

# The application of modified compression to prevent leg ulcer recurrence in the Republic of Ireland

## KEY WORDS

- ▶ Clinical practice
- ▶ Compression
- ▶ Venous leg ulcers

**Background:** Compression therapy is considered best practice for healing and preventing venous leg ulcer (VLU) recurrence, however, some comorbidities require that modified compression be applied. A range of terminologies, application recommendations and compression amount for modified compression are found in the literature and guidelines. This could implicate how these recommendations are transferred into clinical practice. **Aim:** To investigate clinical practice regarding the application of modified compression to prevent recurrence of VLU in the Republic of Ireland. **Methods:** Descriptive qualitative design was used, with six experts in compression and wound management recruited from Ireland. Semi-structured interviews were used to gather data, and reflexive thematic analysis was completed. **Results:** We identified four themes during data analysis; inconsistent understanding and terminology usage; clinical context influences; issues with standard compression application; and focus on healing (non-routine monitoring) with associated sub-themes. **Conclusions:** This research indicates that the application of modified compression to prevent the recurrence of leg ulcers is limited within clinical practice, with inconsistent terminology used, application methods, and non-routine monitoring to prevent recurrence. Reported systemic barriers impact the ability of these services to provide best practice to people with leg ulcers. **Declaration of Interest:** No conflict of interest to declare.

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Compression therapy is considered best practice for both healing venous leg ulcers (VLU) and to prevent their recurrence (European Wound Management Association [EWMA], 2003; Vowden and Vowden, 2006; World Union of Wound Healing Societies [WUWHS], 2008; Amsler et al, 2009; Stephen-Haynes, 2011; Mauck et al, 2014; Moffatt, 2014; Nelson and Bell-Syer, 2014; Ubbink et al, 2014; Partsch and Mortimer, 2015; Dissemmond et al, 2016; Harding, 2016; Welsh, 2016). Compression therapy for wound healing is recommended to be at least 40mmHg with graduated layering of bandages/systems to increase circulation and minimise oedema (Probst et al, 2014; Harding et al, 2015a; Franks et al, 2016; Kelechi et al, 2020). To prevent VLU recurrence, evidence recommends long-term compression therapy, however, both the terminology used (hosiery, garments, stockings or socks) and amounts of pressure

recommended differ within guidelines and the literature (Kapp and Sayers, 2008; Harding et al, 2015b; Mosti, 2017; Nazarko, 2017). Although the amounts range from 18mmHg to 45mmHg compression at the ankle, 20–30mmHg appears to be the most frequent amounts recommended for prevention, where there are no contraindications (Kapp et al, 2013; Clarke-Moloney et al, 2014; Mauck et al, 2014; Franks et al, 2016; Ratliff et al, 2016; Shanley et al, 2020). Other international guidelines, including the Irish guidelines, give no recommended levels of compression, stating to apply compression as tolerated (Health Service Executive, 2018).

There is little consensus regarding modified compression, with both the terminology and range of compression amounts reported in guidelines and published literature (supplemental information available on request). For the purposes of this

article modified compression will be defined as reduced compression pressure or the modification of compression application techniques (Partsch, 2010). Strong evidence exists that chronic diseases, which impacts circulation such as diabetes and peripheral arterial disease (PAD), may be considered either a contraindication or relative contraindication to compression therapy (Andriessen et al, 2017). However, evidence indicates that modified compression is indicated when the ankle brachial pressure index (ABPI) is between 0.5 to 0.8, to assist with healing of leg ulcers (Partsch, 2010; Partsch, 2013; Mosti, 2014; Mosti et al, 2016). This potential population is likely to be higher in incidence than previously recorded, with 90% of VLU patients in Ireland being diagnosed with chronic diseases (Kelly and Gethin, 2019). To further complicate matters, once healed, this population of people with VLUs and chronic illnesses are more likely to be at risk of recurrence (Rocha et al, 2022). Therefore, it is important that appropriate application and amounts of compression is used to prevent recurrence.

