Wounds UK

The role of HydroClean® advance in facilitating autolytic debridement

how to GUIDE

Wound bed preparation has become a cornerstone in wound management to help clinicians identify and address the issues that are preventing a wound from progressing to healing. One element of wound bed preparation is wound debridement, which is a foundation of wound healing. This 'how to guide' explains the role of HydroClean® advance in facilitating autolytic debridement.

Wound chronicity is complex and multifactorial. Once the causes of non-healing are identified, the wound bed itself can be managed with local wound care strategies to promote an environment in which healing can occur. The TIME (Tissue, Infection/Inflammation, Moisture balance and wound Edges) concept can help to identify these challenges and guide the most appropriate wound bed preparation strategies.

The TIME concept is a mnemonic to help clinicians focus upon and manage local barriers to wound healing to help guide wound bed preparation (Schultz et al, 2003) and has developed into a systematic approach for the assessment and management of the majority of acute and chronic wounds (Ousey et al, 2016). Since the introduction of the TIME concept, many new interventions have emerged and the understanding of the biological basis for wound healing has expanded; however, the TIME concept and wound bed preparation remain relevant today (Leaper et al, 2014; Harries et al, 2016). *Figure 1* describes how the TIME concept guides wound bed preparation.

WHAT IS DEBRIDEMENT?

Devitalised tissue includes necrosis, slough, haematomas, eschar, debris, foreign bodies and infected issue (Strohal et al, 2013). Devitalised tissue may mask or mimic signs of infection at the wound bed so it is important that it is removed. Debridement involves the removal of devitalised tissue or foreign material that accumulates on the surface of chronic wounds and is generally colonised by bacteria (Malone and Swanson, 2017). The removal of devitalised tissue is an early step in wound bed preparation and is necessary for wound healing progression. A moist environment is considered to increase the rate of healing faster than a drier wound environment, so adequate moisture should be maintained to facilitate the removal of devitalised tissue (Spruce et al, 2016).

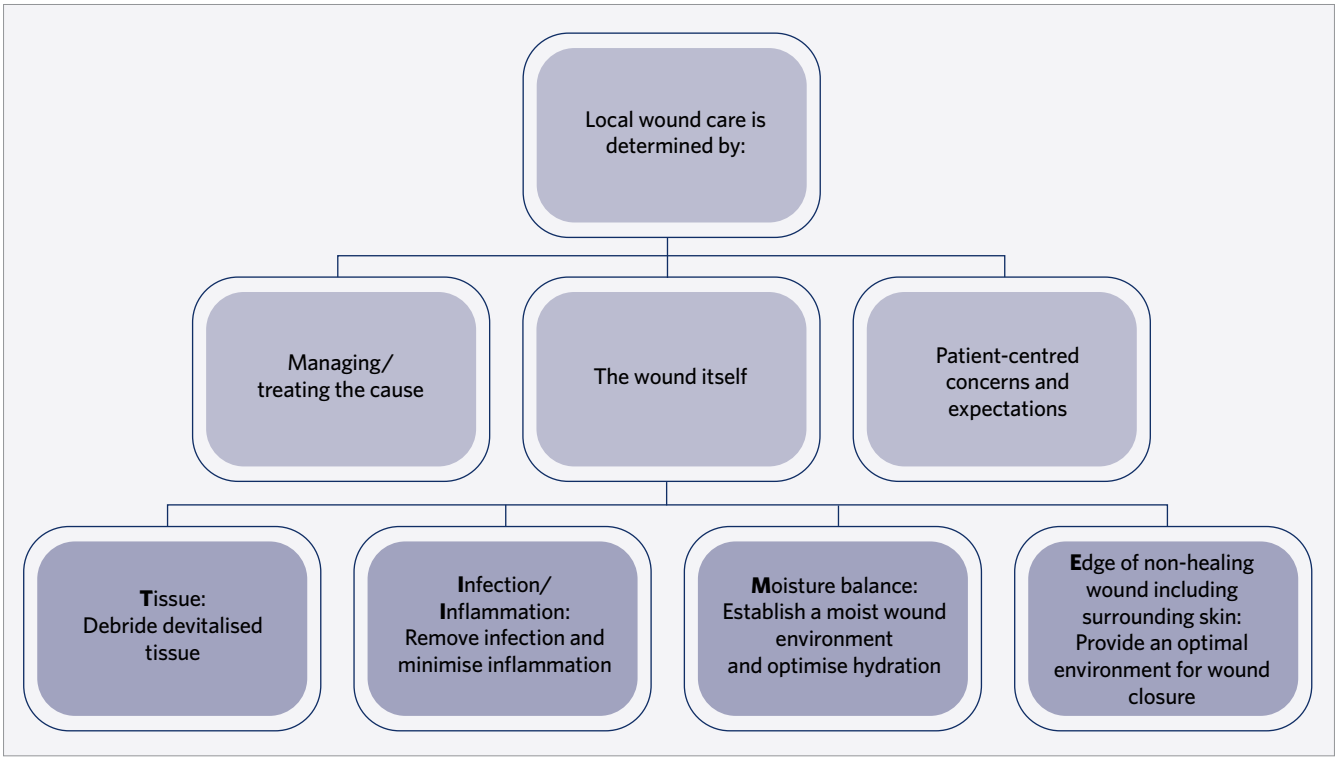

Figure 1. Wound bed preparation is a systematic approach to wound management to help clinicians identify and address the issues that are stopping a wound progressing to healing.

