

PATIENT CARE THEORY 2

UNIT 2, PART 5: Burn Assessment and treatment

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You Have a Burn Patient.....

- ❖ Always consider non accidental trauma in the pediatric burn patient
- ❖ Always consider trauma in your burn patients
 - This may precede the burn assessment (its very hard sometimes to ignore the initial visual presentation of the burn)
 - Most common injuries associated with burns:
 - Fractures (50-60%)
 - TBI (20 – 25%)
 - Thoracic or abdominal injuries (4-24%)
- ❖ All serious burn patients should be receiving 100% O₂ via NRB as quickly as possible. Why?
 - Assume CO poisoning, cyanide poisoning,



Depth of Burns



Depth of Burns

- ❖ Old terminology (still exists in the BLS Standards 2006)
- ❖ 1st degree burns
 - Affects only the epidermis (e.g. sunburn)
 - Healing occurs in a few days
- ❖ 2nd degree burns
 - Burn that extends down to the dermis
 - Healing occurs slowly
- ❖ 3rd degree burns
 - Extends down to the subcutaneous layer and fatty layer
- ❖ 4th degree burns
 - Extends down to the muscle or bone



Depth of Burns

- ❖ burns frequently include more than one level of depth in different areas of the burn
- ❖ i.e. there may be a burn area that extends down to the subcutaneous layer with the area outside the center of the burn only extending down to the dermis
- ❖ There is some overlap and therefore, *new terminology has been adopted*



Depth of Burns

❖ Superficial thickness (1st Degree burn)

- Affects the epidermis
- Mildly painful
- red
- dry
- blanches with pressure with a brisk cap refill
- never blisters
- **NOT CALCULATED IN BURN EXTENT (TBSA)**
- typically heal within 5-7 days (if only the epidermis is involved)



Depth of Burns

Superficial thickness - epidermis



Depth of Burns

Superficial thickness - epidermis



Depth of Burns

Superficial thickness - epidermis



Depth of Burns

Superficial Partial Thickness & Deep Partial Thickness Burn (formally called Second degree)

❖ Superficial Partial Thickness

- Through the epidermis into the superficial dermis
- Pink
- Look wet
- more painful but still have quick cap refill
- Can have Blisters
- Hair follicles, sebaceous and sweat glands are damaged
- We don't de-roof the blisters
- Healing may take 2-4 wks

❖ Deep Partial Thickness

- goes beyond the superficial dermis into the deep dermis
- Look cherry red or pale
- Sluggish cap refill
- More or less painful depending on nerves
- Healing can take up to 6 weeks
- produce scarring and generally requires grafting (to reduce the scarring)



