Treatment of the Burn Patient in Primary Care

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The author has disclosed that he has no significant relationship with or financial interest in any commercial companies that pertain to this educational activity.

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This continuing educational activity will expire for physicians on November 30, 2011.


PURPOSE:
To enhance the learner’s competence in treating burn patients in primary care.

TARGET AUDIENCE:
This continuing education activity is intended for physicians and nurses with an interest in skin and wound care.

OBJECTIVES:
After participating in this educational activity, the participant should be better able to:
1. Use correct burn classifications for documentation and for making patient referrals to burn units.
2. Construct treatment regimens for burn patients.
3. Apply burn care knowledge to patient education scenarios.

According to the American Burn Association (ABA) 2007 Fact Sheet, approximately 500,000 burn-injured patients receive medical treatment at hospital emergency departments and outpatient clinics, urgent care centers, and private healthcare provider offices. Approximately 40,000 of these are admitted to hospitals. Data from the 2010 ABA National Burn Repository Report state that 71% of burn patients had burn sizes of less than 10% total body surface area (TBSA). Approximately 70% of these burn patients were male, with a mean age of 32 years; about 17% were younger than 5 years, and 12% were 60 years or older. The majority of burn patients have minor wounds and may be treated on an outpatient basis.

By reading this article, clinicians will be better able to assess burn injuries, including the depth, severity, extent, and location of the burn, and select the appropriate burn wound care treatment, including pain management, dressings, rehabilitation, and scar management.
ASSESSMENT
A thorough history should be obtained, including the time and etiology of the burn injury, to help determine whether there is concomitant trauma (such as electrical injury causing cardiac dysrhythmias, closed-space injury causing smoke inhalation, or an explosion, fall, or crash causing orthopedic injuries). In addition, the medical, surgical, family, and social history should be obtained to identify comorbid medical conditions (such as diabetes, immunocompromise, heart, respiratory, vascular and kidney disease, substance abuse, or obesity), which may complicate the patient’s recovery. Infants, toddlers, and older adults have a higher risk of morbidity and mortality. Infants and small children have a larger surface area than do adults (larger heads and smaller legs) causing increased evaporative losses and decreased body temperature compared with adults. As with older adults, infants also have a thinner dermis causing deeper burn wounds. \(^3\) Burns resulting from abuse or neglect in patients of any age are not uncommon, and if suspected, they should be thoroughly investigated, and authorities notified according to state law. \(^3\)

BURN SEVERITY
Burn severity depends on the depth, extent, and location of the burn injury. The ABA considers the following to be minor burns:
- superficial-thickness burns.
- partial-thickness burns less than 15% of TBSA in people 10 to 50 years old.
- partial-thickness burns less than 10% of TBSA in children younger than 10 years and adults older than 50 years.
- full-thickness burns less than 2% of TBSA in all populations. \(^3,9\)

DEPTH
The depth of a burn wound depends on the temperature and the duration of contact with the injuring agent, as well as the thickness of the skin and blood supply to the injured area \(^8\) (Figure 1). Burn depth is described as follows, going from the most superficial to the deepest:
- Superficial burns involve only the epidermis. They are red, dry, and painful, blanch, and are tender to palpation. The injured epidermis sloughs within a few days. They require only symptomatic care and usually heal within 1 week without scarring.
- Superficial partial-thickness burns involve all of the epidermis and the superficial dermis. They are red, moist, and very painful. There is blister formation, and the burns usually heal with minimal scarring in 10 to 14 days.
- Deep partial-thickness burns involve all of the epidermis and most of the dermis. They are generally paler, dryer, and less painful than superficial second-degree burns. They frequently take 2 to 4 weeks to heal and often with significant scarring.
- Full-thickness burns involve all of the epidermis and dermis. They are dry, have a leather-like texture due to destroyed collagen, are variable in color depending on the causative agent, are insensate due to destruction of sensory nerve endings, and unless they are very small, do not heal spontaneously. They also may extend beyond the skin to subcutaneous fat, tendon, muscle, or bone and may require amputation or complex reconstruction. \(^3,5,7,9\)

Many burn wounds are a mixture of burn depth, so patients with full-thickness burns frequently also have painful partial-thickness burns and need treatment for pain as well.

