# Clinical Guideline for the Management of Chronic Burn Wounds

Northern Burn Care Network July 2025

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# 1. Introduction

This guideline is for use in wounds that have been assessed by a surgeon and either undergone surgical closure and it has failed, or it has been determined by the surgeon that surgical closure is not appropriate. This pathway is for use when all other measures have been exhausted.

### Holistic wound assessment

Holistic wound assessment is a comprehensive approach that considers various internal and external factors affecting wound healing, ensuring effective patient care and treatment. It involves evaluating not just the wound itself but also the patient's overall health, including their medical history, psychological state and social circumstances. Wound healing is influenced by a variety of factors, both intrinsic (age, comorbidities) and extrinsic (such as environmental and lifestyle choices). This applies to all wounds and not just non-healing wounds so should already have been completed prior to commencing this guideline.

A holistic wound assessment involves:

- the patient's medical history – including current and past medical conditions; their psychological, social and spiritual history; their wound care environment and access to specialised health services.
- a physical assessment of the patient - including factors such as respiration, blood pressure, heart sounds, skin assessment, etc.
- a comprehensive wound assessment – including assessment of the wound bed, the wound edges, the periwound skin and patient pain level.

A wound should be assessed at each dressing change – or at least once a week – to make sure the treatment is having the right effect (Dowsett et al 2020).

This means the patients nutritional status should be optimised, specifically this includes measurement and treatment of their serum albumin and trace elements, a vascular assessment has been completed where appropriate and patient optimised where possible and their glycaemic control should be assessed and maintained.

### Non-Healing Wounds

While there are several definitions of non-healing wounds – and it is generally accepted that under normal circumstances, wound healing occurs within 4-6 weeks of injury and wounds that fall outside that are generally referred to as non-healing wounds – the same cannot be said for burn wounds as we don't know the trajectory of healing of some depths of burns. We know that a superficial burn will heal in 5–7 days and a superficial dermal burn within 7–10 days, but little is understood about the normal healing trajectory of deep dermal or full-thickness burns, (Edwards 2013).

Although many of these deeper burns will undergo surgical closure, in those with comorbidities, mental health or learning disabilities, or in older people, this is often not the case. Also, small deep burns are seldom surgically closed and are often left for many months to heal by secondary intention. Unfortunately, on reviewing the

literature there is a paucity of articles discussing non-healing burn wounds, so we can only utilise the wider evidence for other non-healing wounds.

In clinical practice, burn wounds that remain unhealed for many weeks or months often continue to be treated as burn wounds, as opposed to wounds that have become non-healing (Edwards 2013). This means that they are treated topically with antimicrobials and reassessed every 2–3 days. It is not uncommon for a donor site to be unhealed at 9–12 months and in-patient stays are increasing becoming longer for these patients, with patients sometimes being discharged with significant unhealed areas.

A non-healing wound has differences in wound behaviour and pathophysiology. Most of these changes affect the inflammatory and proliferative phases of the healing process, where there appears to be an enhanced and prolonged inflammatory reaction and a dysfunctional proliferative process. Non-healing wound exudate contains elevated levels of matrix Metalloproteases (MMP's), low levels of growth factors and high pro-inflammatory cytokine concentrations. There is also often increased neutrophil activity and inappropriate macrophage populations.

However, this has not been investigated for non-healing burn wounds, so without that information we currently need to treat them as other non-healing wounds. For this reason, we have opted to treat burn wounds longer than 6 weeks older as non-healing burns. This should be amended to 4 weeks for donor sites.

Nutrition plays a significant role in wound healing and specifically in burns. Management of the patient's nutritional status is standard wound care and should be addressed before proceeding to the chronic burn wound guideline. This means the patient should have their albumin and trace elements measured and addressed.

## 2. Debridement

Removal of slough and other devitalised tissue is a key step in Biofilm-Based Wound Care (BBWC) and wound bed preparation. Debridement is key to management of both slough and biofilm, and several methods are available to achieve this, including surgical/sharp and mechanical debridement. Evidence to date suggests that physical removal, i.e., debridement or vigorous physical cleansing, are the best methods for reducing biofilm burden (Lawrence et al 2007). Whilst surgical or sharp debridement may be the gold standard, few nurses can undertake this. Therefore, the most used form of debridement is autolytic. Autolytic debridement describes the use of the body's own enzymes and moisture to rehydrate, soften and liquefy hard eschar and slough (Gray et al 2010).

No form of debridement or cleansing is likely to remove all biofilm, and so any remaining bacteria/biofilm has the potential to regrow and form mature biofilm within a matter of days. As a result, it is suggested that debridement in a wound suspected of containing biofilm needs to be performed regularly, at each dressing change.

### Sharp Debridement

Surgical sharp and conservative sharp debridement (CSD) is performed by a skilled practitioner using surgical instruments such as scalpel, curette, scissors, and forceps. This debridement type promotes wound healing by removing biofilm and devitalised tissue. The level of debridement is determined by the level of devitalized tissue removal. Sharp and conservative debridement can be performed in a clinic or at the bedside with sterile instruments. While surgeons may debride until the wound bed is bleeding, conservative sharp debridement has a more conservative approach, removing dead tissue to just above the viable tissue level (Fairbairn et al, 2002). This conservative approach is quick and effective, minimises the risk of complications and is considered safe for a wider range of practitioners to undertake in a variety of settings, following training (Preece, 2003)

### Debridement Pads or Cloths

The use of topical surfactant-based wound cleansing solutions and physical “scrubbing” by means of debridement pad or cloth pad, may augment, or replace the physical/mechanical debridement process (Malone & Swanson 2017). BBWC also emphasises combining the effective debridement of biofilm with the application of topical antimicrobial agents that can kill remaining planktonic bacteria, and prevent reformation of biofilm, which can occur within three days (Wolcott et al 2010).