Debridement can:

- remove tissue acting as a physical barrier to healing
- remove tissue acting as a physical barrier to products that are applied to the wound to promote wound healing from being as effective
- reduce the risk of inflammation and infection, as necrotic tissue may serve as a source of nutrients for bacteria
- reduce odour
- reduce excess moisture
- stimulate wound edges and epithelialisation
- reduce potential pain associated with devitalised tissue
- improve quality of life
- aid correct wound assessment
- promote a healing trajectory.

(Gray et al, 2010; Strohal et al, 2013; Davies et al, 2015)

METHODS OF DEBRIDEMENT

There are many types of wound debridement, the most common being autolytic, enzymatic, larval, sharp/surgical and mechanical debridement. There are advantages and disadvantages to all methods including level of expertise required, associated pain, cost and availability. Mechanical and autolytic debridement can be performed by non-wound care specialist clinicians, family members, carers and patients, are most often available on local formularies and are relatively low cost. See *Figure 2*.

Autolytic debridement

Wounds will naturally debride through the process of autolysis, as proteolytic enzymes and macrophages liquefy and separate necrotic tissue from the wound bed (Atkin, 2014). Autolysis can be encouraged by applying wound care products that encourage a moist wound environment by donating fluid to rehydrate dry eschar or absorbing excess exudate. Autolytic debridement is one of the most frequently used techniques (Vowden and Vowden, 2011), and is often adopted by non-specialist nurses because it is considered safe and selective (Young, 2012). However, autolytic debridement has been criticised for being slower than other methods of debridement.

Mechanical debridement

Mechanical debridement involves physical force to clean the wound and can include wet-to-dry, pulsatile, lavage or wound irrigation. It is often fast and simple to use, but can be unsuitable for painful wounds and there may be a risk of damaging healthy tissue.

Autolytic and mechanical debridement combined

Non-medicated wound dressings (NMWDs) are a type of wound dressing that do not contain any active pharmaceutical component but reduce bioburden and bacterial load via alternative methods (World Union of Wound Healing Societies [WUWHS], 2020). NMWDs sequester and kill bacteria based on physical mechanisms and chemical interactions, without the need for topical antimicrobials or antibiotics. Examples of NMWDs include hydrogels, hydrocolloids, super-absorbent polymer (SAPs) dressings, carboxymethylcellulose (CMC), dialkylcarbamoylchloride (DACC) and hydro-responsive wound dressings (HRWDs).

NMWDs are important for the treatment of both acute and chronic wounds, as they remove and sequester bacteria from the wound bed to help manage infection and