Lifelong compression therapy is still gold standard to prevent the recurrence of VLUs (Franks et al, 2016; Todd, 2018), however, research suggests that patients find the use of compression garments/stockings to prevent recurrence difficult to manage (Brown, 2018). Reasons reported for these difficulties include limited access to garments, pain, obesity, difficulties donning/doffing, limited patient education, and poor understanding and opportunities for engagement with wound management processes (Hughes and Green, 2019; Meulendijks et al, 2020; Probst et al, 2021; Weller et al, 2021a). Indeed, these factors are linked to an increased risk of recurrence (Rocha et al, 2022). However, little is known regarding the population of people with leg ulcers and comorbidities, and whether modified (reduced or altered application) compression is being used for prevention of recurrence. The aim of this study was to investigate the application of modified compression to prevent VLU recurrence in the Republic of Ireland.

## METHODS

The research questions were:

- ▶▶ What are the terms, understanding and knowledge of modified compression in clinical practice?
- ▶▶ What methods are used to apply modified

compression in clinical practice?

- ▶▶ How is modified compression monitored in clinical practice?

## Design

The purpose of the study is to investigate the knowledge, understanding and experiences of expert clinicians regarding modified compression application. A descriptive qualitative design was used to address the aim. This approach was selected, as little is known about the application of modified compression within the Irish setting (Given, 2008).

## Sample/participants

Purposive sampling was used to gain insight into the experience of expert clinicians. An expert clinician was defined as having five years or more experience in compression or wound care. Professional member organisations and associations were used as gatekeepers to avoid recruitment bias (International Compression Club; International Lymphoedema Framework, Wound Management Association of Ireland (WMAI), Royal College of Surgeons in Ireland).

## Data collection

Data was gathered via semi-structured interviews and transcribed verbatim by the first author (YP) from digital voice recordings. Each interview lasted between 30 to 60 minutes and were completed remotely or in-person, depending on participant's preference. Informed consent was gained before beginning the interviews.

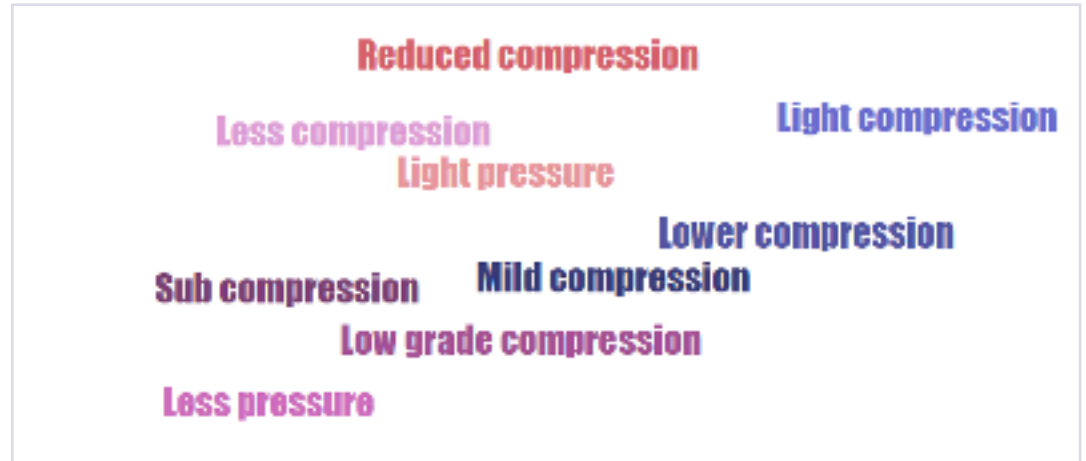
## Data analysis

Reflexive thematic analysis was completed using the Braun and Clarke, six step process (Braun and Clarke, 2012) and two authors (YP, NM) familiarised themselves with the data, YP generated the initial codes and themes independently. Several meetings occurred during this process to discuss and reflect on the subthemes and emerging themes, until there was agreement on the final themes and definitions before the final write up stage.

