

# *Burn Care*



# OBJECTIVES

Describe	Describe the outpatient clinic and inpatient unit within the Burn Institute at Akron Children's Hospital
Discuss	Discuss the multi-disciplinary approach to the burn patient
Identify	Identify outpatient management of burns in the primary care setting
Review	Review advanced burn care and updates in surgical management



Allow Myself  
to  
Introduce...  
Myself



# Allow Myself to Introduce... Myself Some More



## ***The Cleveland Clinic***

*PA-C*

Department of Neurosurgery  
Center for Spine Health  
2011-2014



## ***Children's Hospital Colorado***

*PA-C*

Pediatric Surgery  
2014-2018



## ***Akron Children's Hospital***

*PA-C*

Burn Surgery  
2018 to current  
*Lead APP*  
2020 to current



# The Burn Institute at Akron Children's Hospital



## Outpatient Clinic

Scheduled outpatient clinic visits

- New, follow-up, post-op burn patients
- Emergency walk-in patients
- APPs run outpatient



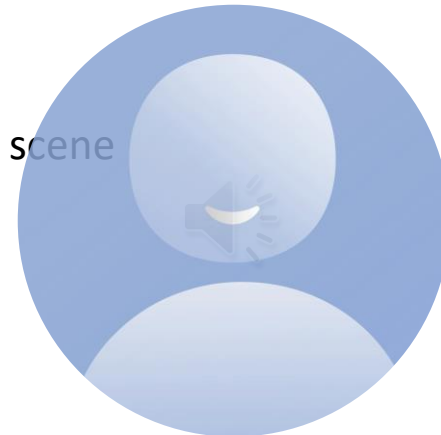
## Inpatient Unit

12 beds

Floor status & critically ill

Patients brought via EMS direct from scene

Transfer from outside hospital





# The Burn Center at Akron Children's Hospital

- 11 APPs supporting OR, outpatient and inpatient
  - 7 Daytime Burn APPs
  - 4 Night House Officer APPs
- No dedicated burn residents
- 1 burn fellow
- 2 burn surgeons





# Burn Care... A Team Effort!!!

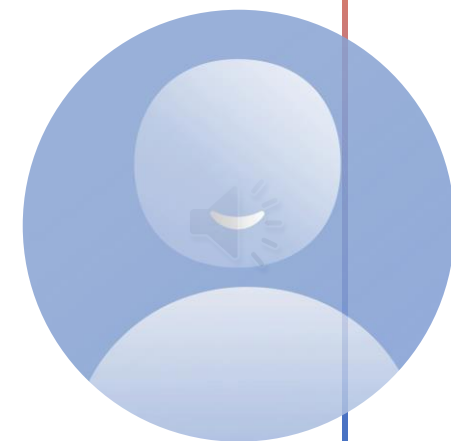
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- Weekly multi-disciplinary team meeting
  - Pharmacy
  - Registered Dietician
  - Speech therapy
  - PT/OT
  - Psychology
  - Psychiatry
  - Palliative Care
  - Social Work
  - Case Management
  - Chaplain
  - Nurses
  - APPs
  - Surgeons