### Larval Therapy

Larvae of the green bottle fly, Lucilia sericata, have been shown to rapidly remove necrotic tissue from all types of wounds, irrespective of their underlying aetiology. Larvae, contrary to widely held belief, do not have teeth and therefore cannot actively ‘chew away’ dead tissue. They feed mainly by a process of extracorporeal digestion. Secreted collagenases and trypsin-like and chymotrypsin-like enzymes have been described (Baer 1929; Casu et al 1994).

These enzymes break down the necrotic tissue into a semi-liquid form that the creatures can ingest. It has been reported that Larval secretions appear able to destroy unhealthy or abnormal tissue leaving healthy tissue in its place.

Although larvae are effective in the treatment of many diverse types of wounds, hard necrotic tissue may prove difficult for them to penetrate. In such situations, the use of a hydrogel or hydrocolloid dressing to rehydrate or soften the dead tissue prior to the application of the larvae is recommended. Do not apply to a wound that has had Silver Sulphadiazine on.

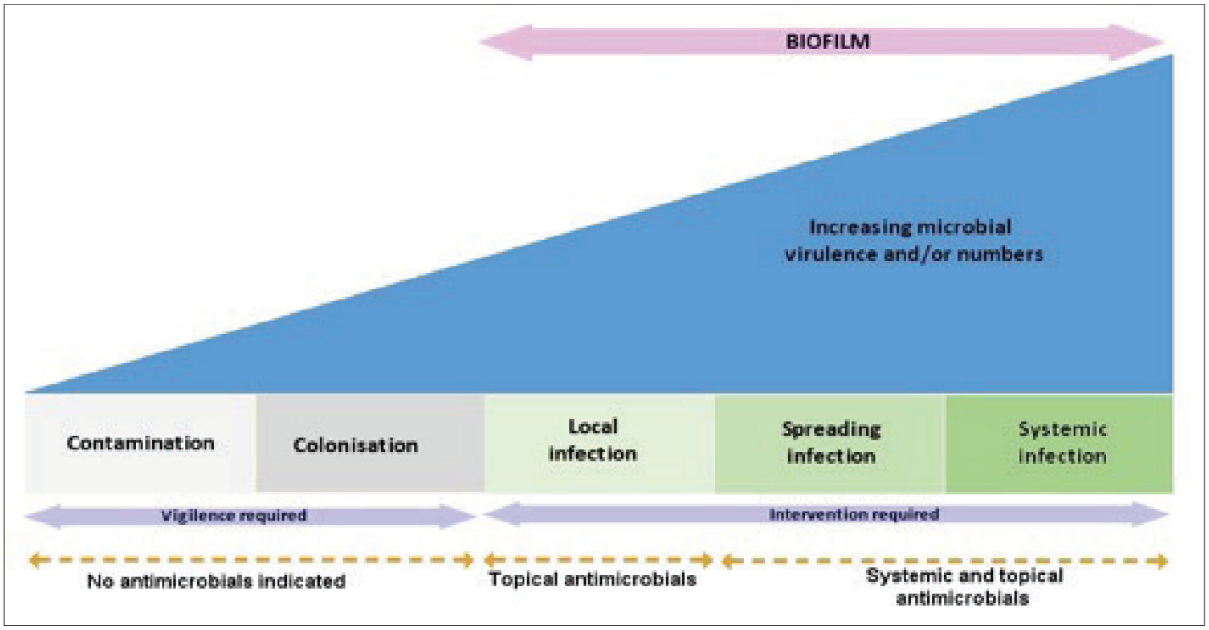
### Debriding Dressings

There are a range of dressings available that will help to debride wounds either by providing moisture, which softens devitalised tissues and absorbs excess wound exudate  which is suitable for necrotic wounds or by effectively absorbing exudate and allowing for vertical transmission of fluid away from the wound bed, which helps to prevent maceration of the surrounding skin, facilitating optimal wound bed preparation for sloughy wounds.  Ideally as burns are considerable risk of infection from dead tissue either dressing would have antimicrobial properties**.**

## 3. Infection and Biofilm

Biofilms are complex microbial communities containing bacteria and fungi. The microorganisms synthesise and secrete a protective matrix that attaches the biofilm firmly to a living or non-living surface (Stoodley et al 2002). Biofilms are also found in wounds and are suspected to delay healing in some. Electron microscopy of biopsies from non-healing wounds found that 60% of the specimens contained biofilm structures in comparison with only 6% of biopsies from acute wounds (James et al 2008), Whilst Malone et al (2017) identified that 80% of non-healing wounds are colonised with biofilm. Since biofilms are reported to be a major factor contributing to multiple non-healing inflammatory diseases, it is likely that almost all non-healing wounds have biofilm communities on at least part of the wound bed. Percival (2011) adds that whilst not all wounds contain a biofilm, non-healing wounds are more likely to have a complex microbiology than those that are not. Wolcott et al (2010) suggest that biofilms have been generally accepted as a factor that can contribute to delay in healing in skin wounds.

