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Deaconess REGIONAL TRAUMA CENTER

Management and Triage of Burned Patients

Purpose: Provide triage parameters and guidelines for the management of the burned patient. Provide guidelines to stabilize thermally-injured persons until they may be transferred to a burn center. Provide information to ensure smooth transfer of the patient to a burn center.

Definitions: The definitions are derived from the classification of burns and guidelines proposed by the American Burn Association (ABA) as well as the American College of Surgeons (ACS).

Severity Determinations:

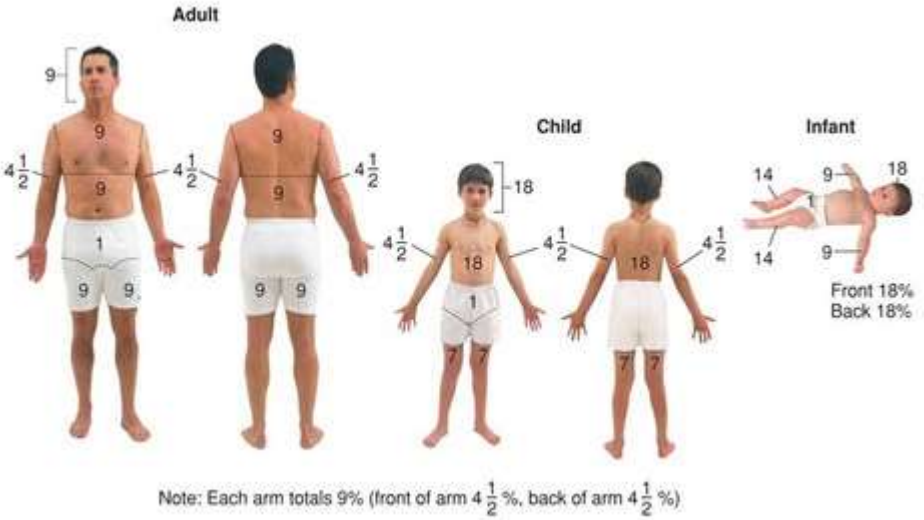
- First Degree/Superficial: superficial, red, sometimes painful
- Second Degree/Partial Thickness: skin may be red, blistered, swollen. Very painful.
- Third Degree/Full Thickness: whitish, charred or translucent, no pin prick sensation in burned area.

ABA Burn Center Referral Criteria: burn injuries that should be referred to a burn center include:

- Partial Thickness burns greater than 10% total body surface area (TBSA)
- Burning involving the face, hands, feet, genitalia, perineum, or major joints
- Third Degree/Full Thickness burns in any age group
- Electrical burns, including lightning injury
- Chemical burns
- Inhalation injury
- Burn injuries in patients with pre-existing medical disorders that could complicate management, prolong recovery, or affect mortality
- Burns and concomitant trauma (such as fractures) when the burn injury poses the greatest risk of morbidity or mortality.
    - If the trauma poses the greater immediate risk, the patient's condition may be stabilized initially in a trauma center before transfer to a burn center
    - Physician judgment will be necessary in such situations and should be in concert with the regional medical control plan and triage protocols

- Burns in children should be transferred to a burn center verified to treat children.
- Burn injury in patients who will require special social, emotional, or rehabilitative intervention.

Percentage Total Body Surface Area (TBSA) ("Rule of Nines")



Note: Each arm totals 9% (front of arm $4\frac{1}{2}$%, back of arm $4\frac{1}{2}$%)

Guidelines:

A. Any patient with > 20% TBSA burn with high suspicion for concomitant injuries should be evaluated by the Trauma Surgeon prior to transfer to a burn center.
   a. Otherwise, Emergency Physician discretion will determine if burn patient needs to be seen by the Trauma Surgeon whether admitted or transferred

B. Treatment Protocol:
   a. Remove any source of heat.
      i. Cool any burns that are warm to the touch with tepid water and then dry the patient.
      ii. Cover patient with a clean, dry sheet or blanket to prevent hypothermia.
   b. Assess the ABCs. Do not allow your attention to be diverted by the cutaneous burn. Look for life-threatening injuries first.
   c. Airway
      i. Assess for upper airway injury caused by the inhalation of hot air or gases. This will potentially result in rapid upper airway occlusion.
      ii. Assess for smoke inhalation. This will result in lower airway occlusion or non-cardiogenic pulmonary edema.
      iii. Carbon monoxide poisoning signs and symptoms include restlessness, headache, nausea, poor coordination, memory impairment, disorientation, or coma.
         1. Consider carbon monoxide poisoning with any of the above findings, and
         2. Carboxyhemoglobin level > 10%
            a. All burns get oxygen

b. Burns with carbon monoxide exposure should have high flow oxygen via a non-rebreathing mask
c. Consider endotracheal intubation for respiratory failure

d. Breathing
    i. Remember that the patient could have sustained a chest injury in association with a burn injury.