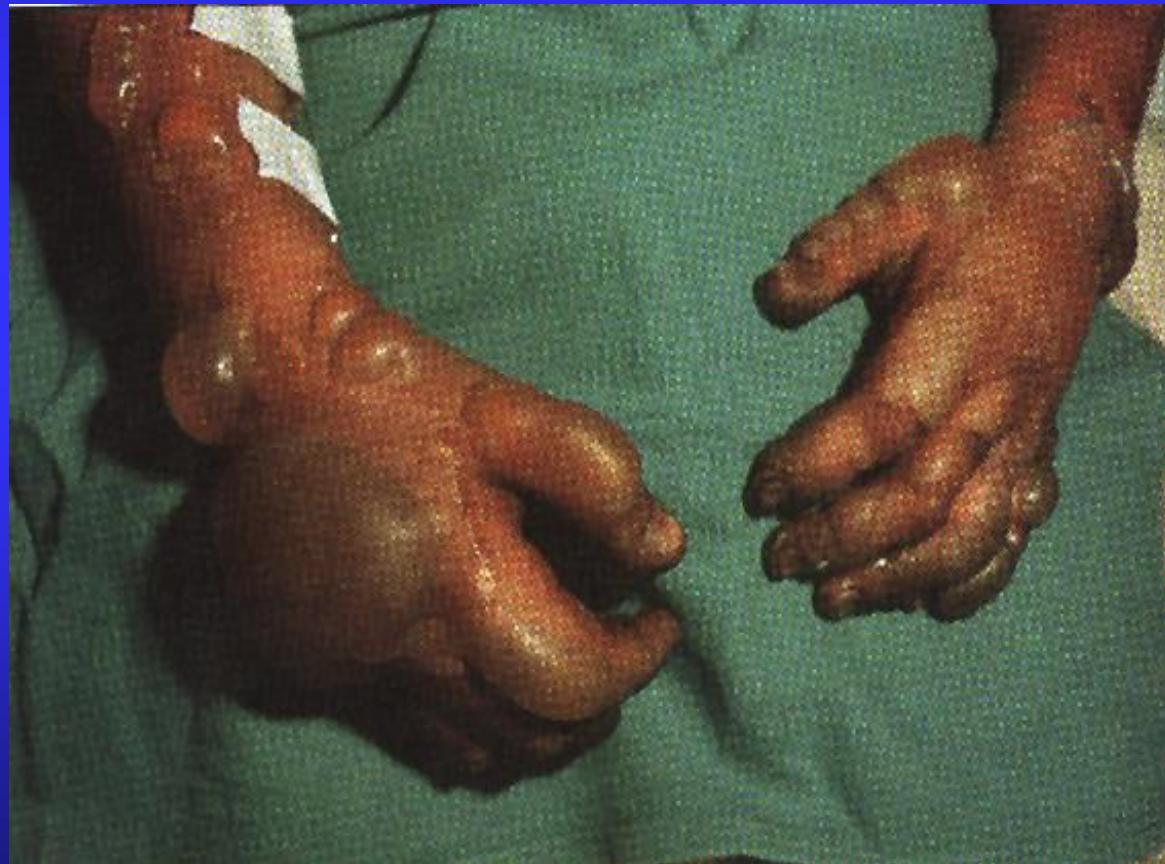
Depth of Burns

Deep Partial Thickness Burn - dermis



Depth of Burns

Deep Partial Thickness Burn - dermis



Depth of Burns

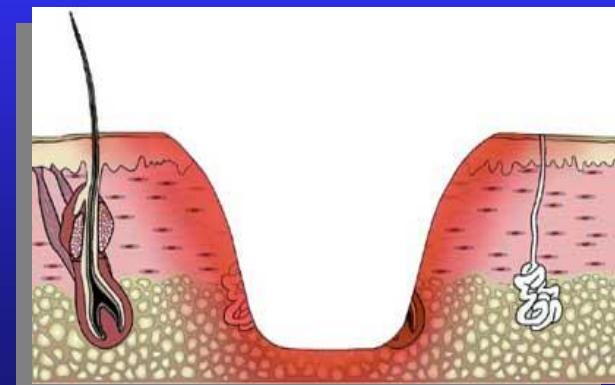
Deep Partial Thickness Burn - dermis



Depth of Burns

Full Thickness Burn (formally called Third degree)

- Affects all layers of skin, the subcutaneous tissue and fatty layer, including underlying fascia, muscle and bone
- Usually painless (in the immediate area)
- No cap refill
- “pearly” white or charred or various colours
- Treatment is always surgical



Depth of Burns

- ❖ Full Thickness Burn – subcutaneous tissue
– campfire



Depth of Burns

- ❖ Full Thickness Burn – subcutaneous tissue
 - bathtub



Depth of Burns

- ❖ Full Thickness Burn – subcutaneous tissue
 - House fire



Depth of Burns

❖ Full Thickness Burn – subcutaneous tissue

- Scald
- Various burn depth present
- Produce keloid scarring



Depth of Burns

Full Thickness with *Eschar*

- ❖ burns past the subcutaneous tissue to the muscle
- ❖ Painless (in immediate area)
- ❖ “pearly” white or charred
- ❖ Performed to reduce risk of compartment syndrome



