for applying compression bandages
- this study determines the impact of further qualifications on knowledge and practical skills of participants
- the results show that health care professionals with further qualifications in wound care management have a partially higher level of knowledge and practical skills in compression therapy compared to health care professionals without these qualifications

recurrence (3,10,11). Adequate compression therapy improves quality of life, and poorly performed compression bandaging has little or no benefit (12). During the initial reduction phase (initial decrease oedema), the leg is generally treated with compression bandages. Furthermore, there is strong evidence that higher pressure is better for wound healing than lower pressure (11,13,14). Healing of VLU may be delayed by ineffective compression therapy (15).

According to publications and guidelines, a phlebological compression bandage has to be applied with high pressure (3,16,17). A phlebological compression bandage that is able to produce a pressure of 30–50 mmHg (millimetres of mercury) in the ankle region may reduce the pressure strain in the vein system (18). Hence, products for the compression therapy of VLU are developed to guarantee such a pressure (19,20). The pressure values of international classifications differ from each other (15). According to an international consensus of the International Compression Club (ICC), the following compression pressure values are recommended: mild (<20 mmHg); medium (≥ 20 –40 mmHg); strong (≥ 40 –60 mmHg), which is recommended for the treatment of patients with VLU; and very strong (>60 mmHg) (19,21).

It was observed that the initial pressure under short-stretch bandages decreases significantly within the first 30 minutes after applying (18). One investigation shows a pressure drop of 50% after 7 hours (20). Compression therapy can only be successful if an adequate pressure persists for an appropriate period of time. Therefore, it is essential to achieve an accordingly high initial pressure by applying short-stretch bandages.

To date, there are only a few studies that examine the knowledge and practical skills of users, for example, nurses, physicians and therapists and their practical skills for applying compression bandages (15–18,20,22,23). These studies did not analyse differences between users with specific expertise and those without specific expertise. However, national and international studies show that specialised nursing professionals are more careful in clinical diagnosis and casual therapy and possess more practical skills with regards to the health care of patients with leg ulcers (24–28) than non-specialised nurses. The study by Clarke-Moloney *et al.* shows a significant improvement of compression therapy as well as longer intervals between dressing changes with trained nurses (28). Therefore, these nurses are more effective in the care of patients with leg ulcers than non-specialised nurses.

First analyses of knowledge and practical skills concerning compression therapy by nurses, doctors' assistants, physicians and therapists in general were published elsewhere (29). This study adds more data and is focused on the differences between users with specific expertise and users without specific expertise. The aim of the cross-sectional observational survey is a comparison of the skills and knowledge of qualified nurses, doctors' assistants, physicians and physiotherapists and users with no further qualification. This comparison will provide information on whether further qualifications have an impact on knowledge and practical skills.

Methods

From October 2011 to April 2016, knowledge and practical skills of participants of workshops and seminars for compression therapy were evaluated nationwide. Therefore, the workshops and seminars were divided in those with a focus on basics in wound care (participants who had no specific expertise; NSE) and those with expertise [participants who already had further training (specific expertise; SE)]. The SE group included participants with further professional qualifications who received training for at least 50–70 lessons in wound management. In contrast, the group of NSE had no further specialisation in wound management.

Inclusion criteria

The participants (age > 18) included nurses (hospital, outpatient care and elderly care), doctors' assistants, physicians and physiotherapists who joined seminars on VLU and compression therapy. Participation in the study was independent of the objective of the learning unit, voluntary and not mandatory. The participants agreed, verbally and through their participation, to the non-commercial and anonymous use of data.

Data collection

Based on a standardised guideline, four questions regarding the knowledge of current materials for compression therapy and their application were asked verbally and answered by the participants by show of hands. A compression bandage has to be upholstered with padding materials (30). Therefore, one question broached the issue of padding: 'Did you learn the principles of upholstery and underpadding during your education?' A follow-up question examined if padding materials were prescribed when patients were treated with short-stretch bandages: 'Does the prescription of short-stretch bandages include padding materials?' Furthermore, two questions detected the knowledge of the users about multi-component systems and ulcer stocking systems: 'Are you familiar with multi-component systems?' and 'Are you familiar with ulcer stocking systems?' Two additional questions specified if and how often the participants use these products in their daily routine: 'Do you use these products regularly every week?' and 'Do you use these products occasionally every 4–12 weeks?' The last question evaluated commonly prescribed pressure values: 'Which levels of pressure are prescribed for compression bandaging of patients with venous leg ulcers?'

