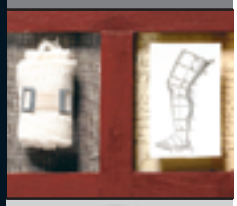
THEME

Wounds



Which dressing should I use?

It all depends on the 'TIMEING'

Keryln Carville

RN, PhD, is Associate Professor Domiciliary Nursing, Silver Chain Nursing Association and Curtin University of Technology, Western Australia. kcarville@silverchain.org.au

BACKGROUND

Wound management is more than the application of a dressing. It requires a comprehensive and informed approach to the assessment of the patient, their wound and their healing environment

OBJECTIVE

This article outlines a systematic approach to guide assessment and management of chronic wounds.

DISCUSSION

An international advisory panel has developed a framework for assessment and management of chronic wounds, known as wound bed preparation. The steps in this framework include tissue assessment and the management of nonviable tissue or tissue deficits, inflammation and infection control, maintenance of moisture balance, and the promotion of epithelial advancement of wound edges. The acronym 'TIME' is a useful aid for these steps. In addition, good wound care involves assessment of the surrounding skin and wound dimensions, and documentation of the wound healing process and treatments used. Dressing choice depends on this assessment and the characteristics of the wound. Goals of care include the need to consider the patient, their wound and their healing environment.

Wound management is more than the application of a dressing. It requires a comprehensive and informed approach to the assessment of the patient, their wound, and their healing environment. The challenge for the general practitioner is how best to keep abreast of the increasing body of research that informs best practice, and the technological advances that expedite optimal healing outcomes. In 1993, there were estimated to be over 2000 wound dressings on the market.[1] Today we have a plethora of wound dressings, pharmaceuticals and devices from which to choose. The problem is, what dressings should we choose?

A systematic approach, known as wound bed preparation, has been developed by an international advisory panel to guide assessment and management of chronic wounds.[2] The acronym 'TIME' can be used to outline individual steps within this framework:

- **T**issue assessment and the management of nonviable tissue or tissue deficits
- **I**nflammation and **I**nfection control
- maintenance of **M**oisture balance, and
- the promotion of epithelial advancement of wound **E**dges (*Table 1*).[3,4]

Tissue management

Wound debridement is performed when assessment reveals the presence of nonviable tissue (*Figure 1*). Surgical sharp debridement is usually employed for removal of extensive tissue necrosis or infection in acute wounds. Regular debridement of necrotic or infected tissue and excessive proteases has been demonstrated to be beneficial in chronic wound management.[5] In addition to sharp debridement, dressings that promote autolytic and nontoxic chemical debridement are available (*Table 2*). In Australia, there is an increasing interest in the use of larval therapy for debridement. Sterile *Lucilia sericata* (Greenbottle fly) larvae are being produced at Westmead Hospital in Sydney, New South Wales, for this purpose.

Infection and inflammation control

Classic signs and symptoms of inflammation were noted by Celsus in the first century as: tumour (swelling), rubor

(erythema), calor (heat) and dolor (pain). Inflammation can occur as a normal response to wound healing. It can also occur in response to wound infection with the added sign of purulent or increased malodorous exudate (*Figure 2*). Contamination, which is defined as the presence of nonreplicating bacteria in a wound, does not inhibit wound healing.[6] However, tissue hypoxia or necrosis is conducive to colonisation, which is defined as the presence of replicating bacteria but with no host reaction.[7] Skin commensals such as *Staphylococcus epidermis* and *Corynebacterium flora* are to be expected in the wound and have been found at low levels to have a positive effect on healing.[2] Critical colonisation or covert infection is defined as an increase in the bacterial burden of the wound. In critically colonised wounds the pro-inflammatory cytokines and matrixmetalloproteases (MMPs) alter the wound environment and healing is impaired.[6,7] Critically colonised wounds do not portray the classic signs of infection, although the wound may demonstrate one or more of the following signs:

- static healing
- increased exudate
- pale grey or deep red granulation tissue
- friable granulation tissue that bleeds easily
- hypergranulation
- tissue bridging, and
- rolled edges.

The prudent use of topical antiseptic dressings at this stage can restore the bacterial balance in the wound and may eliminate the need for systemic antibiotics. Because bacterial imbalance usually results in increased amounts of wound exudate, maintenance of moisture balance, as outlined below, is an associated goal. Examples of antimicrobial dressings available for restoration of bacterial balance are outlined in *Table 3*.