Depth of Burns

Full Thickness with Eschar



BURN DESCRIPTION	APPEARANCE	CAP REFILL	SENSATION/ PAIN	HEALING	
1st SUPERFICIAL THICKNESS	ERYTHEMA	FAST	+	7-14D	
SUPERFICIAL PARTIAL THICKNESS	WET, PINK, BLISTERS,	FAST	++	2-4 WEEKS	
2nd DEEP PARTIAL THICKNESS	LESS WET, RED, +/- BLISTERS,	SLUGGISH OR ABSENT	+/-	3-8WKS WITH SEVERE SCARRING; NEEDS GRAFTING	
3rd FULL THICKNESS	DRY, WHITE	ABSENT	ABSENT	NEEDS GRAFTING	



Eschar

- ❖ full thickness burn that encircles a part of the body or restricts breathing = code 4, CTAS 1
- ❖ dry, chalky appearance
- ❖ inelastic
- ❖ swelling beneath the eschar can result in compartment syndrome - “load & go!”



Depth of Burns

- ❖ Both deep and partial thickness burns may not blanch
- ❖ Burns are dynamic wounds – burns may continue to deepen over a few days
 - True depth of burn may not be known for 48-72 hours
 - Correct depth assessment is accurate 60% of the time on initial assessment



Inhalation Burns

- ❖ thermal burns below the glottis is uncommon
- ❖ exposure to steam may produce DEEP airway burns
- ❖ chemical burns may produce massive pulmonary edema and difficulty in ventilation



Inhalation Burns

Look for the clues to suspect airway involvement

- ❖ burns to the face/neck
- ❖ singed hairs: beard, eyelids, eyelashes, or nasal hairs
- ❖ soot around the mouth, nose, teeth, gums
- ❖ black tongue
- ❖ carbonaceous sputum
- ❖ hoarse voice
- ❖ Stridor (ominous)
- ❖ respiratory distress



Inhalation Burns

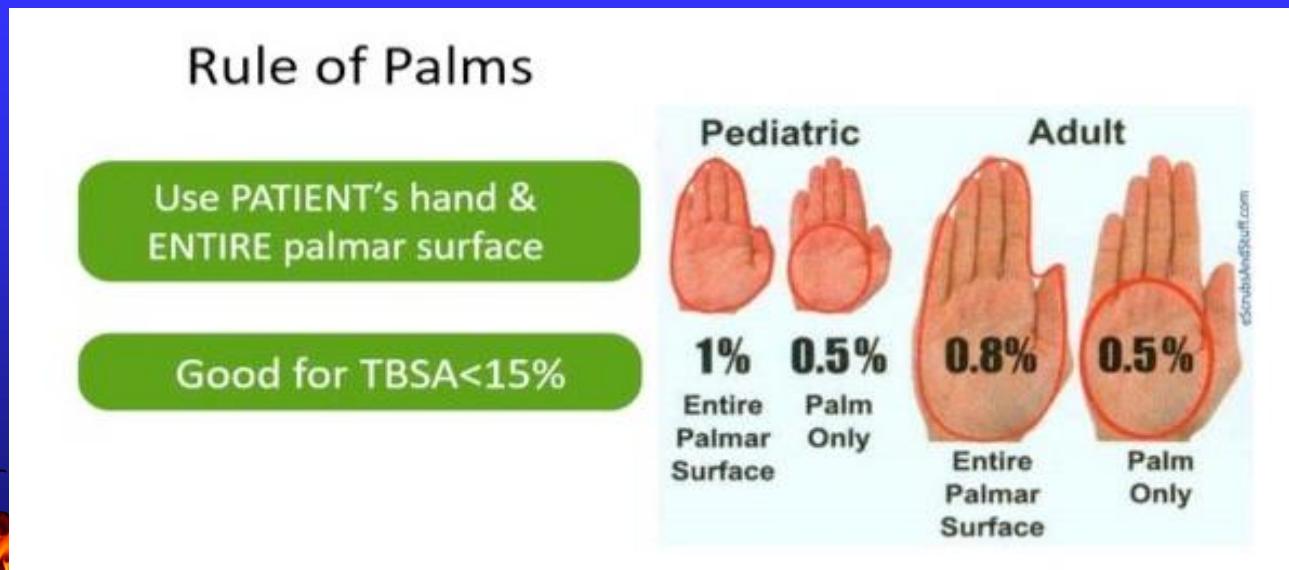
Consider need for future airway management.....