Non-healing skin wounds often lack overt clinical signs of infection and often have low bacterial burdens as measured by standard clinical microbiology laboratory assays (WUWHS 2008). However, standard clinical microbiology tests are optimised to culture planktonic bacteria, and do not adequately measure biofilm bacteria, which require special cultivation techniques. The term critical colonisation was developed to acknowledge the concept that bacteria play a critical role in the failure of wounds that do not have obvious infection to heal (Edwards & Harding 2004). The term critical colonisation was changed to local wound infection (Figure 1) as this more accurately represented the phase of infection in which covert (subtle) local clinical indicators of infection (e.g. pocketing, epithelial bridging and hypergranulation) can be identified by expert wound clinicians. These clinical indicators are primarily observed in the hard-to-heal wound or before the wound exhibits overt (classic) signs and symptoms of erythema, warmth, swelling, purulent discharge, delayed wound healing beyond expectations, new or increasing pain, and increasing malodour. In reality, this probably describes the presence of a biofilm in a non-healing wound.




| Contamination[6] | Colonisation[6] | Local infection | | Spreading infection[19, 20] | Systemic infection[19, 20] |
|---|---|---|---|---|---|
| All wounds may acquire micro-organisms. If suitable nutritive and physical conditions are not available for each microbial species, or they are not able to successfully evade host defences, they will not multiply or persist; their presence is therefore only transient and wound healing is not delayed. | Microbial species successfully grow and divide, but do not cause damage to the host or initiate wound infection. | **Covert (subtle) signs of local infection:**[10, 12, 15-17, 32-37]<br>• Hypergranulation (excessive 'vascular' tissue)<br>• Bleeding friable granulation<br>• Epithelial bridging and pocketing in granulation tissue<br>• Wound breakdown and enlargement<br>• Delayed wound healing beyond expectations<br>• New or increasing pain<br>• Increasing malodour | **Overt (classic) signs of local infection:**[12, 15, 16, 36, 37]<br>• Erythema<br>• Local warmth<br>• Swelling<br>• Purulent discharge<br>• Delayed wound healing beyond expectations<br>• New or increasing pain<br>• Increasing malodour | • Extending induration or erythema<br>• Lymphangitis<br>• Crepitus<br>• Wound breakdown/ dehiscence with or without satellite lesions<br>• Induration<br>• Malaise/ lethargy or non-specific general deterioration<br>• Loss of appetite<br>• Inflammation/ swelling of lymph glands | • Severe sepsis<br>• Septic shock<br>• Organ failure<br>• Death |

*Figure 1 The International Wound Infection Institute's Wound Infection Continuum and associated signs and symptoms of wound infection*

Figure 1 – Wound Infection Continuum

Biofilms stimulate a non-healing inflammatory response to rid the wound of the biofilm. This response results in abundant neutrophils and macrophages surrounding biofilms. These inflammatory cells secrete elevated levels of reactive oxygen species (ROS) and proteases (matrix metalloproteinases (MMPs) and elastase). The proteases can help to break down the attachments between biofilms and the tissue, dislodging the biofilms from the wound (EWMA 2004). However, the ROS and proteases also damage normal and healing tissues, proteins and immune cells and have 'off target' effects that impair healing (Phillips et al 2010). The non-healing inflammatory response is not always successful in removing the biofilm and it has been hypothesised that the response is favourable to the biofilm. By inducing an ineffective inflammatory response, the biofilm protects the microorganisms it

contains and increases exudate production, which provides a source of nutrition and helps to perpetuate the biofilm (Lawrence et al 2007).

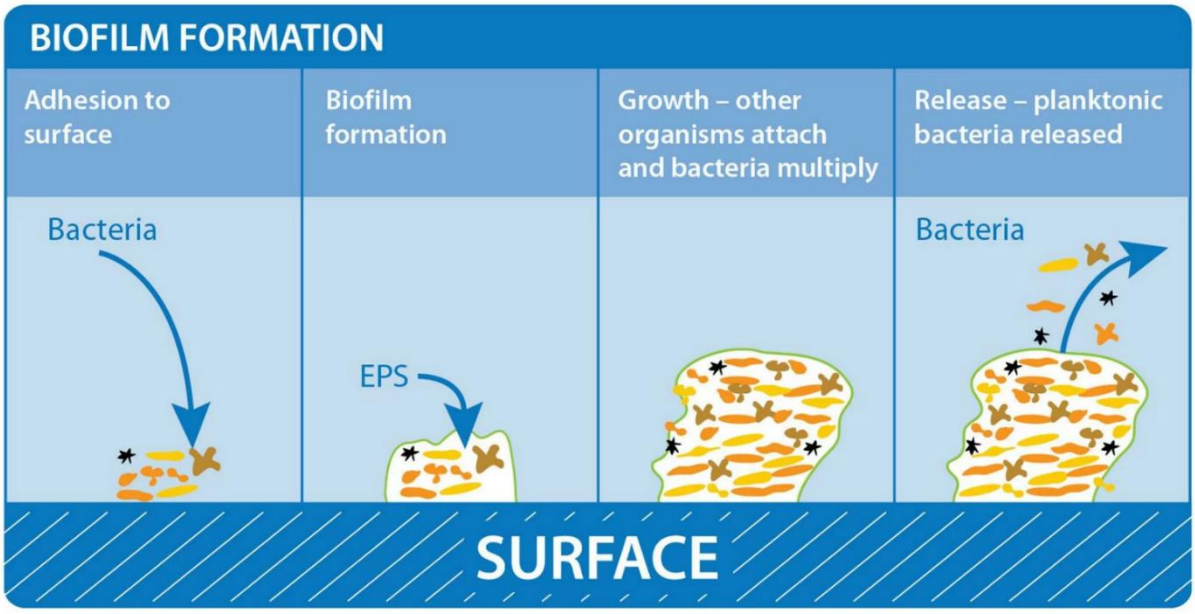



Fig 2 Biofilm Formation

### Antiseptics

Some products are suggested to have additional roles in wound cleansing by aiding removal of bacteria and debris, and disturbing biofilm. Formulations containing surfactant are suggested to be useful in removing biofilm as the surfactant component of the cleansing agent reduces surface tension and aids removal of debris and bacteria by irrigation. A surfactant is a liquid that reduces the surface tension of a liquid, so the liquid can spread further over a surface. This increases the wetting effect, i.e., it moistens the skin and loosens biofilm and devitalised tissue (Assadian et al 2016).