Following the theoretical part of the seminar, participants alternately performed a practical test concerning compression bandaging with short-stretch bandages. The generated pressures were measured and documented. The skills of the participants in performing compression bandaging were examined by measuring the achieved initial resting pressure after completion of compression bandaging. The device used, PicoPress® (Microlab Elettronica, Padova, Italy), is superior to other devices under the aspects of accuracy and reproducibility (31,32). The PicoPress® sensor, which measures the interface pressure between the compression bandage and the skin, was placed at B1 (21,31). This is the region proximal to the inner

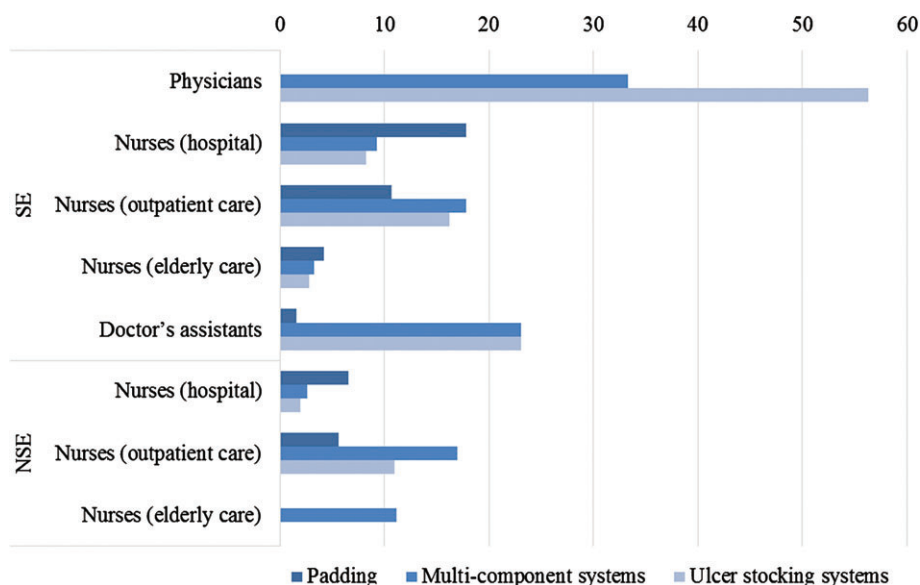


Figure 1 Knowledge of SE and NSE about current products and methods of compression therapy by professional groups in percent (SE: $n = 1338$; NSE: $n = 138$).

ankle, which is recommended in studies for measuring the interfacial pressure (31,33).

Compression therapy with short-stretch bandages has a significant pressure drop in a short time (16,22). To guarantee the strong pressure, which is needed for treatment of VLU, the participants were requested to achieve a pressure between 50 and 60 mmHg. Rosidal® K (Lohmann & Rauscher, Neuwied, Germany) and Pütterbinden® (Hartmann, Heidenheim, Germany) were used in this study. These short-stretch bandages were applied via modified Sigg's technique. Depending on leg circumference, at least two short-stretch bandages are required for this technique. A foam padding (Rosidal® soft; Lohmann & Rauscher) was applied above a tubular bandage (TG size 7; Lohmann & Rauscher). The first short-stretch bandage starts at the big toe's joint and ends at the lower part of the calf. It covers the entire foot and wraps the leg in tightly rolled circular turns by overlapping the preceding layer by 1 cm. Then, the second short-stretch bandage is applied in a figure-of-eight manner and ends shortly below the knee. Finally, the tubular bandage is now pulled over the entire bandaging and is attached to its end with tape (34).

Statistical analysis

Firstly, the analyses were evaluated descriptively. Open responses were categorised and summarised using qualitative methodologies. On the basis of the study design, missing data were not included. The pressure values with corresponding measures of central tendency are displayed by boxplot. Significant differences were analysed using a Chi-squared test and *t*-test. The Chi-squared test was used when statistical requirements were satisfied (35). All data analyses were performed using IBM SPSS Statistics, Version 20.0.

Results

During a total of 62 seminars and workshops, all 1338 (90.7%) qualified wound experts with specific expertise (SE)

participated in this study. A total of 138 (9.3%) participants who had no specific expertise (NSE) were examined in five further seminars and workshops. The majority of SE were nurses (91.6%; $n = 1225$). Most of them, 47.5% ($n = 635$), worked in outpatient care, 28.1% ($n = 376$) in hospital and 16.0% ($n = 214$) in elderly care. In addition, 4.9% ($n = 65$) were doctors' assistants and 3.6% ($n = 48$) physicians. Of the 138 participants, 55.1% ($n = 76$) with no further expertise (NSE) worked in hospitals, 38.4% ($n = 53$) in outpatient care and 6.5% ($n = 9$) in elderly care.