- ❖ burns to the lips, tongue, oropharynx
- ❖ Indications for early intubation:
 - ❖ Signs of respiratory distress, stridor, accessory muscle use
 - ❖ ***New onset of hoarseness*****
 - ❖ Blisters or edema of oropharynx
 - ❖ Deep burns to lower face or neck
- ❖ Not all patients with singed nasal hairs and facial burns will require intubation
 - ❖ Mild inhalational injuries in patients with normal oxygen saturations and no signs of respiratory distress can be safely observed.



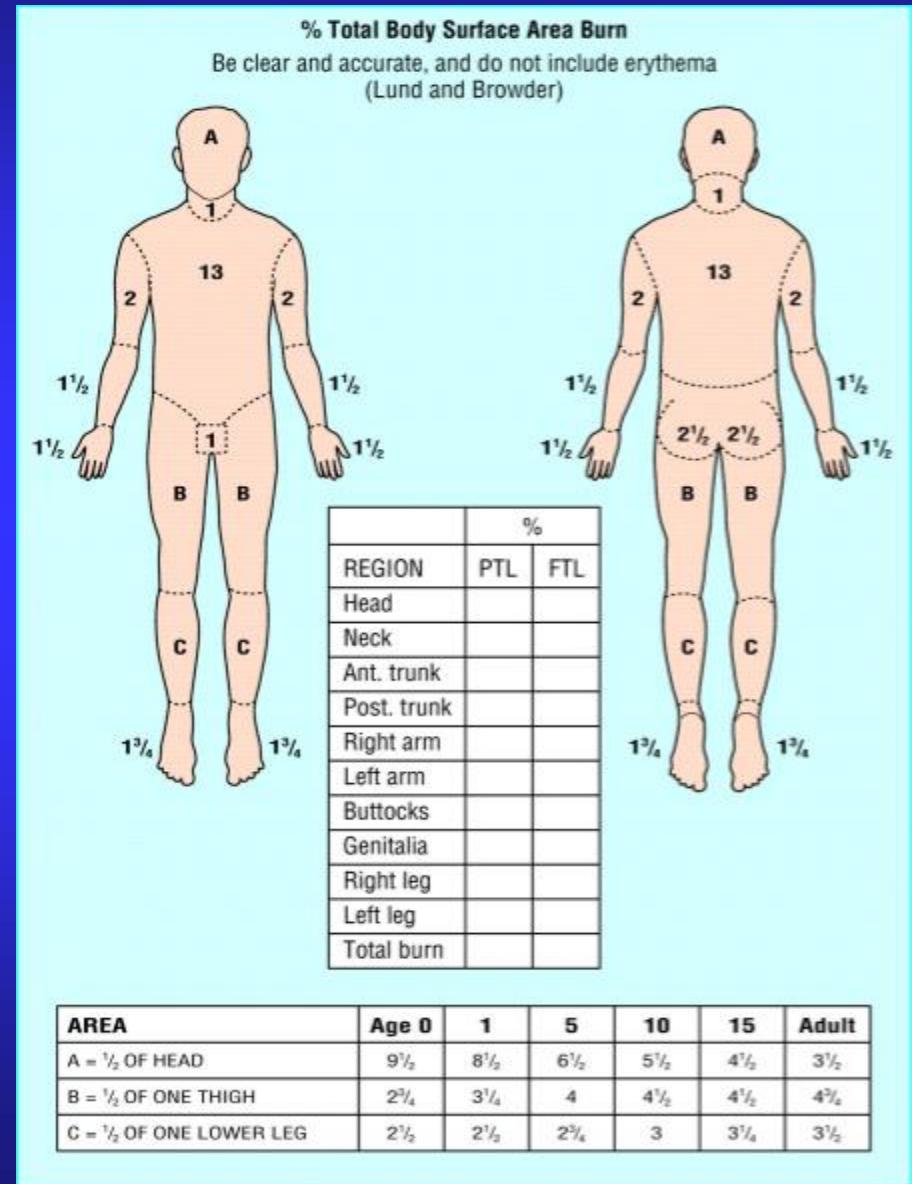
Estimation of Burn Size

- ❖ Rule of Nine's – historically used but inaccurate and consistently overestimates TBSA by about 20%
 - This can lead to over-resuscitation
- ❖ For TBSA <15% or >85% use the Rule of palms
 - Highly accurate
 - Uses the size of the **PATIENTS HAND (including fingers)**



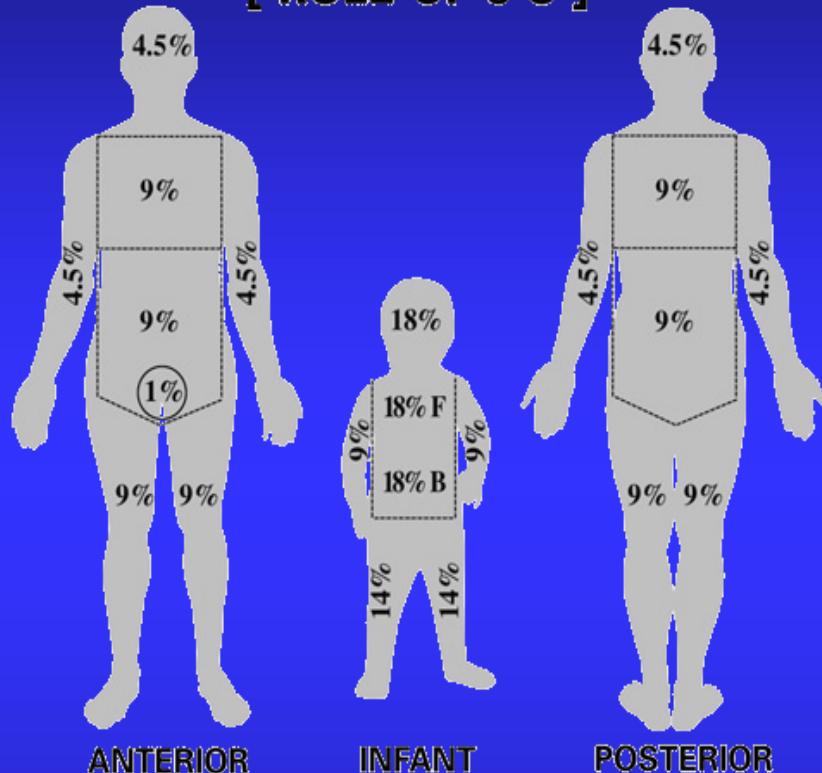
Estimation of Burn Size

- ❖ Lund and Browder Chart
 - Far more accurate and has excellent inter-rater reliability
 - Does NOT include superficial thickness burns



Body Surface Area – Former Method

[RULE OF 9'S]



**PALMAR
METHOD**
(Patient's palm)



Rule of Nine Burn Chart

Total arm (1)	9%
<ul style="list-style-type: none">• Anterior side of arm• Posterior side of arm• If both sides of both arms are burned	<ul style="list-style-type: none">• 4.5%• 4.5%• 18% in total
Total leg (1)	18%
<ul style="list-style-type: none">• Anterior side of leg• Posterior side of leg:• If both sides of both legs are burned	<ul style="list-style-type: none">• 9%• 9%• 36% in total
Anterior Chest	9%
Anterior Abdomen	9%
Posterior Superior Back (back side of the chest)	9%
Posterior Inferior Back (back side of the abdomen)	9%
Head/neck	9%
<ul style="list-style-type: none">• Anterior side of head (the face)• Posterior side of head	<ul style="list-style-type: none">• 4.5%• 4.5%
Groin	1%

