Speaker Disclosure

I, Debbie Harrell, MSN, RN, NE-BC, have no financial relationships to disclose.

I will not discuss off-label uses of any pharmaceutical products or medical devices.

Where hope and healing meet

Management of Acute Burn Injuries: The First 24 Hours

Debbie Harrell, MSN, RN

Shriners Hospitals for Children®—Cincinnati


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Where hope and healing meet


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Statistics

- **Survival Rate:** 96.8%
- **Gender:** 68% Male, 32% Female
- **Ethnicity:** 59% Caucasian, 20% African-American, 14% Hispanic
- **Admission Cause:** 43% Fire/Flame, 34% Scald, 9% Contact, 4% Electrical, 3% Chemical, 7% Other
- **Place of Occurrence:** 73% Home

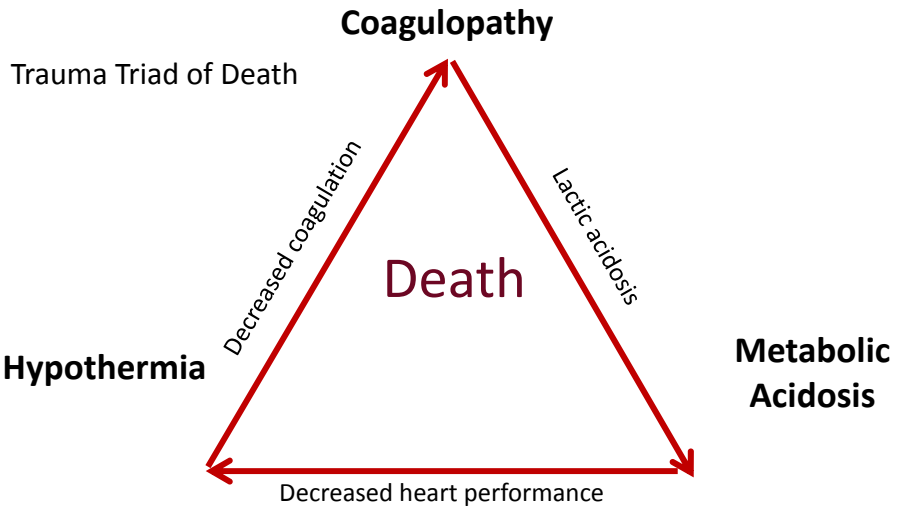
Thermal Injuries

- 75% of burns are 10% or less
- 60% of burns are children 5 and under
- 90% of burns can be managed on an outpatient basis

Initial triage

- Remove all clothing completely
- Stop the Burning Process for 3 to 5 minutes (never use ice)
- Prevent hypothermia
  - Cover with a warm dry dressing
  - Increase ambient air
  - Warm IV fluids

Prevent Hypothermia



Airway Management

Inhalation Injury

- Enclosed space
  - Area where smoke and heat can't escape
- Physical assessment
  - Singed nasal hair
  - Carbonaceous sputum
- Respiratory status
  - Hoarseness
  - Stridor
- Mental status
  - Obtunded

Edema Formation

- Proportional to size of burn
  - 20% TBSA may demonstrate generalized edema
- Proportional to the size of airway
- Facial edema is not indicative of airway edema

Inhalation Injury

- Three distinguishable types:
  - Inhalation thermal injury
    - Above the glottis
      - Hoarse raspy voice
  - Carbon monoxide poisoning
    - Hypoxia/anoxia
  - Inhalation of chemicals and irritants
    - Presents later in the patient's course

Carbon Monoxide Poisoning

- Mechanism
  - 200 X the affinity of CO to Hgb than oxygen
- Presentation
  - Headache/dizzy
  - Hypoxia/syncope
  - Anoxia/cardiac arrest
- Treatment
  - High flow oxygen delivery
    - CO has a half-life of 45 minutes on 100% oxygen

- 9 year old female standing by trash barrel. Gas is thrown in the fire.
- On presentation she is awake and alert. Burns to face and left arm.
- What is the index of suspicion of an inhalation injury?

- 14 year old male sprayed an accelerant on his clothing and lit it.
- He was in his bedroom when this occurred. He ran into the living room screaming, mom put him in the shower to extinguish the flames.
- What is the index of suspicion for an inhalation injury?

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Burn Shock & Edema

- Burn damage causes **increased capillary permeability.**
- This increase in capillary permeability and the accompanying **inflammatory process** causes leakage into the interstitial space = **edema**
- Small burns have localized edema – like a blister - but burns >20% will result in systemic edema including areas not burned.

