



## All Wales Tissue Viability Nurse Forum

*Ffowm Nyrsys Hyfywedd  
Meinwe Cymru Gyfan*

*All Wales Guidance for the:*

# Management of Hyperkeratosis of the Lower Limb

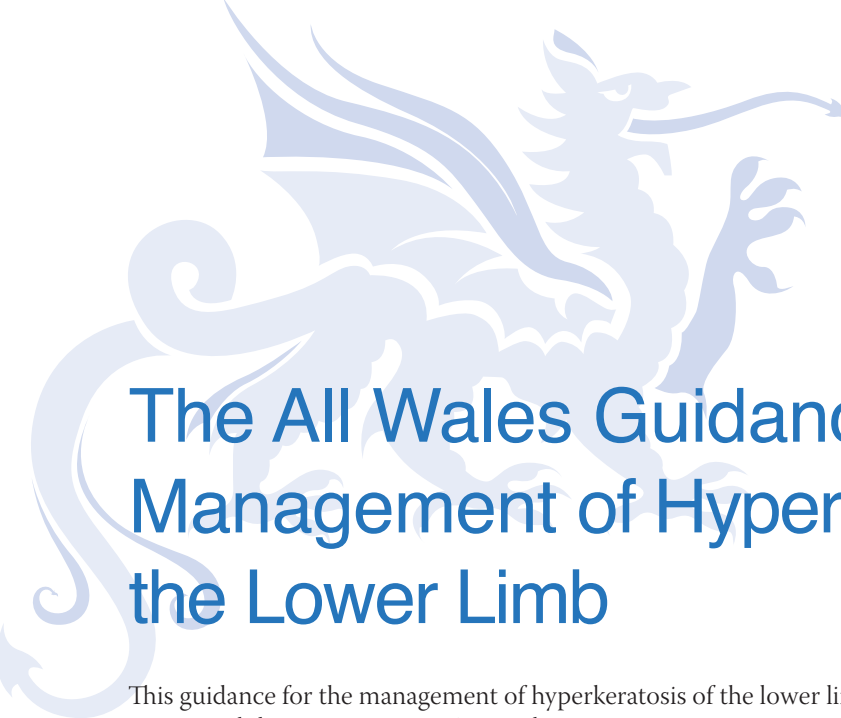
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# The All Wales Guidance for the Management of Hyperkeratosis of the Lower Limb

This guidance for the management of hyperkeratosis of the lower limb has been reviewed and endorsed by the All Wales Tissue Viability Nurse Forum, September 2014.

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## All Wales Tissue Viability Nurse Forum

The All Wales Tissue Viability Forum was formed in September 2003 and has the following aims that form part of the six key principles from the Institute of Medicine (Welsh Assembly Government, 2005):

### Safety, Effectiveness, Patient-centred, Timely, Efficient and Equitable

1. To raise awareness of tissue viability in order to improve patient outcomes
2. To raise awareness of the impact of tissue viability in health economics
3. To promote evidence-based practice in tissue viability and influence appropriate policy across Wales
4. To be recognised by the Welsh Assembly Government as a knowledgeable and valuable resource
5. To contribute to the body of knowledge by initiating and participating in tissue viability research and audit
6. To improve patient outcomes by maintaining the links with academia and disseminating knowledge relating to tissue viability to all healthcare providers
7. To work in partnership with industry in order to improve patient care
8. To provide peer support to all tissue viability nurses working in Wales.

The guidance development group received an unrestricted educational grant from Activa Healthcare Ltd for the development, production and dissemination of this document.

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## 1. Purpose

The purpose of this Best Practice Guidance is to present guidance on the prevention and management of hyperkeratosis of the lower limb.

## 2. Introduction

At present there are no national guidelines for the management of hyperkeratosis. Hyperkeratosis is an increased thickening of the stratum corneum resulting in thickened, scaly skin (International Lymphoedema Framework [ILF], 2012; European Wound Management Association [EWMA], 2005). Hyperkeratosis can become severe, which can make treatment and adjunctive therapies (e.g. compression) more difficult. However, the condition can be managed effectively given appropriate and timely assessment and treatment.