Body Surface Area

- ❖ Rule of Nines (adults)
- ❖ children have their own set of rules
 - * head = 18%
 - * chest & abdomen = 18%
 - * leg = 7% (child), 14% (infant)
- ❖ a hand is worth 1%
- ❖ high risk areas?
 - * face, hands, feet, perineum



Major or Extensive Burns

MAJOR BURN

- ❖ ≥ 25% BSA 2nd degree burn in an adult
- ❖ ≥ 20% BSA 2nd degree burn in a child
- ❖ ≥ 10% BSA 3rd degree burn in an adult
- ❖ Any 3rd degree burn in a child
- ❖ Any airway burn

Read BLS Standards for more detail



Assessment of Burns

- ❖ Scene Size-up
 - Fire Department
 - SCBA and protective clothing
 - Stop any continued burning on the patient
 - MOI
- ❖ A-B-C-D-E



Airway Assessment

Patients at high risk of inhalation injury

- ❖ Steam burns = highest risk
- ❖ Chemical inhalation
- ❖ patient in confined space or caught in an explosion is at higher risk for inhalation injury (thermal) for as little as a minute
- ❖ facial burns
- ❖ wheezing
- ❖ any respiratory distress





Patient Assessment

B Respiratory distress

- ❖ May indicate chemical airway burns, chemical inhalation leading to bronchospasm / pulmonary edema
- ❖ Bronchospasm can be treated with _____
- ❖ Transport lights & sirens



Patient Assessment

- C** Gross bleeding?
 - ❖ Assess for shock
 - ❖ Fluid loss from extensive burns is a relatively slower loss compared to blood loss from trauma
 - ❖ Therefore assume blood loss from trauma if hypotension and tachycardia is present
 - ❖ Assess for eschar that compromises peripheral circulation
 - ❖ Transport lights & sirens



Patient Assessment

D Altered Neuro status

- ❖ May signal CO poisoning, cyanide poisoning, head trauma or hypoxia from partial airway occlusion or lung irritation
- ❖ Transport lights & sirens



Patient Assessment

- E** expose the patient
- ❖ Other obvious signs of trauma?



Patient Assessment

- ❖ HPI
- ❖ c/c
- ❖ Vitals, ECG, SpO₂ monitor
- ❖ PMHx, Rx, allergies
- ❖ assess depth and TBSA affected
- ❖ further resuscitation
- ❖ Get as much information as quickly as possible
in the event your patient condition changes



Patient Assessment

Alternatives to assessing BP
when arms are badly burned



Signs of Abuse: Burns



Overview

- ❖ Burns are a common childhood injury
- ❖ Account for a large number of ER visits
- ❖ Scalds are most common followed by contact burns
- ❖ Unfortunately a significant percentage of abuse is caused by burning
- ❖ Children < 3 are most susceptible



<https://pediatrictraumasociety.org/meeting/multimedia/files/2019/Presentations/Friday/0330-Ziegfeld.pdf>

Risk factors

❖ include:

- Premature child
- Younger (< 3 yrs)
- Chronic illness/ colic
- Developmental, physical, cognitive, emotional or social delays
- Unwanted children
- Misbehaviour or challenging behaviour



Parental factors

- ❖ Young/teenage parent
- ❖ Parent abused as a child
- ❖ Nonbiological caregiver
- ❖ Emotionally vulnerable
- ❖ Low self esteem, Depression
- ❖ Limited ability to cope with stress or anger
- ❖ Unrealistic expectations
- ❖ Social isolation
- ❖ Poorly developed support system
- ❖ Loss of a job / poverty
- ❖ Substance abuse
- ❖ History of domestic violence