# Degrees of Burn





1st  
Degree

Superficial

2nd  
Degree

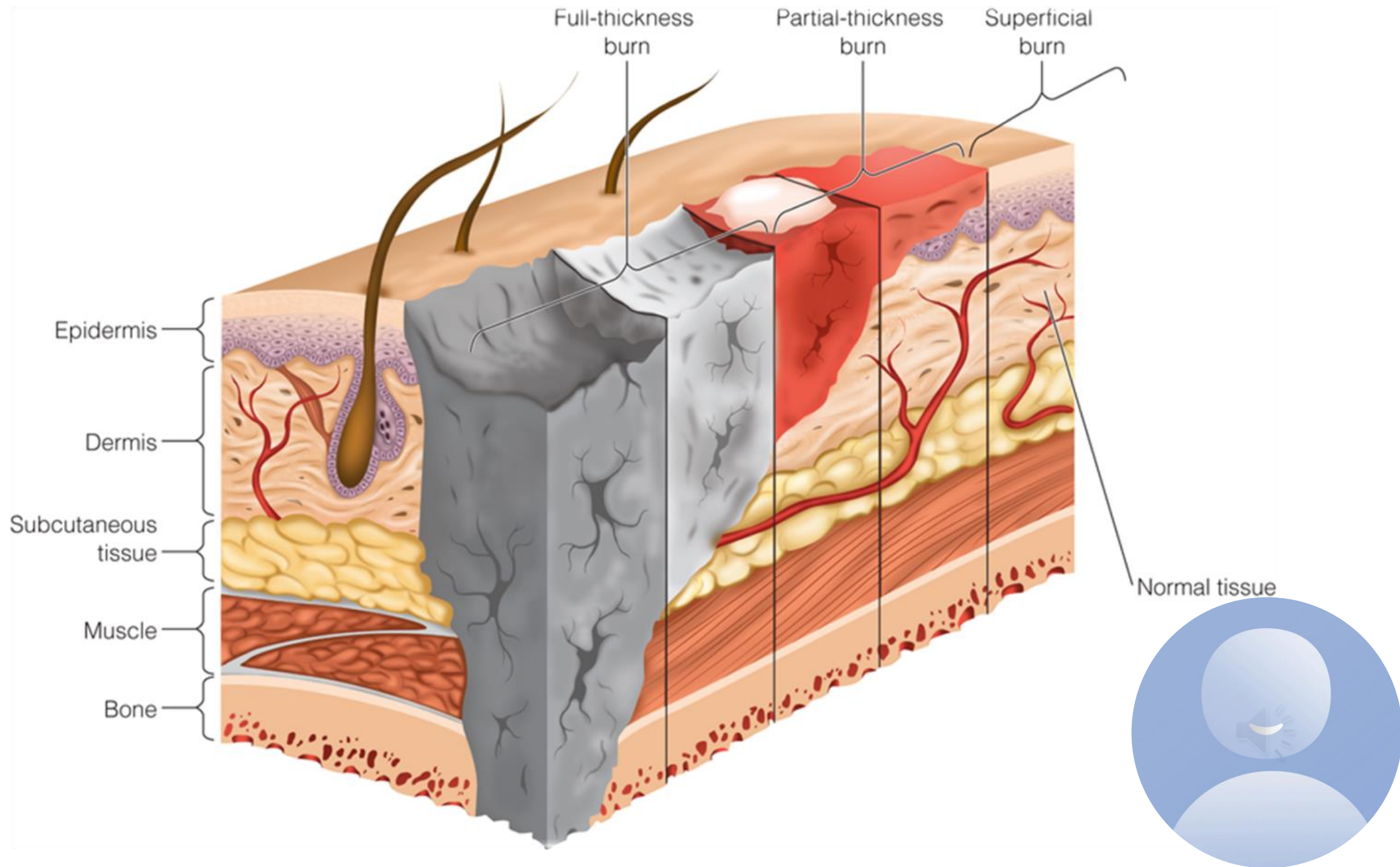
Superficial  
Partial

Deep  
Partial

3rd  
Degree

Full  
Thickness





# Superficial



Example: sunburn, scald with no blisters



Depth: epidermis only



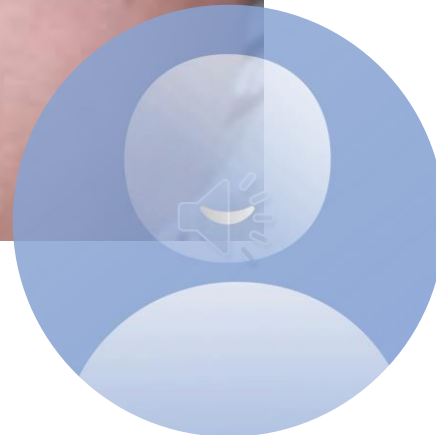
Appearance: red, hypersensitive, no blisters



Healing: within 3-5 days



Scarring: none; no pigment changes





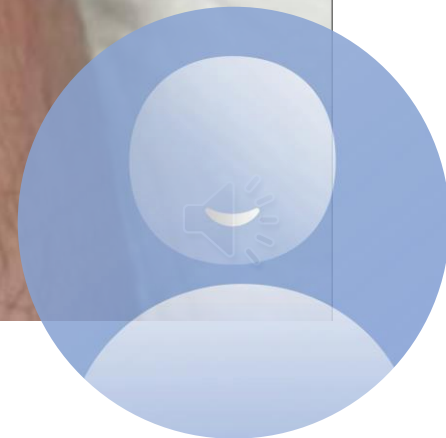
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# Superficial Partial Thickness

- Depth: epidermis destroyed; minimal damage to superficial dermis
- Appearance: blistered or sloughed, wound base red or pink, blanching, moist, hypersensitive
- Healing: within 10-14 days
- Scarring: none; may have pigment changes







# Deep Partial Thickness

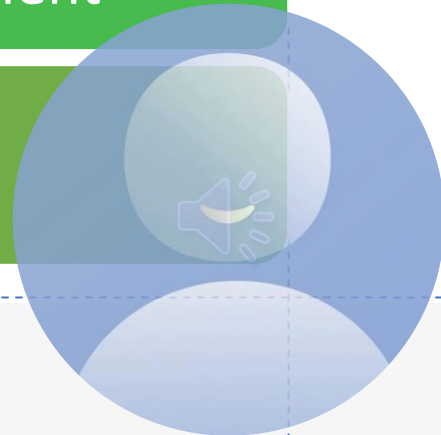
Depth: epidermis and papillary dermis destroyed

