

WOUND MANAGEMENT

WOUND CARE FOR THE ADULT BURN PATIENT

Improving the outcome requires a comprehensive strategy to promote healing while minimizing infection and pain.

By Judy Knighton, RN, BScN, MScN

Management of the adult burn patient is a multifaceted and complex process, but the primary objective is to achieve wound closure. Although there are differences in strategies used by various burn units, certain principles can be applied universally.

CARE AT THE SCENE

The severity of a burn injury can be minimized when appropriate first aid measures are carried out at the accident scene. The proper sequence of events immediately following a burn injury is suggested by the catchphrase “Stop (don’t run) - Drop (to the ground) - Roll (to put out the fire) - Cool” (with water to stop the burning).

Ice should never be applied directly to a burn as it can induce hypothermia and tissue necrosis. Remove jewellery and constricting items such as belts before edema becomes pronounced. Blisters should not be broken unless the blister serum appears cloudy and/or tissue around the wound becomes reddened. Don’t waste time making elaborate dressings, and don’t apply ointments or home remedies to the burn. Clean, cool cloths should be placed directly on the burned areas, and the patient should be kept warm with a clean sheet or blanket. Medical care should be sought immediately.

EMERGENT PERIOD

Upon arrival at a treatment facility, burn severity is determined and treatment priorities are established. Once a patent airway has been ensured and any necessary fluid resuscitation initiated, attention turns to an assessment of the burn wound.

The patient can be immersed in an isotonic saline-and-water bath or showered with tepid water while lying on a plinth. Thorough but gentle cleansing of the burn areas with soft gauze will remove some of the soot and loose debris for easier visual examination of the wounds. Chemical burns should be flushed copiously for at least 20 minutes, preferably longer. Tar burns require numerous applications of an emulsifying agent such as Tween 80, also found in Polysporin ointment. After several days, it will be possible to remove the tar without unnecessary trauma to healthy tissue.

During hydrotherapy, loose, necrotic tissue (eschar) may be gently removed (debrided) using sterile scissors and

forceps. More aggressive debridement should be reserved for the operating room, unless the patient has received Ketamine or propofol prior to hydrotherapy. After the initial bath or shower, further decisions are made regarding wound care.

Table 1

TREATMENT OBJECTIVES

- Prevention of conversion due to infection or desiccation
- Removal of devitalized tissue
- Preparation of healthy granulation tissue
- Minimization of systemic infection
- Completion of the autografting process
- Limitation of scarring and contractures

Table 2

SELECTION CRITERIA: TOPICAL AGENTS

- Clinical efficacy
- Wide antibacterial spectrum
- Toxicity, absorption
- Frequency of superinfection
- Ease and flexibility of use
- Cost
- Acceptance by patients and staff

Table 3

COMMON TOPICAL AGENTS

- Silver sulphadiazine 1% (Flamazine)
- Silver sulphadiazine 1% chlorhexidine digluconate 0.2% (Flamazine C)
- Mafenide acetate 2% (Sulfamylon)
- Silver nitrate 0.5%
- Povidone iodine 10% (Betadine)
- Nitrofurazone (Furacin)
- Gentamycin sulphate (Garamycin)
- Bactracin with polymyxin B (Polysporin)
- Normal saline 0.9%
- Acetic Acid 0.5%
- Hydrogen peroxide, half-strength

There are three methods of treatment used in caring for burn wounds. In the open method, the wound remains

exposed, with only a thin layer (2.0mm to 4.0mm) of topical antimicrobial ointment spread on gauze dressings and then applied to the wound surface. With the closed method, a dressing is left intact for two to seven days. The most common approach is to make multiple dressing changes, every four hours to twice daily, according to a fixed schedule; changing frequency depends on the condition of the wound and the properties of the dressing employed. A new, silver-impregnated dressing (Acticoat) has been recently introduced, which can be placed on burn wounds and left intact for several days at a time.

The choice of treatment method varies among institutions, and also according to the severity of the burn wound. Burn severity is a reflection of five factors; extent and depth of the burn; age of the patient; medical history; and part of the body burned. All treatment approaches have certain objectives in common (Table 1).

ACUTE PERIOD

Topical coverage is selected according to the condition of the wound, desired results and properties of the topical agent. Assessment criteria for choosing the most appropriate agent are given in Table 2.