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- 15 year old male working under the hood of a car. The is a flash of flame when the car is started.
- He is awake and alert. No respiratory distress.
- His total body surface area is less than 10%.

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Escharotomy

- Incision made into the eschar to relieve pressure on compartment.
- Chest escharotomies allow for easier ventilation of pt. Can be life saving.
- Lateral incision mid-axillary line.
- Across chest and abdomen if involved.

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Escharotomy

- Vascular impairment from circumferential burns
- Laterally & Medially
- Across involved Joints

Size of Burn Injury

Total Body Surface Area

TBSA

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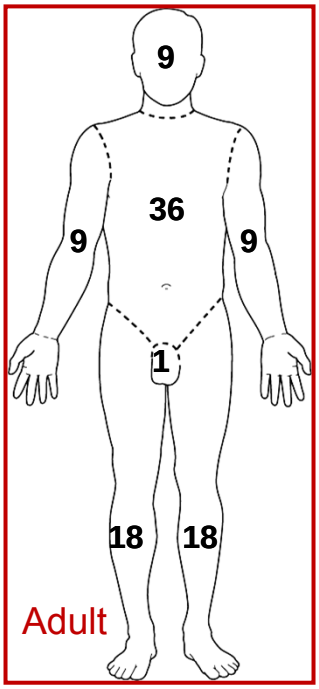
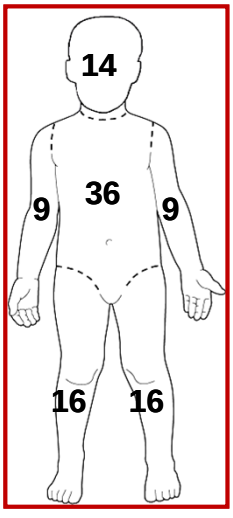
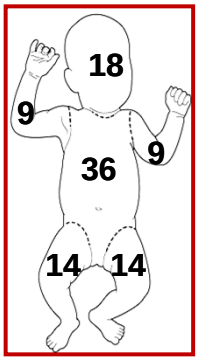
Rule of "Nines"

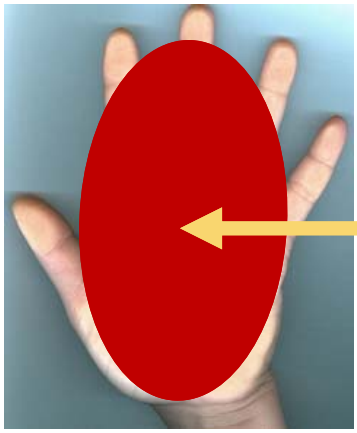
Modified for Age







Estimation of Small Burns



Palmar Method

Patient's palm including fingers is equal to 1% of their Total Body Surface Area (TBSA)

Indications for Fluid Resuscitation

- TBSA > 20% adults
- TBSA > 20% Children
- Age >65 y/o or < 2 y/o any size burn

Fluid Replacement

- Large Bore IV
- Crystalloid Solution
  - Lactated ringers
- Begin as soon as possible

Pain Control

- Intravenous opioid administration.
- Intranasal opioid administration.
  - Remember that the pain is more intense when the burn is open to the air.
  - Managing anxiety in pediatrics is key.

Early Fluid Management

- Pre hospital/primary survey in the hospital
- < 5 y/o 125ml/hr of LR
- 6-14 y/o 250ml/hr of LR
- > 15 y/o 500ml/hr of LR

Resuscitation Calculations

- Calculated Resuscitation requirement
  - 3ml x kg x % burn = estimated total fluids for 24 hours
- Resuscitation Fluid per 8 hours
  - Half of total in first 8 hours
  - Remaining amount in next 16 hours

Parkland Formula

- 3ml x 20kg x 90% = 5400ml/24 hours
- 1st 8 hours 2700 = 338ml/hr
- 2nd 8 hours 1350 = 169ml/hr
- 3rd 8 hours 1350ml = 169ml/hr

Fluid Resuscitation Guidelines

- Based on urine output
  - Pediatric .5ml to 1ml/kg/hr
  - Adults (>15yr) 30ml to 50ml/hr
    - UOP too low ⬆ fluids by 10%
    - UOP too high ⬇ fluids by 10%
  - NO Boluses