## 4. Protease Modulation

Proteases are needed for wound healing to occur, as they naturally debride the wound (Gibson et al, 2009). The two main ones in wound healing are MMPs and serine proteases, e.g., elastin. However, in non-healing /complex wounds, their activity rises above normal levels and gets out of control, prolonging the inflammatory phase of healing and thus delaying healing. In the normal wound healing process, proteases break down damaged ECM proteins and foreign material so that new tissue can form, and wound closure can occur in an orderly fashion. However, when the level of protease activity is too high the delicate balance between tissue breakdown and repair is disturbed.

Excessive wound proteases lead to the degradation of newly formed ECM and other proteins, e.g., growth factors and receptors. As a result, wound healing is impaired due to ECM damage and abnormal prolongation of the inflammatory stage of healing

that prevents the wound from progressing to the proliferative phase (Gibson et al 2009).

Protease-modulating dressings have been developed to reduce the levels of activity of harmful proteases (proteinases), matrix Metalloproteinases (MMPs), in the wound fluid (exudate) of non-healing wounds. This is achieved either by absorbing exudate, removing cofactors, or releasing inhibitors. By actively interacting with the wound, protease modulators influence the wound-healing environment so that it is more conducive to healing.

Reducing the excessive protease activity in the wound is thought to convert the wound to a healing state. A significant amount of research has focused on dressings that act to reduce levels of MMPs by absorbing wound exudate and holding the proteases within the dressing structure. In effect, this binds and inactivates the excess MMPs present in the wound environment. A collagen/ORC dressing has been shown to reduce protease activity and to have a positive effect on healing in a variety of non-healing wounds (Romanelli et al 2007). In general, protease-modulating dressings, e.g., ORC/collagen, are used for short courses of two to four weeks, followed by a full reassessment of the effectiveness of treatment. Intermittent or pulsed treatment is also sometimes used, e.g., two weeks of treatment with the protease-modulating dressing followed by two weeks without the dressing.

## 5. Topical Steroids

Non-healing wounds, defined as those that fail to heal within six weeks, may occur because of a variety of ulcer or patient-specific factors. Yet despite a marked heterogeneity among patients with non-healing wounds, they are commonly characterised by an excessive inflammatory response, essentially getting ‘stuck’ in the inflammatory phase. They are therefore associated with a greater number of inflammatory cells such as neutrophils, lymphocytes, and macrophages.

In **selected** cases, direct application of a steroid containing agent has been shown to improve healing rates, presumably by curtailing this phase. Case series exist of the successful use of topical corticosteroids for excessive granulation tissue following dermatological surgery, but they are few and far between, and topical steroids have not become commonplace in general wound care, which means there is very little evidence to support their use (Mandrea 1998, Hofman et al 2007).

However, despite this they are advocated by Dermatologists for recalcitrant wounds. Use of a combined preparation with antimicrobial effect is preferred rather than a single steroid agent, owing to the well-recognised observation that corticosteroid treatment typically increases infection risk (Bosanquet et al 2013). Bosanquet et al (2013) demonstrated that a combined topical steroid, antibiotic, and antifungal can improve wound healing rates in a cohort of patients demonstrating abnormal inflammatory changes in their non-healing wounds. Furthermore, they add that it can reduce exudate and pain symptoms.

**Inclusion Criteria**

- Non-healing burn wounds of greater than 4 weeks if treated conservatively or 4 weeks after failed surgical intervention
- Maximum 10% TBSA in adults and 5%TBSA in children.

**Exclusion Criteria**

- Untreated infection (bacterial, fungal and viral)
- Avoid prolonged use, especially on the face

Treatment with topical steroids must have a clear treatment period and end date. They should **NOT** be used without agreement and guidance from a **Dermatologist** with an agreed local pathway.

Depending on the potency of application and the frequency of dressing change, **the maximum treatment period for the use of topical steroids is four weeks**. During this period the wound should be reviewed every 7 days or more frequently if indicated, and treatment stopped if there is no improvement

# 6. Recalcitrant Wounds

### Compression Therapy

The mechanism by which leg ulcers develop, i.e., damage to the valves, foot and calf muscle pumps not working properly, leading to stretching of the walls of the veins allowing leakage of fluid, red cells and protein into the tissues can all be seen in patients with burns to their lower legs. Burns to lower legs often take longer to heal than burns to other parts of the bodies and an audit of non-healing burn wounds identified lower leg burns as a key factor in time to healing (Anderson et al 2016). For this reason, compression therapy may be suitable for both new and older non-healing burn wounds of the lower legs.

The main principles underpinning how compression therapy works are:

• Decreasing the capacity of and pressure within the superficial veins. This aids venous return by increasing the blood flow velocity in the deep veins.

• Reducing oedema by decreasing the pressure difference between capillaries and the surrounding tissue and transferring tissue fluid back into the vascular space. This can reduce exudate.