Appearance: pale (red, pink or white), prolonged or absent blanching

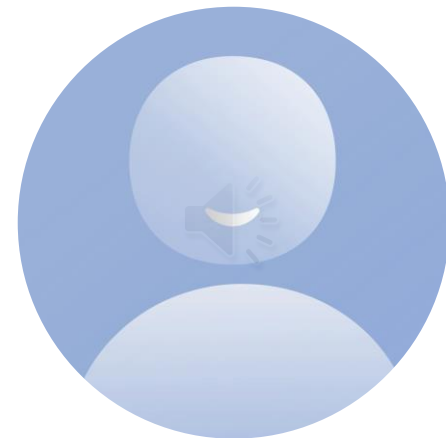
Healing: >3 weeks

Scarring: scarring with fragile epithelium; hypertrophic scarring; functional impairment

May require excision and grafting







# Full Thickness

Depth: epidermis and dermis destroyed; no epidermal appendages remaining

Appearance: pale and mottled (brown or white); contracted, leather like; dry; visible thrombosed vessels

Healing/scarring: requires excision and grafting

Involves connective tissue, muscle, bone

May require amputation

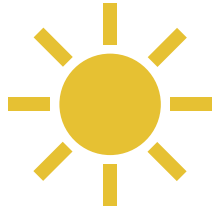








# Factors Affecting Depth of Burn



**Temperature of  
substance**



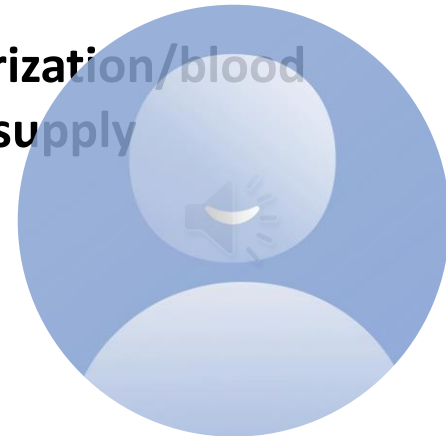
**Thickness of skin**



**Duration of contact**

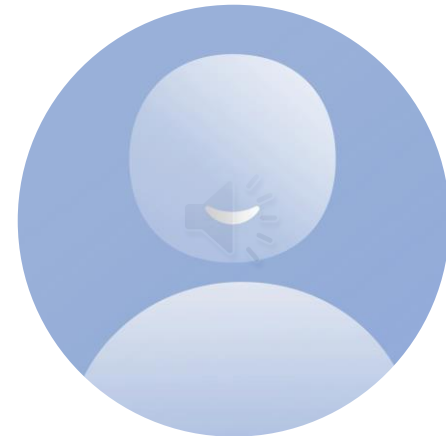


**Vascularization/blood  
supply**



# OUTPATIENT BURN CLINIC PEARLS

- Patient Education
  - Daily wash- SOAP, water, gentle pressure
  - Must wash ointment all the way off
  - Nutrition
  - Nicotine
  - DM2
  - Progression of blistering





# OUTPATIENT BURN CLINIC PEARLS

- 1<sup>st</sup> degree
  - Lotion
  - Does not need to be covered
- Superficial 2<sup>nd</sup> degree
  - Bacitracin
- Deep 2<sup>nd</sup> degree or 3<sup>rd</sup> degree
  - Silvadene & refer to burn center
  - Collagenase + bacitracin
- Concern for infection
  - Silvadene
  - Oral antibiotic
    - Bactrim
    - Clindamycin if sulfa allergy
    - Ciprofloxacin or Levofloxacin if lake/water exposure



# TOPICAL TREATMENT- enzymatic debrider



1 week with Santyl

2 weeks with Santyl



# OUTPATIENT BURN CLINIC PEARLS

- BLISTER? TO OPEN OR NOT
  - Mechanism
    - Contact
    - Submersion or extended scald (DM2)
  - Tense?
  - Resorbing?
  - Is it going to rupture on it's own?



# OUTPATIENT BURN CLINIC PEARLS

- Pain
  - Alternate Tylenol and Ibuprofen every 3 hours
  - Oxycodone for breakthrough
  - Risk/benefit of narcotic for adequate wound care





# OUTPATIENT BURN CLINIC PEARLS

## RECOGNIZING ESCHAR



ESCHAR IS A COLLECTION OF DEAD  
TISSUE & CAN BE PALE YELLOW,  
BRIGHT YELLOW, BROWN, BLACK



# OUTPATIENT BURN CLINIC PEARLS



INFECTION & CELLULITIS



# Burn Patient Referral

- We are happy to take care of any burn patient in the outpatient burn center, no matter how big or how small!
- We try to accommodate new patients through the outpatient burn clinic within 2 business days
- Accept emergency patients 24/7