Types of Burns

- Contact
- Scalds
- Flame
- Chemical
- Electrical

Post burn day 7

Post burn day 14

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Tar Burns

- Tar creates a thermal injury, not a chemical one
- Bitumen compound not absorbed, not toxic
  - Cool tar to stop the burning process
  - Facilitate removal with use of a petroleum-based ointment or medically safe solvent to emulsify the tar

Scald Injuries

- Time of contact and water temperature to cause a burn
  - 120 degrees – 5 minutes
  - 130 degrees - 30 seconds
  - 140 degrees - 5 seconds
  - 160 degrees - instantaneous
- Young children and older adults may burn deeper faster because their skin is often very thin

Accidental Scald Burns

Accidental

- Splash marks present
- Irregular pattern of burn
- Consistent history

Microwave Noodle Soups Are Easy, Fast & Hot!

- According to the American Burn Association, the majority of burn injuries in children are the result of scalds.
- Each year over 100,000 kids are seriously burned with scalding liquids, many of which are from instant noodle soups cooked in the microwave.
- Follow cooking instructions and closely supervise kids of all ages.

Non-accidental Scald Burns

"Classic Dip"

- No splash marks
- Clear demarcation
- No or inconsistent story

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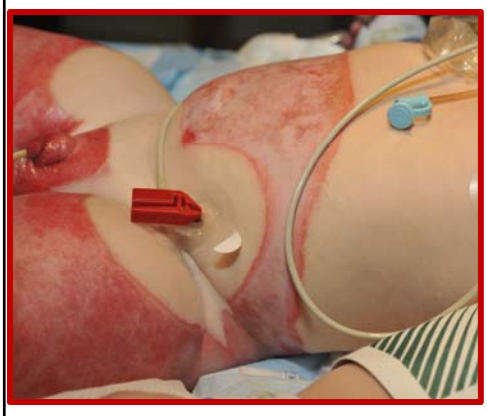

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Flash and Flame Injuries

- Flash burns
  - Intense heat for a short period
  - Clothing protective unless ignited
  - Generally not full thickness
- Flame burns
  - Deep dermal or full thickness
  - Proportional to time of contact

Post burn day 1

Post burn day 7

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Chemical

- Stop Burning Process
- Brush Away vs. Flush Away
- Flushing 20 minutes continuous

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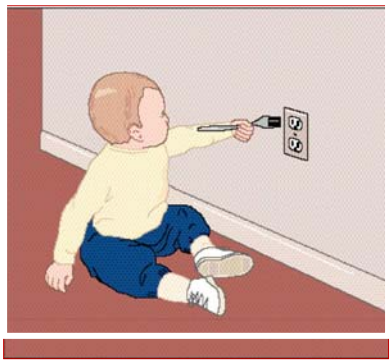
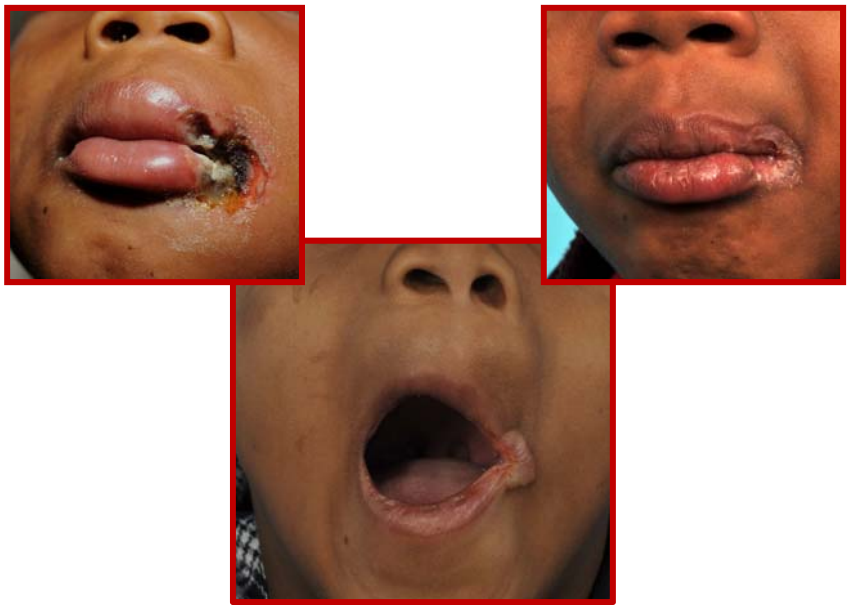
Electrical Injuries

