

CARE OF BURN PATIENTS IN THE HOSPITAL

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Introduction

In caring for the patient with a burn injury it is important to remember that many factors impact on the care that we are able to deliver. This is of particular relevance in the area of wound care. Access to costly wound products is not an option in many settings. In these situations, creativity and innovation have led to many excellent alternatives being developed. In some instances sophisticated products are available but lack of clinical experience makes them difficult to use. Wound care needs to be undertaken in the context of the local environment.

THE BURN WOUND

It is appropriate to highlight the functions of the skin as they underpin the management of the burn wound:

- Protection
- Immunological
- Fluid, protein and electrolyte homeostasis
- Thermoregulation
- Neurosensory
- Social – interactive
- Metabolism

A burn injury results in either the loss or disruption of some or all of these functions. The burns nurse must assess all of these factors when deciding on an appropriate nursing management plan.

Thermal energy effects

The three mechanisms that energy transfers by, are conduction, convection and radiation. All of these mechanisms affecting heat transfer may deliver heat to, or away from, living tissues.¹

Sustained temperatures result in cellular dysfunction and early denaturation of protein.¹ As the temperature or the time of exposure increases, then cell damage increases.

Nguyen, Gun, Sparnon and Ryan² concur with other studies in demonstrating the beneficial effects of cooling on reducing tissue damage and wound healing time.

The question often asked, is how long after the burn injury, is it still worthwhile to commence cooling. Nguyen et al² conclude from various authors that although immediate cooling is preferable, even a 30 minute delay in application of cooling is still beneficial to the burn

wound. The same authors do point out that the application of cooling 60 minutes after injury, does not demonstrate any benefit.

Impairment of blood flow in the zone of stasis can occur from shortly after the burn injury up to 48 hours post-burn¹. If blood flow is compromised, this may lead to the eventual necrosis of cells in this zone.

Clinical management that will promote the recovery of this zone includes:

- Wound dressing chosen to aid moist wound healing
- The use of topical antimicrobial agents
- Adequate fluid resuscitation / hydration
- Elevation of burnt area to minimise oedema
- Advising patient to avoid / minimise smoking
- Management of systemic diseases such as diabetes – monitor & stabilise blood sugar levels.

Burn wound oedema

It is important to have an understanding of the timeframe of oedema development and resolution. The ability of the tissues to receive oxygen and nutrients is reduced during this time, while susceptibility to infection is increased.¹

The impact of this on clinical management is that strategies to aid recovery of the zone of stasis must extend until oedema resolution has occurred.

Burn inflammation

Inflammation becomes prominent at 7-10 days post injury. It is at this time that blood flow in the burn wound is at its maximal level. Surgery therefore, may be hazardous due to an increased risk of blood loss. This is one of the reasons that early burn wound excision, is favoured by many burn surgeons.¹

Burn wound depth

Burn depth in Australia is most frequently described using the following classification system:

- Epidermal
- Superficial Dermal
- Mid-Dermal
- Deep Dermal
- Full thickness

Other classification systems refer to 1st, 2nd and 3rd degree injury. This system however is subjected to personal interpretation of the classification. The advantage of the descriptive system is that it removes any ambiguity. This is especially useful when discussing burn wound management over the phone.

The burn blister

This is a subject still debated at length by various practitioners. A review of the literature by Flanagan & Graham³ led them to conclude that '...empirical evidence over the last 50 years both supports and refutes the routine debridement of blisters'. Authors such as Williams¹, Pankhurst and Pochkhanawala⁴ and Carrougher⁵ conclude that small blisters can be left intact, but as a general rule, blisters should be debrided and the wound dressed.

How this translates into clinical practice is based on treating every patient individually. A variety of factors should be taken into consideration when deciding whether to de-roof blisters or leave them intact.

In the paediatric setting, blisters on the palm of the hand and sole of the foot are often left intact for a period of 48 hours.

In the adult, large blisters on the palm of the hand may impede function to a level that is unacceptable.

It has already been mentioned that the size of the blister should be taken into consideration.

Factors affecting wound healing

Both the very young and the elderly have very thin skin that makes them more susceptible to significant burn injury

Other factors that affect wound healing include:

- Nutrition
- Infection
- Associated illnesses such as diabetes mellitus, malignancy and vascular insufficiency
- Cytotoxic treatments

Burn wound healing

Factors that will enable healing to occur include wound care, good nutrition, maintenance of function, positive attitude and co-operation from the patient. Oedema reduction, prevention of burn wound infection and adequate analgesia will also contribute to optimal patient outcome.