# Burn Patient Referral

Consideration for Inpatient Admission	Outpatient Clinic
>5% TBSA	Deep partial or full thickness
Suspected Inhalation Injury	Chemical Burns
High Voltage Electrical Injury	Low Voltage Electrical Injury
Multiple Large Blisters	Treadmill Friction Burns
	Large Blisters

[ONE PAGE - Guidelines for Burn Patient Referral \(ameriburn.org\)](http://ameriburn.org)





# Abuse & Neglect in Burn

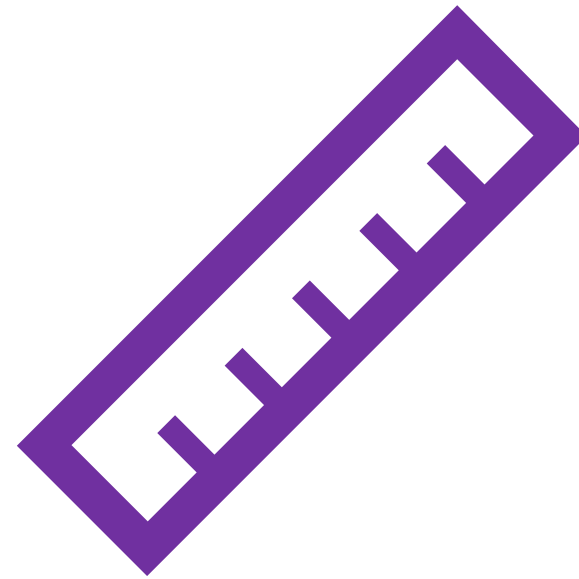
- History inconsistent with injury
  - Parents report that water spilled on the child but consistent with submersion pattern
- History vague
  - Unable to illicit more clear detail with additional questions
- History changes in repeated versions by the same caretaker
  - Thoroughly read all documentation
  - History reported to RN
- Inconsistent with developmental stage of the child