• Minimising or reversing skin changes, to aid the healing of venous ulceration (Vowden & Vowden 2012)

• Application of compression should not be undertaken unless an Ankle Brachial Pressure Index (ABPI) has been conducted and should be done by a suitably qualified practitioner.

### Negative Wound Pressure Therapy (NWPT)

NPWT is a therapy that uses a controlled negative pressure (sub atmospheric) in a closed system applied to acute and non-healing wounds to promote healing. Although its mode of action is still not fully understood several studies have shown the therapy to be beneficial and cost effective in aiding healing by secondary intention (Joseph et al 2000). Application of NPWT to a wound surface has demonstrated to have the following effects on the wound (EWMA 2007):

- Increase local blood flow.
- Reduce oedema and control exudate.
- Stimulate proliferation of cells and formation of granulation tissue.
- Reduce cytokines and matrix metalloproteinases.
- Decrease in wound bioburden.
- Removal of slough.
- Draw wound edges together.
- Maintenance of a moist wound healing environment

**Inclusion Criteria**

- New referrals with burn injuries older than 6 weeks
- Patients with burns/skin grafts older than 6 weeks
- Patients with donor sites older than 4 weeks

### Topical Oxygen Therapy

Wound healing requires, among other things, the restoration of macro- and micro-circulation. Adequate blood flow delivers many key components to the site of a wound; chief among those is oxygen. Oxygen plays an important role in the reconstruction of new vessels and connective tissue, as well as the migration of epithelial cells, and it allows for normal local metabolism while facilitating resistance to infection.

One way of locally delivering more oxygen to a wound is using topical oxygen therapy (TOT), an umbrella term for several modalities for topically administering oxygen to wounds or ulcers to promote tissue healing. TOT involves the administration of topical oxygen directly to injured tissue by either continuous delivery or pressurised systems using mechanical devices (Chen et al, 2023).

This can be achieved in a number of ways:

Continuous delivery of oxygen (CDO) devices deliver a continuous flow of pure, humidified, low-pressure oxygen to blanket the wound for up to 7 days.

Higher cyclical pressure oxygen devices deliver oxygen at variable pressure, cycled between 10 mbar and 50mbar.

Low constant pressure oxygen devices deliver a high flow (2-5l/min) of low-pressure oxygen maintaining constant pressures of up to 29 mbar.

Topical Haemoglobin spray also known as oxygen diffusion enhancement or oxygen transfer involves spraying the wound bed with a thin layer of a liquid containing 10%

purified haemoglobin. The haemoglobin molecules increase the local delivery of oxygen by facilitating diffusion.

Oxygen wound dressings deliver topical oxygen directly to the wound without the need for gaseous diffusion. To optimise conditions for use of oxygen wound dressings, the wound should be regularly debrided and cleansed.

All these therapies should be used for a minimum of **FOUR** weeks before determining they are having no effect.

**Inclusion Criteria**

- Non-healing burn wounds of greater than 4 weeks if treated conservatively or 4 weeks after failed surgical intervention
- If there are clinical signs the wound is hypoxic
- If the patient has underlying conditions or risk factors that make them more susceptible to wound complications.

### Electrical Stimulation Therapy (EST)

Electrical stimulation can be considered a “catch-all” phrase for many different functional therapies and stimuli. It works by restoring the electrical current across the wound, encouraging the cells involved in wound healing to resume their normal functions. It harnesses bioelectrical signalling, creating a positive feedback loop that alters cell behaviour at the wound site. EST promotes wound healing by stimulating various processes such as fibroblast proliferation and migration, reepithelialisation, granulation tissue formation, collagen synthesis and growth factor production (Khouri et al 2017).

Many different waveforms and levels of intensity of E-stim have been used to good effect in wound healing studies (Kloth 2014). It has been suggested that rather than the type of electrical waveform used, it is more important to consider the “dose” provided. Favourable wound healing effects are believed to follow a dose of between 250 and 500 µCoulombs/second (µC/s) (Kloth 2014).

In addition to promoting healing EST reduces wound pain.

**Exclusion Criteria**
Patients with pacemakers fitted
Patients who are pregnant
Patients with Epilepsy
Patients with skin cancer

## 7. Marjolin’s Ulcers

Marjolin’s ulcer, named after the French surgeon Jean-Nicolas Marjolin, is a rare and aggressive type of squamous cell carcinoma that develops in burns, non-healing wounds or scars (Aydogdu et al 2005). Understanding this condition is essential for early recognition, prompt treatment, and improved outcomes for individuals affected

by Marjolin's ulcer. Marjolin's ulcers reflect malignant degeneration arising within pre-existing scar tissue or even chronic inflammatory skin lesions. In most instances, biopsied lesions demonstrate well-differentiated squamous cell tumours but can be basal cell or melanoma.

Marjolin's ulcers are most commonly found in the lower extremity, especially the plantar foot, and are rarely encountered in the digits. As originally presented by Marjolin, to this day the leading cause is old burn scars and approximately 2% of burn scars undergo malignant transformations (Aydogdu et al 2005).

Diagnosis is by assessment, this includes nodule formation, induration and ulceration at a scar site. Other signs include chronic ulceration of greater than 3 months, rolled or everted edges, exuberant or excessive granulation tissue, and pain. Diagnosis is confirmed by tissue biopsy which is the gold standard for the diagnosis of a malignant transformation. Biopsy should be of multiple areas across the ulcer including the wound edges.

## 8. Psychological Issues

Patients who self-harm or wish to prevent healing of the wound need to be considered.