- Low-voltage <1,000 V
  - Localized to area surrounding the contact point
- High-Voltage >1,000 V
  - Deep extension and underlying tissue damage





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High Voltage

- Monitor for Cardiac Dysrhythmias
- Monitor Peripheral Pulses
- Fluid Resuscitation
  - 4 ml X kg X %TBSA
- Rhabdomyolysis present
  - Adult 75-100 ml/hr
  - Children 1 ml/kg/hr

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Other Conditions

- Frostbite
- Dog bite
- Friction burns
- Road rash

Frostbite

Dog Bite

Avulsion

Friction burn

Post burn day 2

Post burn day 10

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Road rash

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Superficial

1st degree

- Involves epidermis
- Reddened, painful,
- No blisters
- Heals within 3-10 Days
- No scarring
- Care
  - Lotion for comfort

Partial Thickness

2nd degree

- Involves epidermis/part of dermis
- Painful, red, blisters
- Most often heals within 14 days

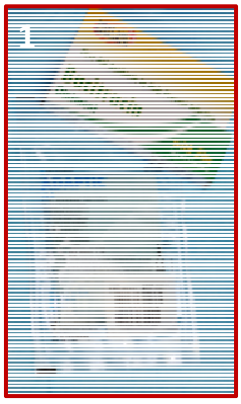
Treatment

- Administer pain medication
- Remove any wet or cold dressing. Cover with a dry dressing
- Wash with soap and water.
- Wound care
  - Transfer directly to a burn unit. Cover the burn with a clean dry dressing.
  - Going home, place antibiotic ointment/vaseline/ aquaphor on a dressing cover the burn.

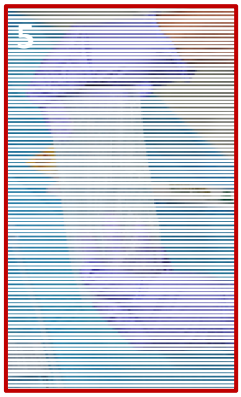
Post burn day 2 tx with silver sulfadiazine

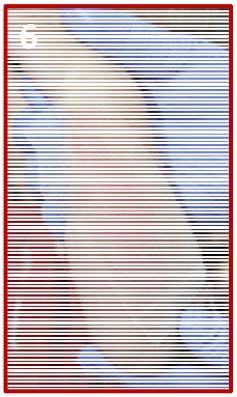
Post burn day 5 tx with Bacitracin

Dressing Preparation



Dressing Application





Post burn day 2

Post burn day 14

Post burn day 1

Post burn day 10

Post burn day 20

Full Thickness

3rd degree

- Epidermis/Dermis
- No pain/blanching
- Whitish/leathery/red
- Will not heal

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Treatment

Sheet Autograft

- Advantages:
  - more durable than mesh grafts
  - more cosmetic
  - contracts less than mesh grafts
- Disadvantages:
  - Bacteria/fluid may collect under the graft causing graft loss.

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Where hope and healing meet

Post burn day 5 | Post autograft 1 | Post autograft 3 months

Where hope and healing meet

Treatment

Mesh Autograft

Donor skin is fed through the Tanner mesher which can expand the skin from 1.5 to 9 times its original size.

Advantages:

- fewer donor sites are needed
- allows passage of exudate through the interstices.

Disadvantage:

- mesh pattern visible

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Scar Management

- Hypertrophic

- Keloid

Guidelines for Compression Therapy

Healing time

<10 days to heal no compression

10-20 days to heal monitor scarring

>21 days to heal or autografting compression

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Post burn 6 months

Post Burn 14 months

Where hope and healing meet

Contracture

Case study

- 12 year old male threw an aerosol can in a trash fire. When first responders arrive the child is sitting in the back yard awake and alert.

Based on mechanism of burn, what is your suspicion of inhalation injury?

Very low

Type of burn?

Flash burn

What is quick way to assess his airway?

Listen to his voice

Where hope and healing meet

- What is the best way to calculate TBSA?
  Palmar method
- What is his TBSA?
  5% TBSA
- What type of dressing should be applied?
  Dry dressing
- Does he require fluid resuscitation?
  No
- What type of pain control?
  IV Morphine or over the counter

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Case Study

- 10 year old male and his 7 year old brother were sleeping in a camper in their backyard. Father noticed smoke and flames from the camper. The 10 year old was pulled from the camper but the brother was not able to be rescued.
- The 10 year old is obtunded at the scene and appears to have eschar covering his entire body.