There is a distinct lack of evidence-based guidance about the condition. Despite the fact that hyperkeratosis is often associated with chronic venous disease (Beldon, 2006), it is not mentioned in the National Guidance for the Prevention and Management of Venous Leg Ulcers (Clinical Resource Support Team, 1998; Royal College of Nursing, 2006; Scottish Intercollegiate Guidelines Network, 2010) and there has been no standardised prevention strategy or guideline on how to manage the condition.

## 3. Surveying current practice

A survey of members from the All Wales Tissue Viability Nurses Forum was undertaken to establish current practice in Wales for the management of patients with hyperkeratosis and related leg ulceration. The nurses who responded to the survey (n=13) estimated that patients with hyperkeratosis ranged from between 20–80% of their caseload. Ninety-two percent (n=11) reported that treatment for patients with hyperkeratosis would involve regular washing and soaking the leg in water and an emollient such as Hydromol®, Dermal® 600, Epaderm® or Diprobase®. Following soaking, treatment approaches included application of an emollient, topical steroid cream (e.g. Diprosal ointment), paste bandages, hydrocolloids and wet wraps. The length of time for each episode of treatment varied enormously ranging from 10–30 minutes. The longer treatment times were due to the slow process that requires the nurse to individually pick off hyperkeratotic scales.

Based on the survey results, it was noted that there is no standardisation of treatment approach across Wales and general comments from the survey reflected a lack of satisfaction with current practice (Young, 2010). This was the rationale for this document, which aims to provide best practice guidance for those in clinical practice.

## 4. Anatomy and physiology of the skin

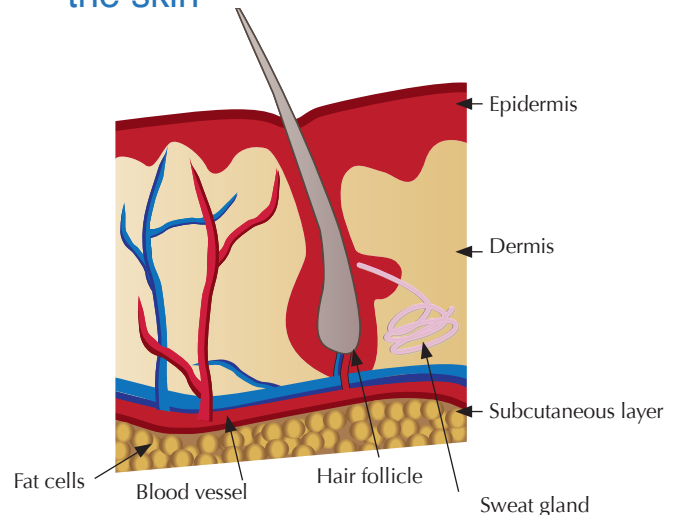


Figure 1. Layers of the skin

As healthcare professionals we have a duty to assess, maintain and restore skin integrity as part of our daily patient assessments (AWTVNE, 2011). It is important to have a basic knowledge and understanding of the anatomy and physiology of the skin to recognise the clinical presentation of hyperkeratosis and implement interventions for prevention or treatment.

The skin is the largest organ of the body and functions as a protective waterproof barrier. It is also involved in maintaining body temperature and plays an active role in the immune system.

The skin comprises three main layers: the epidermis, the dermis and the subcutaneous layer or hypodermis (Figure 1). The epidermis is the outermost layer of the skin. The thickness varies according to the area of the body — from 0.5mm on the eyelids and 1.5mm on the palms and soles. The top layer of the epidermis, the stratum corneum, is made up of dead keratinocytes, which shed approximately every two weeks. The epidermis receives oxygen and all its nutrients by diffusion from the dermis (Beldon, 2010).

The dermis is made up of two layers, predominately comprising fibrous proteins, collagen and elastin (connective tissue), which give the skin its strength and elasticity. The epidermis is firmly attached to the dermis at the dermo-epidermal junction.

The subcutaneous layer is made up of adipose tissue, connective tissue and the larger blood vessels. This layer provides support to the dermis and the fat stored in the subcutaneous layer provides protection to the internal structures ([www.dermnetnz.org](http://www.dermnetnz.org)).

