

Sick Burn Bro! Guide to Minor Burn management

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Board Bombs

Introduction

Burn injuries are responsible for millions of ED visits annually. Let's cover pitfalls, high yield information, and what to do for these when they come into your ED, both sick and non-sick.

Classification

You've probably heard this by now, but you need to move on from using degrees. The latest classification system is more physiologic and reflects how burns can evolve over time. *The injury that arrives to the ED may not be the same one you see in hours/days.*

Superficial thickness: epidermis only. Skin is erythematous, mildly painful. Normal capillary refill. Usually heals in several hours. If it remains after a day or so, it is likely a partial thickness burn.

Superficial partial thickness: epidermis to superficial dermis. Blisters, looks wet, usually more painful. Normal capillary refill.

Deep partial thickness: epidermis to deep dermis. Sluggish capillary refill, possibly less painful due to nerve destruction. Grafting generally needed to minimize scarring.

Full thickness: all layers of skin and subcutaneous tissue, including fascia. Often appear white or brown and leathery. No capillary refill. Usually, painless. Surgery required. Highest risk of infection.

As you can see above, contrary to popular belief, pain is not a reliable assessment to distinguish full thickness from partial thickness. The line between deep partial thickness and full thickness burns is often blurred. Due to the level of injury, it may not be readily apparent in the ED which is which. Both may not blanch, and both may have altering sensation levels. Even experienced burn surgeons will tell you that it is difficult to judge the difference early in the injury course (one study showed a burn specialist is only correct 60% of the time at accurately identifying the depth of the burn on initial exam).

With that, remember that burns are *evolving* injuries. They can worsen over days, and for the first 48-72 hours, you may not know how severe an injury is.

Size Estimation

Before we talk calculating size, let's just emphasize this point: *never include superficial thickness burns.* We can't tell you how often we see this pitfall.

Calculating total body surface area (TBSA) is important because it determines prognosis and level of care required. Stop using the Rule of 9s. Sadly it's still tested on ATLS and Boards, but its inaccurate and overestimates TBSA up to 20%!

For TBSA <15% or >85%: The Rule of Palms is highly accurate. Use the *patient's* hand, not yours, and include the fingers.

For TBSA >15%: Lund & Browder is accurate with great inter-rater reliability.

Burn Debridement

When you are cleaning burns in the ED, keep it simple. No chemicals! Do not use iodine or hydrogen peroxide. Sterile water and soap are just fine with gentle wiping using a washcloth. Do not scrub the wound.

What about burn blisters? This is controversial and we've seen a lot of varying opinions on this. We recommend following the practice of your local trauma center if applicable. However, it seems the paradigm favors removing blisters >6 mm in diameter for several reasons: blisters restrict function, they prohibit proper wound assessment, blister skin is dead and may be a source of infection, and blister fluid might deepen the burn.

Derroof the blister first using scissors to snip the top of the blister and open it, then use a warm washcloth with soapy water +/- forceps to remove the dead tissue.

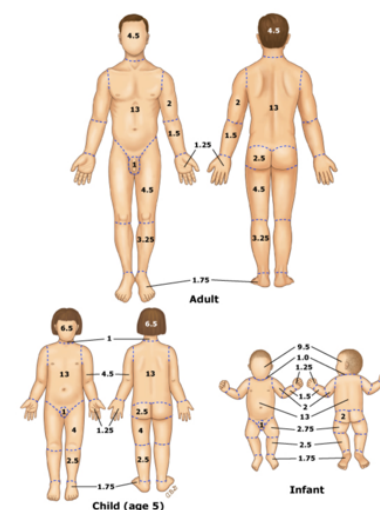
Major burn resuscitation

Never forget that all burn patients are trauma patients *first*. If they were in a fire, don't forget about CO or cyanide poisoning. If they are a child, don't forget about abuse. If they were in a motor vehicle accident, don't forget to think about other internal injuries and do not hesitate to acquire CT and X-ray imaging.

Fluid Resuscitation is another area that is poorly done in the ED. Over-resuscitation is just as harmful as under-resuscitation! Only burns with >15% TBSA in children and >20% in adults need fluid resuscitation.

Lactated Ringers is the preferred agent. Children require D5W+1/2NS in addition to LR.

Modified Lund-Browder chart



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Forget the Parkland formula. It's being dropped by boards, and thankfully is being replaced by more accurate calculations. Never use the Parkland formula in real practice.

The key is titrating fluids to urine output, avoiding vasopressors unless absolutely necessary, and avoiding fluid boluses. Maintenance rates help decrease risk of compartment syndrome.

Preferred formula: modified Brooke/Parkland.

Volume of LR = $2\text{mL}-4\text{mL} \times \% \text{BSA} \times \text{weight (kg)}$ → $\frac{1}{2}$ in 1st 8 hours, 2nd $\frac{1}{2}$ in 16 hours

Titrate urine output to 30-50 cc/hour (1 cc/kg/hour in children).

Maintain normothermia in major burn patients. As with all trauma patients, remove all clothing, fully expose patients to look for other burns and other injuries, and apply warm blankets.

If you are transferring a burn patient, apply a dry sterile towel on the burn, don't get fancy.

Pain management: burns are very painful. Pain control should be a priority as it is not only the right thing to do for the patient but improves healing. NSAID + opioid is a great starting combination.

Burn airways

Burn patients with inhalational injuries have a 10-30% mortality. Be very concerned for patients who were in an enclosed space for more than a minute.

On the other hand, we often over-worry about these airways and end up over-intubating 1/3 of burn patients in the ED. Singed nasal hairs and facial burns are *not* reliable indicators for intubation. So, who needs to be intubated? There is no strong consensus among societies, but some concerning signs include the following: any respiratory distress or stridor (obviously), new onset hoarseness, blisters/edema in oropharynx, full thickness burns to lower face or neck.

Of course, if you have fiberoptic at your facility, taking a peek at the airway and assessing for airway or laryngeal swelling is a great call.

Escharotomy

A rare procedure, but one that you should be keenly aware of and prepared to do. Burns can cause compartment syndrome even if they are noncircumferential.

Indications include inability to properly ventilate due to chest eschar restriction, decreased or absent pulses, or new neurologic deficits.

Escharotomies are not deep. They are performed with Bovie or cautery to minimize bleeding.

Wound care in burns: moist is best. Wet wounds have higher rates of re-epithelization.

Non-adherent dressings: stop using gauze wraps (e.g. Kerlex). Gauze sticks to skin, and it hurts as well as damages skin when removed. Stick with the good stuff: Mepilex. It's amazing, easy to apply, and the patient can leave it on for several days until burn outpatient follow up.

Stop using silver sulfadiazine. We were taught back in the day this was an option, but not anymore. Silver can delay healing and require more dressing changes. It can also create a pseudoeschar around the wound, allowing for bacteria to colonize.

Disposition and when to transfer

Transferring burn patients usually comes down to the following well-agreed-upon criteria:

- Full thickness burns
- Partial thickness burns >10% TBSA
- Burns to hands, face, genitalia, perineum, major joints
- Electrical or chemical burns
- Inhalation injury