Maintaining moisture balance

Desiccation of the wound inhibits epithelialisation and excessive moisture leads to maceration and further breakdown of tissue (*Figure 3*). It has been reported that chronic wound fluid contains increased levels of MMPs, which have the potential to degrade much needed extracellular matrix proteins such as fibronectin and vitronectin.[8] It has also been proposed that excessive fluid in chronic wounds can interfere with the activities of important cell mediators such as growth factors.[4] The goal is to maintain moisture balance and dressing selection will be influenced by the need to hydrate the wound bed or absorb excessive fluids (*Table 4*).

Advancing wound edges

Desiccation of the wound bed, hypergranulation and periwound debris (scale, scab or dried exudate) will inhibit epithelisation (*Figure 4*). Hypergranulation commonly results from bacterial imbalance or wound trauma. Rolled or undermined edges can also indicate bacterial imbalance. However, a biopsy may be indicated if malignancy is suspected.

Table 1. TIME acronym

T	=	Tissue, nonviable or deficit
I	=	Infection or inflammation
M	=	Moisture imbalance
E	=	Edge of wound, advancing or undermined

Surrounding skin

In addition to the TIME acronym, I suggest that at all TIMES we should assess the surrounding **S**kin for:

- **s**tasis (associated with venous oedema or lymphoedema)
- **s**ensation (changes associated with peripheral neuropathy)
- **s**uppleness (the presence of fragile skin, lipodermatosclerosis or lipoedema)
- **s**taining (haemosiderin staining associated with venous stasis or violaceous discolouration associated with pyoderma gangrenosum or vasculitis)
- **s**tria (atrophy blanche in the lower leg)
- **s**inister (characteristics associated with malignancy).

Figure 1. Necrotic eschar covers a pressure ulcer on the right trochanter

Table 2. Examples of dressings used for autolytic or chemical debridement

Autolytic debridement

Hydrogel dressings
- Amorphous hydrogels
  - Intrasite™
  - SoloSite™
  - DuoDerm™ gel
  - Purilon™ gel
  - Aquaform™
  - Solugel™
- Gel sheet hydrogels
  - AquaClear™
  - Curagel™
  - Nu-Gel™
- Gel impregnated gauze
  - IntraSite™
  - Curagel™
- Hydrocolloid dressings
  - Comfeel™
  - DuoDerm CGF™
  - Nu-Derm™

Chemical debridement

Cadexomer iodine dressings
  - Iodosorb™ (powder, paste and dressing)
- Wound honey (provides both autolytic and chemical properties)
  - MediHoney™
  - Apinate™ (honey impregnated alginate)
- Hypertonic impregnated dressings
  - Curasalt™ gauze
  - Mesalt™

The gold standard for the management of venous stasis is compression therapy in the form of compression bandages, garments or pneumatic pumps. Lymphoedema on the other hand, is best managed with manual lymph drainage techniques before the application of compression bandages or garments. Loss of protective sensation requires investigation and when peripheral or autonomic neuropathy of the lower limb is diagnosed, then advice on good skin care, regular podiatry and the wearing of protective footwear is warranted. Further investigations are also warranted when underlying vascular, dermatological or malignant disorders are suspected.

Pain associated with dressing trauma or removal can be eliminated with the use of nonadherent dressings or modern silicone dressings such as: Mepitel™ (tulle), Mepilex™ (nonadherent foam) and Mepilex Border™ (waterproof foam adhesive).

Figure 2. Inflammation and peri-wound maceration

Table 3. Examples of antimicrobial dressings

- Cadexomer iodine dressings
  - Iodosorb™ (paste, powder and dressing)
- Povidone iodine impregnated tulle gras
  - Inadine™
- Chlorhexidine impregnated tulle gras
  - Bactigras™
- Wound honey
  - MediHoney™
  - Apinate™ (honey impregnated alginate)
- Silver impregnated dressings
  - Acticoat™ (3 and 7 day)
  - Acticoat™ Absorbent
  - Aquacel™ AG
  - Contreet™ AG
  - Arglas™

Timed wound management

If we have TIMED our interventions well, we will have considered the five Ds.