## 5. Definition

Hyperkeratosis is a thickening of the outer layer of the skin — the stratum corneum. It is associated with an over-proliferation of the keratin-producing cells over the surface of the skin (ILF, 2012) contributing to increased thickness of the epidermis and dermis (Jakeman, 2012).

## 6. Patient populations

Hyperkeratosis is a known skin problem that affects patients with lymphoedema (Figure 2) (ILF, 2010). It is also a recognised characteristic of elephantiasis (ILF, 2006). Hyperkeratosis can be problematic for patients with venous hypertension and associated idiopathic varicose eczema (Figures 3 and 4) (Moffat et al, 2007). Eczema may also lead to hyperkeratosis if the inflammatory process is prolonged, for example with chronic recurrent periods of eczema. Initially, the prolonged inflammation will result in dry skin and scaling and eventually lead to the development of hyperkeratosis (Drugs.com, 2012).

Although not directly related to this document it is important to note that there are alternative types of hyperkeratosis (Box 1).

**Box 1. Types of hyperkeratosis (Jakeman, 2012).**

- Follicular: excessive development of keratin in the hair follicles
- Plantar: hyperkeratosis of the sole of the foot
- Hyperkeratosis of the nipple and areola
- Epidermolytic hyperkeratosis: caused by clumping of keratin filaments
- Corns and calluses
- Warts
- Lichen planus
- Actinic keratosis (solar keratosis): caused by sun damage
- Seborrhic keratosis: benign growths caused by a build up of skin cells

*Note: Laboratory investigations including skin biopsy may be required to diagnose the exact type of hyperkeratosis.*

## 7. Clinical presentation

Hyperkeratotic skin may present as red and dry with brown or grey patches that are scaly in appearance (ILF, 2012; Jakeman, 2012) (Figure 5). In addition the skin may present with cracks and fissures (Day and Hayes, 2008).

Hyperkeratosis may cover a small distinct area of the skin or be circumferential and cover all the skin of the lower limb. The dry

skin can be itchy and painful and may cause a general feeling of discomfort and pressure due to the thickening of the skin.

Hyperkeratosis can have an accompanying distinct odour caused by the bacterial colonisation within the scaling skin (Day and Hayes, 2008; Jakeman, 2012). It can also harbour fungal infections (Day and Hayes, 2008) and this can lead to a continuous cycle of colonisation, infection and skin breakdown.

## 8. Quality of life

The ILF (2012) suggest that the presence of hyperkeratosis is far from the 'body ideal'. Hyperkeratosis can alter an individual's perception of their body due to its unsightly appearance and the shedding of skin scales (Day and Hayes, 2008). This can adversely affect quality of life and lead to problems of social isolation, anxiety and depression (Wounds International, 2012).



Figure 2. Lymphoedema with hyperkeratosis.



Figure 3. Mixed aetiology leg ulcers in combination with hyperkeratosis.



Figure 4. Idiopathic varicose eczema.



Figure 5. Hyperkeratotic plaques.

## 9. Prevention and treatment of hyperkeratosis

### Holistic assessment

Before starting to treat a patient with hyperkeratosis it is essential that a full holistic assessment is undertaken to ensure accurate diagnosis. Hyperkeratosis can resemble Bowen's disease, which can lead to squamous cell carcinoma if left untreated (Moffatt et al, 2007); therefore alternative diagnoses should always be considered during assessment. Treatment of underlying conditions such as venous hypertension, chronic oedema and lymphoedema is also essential.

### Implementing a management plan

Daily hygiene and a structured skin care regimen is imperative for patients with hyperkeratosis. Patients should be encouraged to perform regular skin care to maintain skin integrity. Promotion of self care, where possible, is of paramount importance in maintaining skin health (Whitaker, 2012; Pidock and Jones, 2013).

### Applying emollient therapy

The aim of emollient therapy is to hydrate the epidermis and reduce the signs and symptoms of dry skin (e.g. scaling and itching). It is a major component of the prevention and treatment of hyperkeratosis.

