The selection of wound care products for wound bed preparation

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Introduction

The healing of an acute wound is usually a highly organised series of predictable, successive and timely occurrences. The phases of healing may overlap, but include the following three phases, namely the inflammatory, proliferative and maturation phases. The healing of a chronic wound, on the other hand, is unpredictable and complex. In this case factors that impair wound healing include less active growth factors, high levels of inflammatory cytokines and protease to be maintained; a bacterial imbalance; abnormal cells and dysfunctional wound matrix component. Chronic wounds are caught up in the inflammatory and proliferative phases, with the result that the wound bed does not epithelialise and close.

In view of these factors steps have been developed to ensure an optimum milieu for wound healing in chronic wounds. These steps are known as wound bed preparation and their main aim is to ensure:

- A viable wound bed without any dead tissue (T = Tissue)
- A bacterial balance (I = Infection)
- A moist milieu (M = Moisture)
- Progressive wound edges and (E = Edges)
- An intact peri-wound area (S = Surrounding skin)

This is the so-called TIMES model.

The focus of wound bed preparation is to act pro-actively instead of reactively. In other words, dead tissue is removed in order to avoid later infection.

A superficial infection is diagnosed and managed timeously before a deep infection and/or osteomyelitis or septicaemia develops. A dry wound bed is moistened to promote the migration of cells that play an important role in wound healing. Excessive exudate is absorbed to prevent, among other things, maceration of the wound edges and surrounding skin and consequent enlargement of the wound. Wound edges are continuously assessed to check whether the strategy is effective. The surrounding skin is protected to prevent skin damage and possible new wounds.

Reactive management of signs and symptoms is not enough. For instance, to treat an infected wound merely symptomatically is ineffective. Giving pain medication and using a highly absorbent dressing will not clear up the underlying cause, i.e. infection.

It is clear from the above that in-depth knowledge of the physiology and the underlying pathophysiology of wound healing, as well as the unique characteristics of every wound care product, are absolutely essential to ensure that the correct product is selected for a specific patient.

It is, therefore, important to do a comprehensive assessment of a patient with a wound before selecting wound care products. The primary aim is to identify the underlying causes, as well as all the factors that may influence wound healing. The following factors must also be taken into account when selecting wound care products:

- Size, depth, shape and location of the wound
- Amount of exudate
- Presence of an odour
- Presence of dead tissue and
- Bacterial load

The dressings selected must also be acceptable and affordable to the patient.

The fluid retention ability of dressings that hold back moisture only by absorption can be considerably curtailed by pressure. For instance, if compression bandages are used, dressings must be selected that remain effective even under compression.

New wound care products are continually developed and launched and there is, therefore, a large variety of products available in South Africa. In view of this, and taking into account the complex and unpredictable nature of chronic wounds, there is a need for guidelines to facilitate the selection of the ideal wound care product(s) for a patient’s needs.

With these facts in mind WHASA has developed a classification system for advanced wound care products available in South Africa. This may be used as a guideline for selecting products for wound bed preparation.

Wound bed preparation

1. Debridement

The primary goal of debridement is to remove dead tissue that could later stimulate an inflammatory reaction or serve as a culture medium for bacterial growth. The bio-load of the wound bed is thus controlled by applying debridement. Wounds containing dead
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Table 1

### Surrounding Skin Protector
- Barrier Creams
- 3M Calcium Cream
- S & N Cream

### Primary Contact Layers
- Impregnated Tulle
- Adhesive
- Colloidal Hydrocolloid
- Alginum
- Graschod

### Biologicals
- Prostata Bulbula
- Promopin

### Tissue Bed Preparation

- **Debridement**: The selection of wound care products for wound bed preparation. The focus will be on autolytic and enzymatic debridement. Enzymatic debridement comprises the breaking down of dead tissue by enzymes (see Section J of Table I for an example of an enzymatic debridement agent). This is accomplished by applying a topical enzymatic agent to dead tissue to digest and liquify it. This occurs by breaking down collagen, elastin and other components of the dead wound matrix. Autolytic debridement is accomplished by covering the wound with moist, interactive dressings or occlusive or semi-occlusive dressings. Examples of semi-occlusive and occlusive dressings are transparent films and hydrocolloids (see Table I: Section F). These help to rehydrate dead tissue and ensure that the enzymes in the exudate do not digest the non-viable tissue.