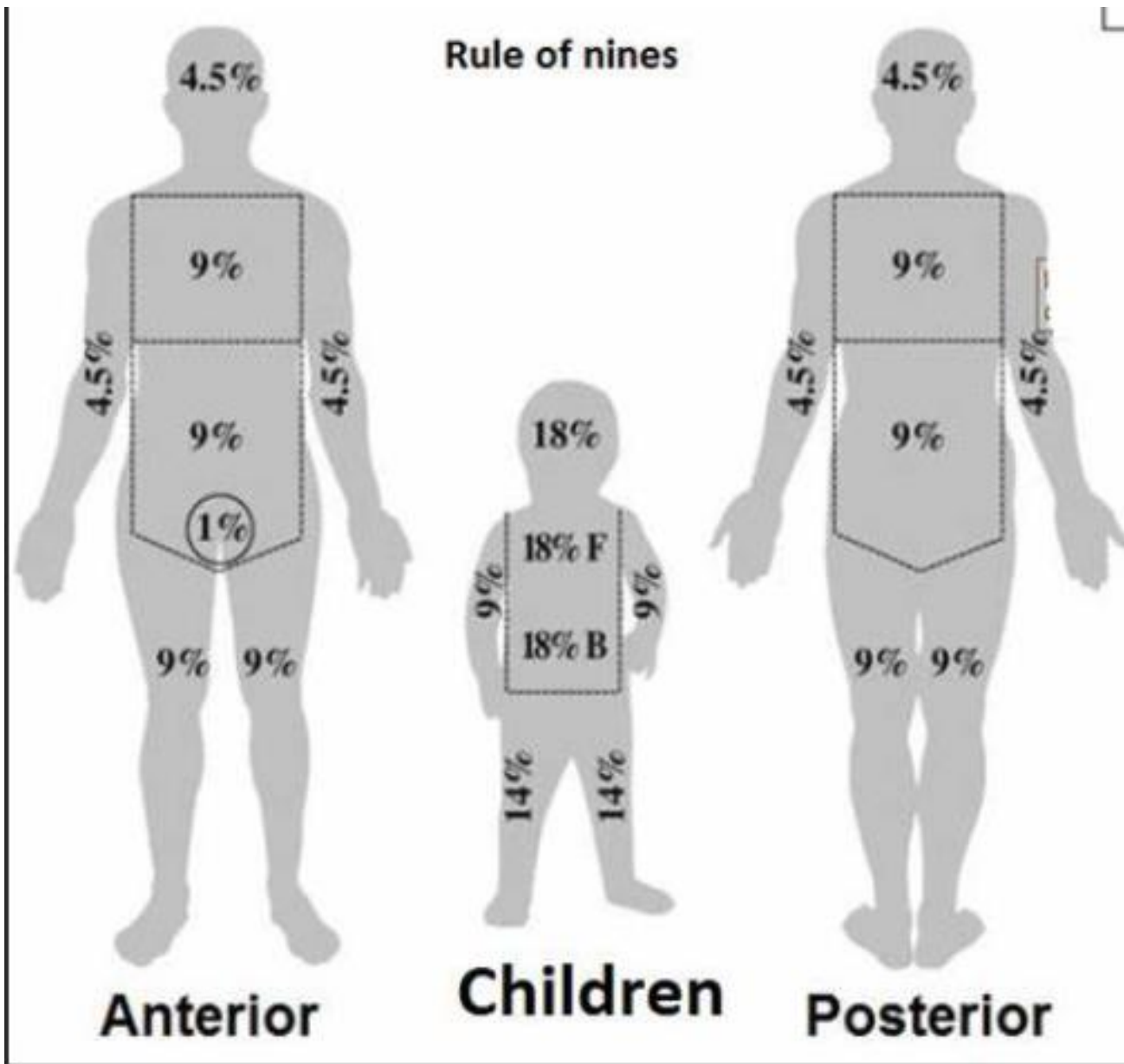


# Burn Size



Reminder!!! Superficial burns are NOT calculated into TBSA