Emollients work to moisturise the skin and should be applied immediately to skin following a bath, shower or leg soaking to trap moisture into the skin (BDNG, 2012). Complete emollient therapy involves replacing all detergents (such as soaps and shower gels) with emollient wash products (e.g. soap substitutes, bath oils) and topically applied emollient products (leave-on ointments, creams, lotions) (Cork and Danby, 2009).

It is important to understand that not all emollients are the same. Some work by occlusion, trapping moisture into the skin. Others work in an active way by drawing moisture into the stratum corneum from the dermis (humectants, e.g. those containing urea and glycerine). As well as holding water in the epidermis, emollients can also be exfoliative (e.g. when combined with salicylic acid) or anti-inflammatory (BDNG, 2012).

Emollients come in gel and mousse formations as well as the traditional ointments, creams and lotions. If emollients are used in combination with topical steroid preparations, the emollient should be applied first and allowed to dry before applying the steroid preparation (BDNG, 2012). The mousse preparations dry very quickly and can be helpful if time is a consideration.

Leave-on topical emollients include ointments, which are lipid-based and leave a fine layer of substances such as petrolatum (a high lipid product) on the surface of the skin. Creams (emulsions of oil and water) are less greasy, while lotions have a higher water content, which makes them easier to spread. Aqueous cream (either as a wash product or leave-on emollient) is not recommended for emollient therapy in hyperkeratosis (Moncrieff et al, 2013).

It is recommended that an adult should apply 250–600g of emollient per week to soften scales (BDNG, 2012). Consideration should be given to frequency of bathing using a soap-substitute to prevent build-up of organic debris on the skin, including dead skin cells and exudate, which may lead to crusting. This build-up can exacerbate the appearance of hyperkeratosis.

Patient acceptability is the most important determinant when considering emollient therapy (Cork and Danby, 2009). For example, using a cream or lotion during the day and an ointment at night, while some patients may be advised to keep a small pot of emollient with them for frequent application during the day. Advice and care planning with healthcare professionals can help to maximise patients' independence and prevent any worsening of their condition.

Patients with lymphoedema are often advised to soak their legs twice weekly in water/emollient for 10 minutes. In addition to washing of the leg, mechanical removal of skin scales will help to prevent build-up of callus and decrease the risk of secondary infections (Appendix 1).

### Removal of skin scales

Removal of hyperkeratotic scales must be safe and atraumatic (Whitaker, 2012). It is recommended that plaques are not removed with sharp implements as this may lead to bleeding, pain and infection. Manually removing scales using a gloved finger or forceps is time consuming: scales must first be softened with emollients and complete removal is unlikely to be achieved in one episode of care and may require several treatments. Some practitioners recommend using soft white paraffin applied under occlusion (e.g. cling film) before washing the leg as a low-cost option for softening the hyperkeratosis.

Recent NICE recommendations (NICE, 2014) support the use of a monofilament debridement pad in the management of hyperkeratosis. This is a sterile, single-use pad made up of monofilament polyester fibres with a reverse side of polyacrylate. The monofilaments are cut at an angle designed to penetrate irregular shaped areas and remove the devitalised skin. Emollients should be removed before using the monofilament debridement pad (see Appendix 2 for step by step guide).