## Ethical considerations

This study has ethical approval from the University College Cork Social Research Ethics

Figure 1: Range of terms used



Committee (Log 2019-075). Confidentiality and anonymity were addressed with pseudonyms and removing descriptive features that could identify the participants or their workplaces. Informed consent was gained before data collection.

## RESULTS

We recruited six participants, all of whom were female and Registered Nurses. In addition, participants also identified as Lymphoedema Practitioners, Tissue Viability Nurses and Public Health Nurses, practicing from seven to over ten years in wound management. Participants worked in both rural and urban settings throughout Ireland. All participants worked within public health service, (Health Service Executive [HSE]), in both inpatient and community settings, with two participants working in both public and private services.

We identified four themes during data analysis: inconsistent understanding and terminology, clinical context influences application methods; issues with standard compression application; and focus on healing (non-routine monitoring). Each of these themes had several subthemes.

### Theme 1: Inconsistent understanding and terminology

The first theme identified was related to compression therapy terminology and understanding in clinical practice. Participants used a range of terms, from reduced compression to light pressure (*Figure 1*).

Participants indicated the term modified compression reported generally was not

used within the Irish context. In addition, no consistent or clear definition or terminology was identified:

*No I don't think there's any specific definition of what a modified compression is.' (P3)*

There were two subthemes that contributed to the theme: practice- and context-dependent terminology, and training and education influences on terminology.

### Subtheme 1.1: Practice- and context-dependent terminology

Participants in the study reported that the terminology used for compression therapy varied depending on the practice context in which they were working. Settings such as community nursing used different terminology compared with tissue viability nurses in hospital inpatient settings. However, all participants agreed that the term 'modified compression' was not used:

*But the modified compression as a term in my experience in outpatients in hospitals and in the community is not a term that's used' (P1)*

Geographical location was also identified as a factor influencing the terminology used. Participants identified that the terminology used to describe modified compression differed between Ireland's cities, towns, and counties. The suggestion was that modified compression was more of an international term.

*'You would find it in a lot of ILF documentation and in you know kind of maybe European or a more international type literature.'* (P1)

### **Subtheme 1.2: Training and education influences**

Participants reported that both the use and understanding of modified compression terminology, was influenced by the education and training clinicians received:

*'I think it comes down to what people are taught.'* (P5)

Understanding was reported to be limited within both specialist and general practices. The expert participants felt in general clinicians' understanding of modification was poor, saying there was poor understanding of compression in clinical practice.

*'You can only use the word modify if you know what it's been modified against.'* (P5)

Continuing education was also highlighted as an influence. This included the impact of clinical guidelines in use within settings or as education.

### **Theme 2: Clinical context influences with application methods**

The second theme explored how the clinical context, such as acute practice settings, influenced the application of modified compression. Generally, participants focused on the concept of healing VLU, rather than prevention. Modifying compression for wound healing was reported to be altered by changing the number of layers or bandage systems.

*'How I would modify it would be to just use one layer instead of two.'* (P1)

When discussing using modified compression to prevent recurrence via stockings/garments, participants reported this was not a common practice in Ireland. Modifications of compression was usually via adjusting the level of stocking, i.e. from Class 2 to Class 1, rather than modifying application methods, such as layering of stockings. The use of alternatives to stockings discussed

included adjustable wraps or ulcer care kits, and occasionally tubigrip or tubifast layering.

*'You know this could go on most people could get them [ulcer care kits] on fairly handy ...'* (P3)

The subthemes within this theme included the influence of the access to resources, factors which influenced the patients and location setting. All these clinical contextual factors were influential.

### **Subtheme 2.1: Access to resources and training**

The data suggested application methods were dependent on access to knowledge and training, particularly regarding what resources were available.