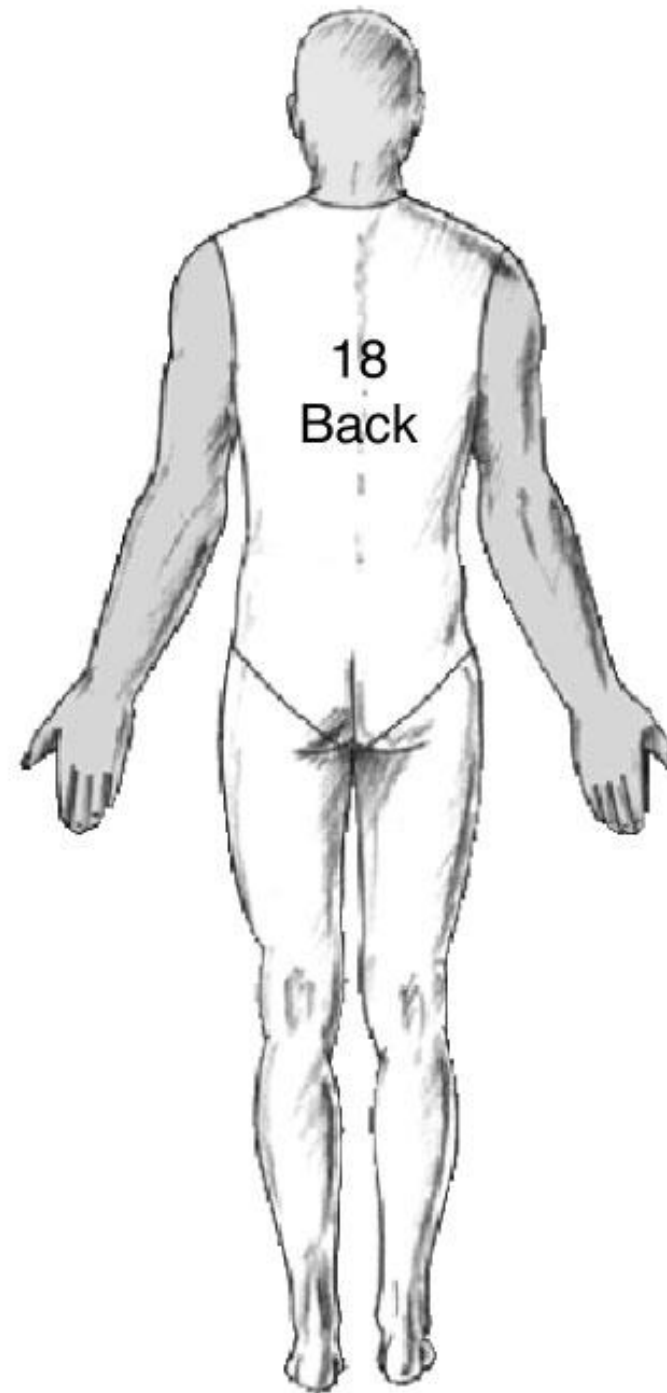
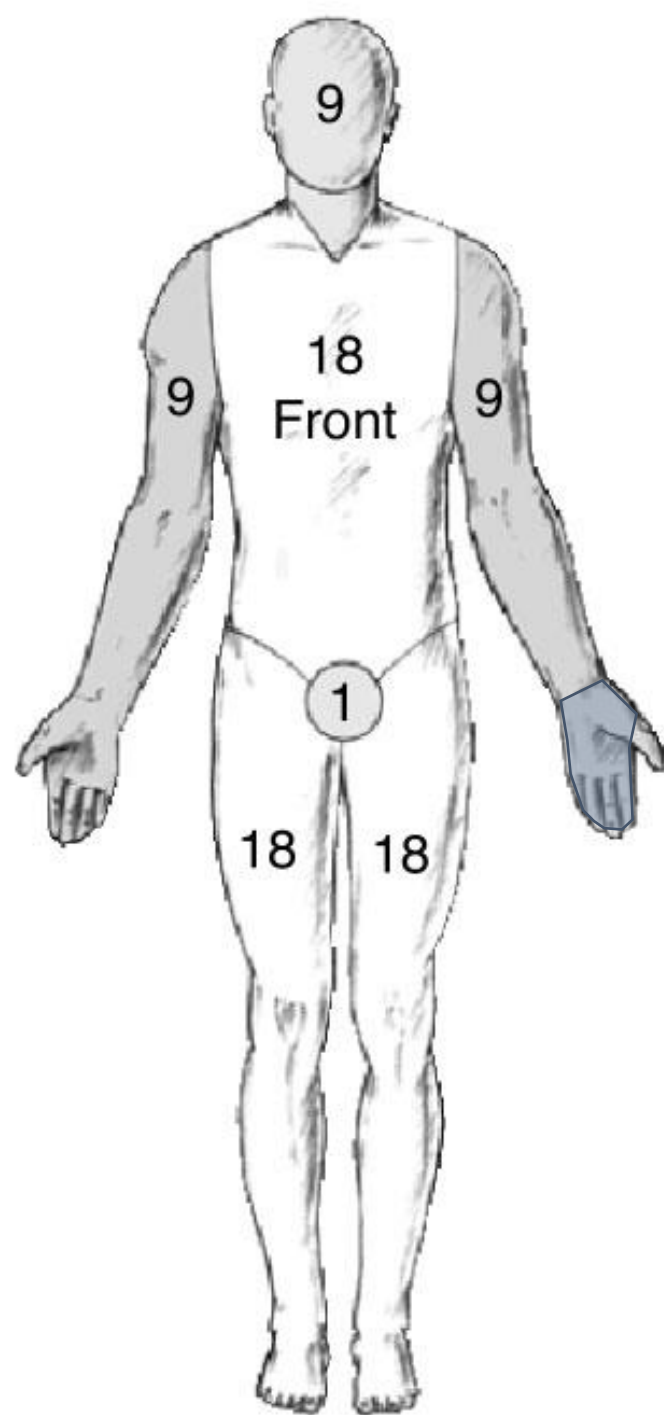
“Rule of Nines”