**Table 1. Common treatment options for hyperkeratosis of the lower limb.**

AIM	TREATMENT	TREATMENT GOALS
Prevention of hyperkeratosis	<p>Daily wash with emollients and/or soap substitutes. For some patients in compression therapy this might need to be a weekly occurrence. Follow these steps:</p> <ol style="list-style-type: none"> <li>1. Use a soap substitute with water to cleanse the leg using a disposable cloth. Alternatively use a monofilament debridement pad on a weekly basis (NICE, 2014)</li> <li>2. Dry thoroughly, especially between the skin folds</li> <li>3. Apply emollients in a downwards motion (Beldon, 2006) to prevent hair follicles becoming blocked</li> </ol> <p>Apply compression therapy, if indicated, according to local protocols</p>	<p>Maintain skin hydration</p> <p>Prevent folliculitis</p> <p>Reduce oedema by improving venous return and reducing venous hypertension</p>
Treatment of hyperkeratosis	<p>All of the above, plus:</p> <p>Use of creams that contain urea and glycerine (humectants)</p> <p>Topical preparations of salicylic acid (3% or 6%) can be used to facilitate penetration of emollients to the dermis. These are not suitable for diabetic patients at risk of neuropathic ulcers (Jakeman, 2012)</p> <p>Diprosalic preparations can be applied daily as a thin film. They contain a potent corticosteroid to reduce inflammation. The maximum weekly dose should not exceed 60g</p> <p>Use of monofilament debridement pad</p> <p>Apply compression therapy, if indicated, according to local protocols</p>	<p>Soften hyperkeratotic areas and facilitate desquamation of stratum corneum (Jakeman, 2012)</p> <p>Mechanically debride hyperkeratosis</p> <p>Reduce oedema by improving venous return and reducing venous hypertension</p>

Clinical evidence in the form of patient case series and case studies also demonstrates its effectiveness, short procedure time (on average 2–4 minutes on wounds) and patient comfort (Bahr et al, 2011, Gray et al, 2011, Stephen-Haynes and Callaghan, 2012).

In cases of chronic oedema and lymphoedema, hyperkeratosis needs to be reduced, and tissues softened, in order to achieve reductions in limb volume resulting from graduated compression therapy (Williams, 2009). The monofilament debridement pad can be used safely by the patient to maintain the optimum skin hygiene required in lymphoedema management (Whitaker, 2012; McGrath, 2013; Pidcock and Jones, 2013).

Similar wound debridement products may have a future role in the management of hyperkeratosis and further research is needed to evaluate their clinical efficacy.

Many of the recommendations provided (Table 1) are recognised as effective treatments used in clinical practice by experts in the field, although in some cases there may be little evidence to support their use. If there is any concern or there is a query about diagnosis and

there is no improvement after a treatment regimen has been put in place, then referral to dermatology specialists should be considered after an appropriate period of time. This will be dependent on individual patient circumstances..

Other treatments include hydrocolloid dressings and paste bandages, which may be used as a precursor to soften plaques. However, evidence that supports their effectiveness is lacking. There is the potential for skin problems and sensitisation in certain patients (Beldon, 2006) so they should be used with caution.

A flowchart has been produced to summarise the treatment options discussed within this document (see Appendix 3).

## 10. Summary

Following a literature search and a survey of the All Wales Tissue Viability Forum, it was highlighted that there were no national guidelines for the management of hyperkeratosis and no standardised prevention strategy across Wales. This has led to confusion with regard to the appropriate management of hyperkeratosis.

With appropriate assessment, diagnosis and treatment, hyperkeratosis can be prevented or managed. This Best Practice Guidance was designed to give guidance for practice where previously there was none. This guidance has been reviewed by lymphoedema specialists in Wales who have experience of treating hyperkeratosis. This has resulted in a document that contains practical advice supported by the evidence base. However, a major limitation of this document has been the lack of published research to guide clinical practice. Nonetheless it is important that clinicians have access to this guidance for optimal care of patients with hyperkeratosis. It is hoped that this subject may be identified as a key topic for future research.