EXTENT
Burn extent is given as a percentage of the TBSA burned. Two common methods of estimating the extent of a burn injury include the Rule of Nines and the Lund and Browder methods (Figure 2). The Rule of Nines is commonly used in the pre-hospital setting because it is easy to remember and use. It divides the adult body into anatomical regions of 9% or a multiple of 9%. Infants and small children have larger heads and smaller legs than adults, and so the rule is modified for them by doubling the size of the head from 9% to 18% and decreasing each leg from 18% to 14% (Figure 3). Also, the rule does not work well with scattered small burns (such as splash burns from spilled hot liquids). To correct for this, the patient’s palm including the fingers, which represent approximately 1%
of the patient’s TBSA, can be used to estimate small scattered burns. The Lund and Browder method uses narrower age ranges and divides the body into smaller anatomical regions to account for changes in surface area with age.3–5,7–9

LOCATION
The location of the burn wound may cause additional complications initially or during the healing process, such as edema, causing pharyngeal obstruction necessitating endotracheal intubation. Facial edema may prevent eyes from opening, impeding vision and circumferential limb burns, and subsequent edema may lead to vascular compromise necessitating an escharotomy. Burns to the perineum may cause urethral obstruction necessitating an indwelling urinary catheter, whereas burns over joints immediately affect the range of motion, which may be exacerbated later by hypertrophic scarring.3,5,8 Consider a consultation with or referral to a Burn Center based on the ABA Burn Center Referral Criteria (Table 1).

BURN WOUND CARE
The acute phase of burn care lasts from the time of injury until the burn wounds are closed. Most burn wounds are painful. The most painful are superficial partial-thickness burns because the sensory nerve endings are intact and working but exposed because of the loss of the epidermis. Burn pain is intense initially, during debridement and dressing changes, but usually moderates once dressings are applied, protecting the nerve endings. Pain increases again with activity, especially physical therapy. Most patients require analgesics and will need opioid-based analgesics for wound care, physical therapy, and sleep. If possible, make sure the patient has been premedicated for pain.

Figure 2.
ESTIMATING THE EXTENT OF BURNS

Relative percentages of areas affected by growth

<table>
<thead>
<tr>
<th>At birth</th>
<th>0 to 1 yr.</th>
<th>1 to 4 yr.</th>
<th>5 to 9 yr.</th>
<th>10 to 15 yr.</th>
<th>Adult</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: half of head</td>
<td>9 1/2%</td>
<td>8 1/2%</td>
<td>6 1/2%</td>
<td>5 1/2%</td>
<td>4 1/2%</td>
</tr>
<tr>
<td>B: half of thigh</td>
<td>2 1/2%</td>
<td>3 1/2%</td>
<td>4%</td>
<td>4 1/4%</td>
<td>4 1/2%</td>
</tr>
<tr>
<td>C: half of leg</td>
<td>2 1/2%</td>
<td>2 1/4%</td>
<td>2 1/4%</td>
<td>3%</td>
<td>3 1/4%</td>
</tr>
</tbody>
</table>

To determine the extent of an infant’s or child’s burns, use the diagrams shown here.
before manipulating the wounds, but be aware that anything less than anesthesia will not eliminate burn pain.3–7,10,11

The patient’s tetanus vaccination status should be assessed and updated if needed.3,7,8 Superficial burns are not open wounds and do not require dressings. They may be treated symptomatically with moisturizers, cool compresses, and analgesics. Large superficial burns may require short-term hospitalization for pain control. Wound care should begin with gentle cleansing of the burn wounds with a bland soap and water or wound cleanser. Remember that the burn wound is initially sterile, and the goal is to remove devitalized skin, dirt, and debris while minimizing pain and additional trauma to the burn wound.3–5

Two frequently asked questions are whether to debride intact blisters and whether burn wounds should be shaved, clipped, or left alone. The literature regarding both issues is mixed. With regard to blisters, recommendations range from leaving blisters intact until the underlying skin heals, needle aspirating them leaving the dead skin in place, to debriding them immediately. The case for debriding blisters is supported by studies that demonstrate that blister fluid depresses immune function by impairing neutrophil and lymphocyte function and increases inflammation. The devitalized tissue and fluid are also mediums for bacterial growth and possible infection.3,4,7,9–11

Researchers in support of leaving blisters intact state that an intact blister usually indicates a superficial burn that will heal spontaneously within a few weeks.3,10 The intact blister creates its own dressing, thereby keeping the wound clean, moist, and protected. The wound is protected from the air, manipulation, and contamination because of dressing changes; thus, there is less pain and less need for analgesics. With fewer dressings, the cost of supplies is decreased. Some practitioners prefer to debride blisters that are already broken, fragile, and imminently going to break or are crossing joints, thus interfering with function. These practitioners leave other blisters intact unless pain caused by pressure from the blister is intolerable or preventing active range of motion.3,4,7,9–11