The achievement of these goals involves the whole burn team, Every team member has a responsibility to maintain a high standard in relation to infection control strategies.

Care of the wound itself should be designed to:

- Promote spontaneous healing
- Prevent further tissue loss
- Prevent infection
- Provide optimal conditions for surgery if required
- Be as painless as possible

- Be acceptable to the patients needs

Wound cleansing

It is interesting to note that in the general wound care arena, there has been much discussion on the choice of wound cleansing solutions. Most studies have not looked at burn wounds. The Joanna Briggs Institute Best Practice information sheet 'Solutions, techniques and pressure for wound cleansing'⁶ excluded studies that compared solutions for patients with burns.

Many authors including Carrougher⁵, and Pankhurst & Pochkhanawala⁴, report that in practice most burns units bath or shower their patients with tap water. Some centres use mild antiseptic impregnated sponges. Extreme caution should be exercised when using solutions that have been shown to be toxic to cells.

The maintenance of the temperature of the burn wound has been identified as beneficial by numerous authors. Methods of achieving this include:

- Warming cleansing solutions
- Warm ambient temperature
- Avoid lengthy dressing changes
- Avoid exposure of wet wound surfaces

Ambulant patients, with minimal wound care needs, use independent showering. Burns units may use burn baths, portable shower trolleys, or a combination of both in their management of patients. The burns nurse will need to decide which is the most appropriate choice. Factors that need to be taken into consideration include:

- Age of patient
- Patient ability to lie still
- Extent of open burn wound
- Presence of wound infection
- Available equipment
- Available space
- Patients need for physical therapy
- Wounds or dressings that may benefit from soaking

Konop⁷ states that the disadvantages of hydrotherapy include the risks of auto-contamination and electrolyte imbalance. Carrougher⁵ warns against excessive immersion times over 30 minutes that may cause sodium and heat loss, in addition to pain and anxiety associated with prolonged exposure.

Cleansing and debridement should be careful, gentle and minimal. Body hair within the burn and to within 2.5cm of the wound periphery should be shaved, with the exception of the eyebrows.⁵ This will:

- Contribute to a decrease in the bacterial load on the wound surface
- Make the application and integrity of occlusive dressings easier
- Make the removal of occlusive dressings easier and less painful.

Mechanisms of wound debridement

There are five methods of wound debridement that may be utilised in wound management.

1. autolytic - the use of moist dressing such as hydrogels or hydrocolloids may facilitate this.
2. surgical – fascial, tangential or sharp debridement with scissors or scalpel
3. enzymatic – e.g. fibrinolysins, (mashed papaya is used in Africa)
4. mechanical – wet to dry dressings (danger of damage to new epithelium), pulse lavage, gentle washing.
5. biological – larvae of *Lucilia sericata*

Burn wound dressings

Various biologic, biosynthetic and synthetic wound dressings are used in burn care. Selection and use of these products depends on the condition of the wound bed, the inherent properties of the dressing and the goals of therapy.⁵ In practice, different products seem to work for some centres and not for others. Patient population demographics and the local environment may all impact on the success or failure of certain dressing products.

Pankhurst and Pochkhanawala⁴ summarise the ideal burn dressing as one that must:

- Protect the wound from physical damage and micro-organisms
- Be comfortable, compliant and durable
- Be non-toxic, non-adherent, and non-irritant
- Allow gaseous exchange
- Allow high humidity at the wound
- Be compatible with topical therapeutic agents
- Be able to allow maximum activity for the wound to heal without retarding or inhibiting any stage of the process

When selecting a suitable dressing, numerous factors need to be taken into consideration:

- Depth of the burn (This determines the amount of exudate)
- Site of the burn
- Extent of the burn
- Type of first aid (cooling with dirty river water may increase the risk of infection)
- Cause of the burn (burns caused by flammable liquids or hot oil have a high potential for infection)
- Patients ability to manage dressing
- Health professionals ability to manage dressing
- Functional impact of dressing on patients lifestyle

- Associated pain
- Urgency of 'time to healing'
- Cost

Management of the circumferential burn

In any circumferential burn, there is a risk of circulatory or respiratory compromise, depending on the site of the burn. Restriction normally occurs in full thickness burns, but may occur in deep dermal injury. If this compromise occurs, then an escharotomy must be performed. This is a longitudinal incision that runs the length of the burn. The incision should start in unburned skin and continue over into unburned skin at the distal end of the incision if possible. There will be some bleeding from the incision and a haemostatic alginate should be used on the escharotomy incision if full excision of the eschar is to occur at another time.