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## Acknowledgements

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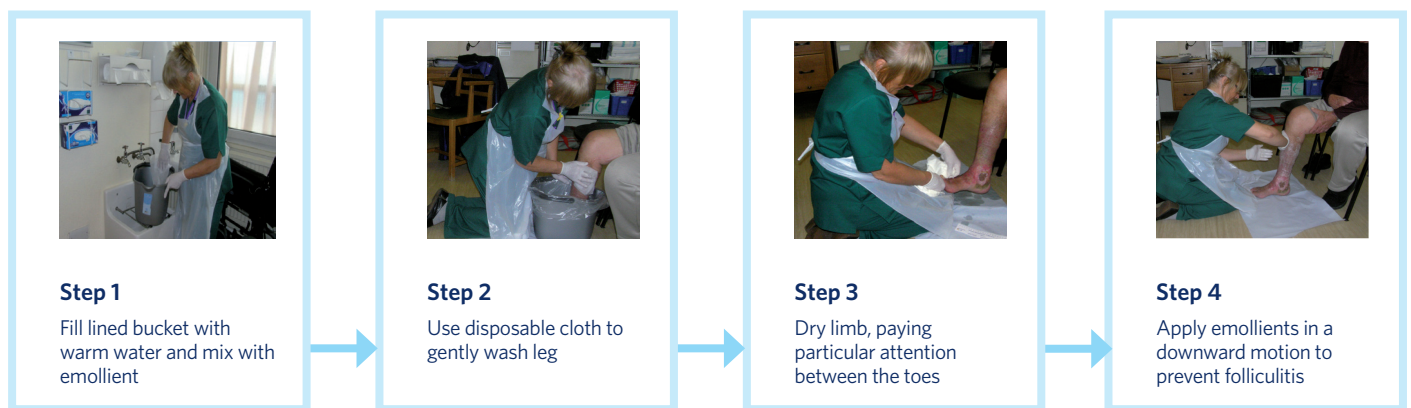
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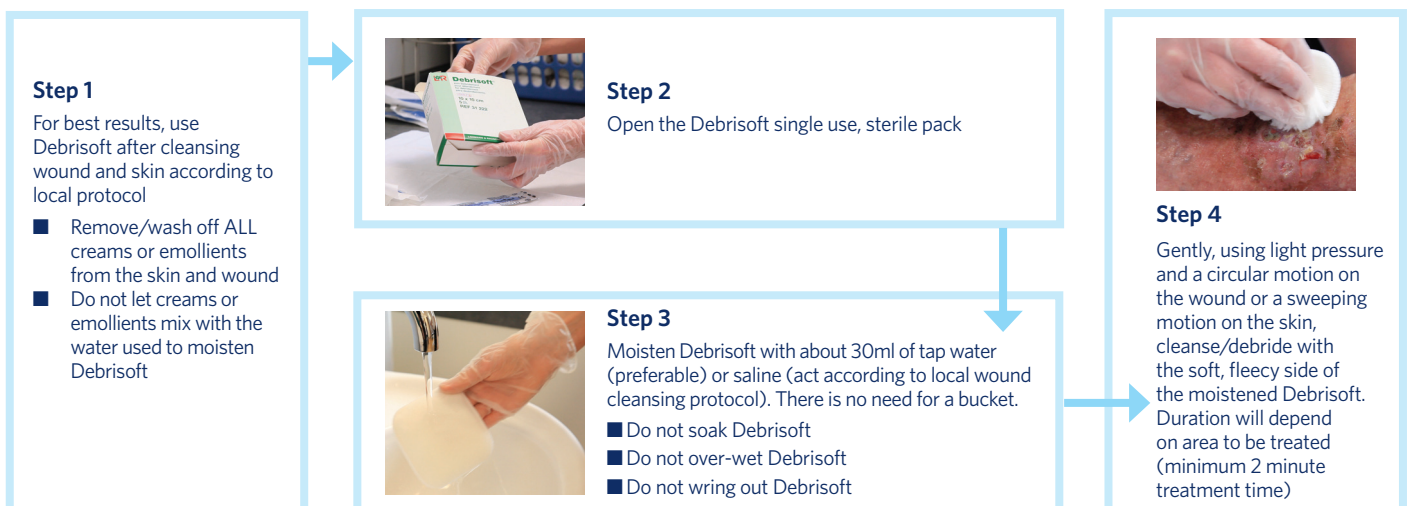
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## Appendix 1: Guide to leg washing



## Appendix 2: Step by step guide to using a monofilament debridement pad (Debrisoft®)



### Notes

- Debrisoft is single-use — use a new piece for each separate wound/area of skin, and dispose of the used Debrisoft in normal clinical waste (according to local protocol)
- Debrisoft is latex-free

Adapted from Debridement Quick Guide (2013) Wounds UK. Available from [www.wounds-uk.com](http://www.wounds-uk.com)

### Appendix 3: Flowchart for the treatment of hyperkeratosis