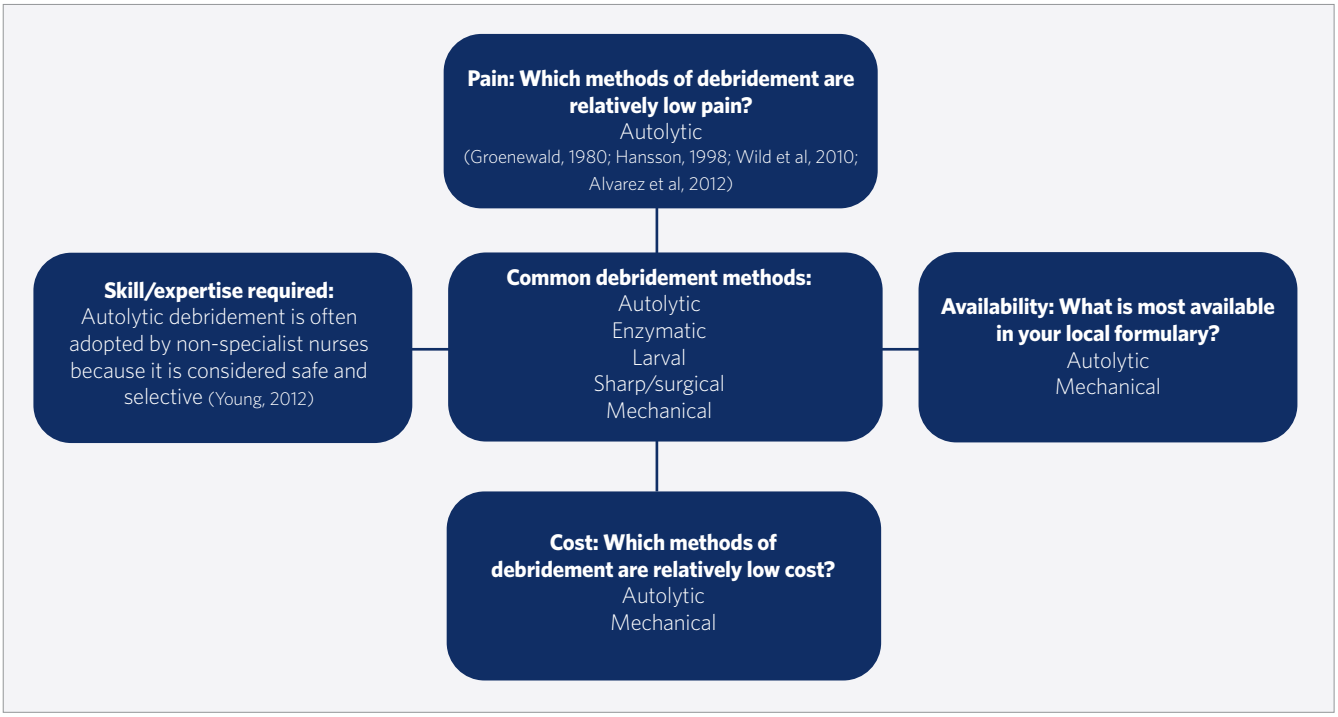

Figure 2. Considerations when selecting a debridement method.

bioburden. The antimicrobial mode of action of NMWDs involves multiple physical steps, without any active/pharmaceutical component, taking place in a coordinated manner ***(Figure 3)***.

This means that NMWDs offer an ideal option in the drive to promote antibiotic stewardship by providing effective treatment for the reduction of wound bioburden in a physical manner, without contributing to the crisis of antibiotic/antimicrobial resistance.

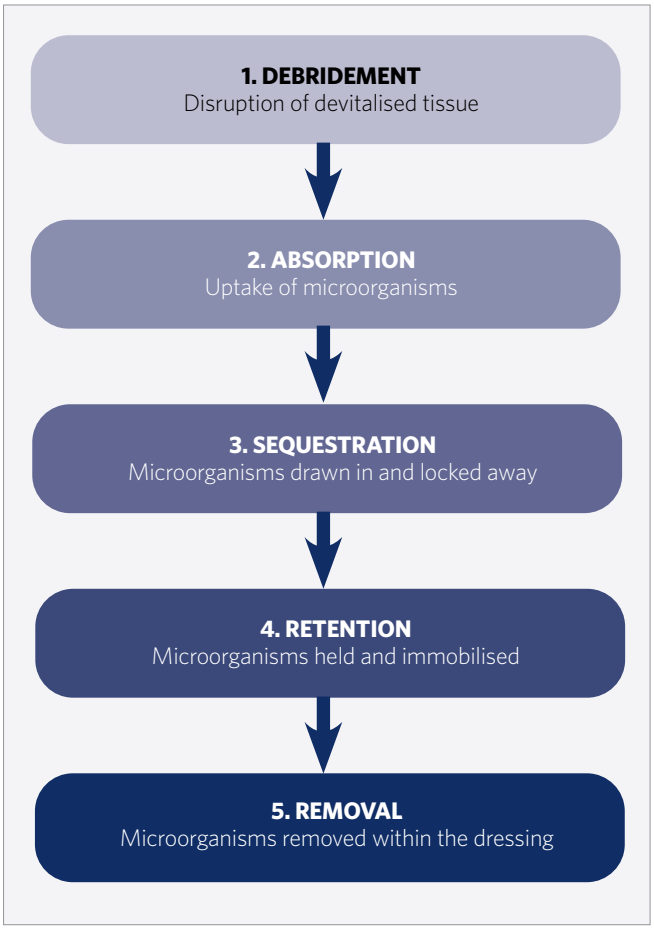

Figure 3. Mechanism of action of non-medicated wound dressings for infection prevention and management.

HYDRO-RESPONSIVE WOUND DRESSINGS

HRWDs are a type of NMWD and comprise of a range of wound dressings that can deliver or absorb moisture depending on the environmental fluid balance, and which optimise the moist wound environment and promote autolytic debridement (Ousey et al, 2016).

HRWDs have an absorbent core, which are composed of superabsorbent polyacrylate granules that can manage large amounts of fluid and have been shown to inhibit matrix metalloproteinase activity in chronic wounds by binding and locking the protein within the particles and blocking associated co-factors, such as calcium, magnesium and zinc (Eming et al, 2008).