In any circumferential burn, care must be taken when applying dressings to ensure that:

- They are not constrictive in any way
- They allow for full assessment of neurovascular or respiratory status
- The limb is elevated

Management of the superficial burn

In the very superficial burn with no epidermal loss, no dressing will be required. These burns are very painful and a topical analgesic cream may be useful. This can be followed by the use of a moisturising cream when the pain has eased.

The superficial burn can be treated by a variety of wound products. These should be chosen to protect the wound and encourage re-epithelialization. Product groups that are commonly used include Polyurethane semipermeable films, Hydrocolloids and retention dressings. If infection is present or there is a high risk of potential for infection to occur, an antibacterial dressing should be chosen.

Management of the partial thickness burn

The management of the partial thickness burn injury and the split thickness skin graft donor site is very similar. The donor site should have a low risk of infection and anti bacterial dressings are not normally required. Product groups that may be considered for this depth of burn, include:

- Hydrocolloids
- Polyurethane films
- Biologic dressings
- Biosynthetic dressings
- Alginates
- Polyurethane membrane supported gel
- Foams
- Antimicrobial products such as products containing silver.

- Vaseline gauze (in Africa this is a dressing that nurses make themselves when dressings such as those listed above are not available. They have found this a great improvement on using plain dry gauze)

The use of temporary skin substitutes such as Biobrane™ and Transcyte™ have become more widely used in the treatment of mid to deep dermal burn injury. As these products do not have any anti-bacterial properties, meticulous wound cleaning must occur prior to application. Many centres give patients a general anaesthetic to allow for a thorough cleansing without causing undue distress to the patient. The use of retentive tape to fix these substitutes instead of using staples minimises further painful episodes that are associated with staple removal.

As with the superficial burns, the presence or suspicion of infection will make the use of an antibacterial dressing obligatory.

Management of the full thickness burn

Full thickness burn injuries are treated with antimicrobial dressings. The most common dressing used in Australia & New Zealand have, until recently, been Silver Sulphadiazine cream and Silver Nitrate Solution. There are now a wide variety of products containing silver available.

The choice of product can be guided by the same principles of choice for any dressing. There are advantages and disadvantages to all of the Silver products. Factors to be considered in addition to those listed above, include:

- Likely time to surgery (pointless to use most expensive product if it is going to be removed in a very short period of time)
- Proximity of skin grafts or skin substitutes (creams may cause separation of substitutes or grafts)
- Presence of escharotomy site
- Access required
- Temperature of patient
- Availability

Alternative dressings

In some countries the use of expensive commercially produced dressing products is not viable. Economic reality is a fact of life. Many centres have been very creative in the development of alternative dressings. The use of amniotic membrane, banana leaf dressing, honey, papaya and Boiled Potato Peel Bandage, have all been reported in the literature. What these reports have shown is that there are alternatives that may be very effective in the management of burn injuries.

Suggested reading:

Gore, M. & Akolekar, D. 2003, Evaluation of banana leaf dressing for partial thickness burn wounds, in *Burns*, Vol 29, pp487-492.

Burn Itch

Burn itch is still very common in many patients who have suffered a burn injury. There are many strategies used to minimise this. The following summary is provided by Demling & DeSanti

Demling, R & De Santi, L. 2002, *The itching Burn Wound*, [Online], viewed 7 July 2004, <http://www.burnsurgery.org/Modules/itch/p1/p1toc.htm>

Non-pharmacological	Pharmacological
<i>Moisturising cream</i>	<i>Oral antihistamines</i>
<i>Massage</i>	<i>Oral analgesics</i>
<i>Colloidal oatmeal products</i>	<i>Topical analgesic</i>
<i>Cool bath / shower</i>	<i>Topical antihistamine</i>
<i>Compression garments</i>	<i>Doxepin cream 5%</i>

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3. Flannagan, M. & Graham, J. 2001, Should burn blisters be left intact or debrided?, *Journal Of wound Care*, February, Vol 10, No 2, pp 41 –45.
4. Pankhurst, S. and Pochkhanawala, T. 2002, Wound Care, in Bosworth Bousfield, C. (ed) *Burn Trauma Management & Nursing Care*, 2nd edition, Whurr Publishers, London, pp 81-108.
5. Carrougher, G. 1998, Burn Wound Assessment and Topical Treatment, in Carrougher, G. (ed) *Burn Care and Therapy*, Mosby, Missouri, pp 133-165.
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<http://www.burnsurgery.com>

<http://www.worldwidewounds.com>