Triggers your Spidey Senses

- ❖ Delay in seeking care
- ❖ Injury attributed to the actions of other child
- ❖ Changes in story/HPI (multiple versions)
- ❖ HPI inconsistent with the developmental capabilities of the child (i.e. a 3 month old can't turn on the hot water tap)
- ❖ HPI inconsistent with the presenting injury
- ❖ Injury claimed to be unwitnessed



Burn Patterns in Child Abuse

Inflicted/Abuse

- ❖ burn patterns consistent with forced immersion in a hot liquid (a distinct boundary line where the burn stops);
- ❖ Uniform burn depth
- ❖ burn patterns consistent with a spattering by hot liquids;
- ❖ patterns caused by a particular kind of implement, such as an electric iron;
- ❖ or instrument, such as circular cigarette burns



Unintentional

- ❖ Reasonable story
- ❖ Irregular burn margins
- ❖ Variable burn depths (initial point of contact most deeply burned)
- ❖ Multiple splash marks (burn severity lessens as it flows towards dependent anatomy)

Burn Patterns in Child Abuse



Cement burns

64% calcium oxide (also called lime) and 21% silicon oxide and has an alkaline pH of approximately 12.5



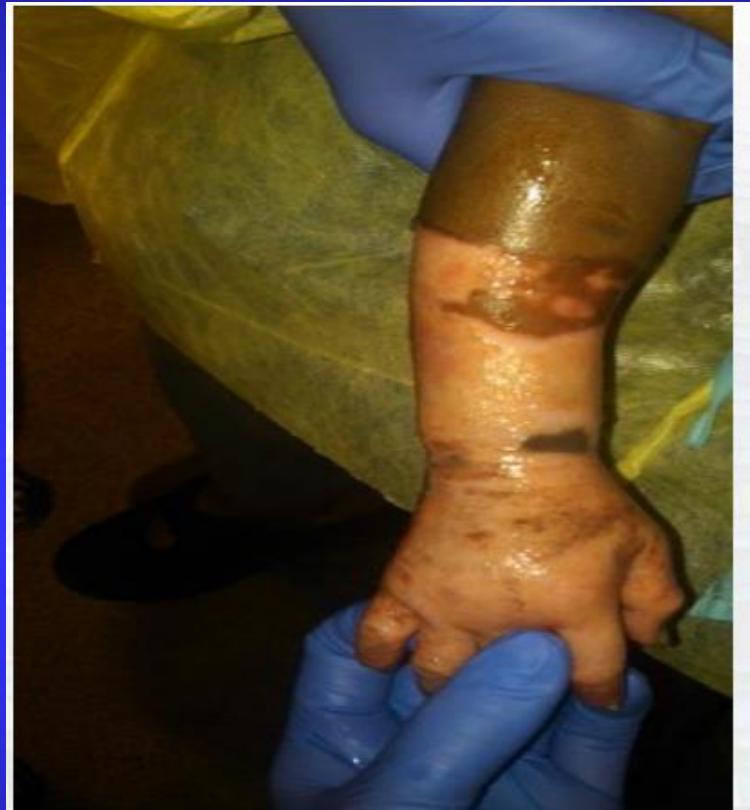
Concerning or No?



- ❖ 3 yr old grabbed a hot tea off the kitchen table



Concern or no?



- ❖ 18 month old washing his hands



Burn Patterns in Child Abuse

BURN MARKS

Hot plate



Light bulb



Curling iron



Car cigarette lighter



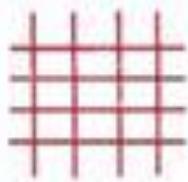
Steam iron



Knife



Grid



Cigarette



Forks



Immersion



Key points

- ❖ Mindful consideration of potential abuse should be used when dealing with pediatric burns
- ❖ Looks for patterns and red flags
- ❖ Any suspicions need to be reported (mandatory reporting requirements)
- ❖ **Child in Need of Protection Standard**



Questions?