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Priorities

- What type of airway management?
  - Immediate intubation
- The child is lying naked on the grass covered in wet sheets. What should be done?
  - Cover with warm dry sheets/blankets
- Due to extensive eschar what type of IV access?
  - Intraosseous
- What would be fluid of choice and at what rate?
  - Lactated ringers at 250ml/hr

80% TBSA all Full Thickness Burns

- What is a complication of circumferential eschar?
  - Compartment syndrome/chest expansion restriction
- What does rhabdomyolysis represent?
  - Muscle damage
- What is the Parkland formula?
  - 3ml X %burn X weight in Kg
- The patients weight is 45Kg. What should his UOP be?
  - 0.5ml to 1 ml per Kg per hour

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12 hours post burn

- Temperature 35.5°C
  - What measures can be taken to warm the patient?
    - Keep covered at all times
    - Warm IV fluids
    - Increase ambient air temperature
- Urine output 5ml last hour
  - How should the fluids be managed?
    - Increase total amount by 10%
- RUE peripheral pulses have become less evident
  - What measures should be taken?
    - Extend escharotomies

2 months post burn

- Wound coverage 90%
- Decanulated
- Enteral feeds held 2 hours before meals
- Beginning weight bearing

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Post burn 2 weeks

Post burn 2 months

Feeling Good!

One year post burn


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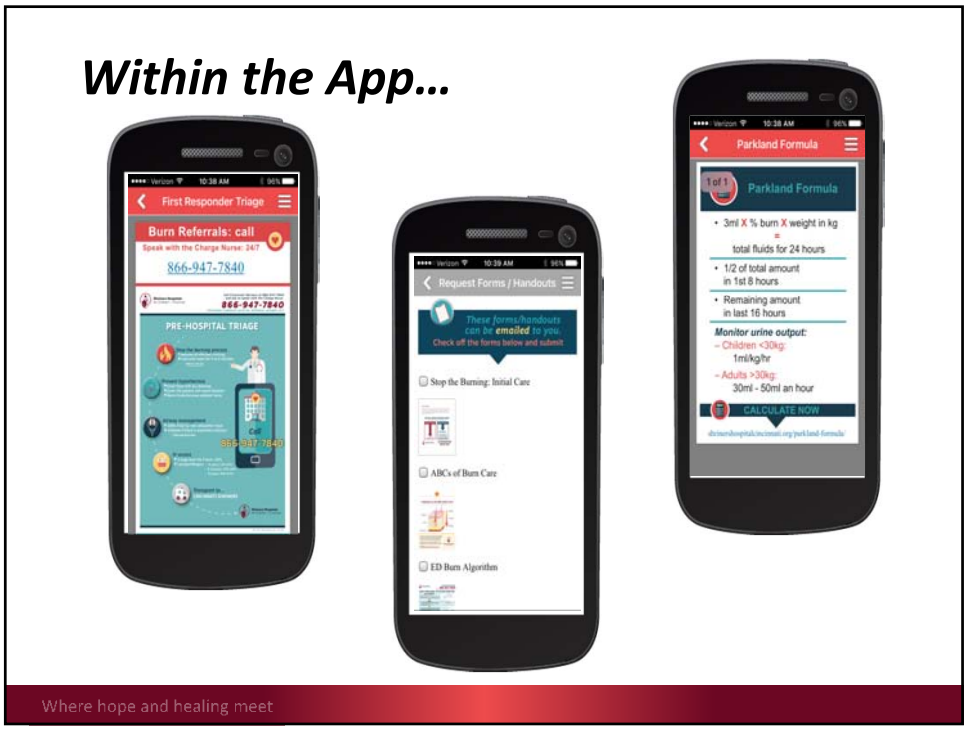
Within the App…
First Responder Triage
Burn Referrals: call
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PRE-HOSPITAL TRIAGE
Request Forms / Handouts
These forms/handouts can be emailed to you.
Check off the forms below and submit
Stop the Burning: Initial Care
ABC's of Burn Care
ED Burn Algorithm
Parkland Formula
1 of 1
Parkland Formula
3ml X % burn X weight in kg
=
total fluids for 24 hours
1/2 of total amount in 1st 8 hours
Remaining amount in last 16 hours
Monitor urine output:
– Children <30kg:
1ml/kg/hr
– Adults >30kg:
30ml - 50ml an hour
CALCULATE NOW
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