Table 1.
BURN CENTER REFERRAL CRITERIA

| The ABA has identified the following injuries as those requiring referral to a burn center. A burn unit may treat adults, children, or both. Burn injuries that should be referred to a burn unit include the following: |
| (1) Partial-thickness burns greater than 10% of TBSA. |
| (2) Burns that involve the face, hands, feet, genitalia, perineum, or major joints. |
| (3) Full-thickness burns in any age group. |
| (4) Electrical burns, including lightning injury. |
| (5) Chemical burns. |
| (6) Inhalation injury. |
| (7) Burn injury in patients with preexisting medical disorders that could complicate management, prolong recovery, or affect mortality. |
| (8) Any patient with burns and concomitant trauma (such as fractures) in which the burn injury poses the greatest risk of morbidity or mortality. In such cases, if the trauma poses the greater immediate risk, the patient may be initially stabilized in a trauma center before being transferred to a burn unit. Physician judgment will be necessary in such situations and should be in concert with the regional medical control plan and triage protocols. |
| (9) Burned children in hospitals without qualified personnel or equipment for the care of children. |
| (10) Burn injury in patients who will require special social, emotional, and/or long-term rehabilitative intervention. |

Those in support of shaving or clipping hair from the burn wound say that the risk of infection is decreased by making it easier to debride dead tissue and keep the wound clean. Shaving the hair exposes the burn, making it easier to evaluate the depth and extent of the burn. The pain of subsequent wound care is decreased because devitalized tissue and exudates wash off easier as they are not anchored in place by intact hair.\textsuperscript{3,11} Other practitioners believe that shaving the hair from minor burn wounds can cause additional trauma.\textsuperscript{3} Some prefer to shave most burn wounds to expose their depth and extent especially on scalps, and most importantly on infants and toddlers whose hair may hide a moderate or major burn that should not be treated in a primary care setting.\textsuperscript{3,8,11}

Immediately following the burn and for up to 24 hours after injury, the burn wound is essentially sterile. Systemic antibiotics are no longer prescribed to prevent burn wound infections, and burn wounds should not be routinely cultured in the primary care setting.\textsuperscript{10} Burned limbs should be elevated above the level of the patient’s heart when not being actively exercised to decrease edema and pain.\textsuperscript{10} Burned skin contracts and so range of motion of all affected areas should begin with the first visit. This may necessitate referral to a physical therapist.\textsuperscript{3,4}

**BURN WOUND DRESSINGS**

The burn wound dressing should keep the wound moist and clean, promote optimal function of affected joints, protect the wound from additional trauma, and provide for patient comfort. There are quite a variety of dressing types available to treat burn wounds on an outpatient basis, and there are several ways to accomplish the goals above. They vary widely in complexity and cost. In the primary care environment, simple and inexpensive will work best for the patient and the provider.\textsuperscript{3,5,9}

Superficial burns do not require topical antimicrobials. Moisturizers should be used for dry skin and comfort, as well as sunblock as a moisturizer when the hypopigmented skin is exposed to the sun until it is back to its baseline color. Superficial partial-thickness burns without adherent exudates or eschar can be treated with a topical antimicrobial ointment, such as bacitracin, other over-the-counter antimicrobials, or vitamins A and D ointment. They are inexpensive and easy to use. Bacitracin has activity against Gram-positive bacteria. On occasion, it may cause contact dermatitis causing additional skin breakdown, especially after long-term use.\textsuperscript{10} The ointment should be covered with a nonadhering layer then dry gauze and may be secured with flexible elastic netting and changed 1 to 2 times per day, depending on the amount of drainage. Avoid the use of occlusive dressings as they do not allow absorption or drainage of exudates and lead to skin maceration and an anaerobic environment.

Deep partial-thickness burns with adherent exudates, full-thickness burns, or cellulitic wounds can be treated with silver sulfadiazine 1%. It has a broader spectrum of antimicrobial activity and better penetration of necrotic tissue than bacitracin.\textsuperscript{10,12} Silver sulfadiazine 1% inhibits wound epithelialization and should be discontinued once exudates and eschar have separated from the wound, leaving a clean wound bed, which is then treated as a superficial partial-thickness burn.\textsuperscript{10} Silver sulfadiazine 1% is a sulfa drug and should not be used on patients with sulfonamide allergies.\textsuperscript{10} It should also not be used on pregnant or nursing women or on infants younger than 2 months.\textsuperscript{10}