e. Circulation
    i. Assess for shock and treat accordingly
    ii. Insert 2 large bore IVs
        1. These may be placed peripherally or centrally
            a. It is ok to place the IV through eschar if it is the only access site
f. Disability
    i. Assess neurologic status
g. Expose
    i. Remove all clothing and constricting bands or jewelry
    ii. Place patient on clean sheet
        1. Sterile sheets are not required
    iii. Do not immerse burn into water or ice
h. Obtain blood sample for laboratory
    i. CBC, renal panel, UA, clotting studies, blood alcohol (if necessary)
    ii. Obtain chest x-ray if not already done
    iii. Obtain EKG in patients who are having arrhythmias
    iv. Obtain arterial blood gas with carboxyhemoglobin level
i. Insert Foley catheter with > 90% TBSA burn
j. Consider nasogastric/orogastric tube if > 20% TBSA burn
k. Examine the burn when the patient is otherwise stable
    i. Rule of Nines for Partial Thickness/Second Degree burns and Full Thickness/Third Degree burn only
    ii. The palm of the patient's hand (without fingers) is equal to 1% TBSA
    iii. Assess depth of burn
        1. Superficial/First Degree: erythematous, dry , painful, blanches (e.g., sunburn)
        2. Partial Thickness/Second Degree: blisters, wet, erythematous, painful, blanches (e.g., blister burn)
        3. Full Thickness/Third Degree: dry, leathery, gray or brown, painless, does not blanch (e.g., surface of football)
        4. Only Partial Thickness/Second Degree and Full Thickness/Third Degree are considered when assessing the size of the burn
l. Calculate the fluid requirements
    i. The calculated fluid volume is initiated in the following manner
        1. Half (1/2) of the total fluid is provided in the first eight (8) hours after the burn injury

a. Example: 100 kg man with 80% TBSA burns requires 2 x 80 x 100 = 16,000 ml/24 hours. 8,000 ml should be given in the first 8 hours

ii. The formulas provide a target rate. The amount of fluid replacement should be adjusted according to the urine output target of 0.5 ml/kg/hr for adults and 1 ml/kg/hr for children weighing < 30 kgs

iii. In adults, urine output should be maintained between 30 and 50 ml/hr to minimize potential for over-resuscitation

Burn resuscitation fluid rate and target urine output by burn type and age

Category of burn	Age and weight	Adjusted fluid rate	Urine output
Flame or scald	Adults and older children (≥ 14 year old)	2mL LR x kg x % TBSA	0.5 mL/kg/hr 30-50mL/hr
	Children (< 14 years old)	3mL LR x kg x % TBSA	1mL/kg/hr
	Infants and young children (≤ 30kg)	3mL LR x kg x % TBSA Plus a sugar containing solution at maintenance rate	1mL/kg/hr
Electrical injury	All ages	4mL LR x kg x % TBSA until urine clears	1-1.5mL/kg/hr until urine clears

m. Access for constricting eschar
   i. Usually on extremity but may be on chest or neck
   ii. Release eschar medially and laterally as follows
      1. Prep with betadine
      2. Use #11 blade
      3. Hold between your thumb and forefinger with the blade protruding one quarter (1/4) inch
      4. Run the blade on the medial and lateral aspect of the involved limb
         a. For chest injuries, release the eschar on the lateral aspect of the chest at the anterior axillary line
      5. There should be no pain and minimal bleeding
      6. Expand the escharotomy with a clamp
      7. Cover the site with a dry, sterile dressing
n. Do not administer antibiotics unless there is concomitant injury
o. Administer intermittent boluses of morphine intravenously as needed for pain
   i. If the patient is intubated and stable, you can be moderately liberal with the pain medicine

C. Wound Care
    a. Gently cover with a clean sheet. This decreases the pain from air currents passing over the skin
    b. If transferring the patient to a tertiary center within twelve (12) hours, debridement and application of topical antimicrobials is unnecessary. Transport the patient wrapped in a dry sheet and blanket
    c. If it will be longer than twelve (12) hours before the transfer is completed, debride all loose tissues and gently cleanse the wounds of all debris with mild soap and water. This should be done with opiate analgesia but not general anesthesia. Consult burn center for topical therapy

References:

- American Burn Association, Advanced Burn Life Support Course Guidelines
- Resources for the Optimal Care of the Injured Patient
- Deaconess Hospital Policy and Procedure Manual 30-03, Patient Room Preparation and Bed Assignment
- Deaconess Hospital Policy and Procedure Manual 40-06, Emergency Medical Transfer and Active Labor (EMTALA) Guidelines