- **Examples of moist interactive dressings**: Amorphous hydrogels, impregnated hydrogels and hydrogel sheets. Polysaccharides such as honey products may also be used.

- **Debridement of dry eschar**:
  - Incise in a matrix pattern with a sterile surgical blade
  - Apply an enzymatic debriding agent
  - Cover the area with a transparent film dressing and
  - Remove after two days and remove soft eschar with sterile forceps

- **Negative Wound Pressure Therapy**

- **Ensuring a bacterial balance**

  It is important to differentiate between a superficial and a deep infection of the wound as their management differs.

  The signs that indicate a superficial infection are lack of wound healing; high exudate levels; a bright red wound bed that bleeds spontaneously; an offensive odour and dead tissue in a previously granulating wound bed.

  Topical antimicrobial dressings containing iodine, silver or chlorhexidine may be used to lower the bio-load (see Table I: Section E). Povidone iodine has brief antimicrobial activity and its action is also diminished as soon as it is exposed to organic material. On the other hand, cadexomer iodine slowly releases iodine from its microspheres while absorbing bacteria. It has a threefold action: it absorbs high exudate levels, therefore simultaneously lowers the bacterial load and debrides dead tissue. It is also effective against methicillin-resistant *Staphylococcus aureus* (MRSA).

  Medicated honey products may also be used. These products have a dual action—they stabilise the bio-load, and also debride.

  Hydrophobic dressings have a great attraction for microorganisms, therefore changing the dressings lowers the bacterial load of the wound.

  Deep infections are characterised by a wound that increases in size; an elevated temperature; new or satellite areas of tissue breakdown; an offensive odour; visible bone or bone that can be probed; redness, heat and oedema of the surrounding skin.

  In this case it is essential to take a wound biopsy or a wound swab to identify the causative organism and to find an antibiotic to which the specific organism(s) is/are sensitive. While waiting for the laboratory results the wound may be treated with antimicrobial dressings.
An antiseptic solution may also be used for a few days to stabilise the bacterial load of an infected wound. Its chronic use is, however, not recommended as these solutions are sattoxic.

An offensive odour may be additionally managed with dressings containing activated carbon. Some of these dressings also contain silver to control bacterial growth.2,13 (See Table I: Section G)

Dressings containing povidone or cadexomer iodine or silver are also very effective for managing an offensive odour.2,13 In cases of deep infection the patient should also receive systemic antibiotics.

The use of metronidazole as a gel on the wound bed and/or systemically is very effective for the control of anaerobics and naturally also for the treatment of an offensive odour.2,13

Should the patient experience pain, dressings may be selected that promote comfort and reduce pain. Certain dressings are designed specifically for this purpose. (See Table I, Section H)

3. Ensure a moist milieu

A moist wound milieu ensures rapid epithelialisation since the epithelial cells migrate freely into the fluid layer over the wound bed.11 A dry environment on the other hand, causes dehydration and dessication of the superficial cells and the formation of a hard crust. In this case epithelial cells must tunnel through under the dry crust to close the wound – a time-consuming process that demands a great deal of energy.11

A granulating, moist wound bed may therefore be covered with hydrocolloid or permeable film dressings to maintain fluid balance, promote epidermal migration, keep the wound temperature constant and to protect the wound bed against contamination and mechanical trauma.12,14 (See Table I: Section F)

Exudate from chronic wounds can, however, also be detrimental to wound healing.3,15 This exudate consists mainly of serum with many white blood cells. It serves as a source of proteases, enzymes that break down protein and can, therefore, damage healthy tissue. Excessive exudate also causes maceration of the wound edges and surrounding skin.15

If the exudate levels are high it is important to select dressings that absorb exudate and restore the fluid balance. Alginate dressings can absorb a volume of up to 20 times their weight.11,12,16 Examples are Kaltostat®, Seasorb®, Sorbalgon®, Melgisorb® and Curasorb®. These products are developed from brown seaweed and differ in their indications of all wound care products is therefore absolutely essential. A thorough knowledge of the action, the indications and contra-indications of all wound care products is therefore absolutely essential. Without this knowledge ineffective products may be selected which waste precious time and sources of wound healing products.

It is also important to treat patients holistically and to consider how an underlying illness, nutritional status and immunity can influence wound healing.

References