The open-dressing method for face, head, and neck burns is effective because contamination is unlikely. A thin film of bacitracin ointment applied to these wounds works well because it stays in place.\textsuperscript{10} Because most people do not like having their face covered, silver sulfadiazine 1% may be used without a dressing to cover the face; however, the drug runs off as it warms and mixes with serum and turns gray to black when exposed to light because of silver nitrate. Dressings applied over burned joints should facilitate range of motion, and fingers should be wrapped individually.\textsuperscript{3,5,7,6-11}

For patients with limited financial resources, alternative dressings to keep ointments on wounds include light cotton gloves and snug-fitting T-shirts, undergarments, socks, or other items that can be purchased at discount stores in multipacks, washed, and reused until the burn wounds heal. Diapers work well for buttock and perineal burns in infants, young children, and adults with incontinence.\textsuperscript{3}

A variety of burn care products are available. Although many claim to provide the fastest healing time at the lowest cost, clinicians must evaluate the claims and the research to decide what will work best for individual patients.\textsuperscript{3,9}

Alternative dressings for superficial partial-thickness burn wounds without adherent exudates or eschar include alginates, hydrofibers, or foam dressings that absorb exudates, maintain a moist environment, and require fewer dressing changes, thus decreasing pain and anxiety for patients. Many of these products have silver in them, which is used as an antimicrobial.\textsuperscript{3-5,7}

An alternative treatment for deep partial-thickness burns is an enzymatic debrider that chemically debrides devitalized tissue without harming healthy tissue and may speed healing, decrease the likelihood of a surgical procedure, or may be used when surgery is not an option. Once the wound bed is clear of debris, another dressing may be used.
PATIENT EDUCATION
The patient and caregivers should be instructed in burn wound care and range-of-motion exercises and provided with oral and written instructions, with demonstrations if possible. Also, pain management, signs and symptoms of infection, and information about wound healing, scar formation and maturation, and expected outcomes should be discussed (Table 2).

REHABILITATION AND SCAR MANAGEMENT
The rehabilitation phase of burn care lasts from burn wound closure until scar maturation. The most frequent question patients and families ask is about scarring. Patients and their caregivers should be informed that scarring is a normal process, but the amount of scar formation is variable. The deeper the burn wound, the more scar tissue will form. Scar tissue replaces normal skin in deep partial- and full-thickness burn wounds. Scar tissue formation is also genetic and unique, so only time will tell how much scar tissue will develop. Frequently, patients and families consider any difference in skin color as scarring, although this may not truly be scar tissue. Healed burns that remain hyperemic or hypopigmented are sensitive to UV light, are more easily sunburned, and may become permanently hyperpigmented. This can usually be prevented by protecting this skin from UV radiation using sunblock and proper clothing until the skin returns to its

### Table 2.
#### PATIENT EDUCATION: WOUND AND BURN CARE INSTRUCTIONS

Listed below are the basic principles of wound care regarding your burn injury:

1. **SILVER SULFADIAZINE DRESSING**: Your burn has been dressed in silver sulfadiazine. This is to be changed 2 times a day. This is very important to promote healing and prevent infection. Follow these guidelines as the healthcare practitioner has instructed you:
   - (a) Wash the burn with mild soap, water, and a washcloth, removing all old ointment and any loose skin.
   - (b) Blot dry.
   - (c) Apply a thick coat of silver sulfadiazine (like icing on a cake) and cover with a minimal amount of gauze netting. Silver sulfadiazine tends to work better when some air can get through the dressing.
2. **BACITRACIN AND DRESSING**: Your burn has been dressed in bacitracin with a nonadhering dressing. This dressing is changed 2 times a day. This is very important to promote healing and prevent infection. Follow these guidelines as the healthcare practitioner has instructed you:
   - (a) Wash the burn with mild soap, water, and a washcloth. Be sure to remove all old ointment and any loose skin.
   - (b) Blot dry.
   - (c) Apply a very thin coating of ointment only on the open areas.
   - (d) Place a sheet of the nonadhering dressing over the ointment. Do not overlap excessively.
   - (e) Cover with minimal amount of gauze followed by netting.
3. **MOISTURIZER AND SUNBLOCK** should be applied on all areas. Healed skin is pink and shiny with no drainage. Apply as needed throughout the day. If in water, sunblock should be applied every 30 minutes.
4. **FACE AND NECK BURNS**: Face and neck burns should be washed at least 2 times a day, removing all old ointment and any loose skin. Apply bacitracin ointment on all open areas. If this ointment is rubbed off during the course of the day, reapply bacitracin as often as needed to keep wounds moist.
5. **INFECTION**: A low-grade fever associated with burn injuries is normal. Cellulitis, however, is a localized infection of the burn wound and would benefit from simple treatment. If there is redness spreading out from the burn wound and the surrounding skin is warm and swollen, you should contact the healthcare practitioner immediately.
6. **BATHING**: A daily bath is helpful in wound management. Shampoo and other chemicals involved in bathing will not contaminate your burn injury. Immediately before getting out of the tub, wash your wounds as described above.
7. **DIET**: Fluid intake is very important. Increasing your normal fluid intake with juices and drinks high in protein and calories will help speed healing. Be sure to eat well-balanced, nutritious meals.
8. **ACTIVITY**: Maintaining function of a burned extremity decreases pain and swelling as well as promotes healing. Therefore, normal activity is encouraged except when otherwise instructed by the healthcare practitioner.
9. **PAIN CONTROL**: Dressing changes are often very painful, and medication cannot take all the pain away. It may be helpful for you to take your pain medication 30 minutes before doing the dressing change. Please ask for medication refills at your appointment or call 48 hours before you finish your prescription.