The most widely used topical antimicrobial agent is silver sulphadiazine (Table 3). Since silver sulphadiazine inhibits proteolytic enzymes which enhance separation of the eschar from a viable wound bed, timely use is essential. When selecting topical therapy, the strengths and limitations of each product should be taken into consideration.

Table 4

SELECTION CRITERIA: DRESSINGS

Promotion of healing
Pain alleviation
Application of pressure
Enhance debridement
Permit immobilization
Preserve function
Psychosocial considerations

The dressing strategy is chosen according to a rationale such as that shown in Table 4. The choice of dressing is based on the condition of the wound, desired clinical results, and the properties of the particular dressing. The Acticoat dressing allows for continual release of silver at the wound site by incorporating the antimicrobial properties of silver into a dressing material. It is important to remember that burned surfaces should never be allowed to touch each other. Burned fingers or toes should be wrapped individually, and web spaces should be maintained wherever possible.

OUTPATIENT MANAGEMENT

If the assessment shows that the patient's burns are superficial, with potential to heal by re-epithelialization within seven to 10 days, management on an outpatient basis may be considered. This decision will also depend on the patient's home situation, willingness to comply with treatment and follow-up appointments, and location of the burn wounds. For example, burns to the face, hands, feet or perineum require special consideration.

Table 5

DRESSING MINOR BURN WOUNDS

Body Burns

Layer	Dressing	Rationale
Inner	Petrolatum gauze eg. Jelonetâ	Protects re-epithelializing tissue
Middle	Normal saline-Soaked gauze	Prevents desiccation
Outer	Dry gauze	Promotes wicking of exudate from inner & middle layers; protects wound
	Gauze wrap Eg. Klingâ	Holds dressing in place

Facial Burns

Action	Rationale
Normal saline-soaked gauze pads applied directly to burn, left on for approximately 10 min. twice daily.	Removes exudate from face
Polysporinâ ointment applied to face twice daily as needed	Prevents conversion of wound

Before a dressing is applied, burned areas must be gently but thoroughly cleansed with normal saline solution. Burned tissue should be debrided using sterile scissors and forceps in order to reveal healthy tissue (Figure 2)

A suggested dressing strategy is shown in Table 5. The patient should return to have the dressing changed every three days, or more frequently if it is disrupted or if "break-through" drainage occurs. With facial burns, face care should be performed twice daily by the patient, with ointment lightly reapplied as needed to keep the area lubricated.

In selected circumstances, "dirty" burn wounds may be managed on an outpatient basis. Silver sulphadiazine dressings must be changed at least once, but preferable twice, daily to prevent conversion through desiccation or infection. Silver sulphadiazine must not be left in place for more than 24 hours. Acticoat is also clinically indicated in such situations.

Once the burn wound has healed, dressings can be discontinued and a thin layer of Polysporin® ointment applied. After approximately one week, water-based moisturizers can be substituted for the Polysporin® ointment, to combat dryness and return suppleness to the burn areas. Two highly recommended, water-based lotions are Vaseline Intensive Care Extra Strength Unscented and Complex 15.

Table 6

DRESSING MAJOR BURN WOUNDS

Early post-admission

Layer	Dressing	Rationale
Inner	Silver sulphadiazine 1% cream	Provides topical antimicrobial coverage
Middle	Normal saline-soaked Gauze	Prevents dessication of the wound
Outer	Dry gauze	Promotes wicking of exudate from inner & middle layers
	Gauze wrap	Holds dressing in place

Later post-admission and pre-operatively

Layer	Dressing	Rationale
Inner	Normal saline-soaked gauze	Enhances spontaneous separation of eschar
Outer	Dry gauze	Promotes wicking of exudate
	Gauze wrap	Holds dressing in place

Healing burn wounds/grafted areas

Layer	Dressing	Rationale
Inner	Petrolatum gauze	Protects re-epithelializing Tissue
Middle	Normal saline-soaked Gauze	Prevents dessication of wound
Outer	Dry gauze	Promotes wicking of Exudate; protects wound
	Gauze wrap	Holds dressing in place

Facial Burns

Action	Rationale
Normal saline-soaked gauze	Removes exudate pads applied directly to burns from face and left for 10 min. twice daily
Polysporin® ointment applied to face twice daily and as needed	Prevents conversion of wound

INPATIENT MANGEMENT

Deeper partial-thickness and full-thickness burn wounds are usually managed in a hospital setting. Burns to the face, hands, feet, or perineum may also require management on an inpatient basis.