For many patients who self-harm there is no suicidal intent, but rather that they get a sense of relief and relaxation when undertaking self-harm. It is often a coping mechanism often as a result of trauma, psychological illness, abuse, a deep-seated sense of powerlessness or negative feelings such as anger, guilt, frustration, hopelessness, and self -hatred (Mitchell 2021). Patients should be assessed for risk of further injurious behaviour as well as potential suicide. Assessment should identify the patient's mental capacity and willingness to undergo a further psychological assessment. Patients should be discussed with the psychology service.

Factitious wounds occur when patients exhibit auto destructive behaviour and this leads to acute skin lesions, non-healing wounds, post-operative delayed healing, or factitious skin infections. The motivation for this behaviour can be a desire to want to be a patient, gain rewards in terms of attention or avoid unwanted situations. Recognition of factitious disorder is difficult, but often the person has had various treatments at different hospitals or clinics, numerous poor outcomes to surgery, Younger patient age, obvious wound locations, wound healing under occlusive dressings, wound not progressing as usual, patient keen for surgery, no clear explanation for wound deterioration, patient predicts the deterioration, exacerbations shortly before or after discharge and patient is opposed to psychiatric assessment (Amro et al 2017). Effective management involves early contact with psychology/psychiatry.

## 9. Management

If wound older than 6 weeks and near a bony prominence, consider taking a baseline x-ray to rule out osteomyelitis.

## Debridement

1. If not suitable for surgical debridement, consider larval therapy as soon as possible. Larval therapy is a faster means of debridement aside from surgery but cannot be used if Silver Sulphadiazine products have been used.

2. Use Larval therapy over all areas requiring debridement at the same time, larvae should not be rotated around wounds. Rotating larval therapy slows down debridement time.

3. Once larvae have removed the majority of slough then a debriding dressing should be applied to all areas. A debriding dressing can remove residual slough down to a clean granular bed without causing pain.

4. If Larval therapy is not possible then used a debriding dressing straight away.

### Reducing Bacterial Bioburden

1. Treat any hyper granulation before commending pathway (Appendix 1)

2. Use a debridement pad or cloth at each dressing change, this will break down the biofilm and remove surface slough that may have developed. If obvious necrotic tissue, this will impede healing so must be removed before commencing this part of the pathway.

3. Patients to commence antiseptic soaks for 5 minutes prior to application of antimicrobial, this will help to breakdown the biofilm and allows the antimicrobial to be effective

4. Application of a donating antimicrobial for a 2-week period. A 2-week antimicrobial challenge is considered optimal for wound bed preparation.

5. Take a wound swab after 2-week challenge. To determine any remaining bacteria in the wound.

6. Consider another 2-week challenge if wound not improving

7. If wound deteriorates consider a biopsy and oral antibiotics, as often infection is deep seated and normal swabbing methods do not identify the causative organism.

### Protease Modulation

8. Ensure wound is suitable for protease modulator – There should be no slough or necrotic tissue present. Protease modulators cannot work in the presence of slough or necrotic tissue.

9. Use a debridement pad or cloth at each dressing change, this will help to prevent regrowth of the biofilm.

10. Continue antiseptic soaks for 5 minutes prior to application of antimicrobial, this will help to prevent biofilm regrowth.

11. Apply appropriate protease modulator and change every 3- 4 day

12. Take a wound swab for Virology. This is needed before progressing to steroid therapy as there is a need to know the patient's herpes simplex status prior to commencing steroids.

13. Photograph weekly, to ensure a record of wound progress.

14. It is usual to see something happening to the wound after one application. The wound may become more vascular and bleed. This means the dressing is redressing the balance and new growth of tissue is happening. Do not stop treatment or treat for hyper granulation unless it is severe.

15. Continue treatment for a minimum of 8 weeks, it can take up to that to see signs of improvement. If there are 2 consecutive weeks of no change then refer back to the pathway.

16. If continuing to improve, continue the protease modulator until wound is healed or improvement ceases. There is no maximum period of application if wound continues to improve.

17. If wound deteriorates consider oral antibiotics.

### Topical Steroid Therapy

1. If patient has not responded to other measures, then consider topical Steroid Therapy if all other measures have failed.

2. This therapy needs to be in conjunction with a Dermatologist unless a local pathway has been agreed.

3. Need to know status regarding Herpes Simplex before commencing steroid therapy. If significant infection or Herpes Simplex cannot commence steroid therapy as this will be exacerbated by the steroids.

4. Use a debridement pad or cloth at each dressing change, this will help to prevent regrowth of the biofilm

5. Continue antiseptic soaks for 5 minutes prior to application of antimicrobial, this will help to prevent biofilm regrowth

6. If agreed with Dermatologist, apply a potent topical steroid (refer to Steroid Ladder). Start high and reduce over time, but if elderly start moderate then reduce.

7. Continue treatment for no longer than 4 weeks, this is the maximum time for each steroid

8. Reduce to less potent steroid for a minimum of 2 weeks, maximum 4 weeks i.e., to moderate then mild. Reduce potency rather than stopping as steroid is absorbed and may cause Addison's Crisis.

### Recalcitrant Wounds

1. If the wound has not healed at the end of the pathway, or the patient is waiting for referral to Dermatology, alternate between three different antimicrobials e.g., silver, ROS, Honey, every 3 days. Wounds can become tolerant and resistant to antimicrobials. Switching them around breaks this tolerance and wounds can improve.

2. Consider oral antibiotics 5-7 days. Giving antibiotics with supportive antimicrobial therapy may prolong the effectiveness of the antibiotic.

