

## Burn Objectives

### **Describe the purposes of skin and the effect of a burn on the skin itself.**

The skin's purpose is to act as a barrier. It keeps the "inside" in (fluids, electrolytes, protein, heat); and it keeps the "outsides" out (bacteria, yeast, fungi). The skin is the first line of defense, so it plays a very important role in immune function.

### **State the effects of a major burn injury on the cardiovascular system, and explain why the advent of IV resuscitation heralded increased survival for burn patients.**

Prior to IVs, patients who were not able to keep down fluids were not able to be fluid resuscitated adequately. Hypovolemia is a HUGE problem for burn patients b/c so much of the fluid leaves the vascular space d/t permeability of capillaries (and damage to vessels).

### **State the major determinant of mortality in the burn patient.**

The major determinant of mortality is the presence of smoke inhalation.

### **Explain why securing the endotracheal tube is paramount for survival in the resuscitative phase of a major burn patient.**

If that tube comes out, it is likely that you won't be able to get it back in again. Edema sets in and the airway could close off.

### **State the three classic phases of burn injury and explain why they are no longer distinct periods in burn hospitalization.**

The three phases are resuscitative, acute and rehabilitation:

- Resuscitative
  - Description
    - Time between initial injury to 36-48 hours after injury. This phase ends when fluid resuscitation is complete.
    - Major concerns: life-threatening airway and breathing problems
    - Characterized by development of hypovolemia (leaky capillaries → edema)
    - Burn itself is of less immediate concern (except for cases where escharotomy is performed to restore perfusion)
    - Manage circulatory and pulmonary abnormalities in this stage
  - Medical Management
    - Assess burn severity (depth, size, location, age, general health, mechanism of injury)
    - Treat minor burns in outpatient or ambulatory setting; < 15% TBSA in pts under 40 or < 10% in pts older than 40; no cosmetic or functional disabilities
  - Major burns
    - Monitor airway and breathing
    - Prevent hypovolemic shock (burn shock): 2 large bore IVs; goal is to maintain vital organ perfusion while avoiding complications of fluid administration
    - Prevent aspiration: NG tube and no oral fluids!
    - Minimize pain and anxiety: IV opioids (morphine sulfate or fentanyl). Small doses are given and repeated q 5-10 min. Explain everything to patient
  - Wound care:
    - Stop the burning process (remove clothes, irrigate chemical burns). Cover with a dry sheet.
    - Immediate care is to cover wound with sterile towels and place clean dry sheets/blankets over the pt. Definitive wound care takes place at the hospital and consists of cleansing with mild soap and water, debridement, removal of damaging agents such as chemicals and tar, and application of dressing and topical agent. Trim away loose tissue, shave hair within 1-inch margin.
    - Prevent tetanus: Booster if haven't had tetanus within 5 years. Immunoglobulin (passive immunity) and immunizations (active acquired immunity) for anyone who has never had a tetanus shot.

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Wound care, cont'd

- Prevent tissue ischemia: Elevate injured extremities 15-degrees above heart; assess pulses frequently; escharotomy may be needed at bedside; fasciotomy is done in surgery
- Acute Phase
  - Description
    - Begins when pt is hemodynamically stable, capillary integrity is restored and diuresis has begun.
    - Typically 48-72 hours after the time of injury.
    - More emphasis placed on restorative therapies.
    - This phase continues until wound closure is achieved.
  - Medical Management
    - Prevent infection (a major component!); gloves, caps, masks, shoe covers, scrub clothes, plastic aprons, strict hand-washing, limit # of visitors.
    - Provide metabolic support: Maintenance of nutrition is essential to promote wound healing. Basal metabolic rates may be 40-100% higher than normal (depending on extent of burn). Preferred route is oral or enteral.
    - Minimize pain: Opioids + PCA, inhalation analgesics, NSAIDS, hypnosis, guided imagery, art and play therapy, relaxation techniques, distraction, music, biofeedback.
    - Provide wound care: Daily care involves cleansing, debridement, and dressing
      - Wound cleansing: Hydrotherapy via immersion, showering or spraying (can also wash wound at bedside).
      - Debridement: The removal of eschar, exudate and crusts; Done via mechanical (scissors and forceps; wet-to-dry; can be very painful), enzymatic (proteolytic and fibrinolytic topical enzymes; need moist environment; pain and bleeding are common side effects; may open blood vessel leading to bacteremia; not for all wounds; or surgical means (excision of the devitalized tissue and coverage of the wound; begins during first week after injury once pt is stable)
      - Topical antimicrobial treatment: many burn centers use silver sulfadiazine cream as the initial topical agent; open or covered with gauze; may be covered with skin substitutes.
      - Maximize function: work with OT/PT; proper positioning to prevent contracture; ROM
      - Provide psychological support: longest period of adjustment is in acute phase; explain everything; get pt involved in his care
- Rehabilitation Phase
  - Description
    - Time from wound closure to discharge and beyond. This phase should overlap the acute care phase.
  - Medical Management
    - Minimize functional loss: early wound excision helps minimize short-term and long-term functional loss by closing the wound, minimizing infection and eliminating wound pain. Skin grafts do not have normal elasticity, so the wound stiffness must be counterbalanced with aggressive therapy and splinting; minimization of hypertrophic scarring (massage, pressure therapy, measure pt for pressure garments)
    - Provide psychosocial support: Pt will face numerous issues such as self-image issues, pain, physical limitations, reintegration, fear or rejection; maintain good communication