Source: University Health Care Burn Center, Salt Lake City, Utah. Used with permission.
baseline color. Patients with burns to the face or joints may need physical therapy to maintain their range of motion, regain their strength and endurance, control hypertrophic scarring, and prevent scar contractures.

Common complaints that must be addressed during the rehabilitation phase include itching, pain and discomfort associated with exercise, pressure, and positioning; and sleep disturbances. Itching can be especially troubling and difficult to treat. It is frequently treated with moisturizers and antihistamines with inconsistent results. Pain at this stage of healing is usually managed with a nonsteroidal anti-inflammatory drug. Some patients develop postinjury nerve pain, which is similar to diabetic neuropathy and may be treated in a similar fashion. Sleep disturbances may be due to poor sleep hygiene, pain, itching, anxiety, or other psychological problems (ie, depression or posttraumatic stress disorder), which may require additional medication or counseling.3,5,10

FOLLOW-UP
Follow-up visits range from daily to weekly during the acute phase, depending on the severity of the burn injury, medical history, and social factors including significant others who can assist the patient with burn care and activities of daily living. Other factors include financial resources and the patient’s living arrangements, such as whether it is a clean environment with functioning utilities (electricity and running water), pain management, and the type of burn dressing used.

If burn wounds are not clearly healing in 2 weeks or are not fully healed by 4 weeks after the injury, the burn may be deeper than previously assessed and may require surgical intervention. These wounds are also more likely to develop hypertrophic scar tissue and require scar management, especially over joints that could hinder their function. These patients should be considered for referral to a burn clinic for further evaluation and treatment. Patients should be advised to contact their primary care provider with any concerns including inadequate pain management, signs or symptoms of infection, or any problems with their wound care. Although most burn wounds are “healed” within a month, burn patients in the rehabilitation phase should be monitored intermittently until their wounds are mature (approximately 1 year), as evidenced by skin that is soft, supple, and back to baseline color, to evaluate and manage any hypertrophic scarring or scar contractures that may develop. Families of patients burned as children should understand that even after burn wounds are fully mature, scar contractures can develop until the patient stops growing.3,5–7

PREVENTION
The ability to treat burn patients and obtain successful outcomes is very important, but it is always better to prevent burn injuries than to treat them. Primary care providers are in a unique position to offer burn prevention education to their patients and families. In the same way that teaching is provided with routine visits regarding diet, exercise, smoking cessation, and other health promotion topics, burn prevention should be discussed with each encounter related to the age and developmental level of the patient.6 Burn prevention resources are available on the ABA Web site, http://www.ameriburn.org.

SUMMARY
Managing burn injuries is one of the many challenges of wound care. After reading this article, clinicians should be better able to assess burn injuries, including the depth, severity, extent, and location of the burn, and select the appropriate burn wound care treatment, including pain management, dressings, rehabilitation, and scar management for patients of all ages.

PRACTICE PEARLS
Tips for using wound care dressings and alternatives for burn patients include the following:
• The open-dressing method for face, head, and neck burns is effective because contamination is unlikely.
• Dressings applied over burned joints should facilitate range of motion, and fingers should be wrapped individually.
• Alternative dressings to keep ointments on wounds include light cotton gloves, snug-fitting T-shirts, undergarments, and socks.
• Diapers work well for buttock and perineal burns in infants, young children, and adults with incontinence.
• Alternative dressings for superficial partial-thickness burn wounds without adherent exudates or eschar include alginates, hydrofibers, or foam dressings that absorb exudates, maintain a moist environment, and require fewer dressing changes.

REFERENCES

For more than 56 additional continuing education articles related to Skin and Wound Care topics, go to NursingCenter.com/CE.