

# Burn Management in the Low Resource Setting

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# Conflict of Interest Statement

- Dr. Bitter does not have a significant financial interest to report



**ITLS**  
International  
Trauma Life Support

# Objectives

- Understand epidemiology and health disparities of burn injuries
- Recognize and manage immediate life-threats in the burn patient
- Understand risks of fluid creep and controversies in fluid management
- Use physiologic parameters to guide volume resuscitation



# Epidemiology

- 11 million burn injuries per year worldwide
- Estimated 180,000-265,000 deaths
- 70-95% in Low & Middle Income Countries (LMIC)
- Morbidity and mortality for a given burn are higher in LMIC
- High rates of disability

# Epidemiology - pediatrics

- 14.4 % of all injury deaths age 1-19
- 85% occur in the home
  - Predominantly flame burns from cooking
- Rare injury where female incidence higher than male

# Epidemiology

- 10-12% of trauma in conflict zones due to burns
- Acid attacks
- Immolation as means of suicide



# Evaluation of the Burn Patient

- Scene Safety
- ABCs
- Evaluation of burn wound
- Resuscitation

# Evaluation of the Burn Patient- ABCs

- Inhalation Injury
  - Singed facial hair
  - Burns of nose or mouth
  - Soot in sputum
  - Coughing/ dyspnea
  - Hoarse voice



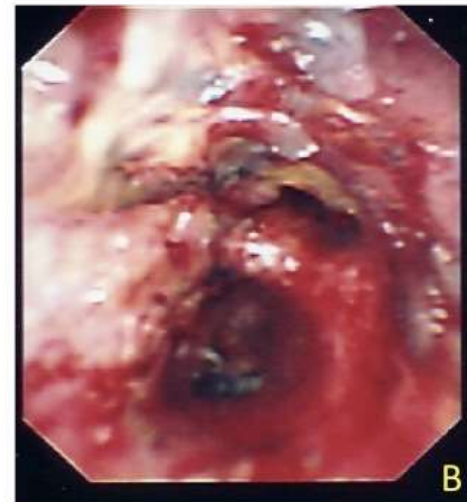


# Evaluation of the Burn Patient - ABCs

- Direct thermal injury to airway with swelling
- Inhalation of soot and fumes

# Evaluation of the Burn Patient - ABCs

- Early airway control
  - Swelling makes delayed intervention more difficult



# Evaluation of the Burn Patient - ABCs

- Breathing
  - Insufficient respiratory drive in setting of massive injury
  - Thoracic eschars



# Evaluation of the Burn Patient - ABCs

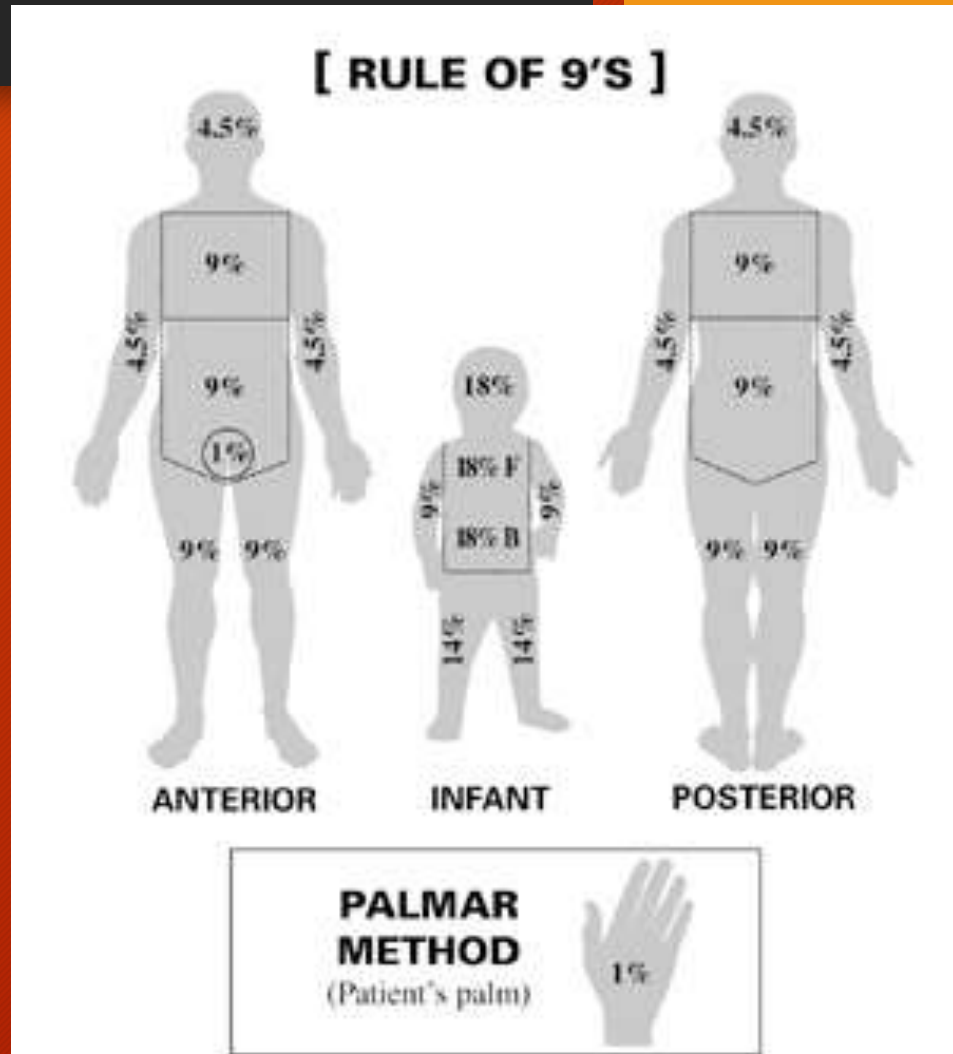
- Circulation
  - Early hypotension due to other injuries
  - Large burns cause dehydration from capillary leak and transudative loss but this occurs hours-days later