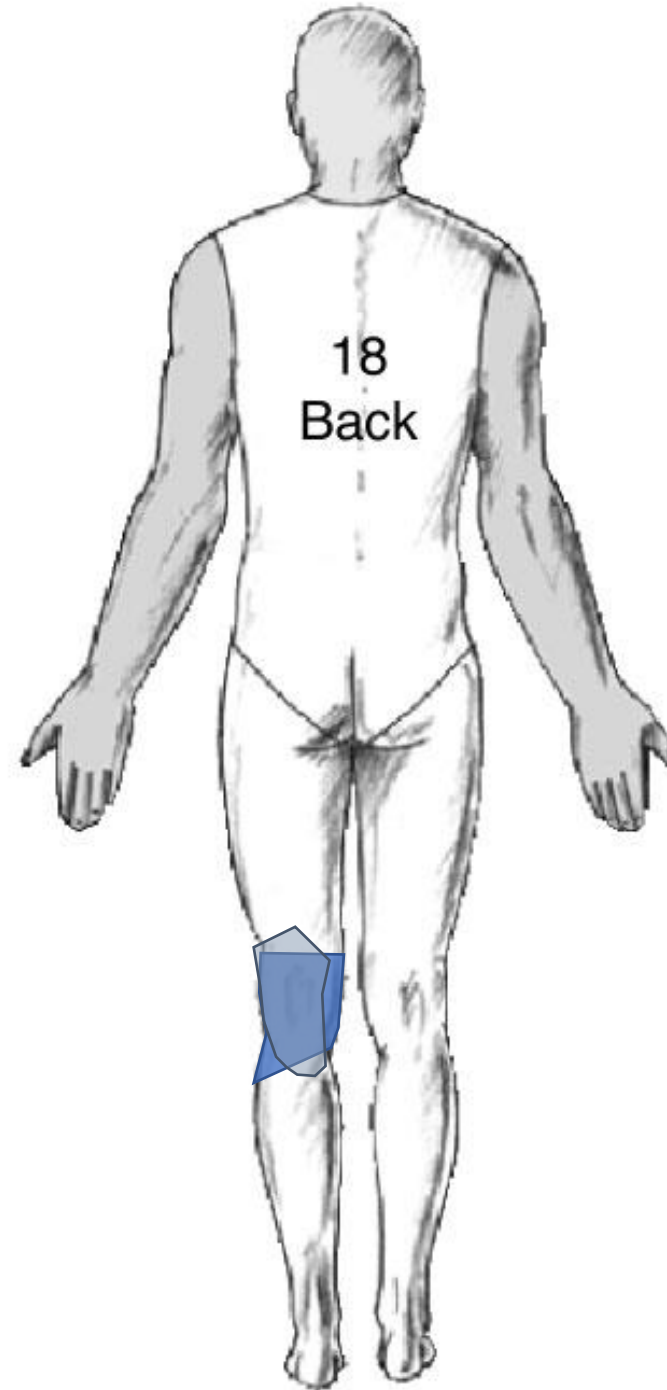
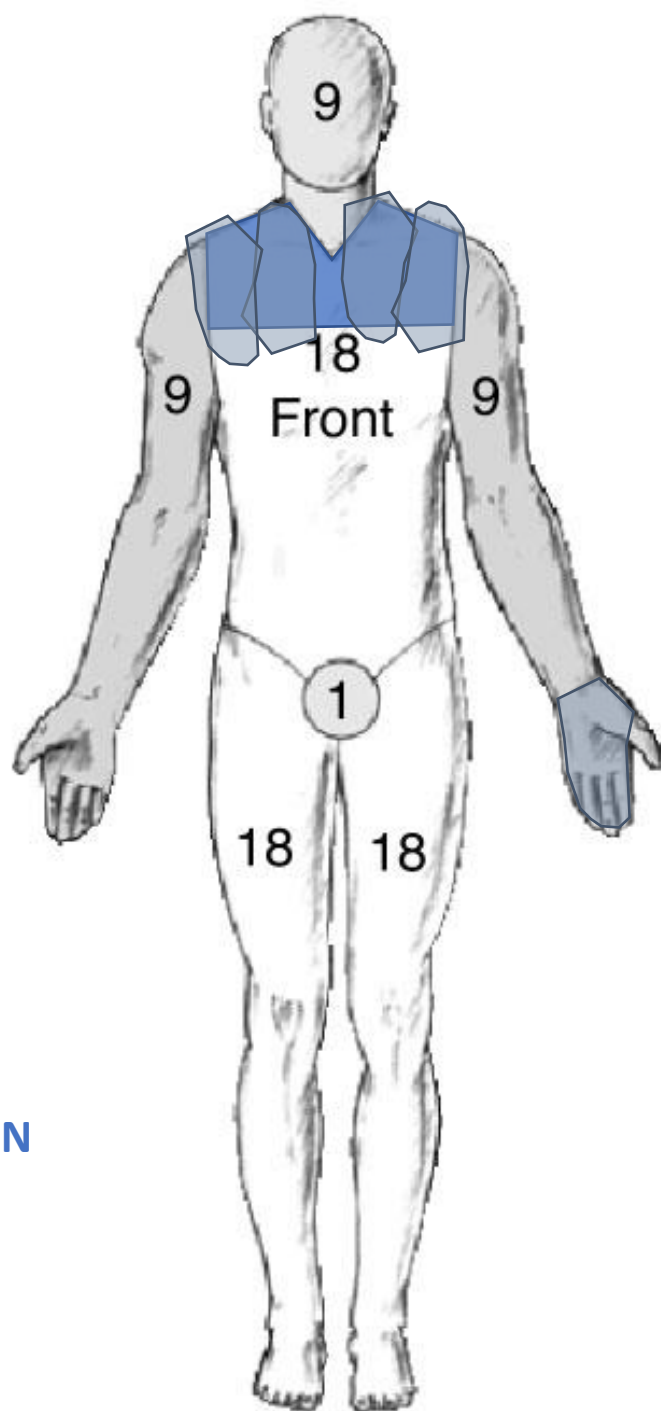