Early post-admission “dirty” burn wounds should be cleansed twice daily during hydrotherapy and dressed according to guidelines shown in Table 6. Emphasis is placed on providing topical antimicrobial coverage and stabilizing the patient. At approximately one week post-admission and preoperatively, separation of the eschar is encouraged.

Once the eschar has been removed spontaneously or surgically, the “clean” burn wound is dressed once daily. This process is repeated until healing is observed, then discontinued; a thin layer of Polysporin® is then applied.

A biologic dressing such as homograft (human skin), heterograft (animal skin- usually from pigs), amniotic membrane, or biosynthetic materials (e.g. TransCyte, Biobrane® or Opsite®) may be applied to clean, uninfected, moist granulation beds. This provides protection until re-epithelialization begins or until the patient has donor sites available for skin grafting. If grafts are managed using an open technique; they must be “gardened” every two to three hours. Sterile cotton-tipped applicators moistened with normal saline are used to roll exudate out from the middle to the edges of the graft. Otherwise, grafts are covered with dressings that remain intact for around 5 days. At this point, the dressings are carefully removed and the grafts inspected for degree of adherence or “take”. Donor sites are covered intraoperatively with a variety of dressings (e.g. Scarlet Red®, Acticoat, OpSite, Tegaderm, Allevyn). Once re-epithelialization has taken place, dressings are discontinued and a thin layer of Polysporin® applied.

Recently, selected patients with major burns and with no available donor sites have been managed with autologous epidermal skin cultures (CEA) or a bilayered “artificial” skin covering with epidermal and dermal components (Integra). Both strategies hold promise for patients with major burns.

Careful attention to face care is essential. Cartilaginous tissue in the nose and ears must be watched closely for signs of necrosis. The eyes should be examined by an ophthalmologist, and burned eyelids and exposed corneas require special attention.

REHABILITATION PERIOD

Healed burns must be kept well moisturized, since the sebaceous glands are unable to secrete sufficient lubricating oils. Frequent applications of mild, non-perfumed, water-based moisturizers are recommended; oil-based lotions can block pores and do not penetrate into the dermis. In order to prevent sunburn and hyperpigmentation, burns and donor sites must not be exposed to direct or indirect sunlight for approximately six months. Sunblocks with a high sun protection factor (SPF) and a wide-brimmed hat (for facial burns) are also strongly recommended, but are no substitute for avoiding the sun.

Patients should be made aware of the potential for hypertrophic scarring and the possible need for pressure therapy. They should also be told how long scars may take to fully mature (usually about two years). Counselling should also include information on skin care and paramedical cosmetic camouflage.

information and feedback. Incorporation into the clinical repertoire of a variety of pharmacologic and nonpharmacologic strategies is also necessary for effective pain control.

Effective pain management will improve the burn survivor's outlook, and help lead to a positive outcome.

INFECTION CONTROL

Avoiding or minimizing infection involves appropriate use of topical antimicrobial agents, support for the patient's immune mechanisms, rapid elimination of reservoirs of infection, and suppression of infection transfer (Table 7).

PAIN MANAGEMENT

Unfortunately, aspects of burn care can be painful, such as dressing changes and physio/occupational therapy. Effective pain control requires flexibility in the treatment facility's approach to pain management. Physicians and nurses must be firmly committed to alleviating pain in burn survivors.

Table 7

INFECTION CONTROL GUIDELINES

1. Scrupulous attention to handwashing technique must be paid, along with an alcohol hand rinse.
2. Plastic liners for hydrotherapy equipment must be changed for each patient.
3. Specific procedures and specialized training must exist for housekeeping staff to maintain cleanliness in the burn unit.
4. Isolation gowns, head covers and masks are to be worn when unhealed burn wounds (except facial) are exposed.
5. Clean gloves are required for removal of soiled dressings and cleansing of burn wounds.
6. Clean isolation gowns are to be worn when applying dressings.
7. Sterile gloves are to be worn when applying topical agents to gauze and inner dressings to the wound.
8. Clean technique is to be used when applying outer dressings.
9. Sterile bed linen is NOT necessary.
10. Cubicle isolation technique must be observed in each patient room.
11. Strict isolation policies are to be enforced when patient develops a resistant organism.
12. Live plants and flowers are not permitted in the burn unit.

Caregivers must be aware of research on pain control in patient with burn wounds, since this clinical problem is fraught with misconceptions. Members of the burn unit should use pain assessment tools to gain essential subjective