*'I didn't realise until recently that there was a wrap on it [equipment contract]. They don't advertise this. Like they don't want you to know.'* (P2)

Other resources included access to training on the use and application of different equipment such as wraps and bandages. Participants spoke of using the sales representatives to provide training instead of in-house training by clinicians.

*'If it's a new compression bandage that comes that a nurse isn't comfortable with then we would contact the reps and they would come and they would show us and explain and give us the advice on the safe use of them.'* (P4)

This sub-theme also included the reported increased use of supply companies to fund and/or provide training for clinicians.

### **Subtheme 2.2: Influence of factors pertaining to patients**

Patient's physical, psychological and social factors were reported to influence the application methods of compression. Factors such as underlying health conditions, circulation issues, gender and ageing were taken onto consideration when choosing the application methods.

*'I mean you're getting an older generation you're seeing more mixed disease hence you need to change your practice.'* (P2)

Specifically, when choosing the application technique, the patient's functional ability and social support were considered.

*'Maybe because they're ill or they can't don the garments...that's another reason I'd modify it.'* (P3)

Other patient factors were associated with psychological factors, such as the patient's ability tolerate standard compression.

*'Purely from the idea of tolerance and maybe trying to improve compliance to modify compression.'* (P3)

### **Subtheme 2.3: Location of the clinical setting influences the application**

Lastly within theme 2, the location of the service was influential. The concept of location here addresses both the geographical location and the institutional location within the health care system environment. From a geographical location, differences were highlighted between different locations, both between and within counties. These differences included clinicians' access to services, expertise, and resources, as well as patients' ability to access expert wound services.

*'It can be hard to access clinical expertise, depending on where you are.'* (P6)

Other contextual factors included whether the service was either privately or publicly funding, as well as how policies were implemented within publicly funded services. In Ireland, individuals with a medical card have free access to medical services, including compression therapy bandaging.

*'That [medical card] is sort of their golden ticket [to services].'* (P4)

Participants suggested there was inequitable access due to inconsistent policy implementation for non-medical card holder treatment, leading to inequity for these services between and within counties

### **Theme 3: Issues with standard compression application**

The third theme included the concern that standard compression was not being completed

routinely or consistently. Participants felt that the application of standard compression needed to be addressed. Generally, the application of modified compression was to be limited to expert clinicians, as overall, general practice clinicians' knowledge and training of compression is lacking:

*'I hear funny statements... that will say that full compression can be put on in ABPI of 0.6. Well... No, no, that, that is that is not the case.'* (P4)

We identified two subthemes within this theme, when discussing generic non-specialist practice: Fear of applying compression and education and training requirements.

### **Subtheme 3.1: Fear of applying compression**

The fear of harming patients and repercussions for critical incidents was indicated as a barrier to the application of any compression generally. The fear of harm and consequences contributed to negative attitudes

*'Bulk standard compression is not used for fear they will do the wrong thing.'* (P6)

### **Subtheme 3.2: Training and resources are required**

Access to training and expert skills also influenced the application of standard compression. Participants felt that more training and access to resources, such as clinical expertise is needed.

*'I mean the...application of compression [in the community]...is in horrendous need of education.'* (P1)

### **Theme 4: Focus on healing (non-universal routine monitoring)**

The final theme addressed was the monitoring of compression after healing. This theme indicates that monitoring does not universally happen after healing.

*'We do [monitoring]... you know, hopefully this would all be done through at the national level. Currently, it's only our county...'* (P3)

The service context and resources, as well as the patient funding and education, were identified as factors in the ability to provide monitoring.

#### **Subtheme 4.1: Influence of context and resources**

The clinical context, such as acute, public funding resources, were related to the ability to provide ongoing monitoring services. Participants also reported that patients felt lost in the system, when transferring between service contexts, as within Ireland, tissue viability services are generally provided within an acute/outpatient hospital services. After wound healing, the person is discharged from the service, and may or may not have follow-up in the community, due to staffing, resources or funding (private or public):

*'We'd lose that patient from the acute sector and generally they're gone from say the public health nurse as well at that stage.'* (P2)

In addition, the staffing levels and recruitment difficulties were also highlighted as a barrier to implementing monitoring. Participants felt that resources could not be stretched to include monitoring after healing, as the focus of clinical efforts was predominantly focused on healing.