Knowledge and working practice about compression therapy

The majority of SE could not correctly respond to the questions regarding knowledge about products and methods of compression therapy as cited above. NSE participants showed a marginally higher proportion of unknowingness. About 13.6% of the SE participants were aware of ulcer stocking systems (versus NSE = 9.5%), and 10.0% knew multi-component systems (versus NSE = 8.7%); 7.9% of the SE had learned to upholster compression bandaging during their education (versus NSE = 5.8%). However, the differences regarding the knowledge about products and methods in compression therapy between SE and NSE participants were not significant (multi-component systems $P = 0.535$; ulcer stocking systems $P = 0.172$).

The knowledge about multi-component systems (MC) and ulcer stocking systems (US) was best in SE within the group of physicians ($n = 48$) (MC = 33.3%; $n = 16$) and US = 56.3% ($n = 27$) and doctors' assistants ($n = 65$) [MC, US each = 23.1% ($n = 15$)] (Figure 1). SE nurses in hospitals (17.8%) and outpatient care (10.7%) had the highest knowledge about padding compared to the other professional SE groups. SE groups, like doctors' assistants, physicians and NSE nurses in elderly care, showed a lack of knowledge regarding padding (Figure 1).

When asked about the prescription of short-stretch bandages, significantly more SE reported a prescription of padding

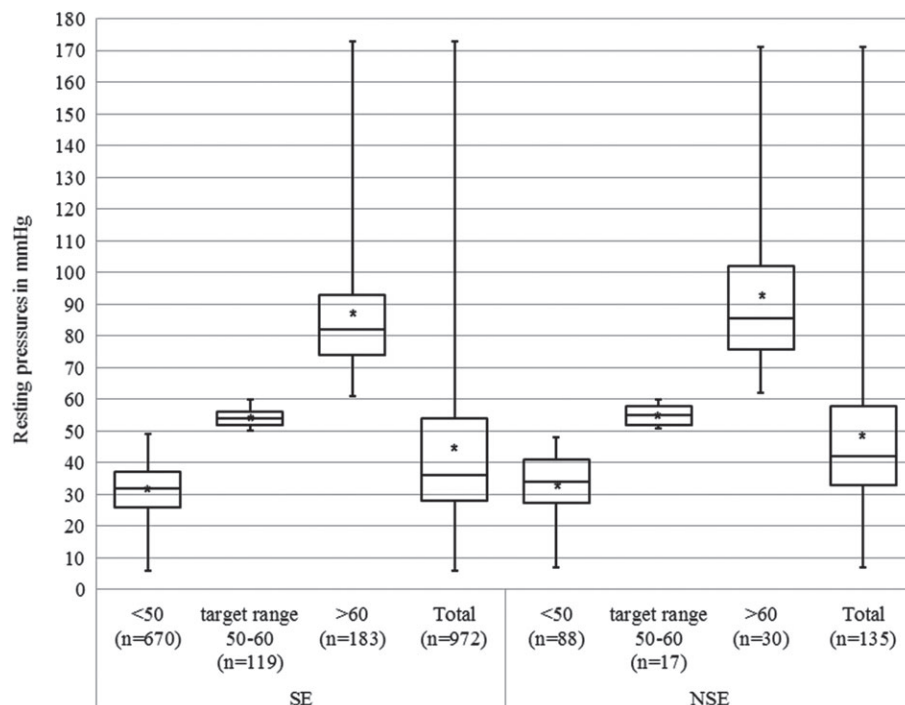


Figure 2 Resting pressure with short-stretch bandages applied using Sigg's technique by SE ($n=972$) and NSE ($n=135$).

material than NSE (SE = 24.2%, NSE = 5.1%; $P < 0.001$). A total of 44.0% of SE and 14.3% of NSE nurses reported that physicians tend to prescribe padding materials when the benefit of these materials was explained to them. SE participants with knowledge about multi-component systems worked with these products on a much more regular basis than NSE (SE = 78.4% and NSE = 33.3%; $P = 0.002$). A total of 32.1% of SE used multi-component systems on a regular basis, and 46.3% used it occasionally. The proportion was lower in the group of NSE (8.3% regular basis and 25.0% occasionally). All participants in both groups who are aware of ulcer stocking systems also worked with them on a regular basis.

Concerning the question of which pressure values are prescribed for patients with compression bandaging of VLU, 89.1% of SE and 97.1% of NSE participants gave no specific answer. Further answers were: compression bandaging in Pütter technique, powerful or strong compression.

