

# BURNS – THERMAL / ELECTRICAL / LIGHTNING

## UPDATED 1/2024

### ALL PROVIDERS / EMT

- Scene and patient management
  - Thermal Burns
    - Stop the burning process.
    - Do not pull material out of the wound but cut clothing around it.
  - Electrical Burns
    - Safely evacuate patient from electrical source.
    - Do not touch the patient until you are sure that the electrical source is disconnected.
    - When multiple patients are struck simultaneously by lightning or a high voltage source, those in respiratory and/or cardiac arrest should be given the highest priority of care, even those who appear dead on initial evaluation. These patients may be in ventricular fibrillation and resuscitated with CPR and defibrillation.
- Focused history and physical exam
  - Identify potential entry and exit wounds for electrical burns – both sites will generally be a full thickness burn site.
- Cardiac monitor, ETCO<sub>2</sub>, and pulse oximetry monitoring, when available. Avoid placing monitor attachments over burned skin if possible.
- Treatment Plan**
  - Initiate early oxygen therapy with high flow O<sub>2</sub>.
  - In the unconscious patient, implement spinal motion restriction per the *Spinal Motion Restriction Guideline*
  - If patient is in shock, fluid resuscitation as per *Shock, Sepsis and Fluid Therapy Guideline* (AEMT/Paramedic)
  - With electrical burns anticipate heart rhythm irregularities.
  - Assess for circulatory compromise from circumferential extremity burns or ventilator compromise from circumferential chest burns.
  - Remove items that may constrict swelling tissue.
  - Estimate size and depth of burn using the percentage chart (below).
  - Dressings: Cover burns with dry dressings.
  - Closely monitor patient's temperature and prevent hypothermia.
  - Treat for pain and/or anxiety per the *Pain Management Guideline and/or Behavioral Emergencies Guideline*.
  - Burn patients with major trauma should be transported to a trauma center as per the Utah Trauma Field Triage Guideline
  - Consider air ambulance transportation for long transport times, inability to control pain after maximal doses of analgesics, and airway concerns that might necessitate advanced airway management
  - Consider transport directly to a designated burn center for the following:
    - Inhalation injuries
    - Partial or Full Thickness (2<sup>nd</sup> or 3<sup>rd</sup> degree) burns with TBSA >10%
    - Circumferential burns
    - Partial or full thickness burns involving face, hands, or genitalia
- Cyanide or carbon monoxide (CO) poisoning**
  - Signs: muscular weakness, confusion, agitation, unconsciousness, or profound shock
  - Most common in closed-space fires
  - Apply 100% NRB oxygen
- Key Considerations**
  - Electrical Burns are frequently more serious than they appear.

- Identifying the source as AC or DC voltage with the amperage will be helpful in the treatment.
- Consider 12-lead ECG for patients with electrical burns
  - Care for traumatic injuries should precede care for the burn.
  - If patient is initially hypotensive after burn (first hour), it is NOT a result of the burn: strongly suspect underlying trauma.
  - Keep patients warm! Patients are prone to hypothermia due to heat loss from the burns.
  - Consider Child Abuse as a cause. Circumferential scald burn to hands, feet, buttocks, and genitalia are common burns seen in child abuse (especially in children <5 years old)
  - Do not overhydrate patients with IV fluid. See proper fluid rates for burns below.
  - Definitions:
    - Superficial (1<sup>st</sup> Degree) Burns – red, painful, without blisters.
    - Partial Thickness (2<sup>nd</sup> Degree) Burns – red, painful/hypersensitive, swollen, with either intact or ruptured blisters.
    - Full Thickness (3<sup>rd</sup> Degree) Burns – dark, leathery, painless, waxy, and does not blanch.