*'We were firefighting it was it was those [recurrent ulcers]... that came back under my radar.'* (P3)

Instead, patients were expected to self-manage after the ulcer was healed and they were discharged. Self-management here was related to the patients maintaining their healed leg and coming back when a problem arises.

#### **Subtheme 4.2: Patient funding**

The funding of the patient, whether private or public, in Ireland is ad hoc regarding post-healing monitoring. Specifically, the participants felt it was unreasonable to ask a privately paying patient to fund monitoring services.

*'I just I don't feel I could ask somebody to pay to come back and just check if the compression is okay.'* (P5)

#### **Subtheme 4.3 Education and motivation to self-manage**

Self-management and self-monitoring were identified by the participants as the responsibility of the patients and carers/family. The importance of education, at the level of the patient, was reinforced from all participants.

*'It's really important that you educate... You need to educate a family member or a caregiver as well.'* (P1)

Verbal education was reported to be provided, with some participants mentioning direct training donning and doffing compression stockings. However, written support or follow-up was often lacking. However, there was some doubt as to how well information was understood or adhered to by patients.

## **DISCUSSION**

### **Terminology and understanding**

The results of this study indicated that the term modified compression is not used in the Irish clinical context. As with the literature, a range of terminologies and understandings were identified during the study, with a focus on wound healing, rather than prevention (Franks et al, 2016). Inconsistencies found in terminology, definitions and applications of compression levels reflect similar concerns identified within existing clinical guidelines (WUWHS, 2008; British Columbia Provincial Nursing Skin and Wound Committee, 2014; Harding et al, 2015a; Di and Clark, 2016). The use of consistent terminology and compression amounts (dosage) within guidelines and research internationally is important for patients to be provided with best practice treatment for leg ulcers.

### **Application of compression**

Within the literature, the application of modified compression is recommended for people with relative contraindication (Partsch, 2010; Mosti et al, 2016; Andriessen et al, 2017). This study reinforced that for wound healing, modified compression is being used in Ireland. However, due to the reported limited knowledge, understanding and general clinicians' fear associated with compression application, participants recommended modified

(reduced) compression application be limited to specialist clinicians. In addition, the findings identified other barriers to compression application and best practice, similar to published research. These included high workloads, limited access to education and training, funding limitations and inconsistent application of policies and procedures across different locations (Fife et al, 2010; Skerritt and Moore, 2014; Weller et al, 2020b; Weller et al, 2021b). As with the inconsistency of guideline terms and compression amounts/dosage, barriers to compression application limit the ability to provide best practice care to patient. This can result in delayed healing and increased recurrence (Weller et al, 2020b). These systemic barriers also were reported to impact the application of compression to prevent recurrence. The recurrence of VLU has a significant impact on both patients and the health system (Phillips et al, 2018) with rates of recurrence reported between 24% and 70% (Nelson and Bell-Syer, 2014; Skerritt and Moore, 2014; Kelechi et al, 2020) and recurrence is higher with those with comorbidities (Rocha et al, 2022). This study's findings indicate that modified compression application methods are not used in Ireland to address recurrence, with decreasing compression class or no compression being the options used. To prevent recurrence, Class 2 is recommended (Vowden et al, 2020), however, the findings indicate systemic barriers impede implementing these recommendations.

Although literature highlights modified compression therapy may be appropriate for treating leg ulcers with PAD (ABPI >0.5) (Mosti et al, 2016; Andriessen et al, 2017), additional patient considerations including a person's tolerance, impact a clinicians' application must also be considered. Other factors including the person's social situation, ability to don/doff garments impact the adherence to treatment (Probst et al, 2014; Probst et al, 2020; Weller et al, 2021a). Within our study, the participants reported using the application of modified (reduced) compression to build up tolerance to standard compression. As a concept, the building of tolerance is not discussed widely in the literature, especially when related to garments/hosiery. This could be an area of further exploration to assist people with maintaining compression therapy post-healing.

