Pre-hospital Management of Burn Injuries

Stacey Rotta MD
• I have no disclosures,

But a disclaimer: lots of burn photos
OVERWHELM!
Toolbox

• Introduction to burn physiology
• Burn injury initial assessment
• First aid concerns
• Burn center transfer
Burn Pathophysiology

- Zone of hyperemia
  - Will heal

- Zone of stasis
  - Attempt to salvage

- Zone of coagulation
  - Irreversibly damaged
Burn wounds *evolve* considerably over the first 72 hours – the severity and degree may not be immediately clear.
Burn Physiology

Smaller burns <20% TBSA do not result in major changes

*Big changes* happen for larger burn injuries, >20% TBSA (total body surface area)

- Destruction of normal tissue barriers
- Introduces significant fluid shifts
- Changes every major body system
Burn Physiology

Immediately after a burn injury most vital signs are normal, but:

• Expect tachycardia
• Prevent hypothermia
• Be concerned about tachypnea (RR >25) and reports of feeling short of breath
• For hypotension, look for other causes (trauma, medications)
Burn Physiology

Trauma Volume Loss:

Burn Volume Loss:
Burn Physiology

Bolus Fluid Administration

Continuous Fluid Administration
For burns <20% TBSA, the physiology does not really change! So giving too much fluid to a “smaller” burn can actually be harmful.
Assessing a Burn

• Trauma first!
  – A,B,C,D,E

• Get a detailed history
  – May be the only opportunity to hear events from the patient’s perspective
  – Obtain emergency contact information

• Burn Severity
  – Burn depth
  – Total body surface area involved
Assessing a burn

• Airway
  – Look for soot, singed hair, but always consider mechanism

• Breathing
  – Shortness of breath, stridor

• Circulation
  – Remove anything restricting, IV or IO access

• Disability
  – Glasgow Coma Scale

• Environment
  – Safe, warm
Assessing a Burn
Assessing a Burn

• Consider risks of inhalation injury
  – Enclosed space with prolonged smoke exposure
  – Carbon monoxide poisoning exposure
• Consider risk of airway edema (or neck edema which could compress airway)
• Children especially need careful airway attention
• Flash burns, smoking on oxygen, usually only brief exposures with low likelihood of smoke inhalation
Skin Burn

First-degree Burn

Second-degree Burn

Third-degree Burn
Assessing a Burn

• **First Degree:**
  - Blanching erythema
  - Limited to epidermis
  - Painful to touch
  - Will heal on its own with no treatment
First Degree Burn Injury
Assessing a Burn

- **Second Degree:**
  - Blistering
  - Through epidermis into dermis
  - May be superficial, which heals, or deep, which may need a skin graft
  - Very painful
  - Wet, pink appearance
Second degree burn injury
Assessing a Burn

• **Third Degree:**
  - Waxy eschar
  - May be tan, brown, black, or white
  - Full thickness
  - Insensate
  - Cannot swell
  - Must be treated with a skin graft
Third Degree Burns
Assessing a Burn: Total Body Surface Area

- Rule of 9s estimate
- Patient’s palmar surface approximately 1% TBSA
Burn First Aid

• Mechanism Matters!
  – Electrical: safe scene?
  – Flame: accelerant?

Remove all clothing that may be holding in heat or chemicals, remove all jewelry and rings in anticipation of swelling.
Burn First Aid

Cool the burn

Cool the burn, but warm the patient
Burn First Aid

- Warm patient
- Get access
- Oxygenate
- Rule of 10s for fluid
- Pain management
Burn First Aid

• Get access as soon as possible
  – Ideally this will be through non-burned skin
  – But if no other options, establish large bore (16, 18) through burned tissue
  – Can also consider intraosseous access, especially in large burns and children
Burn First Aid

• Initiate fluid resuscitation
  – Rely on “rule of 10s”

1. Calculate TBSA to closest 10%
2. TBSA x 10 = initial fluid rate in ml/hr
   (valid for weights 40-80kg)
3. If patient weighs more than 80kg, add 100ml/hr for every 10 kg over 80
Burn Center Transfer Criteria

- Partial thickness burns involving greater than 10% TBSA
- Burns to the face, hands, feet, genitalia, perineum, or major joint
- Full thickness burns
- Chemical burns
- Electrical burns
- Inhalation injury
- Multiple medical co-morbidities
- Extremes of age, (children, elderly)
- Concomitant Traumatic injuries
- Special social, emotional, or rehabilitation needs
Care during transport to a burn center

Pain and Sedation

• Infusions can cause significant hypotension
• Best to administer individual doses at regular intervals
• Use soft restraints for safety

Fluid management

• Continuous fluid administration rather than boluses
• Cover burn wounds with clean dry dressings

• Monitor urine output and titrate up on fluids ad needed
Questions?