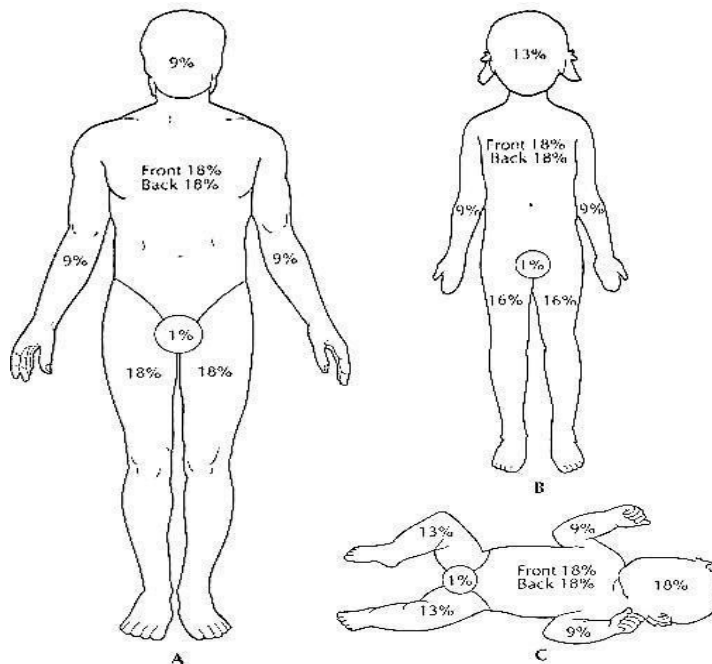
❑ **Western Region Burn Disaster Consortium (WRBDC) (UofU, IHC, Utah Dept. of Health) fluid resuscitation**

- **LR is the fluid of choice, but NS can be used if LR is not available**
  - ≤ 5 years of age: 125 ml L R/NS/hr
  - 6-12 years of age: 250 ml LR/NS/hr
  - ≥ 13 years of age: 500 ml L R/NS/hr

❑ **Parkland Formula**

- $4 \text{ ml} \times \text{weight (kg)} \times \% \text{BSA} = \text{total fluid (ml) to be administered in 24 hrs}$
- 1/2 of total should be given in first 8 hrs, the remainder in the next 16 hrs

- **Calculation of Burn Surface Area (%BSA): based only on 2<sup>nd</sup> and 3<sup>rd</sup> degree burn totals**



## ADULT

### AEMT

- Advanced airway, vascular access
  - If possible, avoid placing IV through burned skin
- IV Fluid therapy:** If 2nd + 3rd degree >10% BSA or if an electrical burn, begin:
  - LR or NS at appropriate drip (no bolus)
    - 500ml LR/NS per hour
  - If time from burn is >30 min, begin fluids using Parkland Formula

### PARAMEDIC

- If evidence of possible airway burn (singled nasal hair, carbonaceous sputum, hoarse voice, or stridor), consider early intubation
- If signs of cyanide toxicity present: **hydroxycobalamin (Cyanokit) 5 gm IV over 15 min**
- High voltage electrical injury or direct lightning strike
  - LR or NS at 500 ml/hr (no bolus)
  - If diagnosed with rhabdomyolysis prior to transport, increase fluid replacement to keep urine output >2 ml/kg/hr

## PEDIATRIC (<15 years of Age)

**NOTE: Pediatric weight based dosing should not exceed Adult dosing.**

### AEMT

- Advanced airway, vascular access
  - If possible, avoid placing IV through burned skin
- IV Fluid therapy:** If 2nd or 3rd degree >10% BSA or if an electrical burn begin:
  - LR or NS at appropriate rates (no bolus)
    - <5 years old: 125 cc/hr
    - 5-13 years old: 250 cc/hr
    - >13 years old: 500 cc/hr
  - If time from burn is >30 min, begin fluids using Parkland Formula

### PARAMEDIC

- If evidence of possible airway burn (singled nasal hair, carbonaceous sputum, hoarse voice, or stridor), consider early intubation
- If signs of cyanide toxicity present: **hydroxycobalamin (Cyanokit) 70 mg/kg IV over 15 min (max 5 gm)**
- High voltage electrical injury or direct lightning strike
  - LR or NS infusion rates (no bolus)
    - <5 years old: 125 ml/hr
    - 6-12 years old: 250 ml/hr
    - >13 years old: 500 ml/hr
  - If diagnosed with rhabdomyolysis prior to transport, increase fluid replacement to keep urine output >2ml/kg/hr