3. This can be continued whilst waiting for referral to be actioned, wounds may continue to improve, and it provides and ongoing treatment plan.

4. If no improvement, consider referral to Dermatology or Tissue Viability, to continue the patients care. Only if pathway has been followed to end point should patient be referred to Dermatology/Tissue Viability

### Other Treatments

### Compression Therapy

1. Lower leg burns may be suitable for compression therapy. These must be isolated lower legs with no wounds over or near the knee.

2. This therapy can be used on new burns, non-healing wounds or skin grafts.

3. Arterial and Vascular supply must be assessed through Vascular Studies. An ABPI must be completed. This is to ensure that there is no arterial compromise which could lead to ischaemia of the limb.

4. If suitable an appropriately trained nurse should apply compression therapy. Ideally leg ulcer training so there is an understanding of pathophysiology. Nurses need to be trained to apply this therapy as it can cause ischaemia if incorrectly applied.

5. This might be changed twice weekly initially then weekly. In burn patients the initial compression often pushes out residual oedema leading to considerable leakage.

6. If not, suitable lower leg burns should still be bandaged toe to knee, this will still improve venous return.

### Negative Wound Pressure Therapy (NWPT)

1. Sloughy wounds that are not progressing can be considered for NWPT. NWPT will promote debridement and removal of slough.

2. Deeper wounds can be considered for NWPT, as it will draw the wound edges together.

3. NWPT must be applied by an appropriately trained nurse, incorrect application or setting of pressure could lead to ischaemia or bleeding.

4. Therapy should range from 50 -125mmHg. Skin grafts benefit from 50-75Hg up to 125mmHg for wound bed prep/slough removal.

5. Dressings should be changed at least twice a week; infected wounds may need more frequent changes

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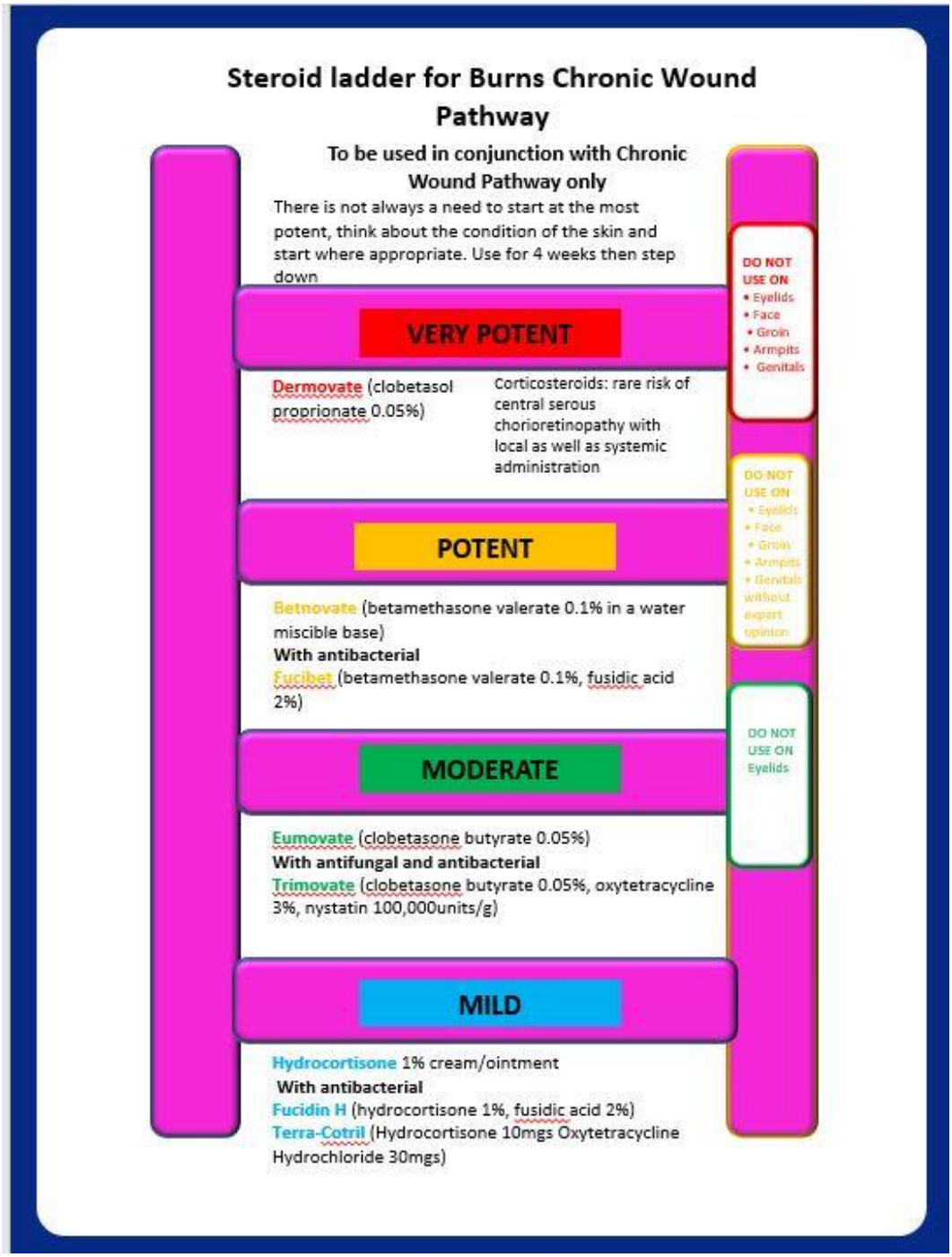
Appendix 1