Superabsorbent polyacrylate-containing dressings are ideal for exuding wounds at-risk of infection; they effectively absorb and retain exudate that contains wound healing inhibitors and bacteria via a physical mode of action, while not inducing bacterial resistance.

HYDROCLEAN® ADVANCE

HydroClean® advance is a hydro-responsive wound dressing that cleanses, debrides and absorbs moisture by promoting an optimal level of hydration and maximising autolytic debridement processes at the wound bed ***(Figure 3)***. The dressing comprises a soft and comfortable pad that contains SAP particles containing Ringer's solution that form a hydro-responsive matrix at its core, providing continuous rinsing and absorption at the wound bed. Ringer's solution is an isotonic salt solution balanced relative to the body's fluids that has been reported to be very effective in reducing signs and symptoms of infection (Hodgson et al, 2017).

Clinical impact

Rinse: Ringer's solution, which is released from the SAP particles, provides rapid and sustained cleansing of the wound bed (König et al, 2005; Humbert et al, 2014; Ousey et al, 2016; Spruce et al, 2016).

It is expected that dressings that contain Ringer's solution provide a controlled moist environment that is favourable for rapid healing, as well as a high degree of pain relief by encouraging the following mechanisms at the wound (Colegrove et al, 2016):

- forming a protective barrier to the nerve endings in the wound and decreased friction
- diluting exudate
- balancing the exudate pH and ionic composition
- recruiting leukocytes (white blood cells).

In a study of 100 patients using HydroClean advance, despite reported pain levels being low pre- and post-dressing change, overall wound pain improved (reduced) in 48% of patients (Hodgson et al, 2017). In another study of 403 patients, >90% of patients rated the dressing 'good' or 'very good' on wearing and tolerability (HARTMANN, 2010). Also, patients reported that the dressing was comfortable to wear at 99% of dressing changes and there were no reports of the dressing moving out of place from the wound (Spruce et al, 2016).

Debride: HydroClean advance has been shown to be effective in managing wound exudate, promoting wound cleansing and debridement and supporting effective wound bed preparation (Sterpione et al, 2021). Over 90% of the clinicians reported that HydroClean advance aided in the removal of devitalised tissue to enable a healing response in both chronic and acute wounds. Levels of devitalised tissue (necrosis and slough) reduced from 85.5% to 26.3%, and this was accompanied by an increase in wound bed granulation from 12.0% to 33.7% and a wound area reduction corresponding to the fact that a high percentage of patients had wound transition from a non-

healing to a healing state (Hogsdon et al, 2017).

Absorb: Ringer's solution partially hydrates the polyacrylate material and results in the binding of proteins and bacteria in the wound exudate into the dressing's core (Paustian, 2003; Eming et al, 2008). In a multicentre observational study of 170 patients, 80% of clinicians rated absorption capacity 'very good/exceeded expectation' or 'good/fulfilled expectation', and 88% of caregivers rated moisture retention capacity 'very good/exceeded expectation' or 'good/fulfilled expectation' (Kaspar et al, 2011). In another study, 92% of clinicians rated HydroClean advance as good or excellent at exudate management control (Hogsdon et al, 2017).

Laboratory studies have demonstrated the presence of large numbers of bacteria held within the matrix of a HydroClean advance. Clinically, HydroClean advance has been shown to be very effective in reducing signs and symptoms of infection (Kasper et al, 2008) by disrupting, dispersing and destroying biofilm so that the resultant planktonic bacteria are absorbed by the dressing, and sequestering and retaining the damaging proteases released by pathogenic bacteria within its matrix (Davies et al, 2017; Rippon et al, 2018).

COST IMPACT

A recent study has shown that using HydroClean advance and a secondary film dressing over current standard practice regimens can be cost-effective compared to using a four-step standard care debridement process (21% cost saving); larval therapy (98% cost saving); and mechanical pad debridement and secondary dressing (45% cost saving) (Hogsdon et al, 2017).

Another analysis has shown that there are significant cost savings using HRWDs (£261.38) in relation to the previous wound care regimen (£534.89); there are also potential savings from preventing an above-knee amputation, estimated to cost over £10,000 (Cooke et al, 2017). Over 33 weeks, the patient who was at high-risk of amputation was treated with a range of antimicrobial dressings including honey and silver, was prescribed antibiotics and had received surgical debridement, but the wound did not progress. After 6 weeks of wound care with HydroClean advance, the wounds healed, no antibiotics were required and amputation was avoided.

CONCLUSION

Studies have indicated that HydroClean advance can rapidly and effectively prepare the wound bed by reducing both slough and necrotic tissue, can contribute to a reduction in wound-associated pain, and is highly acceptable to clinicians and patients (Scholz et al, 1999; Kaspar, 2011). An advantage of using NMWDs is that these dressings avoid cytotoxicity of antimicrobial substances and avoid increasing antimicrobial resistance, thus promoting safety in daily practice (WUWHS, 2020).

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