### **Focus on healing/non-routine monitoring**

The findings indicate that within the Irish healthcare system, the focus is primarily on healing leg ulcers rather than routine monitoring. As within the literature, the findings related this issue to barriers such as resource limitations, specifically the access to staff with the required clinical expertise (Skerritt and Moore, 2014; Weller et al, 2020a) impacts the ability to provide services. In addition, these services are within an acute medical system, for a chronic care condition.

As indicated in the findings, an inability to provide routine monitoring causes issues, such as a loss of people from the services after the healing. In addition, the Irish national guidelines, recommend self-management by the patients, which may influence the focus onto healing, however, limited information is available on how to support patients self-manage after healing. Poor patient knowledge, understanding and education is reported in the literature to be related to poor adherence to treatment and increased recurrence of leg ulcers (Gonzalez, 2017). The concept of the understanding of self-management was not explored in this study, however, participants did highlight concerns regarding patients' understanding and ability to self-manage after healing. This could indicate potential influence on recurrence rates and may need to be further explored.

The consensus among experts and evidence supports that lifelong compression is the best way to prevent recurrence. However, lack of concordance with compression therapy is a well-documented issue (Ziaja et al, 2011; Weller et al, 2016; Weller et al, 2021a). However the concept of whether self-management knowledge and skills impacts recurrence or compression therapy tolerance is not well documented as this time (Wilde, 2020). Research purports that targeted patient education is required to support self-management (Kapp and Santamaria, 2017). Currently, there is limited research related to the type and amount of education to develop self-management skills for preventing wound recurrence from the patient or carers' perspectives. With increasing rates of frailty and comorbidities, adhering to lifelong compression may be difficult for this patient population to maintain. Further exploration of how these patients self-manage is needed to prevent these avoidable outcomes long term.

### Study limitations

There are several limitations, firstly, a small number of participants were recruited. This may be due to limiting participants to experts, with a minimum of five years of clinical practice using compression. This did prevent the recruitment of clinicians with less experience. However, no new information or data was received in the latter interviews, hence the number was felt to suffice to explain the preliminary status of modified compression application in Ireland. In addition, the participants recruited all identified as registered nurses, however, this reflects that nurses complete most wound care within Ireland. Future research in different clinical areas, such as physiotherapy, GPs and occupational therapists, may provide further information. Additionally, it is acknowledged that the term 'modified' may be problematic. However, it does highlight the ongoing issue of terminology use in this area.

### CONCLUSION

This research indicates that the application of modified compression to prevent the recurrence of VLU is limited within the clinical practice setting in Ireland, with inconsistency around

Clearly the term modified compression, is not routinely used in clinical practice in Ireland. Indeed the findings report poor knowledge and fear associated with compression for leg ulcers within the generalist clinical setting. Ongoing training and service supports, such as clear consistent terminology use and compression amounts/dosage to increase compression application confidence in generalist settings, could also address wound management service pressure.

Within this study, the concept of compression was predominantly focused on wound healing as the final goal, with the prevention of recurrence not able to be on the agenda. This reflects the orientation of the Irish health system towards acute medical service provision. This, along with other systemic barriers such as inconsistent policy implementation and limited access to services, exacerbate difficulties to provide support to self-manage this chronic condition. The health service does not promote prevention and self-management, however systemic changes are needed to change clinical practice. Consistent terminology use, implementation of clear guidelines and ongoing education and training

would assist to addressing this change to support self-management for the prevention of recurrence.

Further research into the experience and requirements of self-management for patients and their carers is needed. In this study the participants reported 'firefighting' wound management within clinical practice. However, clarification of the concept of self-management, related to skills and education needed by both patients, families/carers and clinicians is needed. WUK

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