Dimensions

Assessment of the wound dimensions will determine the presence of cavity or sinus tracking. Cavity wounds, with the exception of a fistula or a fascial plane separation, require gentle wound packing to eliminate dead space. Amorphous or gauze impregnated hydrogels (*Table 2*) can be used for dry wounds. Calcium alginate ropes or ribbon packing agents (Kaltostat™, Sorbsan™, AlgiSite™) or hydrofibre packing (Aquacel™) are applicable for absorbing low to moderate amounts of exudate. Foam cavity filling dressings (Allevyn™ or Biatain™) or capillary wicking agents (Vacutex™ or Cerdak™) are useful for absorbing heavy amounts of exudate. The use of negative pressure vacuum assisted therapy (VAC ATS™) is an increasing trend in both hospitals and the community. These devices involve the use of foam dressings shaped to the wound dimensions and sealed with semi-permeable film drape. A drain port and tubing (TRAC™ pad) is inserted through a cut made in the drape and additional film drape is used to create an airtight seal. The tubing is attached to a negative pressure pump that is either electrically or battery operated.

Dressings and devices

Unfortunately there is no perfect dressing or device for every wound. Dressing choice is subject to the assessment outcome and goal of care. Although the initial cost of modern dressings rates higher than the cost of traditional dry dressings, their cost effectiveness is evident when one compares their functionality and durability.

Documentation and directions

Documentation of the wound healing progress and treatments fulfils professional obligations and provides a point of reference for evaluation. The use of digital photography and computerised wound planimetry for documenting assessment outcomes are gaining popularity

Table 4. Examples of dressings and devices available for maintaining moisture balance

Dry wound	Minimal exudate	Moderate exudate	Heavy exudate
Dressing options	**Dressing options**	**Dressing options**	**Dressing options**
• Hydrogels	• Hydrogels	• Calcium alginate	• Extra absorbent dry dressings (Zetuvit™, Mesorb™, Exudry™)
• Hydrocolloids	• Hydrocolloids	• Hydrofibre dressings (Aquacel™)	• Capillary wicking agents (Vacutex™, Cerdak™)
• Interactive wet dressings (TenderWet™)	• Semi-permeable films (Tegaderm™, OpSite™)	• Hydrocolloid/paste, powder	• Wound/ostomy bags
	• Calcium alginate (Kaltostat™, Curasorb™, Sorbsan™)	• Foam dressings (Allevyn™, Biatain™)	

Figure 3. Moisture imbalance in a venous leg ulcer

Figure 4. Slightly raised and pigmented edges surround a vasculitic ulcer

and simplify record keeping. In addition, the use of acronyms such as TIME (TIMES, TIMED and TIMEING), guidelines, and standards for wound management direct care and are readily sourced from the Australian Wound Management Association (www.awma.com.au).

Conclusion

Getting the timing right

Wound management is more than the application of a dressing. However, the best choice of dressing, is for some practitioners, the greatest challenge; simply because the choice is so vast. But as is the case with pharmaceuticals, dressings can be grouped into generic categories such as hydrocolloids, hydrogels, and foams. Compendiums of these groups and products are freely available in the professional and commercial literature, and practitioners can rely on these resources, as they would prescription guides, to guide their decisions. Best practice in wound management is a matter of timing and if we get our TIMING right, our decisions will also be mindful of the need for:

- **I**nformed practice that is evidenced based
- **N**etworking with patients and colleagues to ascertain optimal outcomes
- **G**oals of care that consider the patient, their wound and their healing environment.

Conflict of interest: none declared.

References

1. Krasner D. Rolstad B. The ABC of wound care dressings. Ostomy Wound Manage 1993;39:66–86.
2. Schultz G, Sibbald RG, Falanga V, et al. Wound bed preparation: a systematic approach to wound management. Wound Repair Regen 2003;(Suppl)11:S1–28.
3. Moffatt C. Wound bed preparation in practice. European Wound Management Position document. London: MEP Ltd, 2004.
4. Falanga V. Wound bed preparation in practice. European Wound Management Position document. London: MEP Ltd, 2004.
5. Schultz G, Barillo D, Mozingo D, Chin G, et al. Wound bed preparation and a brief history of TIME. Int Wound J 2003;1:19–32.
6. Chin C, Schultz G, Stacey M. Principles of wound bed preparation and their application to the treatment of chronic wounds. Primary Intention 2003;11:171–182.
7. Sibbald RG, Orsted H, Schultz G, Coutts P, Keast D. Preparing the wound bed 2003: Focus on infection and inflammation. Ostomy Wound Manage 2003;49:24–51.
8. Trengove N, Stacey M, MacAuley S, et al. Analysis of the acute and chronic wound environments. The role of proteases and their inhibitors. Wound Repair Regen 1999;7:442–52.

afp CORRESPONDENCE email: afp@racgp.org.au