Not sure I explained why these should be concurrent, but I think it's clear that rehabilitation needs to begin as early as possible to promote maximal functioning.

**Explain why normal saline is used for pulmonary lavage in the resuscitation phase of burn injury.**

Did we go over this in lecture? I don't have anything in my notes.

**Calculate the fluid resuscitation requirements for a patient of a given weight and given burn percentage, using a 4 ml per percentage burn per kilogram formula.**

The formula is  $\text{kg} \times \text{TBSA} \times 4\text{ml/hr}$

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**For the same patient, calculate the hourly fluid infusion rate for the initial 8 hours after injury, and for the subsequent 16 hours after injury.**

You give HALF the total volume in the first eight hours, and the remainder of the next sixteen hours.

**Explain why albumin must often be replaced in burn inpatients.**

Albumin is a component of plasma and plasma leaks out of the vascular space.

**Explain the connection between nutritional intake and healing.**

Nutrition is necessary for wound healing. The burn pt's metabolic demands are 40-100% higher, possibly due to a re-setting of the hypothalamic-pituitary-adrenal axis thermostat thingamajig, leading to an increase in heat production. These increased energy requirements are necessary to promote healing and to prevent the untoward effects of catabolism.

**Provide two accepted strategies for decreasing cross-contamination among burn patients.**

Wash hands between patients, gown -up and glove-up.

**Explain why IM medications for pain are ineffective in major burn injury.**

Poor perfusion would mean the IM med just sits there in the muscle. It's not going to do the patient any good if it's not getting transported throughout the body.

**Name one strategy that might eliminate the need for an escharotomy in a circumferential burn of the arm.**

Elevate the extremity!

**State the priority assessment parameters for a non-intubated patient with a small flash burn to the face, singed nasal hairs, soot in the mouth, and no immediate respiratory distress.**

I have no idea! Sounds like they may have smoke inhalation. I'd put them on 100% NRB and check O2-sats. I'd also check the eyes to see if they are affected. I'm guessing here.

**Name the three age peaks of burn injury and state a prevention strategy appropriate for each age range.**

Kids between 1-5, risk-taking males between 18-35, and adults over 60.

**Explain why preexistent mental illness can predispose to burn injury.**

Because they're crazy? Many mentally ill try to end their life with fire. Because they're crazy?

**Explain the differences among DNR, "no compressions," and comfort care.**

DNR means no heroic life-sustaining measures at all...just let 'em go. "No compressions" means they want the meds, but don't want the meds circulated via CPR. Comfort care is palliative...just taking good care of them b/c there is nothing else to be done.

**Explain how increases in age and percentage burn surface area affect the likelihood of survival.**

The formula for estimating mortality is the TBSA + age in years. If it's over 120 this is not a good prognosis at all. For example, a 60-year old pt with a TBSA of 35% has a 5% chance of survival. No bueno.

**The three foci of burn surgical intervention are survival, function, and cosmesis. Explain what this means for the patient with greater than 80% burns.**

A patient with > 80% burns is going to be lucky to be alive, but it is important to promote function as well so that they're actually glad they survived. Cosmesis, though, important, is not a factor if they're not going to survive.

**Explain why some patients cared for by the burn team are not burned.**

The burn team takes care of skin injuries of all kinds...this could be frostbite or a de-gloving. Basically any kind of injury that disrupts the normal protective function of the skin.