Pressure measurements

A total of 1107 of all participants (SE $n=972$, NSE $n=135$) performed compression bandaging with short-stretch bandages by using the modified Sigg's technique. SE participants achieved an average level of pressure of 45.0 mmHg (median = 26.0; standard deviation = 24.6) and NSE 49.4 mmHg (median = 42.0; standard deviation = 28.7). However, these differences were not significant ($P = 0.054$) (Figure 2).

The target pressure value of 50–60 mmHg was achieved by 12.2% ($n=119$) of SE and 12.6% ($n=17$) of NSE. The majority of 68.9% ($n=670$) of SE and 65.2% ($n=88$) of NSE were below this target (<50 mmHg). Considering the resting pressure, the majority of SE participants achieved pressure values between 28 (lower percentile) and 54 mmHg (upper quantile)

and the NSE participants between 33 (lower percentile) and 58 mmHg (upper quantile). In total, all participants achieved pressure values between 6 and 173 mmHg (SE) and between 7 and 171 mmHg (NSE) (Figure 2).

Discussion

A huge lack of knowledge and practical skills concerning compression therapy being performed by nurses, doctors' assistants, physicians and therapists with specific expertise in general have already been shown (29). Compared to the first publication, this study adds a significantly higher number of investigated cases and a comparison of users with specific expertise and users without specific expertise. The objective of this study was to show if there are differences in knowledge about certain aspects of compression therapy and performing compression bandaging between SE and NSE.

The results show that knowledge of the majority of SE and NSE from different professions was not up-to-date according to the latest standards for compression materials, methods or their usage. However, it could be shown that health care professionals with further professional qualifications in wound care management have a partially higher level of knowledge and practical skills in compression therapy compared to health care professionals without these qualifications. Significant differences between SE and NSE can be shown in the use of multi-component systems and padding materials.

Multi-component systems and ulcer stocking systems are available for more than 15 years. Their composition, the possibilities and necessities of their application and their mechanisms and impact have been thoroughly researched (5,10,16,17). Nevertheless, under 10% of health care givers are aware of these systems. Furthermore, the study has shown that the majority of participants (up to 90%), regardless of

expertise, were not able to reach the target pressure range of 50–60 mmHg.

Nevertheless, compared to other studies, we cannot confirm that SE is more effective in the care of patients with leg ulcers than non-specialised nurses (24–28). However, we equally found a huge gap between state-of-the-art knowledge and daily practice of SE and NSE. The health care givers do not have enough knowledge about compression therapy or do not use up-to-date materials in their daily professional practice, even though professional magazines and journals report regularly on modern methods and utilities.

The lack of knowledge about certain aspects of compression therapy and performing compression bandaging has been shown in other international studies, independent of the participants' professions (22,23). It is also reflected in the low number of patients with VLU who received compression therapy (40 %) in Germany (10). In accordance with the legal requirement that health care has to be based on guidelines and according to latest scientific knowledge, there is an urgent need for information on compression therapy.

An increase in knowledge regarding material and use and improved skills in compression bandaging may shorten healing time and thus affect the quality of life positively. The acquisition of theoretical knowledge by the professionals may be the basis for adequate compression therapy. However, this study shows that even further qualified carers lack basic knowledge concerning up-to-date materials and methods of compression therapy. This implies that qualifications do not always guarantee expertise. In Germany, the practice of compression bandaging is not taught in university medical training. The curricula for nurses' education differ nationwide. On average, 1–2 lessons are spent on this topic (34). This should be completed by practicing with pressure-measuring devices on a regular basis. The use of these instruments is currently the most practical method for determining the value of interface pressure. Appropriate exercises should be mandatorily offered to all professional groups who perform compression bandaging. The use of pressure-measuring devices for training is considered a viable way to practice the achievement of predetermined pressure values (31,36). It should become part of the curricula of physicians and nurses and also part of daily routine. Also, establishing training sessions should be considered for all carers, even the further qualified, who are natural teachers for new staff. The so-called adaptive compression bandages may be an alternative option. The easy handling of these bandages allows the carer, the patient or relatives to adjust the pressure after a short training session (37).

Furthermore, a number of limitations has to be discussed. It should be considered that a vastly higher number of SE participated in this study. Therefore, significant differences in usage of multi-component systems cannot be analysed. The non-anonymous questioning by raising hands was chosen because of time constraints and practical reasons. Therefore, social sanctions and social desirability may have influenced the outcome. This includes a possible limitation of participation or willingness, which could influence the response of the participants (response bias). Furthermore, health care givers with a greater interest in wound care management have a higher willingness to participate. Therefore, it must be concluded that

knowledge and practical skills in compression therapy are much lower than expected.

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