CHRONIC BURN WOUND ALGORITHM
Give antibiotics if spreading or systemic infection is present
Does the patient have an unhealed superficial burn or donor site >4 weeks or an unhealed deep burn at 6 weeks
If the wound is near boney area take a baseline X-ray
Is the wound sloughy or necrotic?
Yes
Debride wound until a clean granular bed
No
Treat any hypergranulation prior to commencing
Use debridement pads/cloths & Antiseptic soaks at every dressing change.
Dress with donating antimicrobial and review at 2 weeks
Deteriorated
Static
Improved
Almost Healed
Consider Biopsy and Antibiotics
Use Protease Modulator for 4-8 weeks
Review Weekly
Minimum 4 week treatment
TAKE VIROLOGY SWAB
Protection
Deteriorated
Static
Improved
Almost Healed
Consider Oral Antibiotics
CHECK VIROLOGY RESULTS
In discussion with Dermatologist commence very potent steroid for 4 weeks. For elderly/thin skin start with moderate. Step down every 4 weeks
Continue with current regime
Deteriorated
Rewab Stop/Start Oral antibiotics
Roate 3 different antimicrobials every 3 days e.g. Silver, Honey, DACC.
Refer if no improvement after 12 weeks
Static
Almost Healed
Dermatology/TVN

**Appendix 2 - Example of Steroid ladder - need to discuss with local dermatologist.**



## 1. Equality Impact Assessment (EaIA) Tool

| 1. Possible Negative Impacts | | |
|---|---|---|
| **Protected Characteristic** | **Possible Impact** | **Action/Mitigation** |
| **Age** | **No known impact** | |
| **Disability** | **No known impact** | |
| **Ethnicity** | **No known impact** | |
| **Gender** | **No known impact** | |
| **Marriage/Civil Partnership** | **No known impact** | |
| **Pregnancy/Maternity** | **Some wound care products may not be able to be used in pregnancy** | **Source suitable safe alternatives** |
| **Religion and Belief** | **No known impact** | |
| **Sexual Orientation** | **No known impact** | |
| **Trans** | **No known impact** | |
| **Other under served communities including carers, low income, and veterans** | **No known impact** | |

| 2. Possible opportunity for Positive Impacts | | |
|---|---|---|
| **Protected Characteristic** | **Possible Impact** | **Action/Mitigation** |
| **Age** | **Potential to heal an unhealing wound and promote well being** | **Guideline is appliable to any patient with a chronic burn wound** |
| **Disability** | **Potential to heal an unhealing wound and promote well being** | **As above** |

| | | |
|---|---|---|
| **Ethnicity** | **Potential to heal an unhealing wound and promote well being** | **As Above** |
| **Gender** | **Potential to heal an unhealing wound and promote well being** | **As Above** |
| **Marriage/Civil Partnership** | **Potential to heal an unhealing wound and promote well being** | **As Above** |
| **Pregnancy/Maternity** | **Potential to heal an unhealing wound and promote well being** | **As Above** |
| **Religion and Belief** | **Potential to heal an unhealing wound and promote well being** | **As Above** |
| **Sexual Orientation** | **Potential to heal an unhealing wound and promote well being** | **As Above** |
| **Trans** | **Potential to heal an unhealing wound and promote well being** | **As Above** |
| **Other underserved communities including carers, low income, and veterans** | **Potential to heal an unhealing wound and promote well being** | **As Above** |

| **3. Action Plan** | | | |
|---|---|---|---|
| **Action** *(List all actions & mitigation below)* | **Due Date** | **Lead** *(Name & Job Role)* | **From Negative or Positive Impact?** |
| Some wound care products may not be able to be used in pregnancy | Date of Guideline going live | Jacky Edwards<br><br>Lead Nurse | Negative |
| **Potential to heal an unhealing wound and** | **Date of Guideline going live** | **Jacky Edwards** | **Positive** |

| | | | |
|---|---|---|---|
| **promote well-being.**<br><br>**Ensure appropriate training to NBCN Nurses** | **Jan 2025** | **Lead Nurse**<br><br>**Jacky Edwards**<br><br>**Lead Nurse** | **Positive** |
| | | | |
| | | | |
| | | | |

| **4. Information Consulted and Evidence Base (including nay consultation** | | | |
|---|---|---|---|
| **Protected Characteristic** | **Name of Source** | **Summary of Areas covered** | **Web link/contact info** |
| Age, Disability, Gender, Ethnicity | Data collection from bibliography above | Take into consideration factors which might prevent equity in care. | As above |
| Marriage/Civil Partnership | As above | As above | As above |
| Pregnancy/Maternity | As above | As above | As above |
| Religion and Belief | As above | As above | As above |
| Sexual Orientation | As above | As above | As above |
| Trans | As above | As above | As above |
| Other underserved communities including carers, low income, and veterans | As above | As above | As above |

| **5. EqIA Update Log**<br>*(Detail any changes made to EqIA as guideline has developed, and any additional impacts included)* | | |
|---|---|---|
| **Date of Update** | **Author of Update** | **Change made** |
| | | |
| | | |

**6.**

**Have all of the negative impacts you have considered been fully mitigated or resolved?** *(If the answer is no, please explain how these do not constitute a breach of the Equality Act 2010 or the Human Rights Act 1998)*

Yes, there are appropriate alternative treatments that can be applied to pregnant women that will enable them to be treated effectively.

**7. Please explain how you have considered the duties under the accessible information standard if your document relates to patients?**

The document is not meant for patient use; it is purely a clinical guideline for staff use.