# Evaluation of the Burn Wound

- Stop burning process
  - Remove smoldering clothing
  - Remove constricting jewelry
  - Irrigate with cool water

# Evaluation of the Burn Wound

- Size/TBSA
  - Rule of 9s
  - Pediatric Rule of 9s
  - Palmar method





# Evaluation of the Burn Wound

- Depth
  - Superficial
  - Superficial partial thickness
  - Deep partial thickness
  - Full thickness
  - 4<sup>th</sup> degree

# Superficial

- Epidermis only
- Erythema
- Painful
- Heals without scar





# Superficial Partial Thickness

- Blisters with moist base
  - may be delayed
- Very painful
- Generally heal without scarring





# Deep Partial Thickness

- Immediate blistering
- Mottled base that blanches
- Nerves damaged, so less pain
- Heal with scarring



# Full Thickness

- Mottled base that does not blanch
- Leathery eschar
- Heal with contractures, require skin graft





# 4<sup>th</sup> degree

- Involves deep structures
- Charred appearance





What depth is this burn?



What depth is this burn?



What depth is this burn?





# Burn Treatment

- Protect core temperature
- Pain relief
  - Ketamine
- Tetanus immunization
- Fluid resuscitation
- Dressings

# Fluid Resuscitation

- Parkland formula
- $4 \text{ ml/kg} \times \% \text{TBSA} \times \text{wt}$  crystalloid
  - 1/2 in first 8 hours after burn
  - 1/2 in next 16 hours

# Fluid Resuscitation

- Modified Brooke Formula
  - $2 \text{ ml/kg} \times \text{wt} \times \% \text{TBSA}$  crystalloid for adults
  - Peds-  $3 \text{ ml/kg} \times \text{wt} \times \text{TBSA}$



# Fluid Resuscitation

- Rule of 10
  - 10 ml crystalloid x TBSA per hour
  - Adjust hourly based on urine output
  - Validated in adults only
  - US Armed Forces Institute of Surgical Research

# Fluid Resuscitation

- Significant number of patients over-resuscitated
  - Higher risk for pulmonary edema, compartment syndrome, sepsis
- Important to follow clinical parameters
- Target urine output 0.5-1 ml/kg in adults

# Fluid Resuscitation

- Oral treatment with ORT validated in burns up to 40% TBSA
  - May require NG/OG tube

WHO formula	Simple formula
1 L potable water	1 L potable water
3/8 tsp salt	1/2 tsp salt
1/4 tsp salt substitute (KCl)	6 tsp sugar
1/2 tsp baking soda	
6 tsp sugar	



# Wound Treatment

- Gently wash area
- Debride large or leaking blisters
- Dressings
  - Silver based
  - Hydrocolloid
  - Improvised

# Controversies

- Risk/benefit of cooling wound
- Crystalloid vs colloid
- Non-invasive monitoring vs central line/PA catheter
- Role of TEE
- Debride blisters?
- Best dressing material
- Vitamin C

# Summary

- Burn morbidity and mortality disproportionately affect LMIC
- Airway compromise is the most immediate life-threat
- Hypovolemia, multisystem organ failure and sepsis occur later
- Optimal care early in course reduces complications



- Thank you for your attention

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