Palm





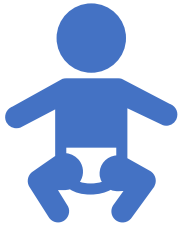


5% TBSA BURN





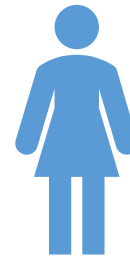
# Who needs IV resuscitation?



>10% TBSA



>15% TBSA



>20% TBSA



>15% TBSA



# Resuscitation



## Too much?

Elevated compartment pressures

ARDS

Multiple organ dysfunction



## Just right

Support tissue perfusion and organ function

Prevent burn shock



## Too little?

Shock

Renal failure

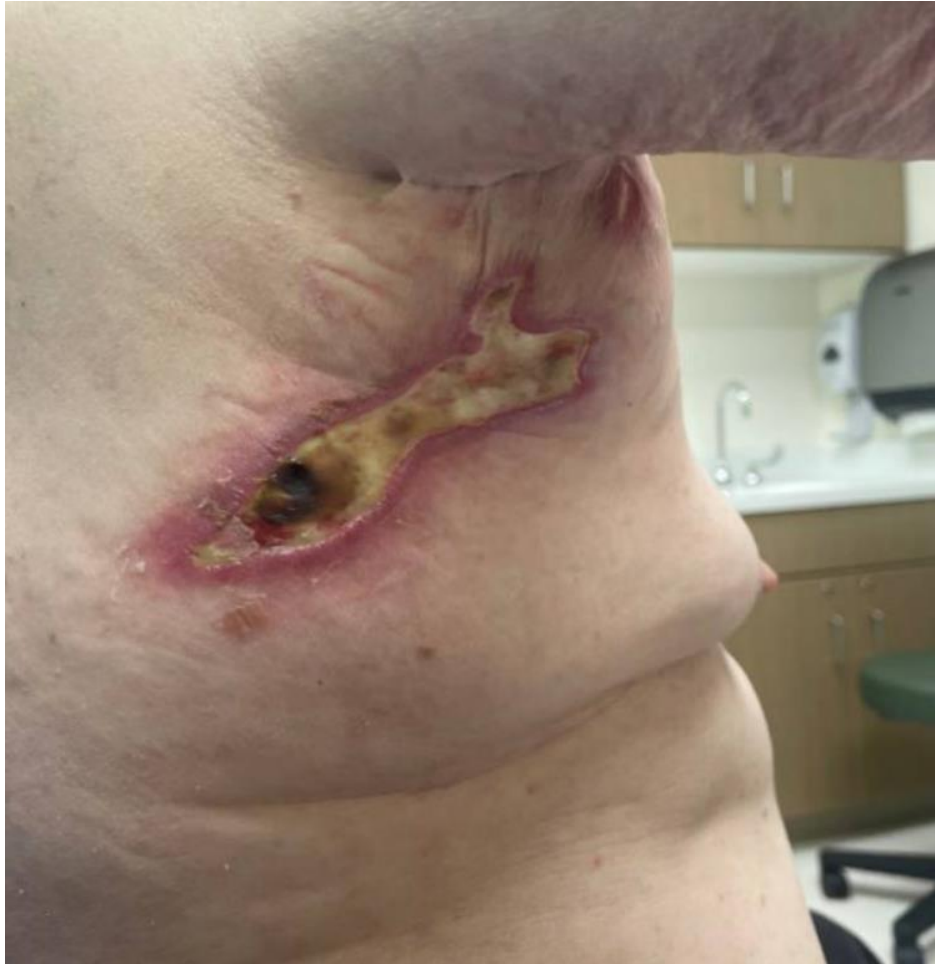


# SURGICAL TREATMENT

- EXCISION +
  - PRIMARY CLOSURE
  - EPIDERMAL AUTOGRAFTING (aka Spray Skin)
  - SPLIT THICKNESS SKIN GRAFTING (STSG)
  - FULL THICKNESS SKIN GRAFTING (FTSG)
- 2 STAGE
  - WOUND VAC --> STSG
  - HOMOGRAFT --> STSG
  - SKIN SUBSTITUE --> STSG
  - FLAP



# PRIMARY CLOSURE





# EPIDERMAL AUTOGRAFTING RECELL SKIN SPRAY



Suspension of the patient's own live skin cells including keratinocytes, dermal fibroblasts and melanocytes



*Using the new RECELL burn treatment system, Dr. Anjay Khandelwal was able to treat 4-year-old Jason Zimmerman with less skin grafting and much less time in the hospital.*

# EPIDERMAL AUTOGRAFTING





# SPLIT THICKNESS SKIN GRAFTING (STSG)



# PREVENTION & EDUCATION

- SMOKE DETECTORS
- TRAVEL COFFEE MUG FOR HOT DRINKS
- ADULTS COOK THE RAMEN!
- RAMEN DOES NOT BELONG ON THE LAP, THE BED OR THE COUCH
- NO ACCELERANTS ON FIRES...







*The Akron Children's medallion given to burn survivors is designed to be a symbol of hope, life and better things to come.*



Drumm talked to burn patients before creating a design to represent the qualities of a burn survivor, a phoenix. In Greek mythology, the phoenix, a mythical bird, rises from the ashes of its previous life and is a symbol of hope, of life and of better things to come. The phoenix was imprinted on one side of an aluminum medallion with Akron Children's logo printed on the back.



# References

- Khandelwal, A. (2022) *ICE-T* [PowerPoint presentation].
- Khandelwal, A. (2022) *Burn Update* [PowerPoint presentation].
- DeVault, A (2023) Burn Webinar [PowerPoint presentation].
- Żwieretło, Wojciech, et al. "Burns: Classification, Pathophysiology, and Treatment: A Review." *International Journal of Molecular Sciences*, U.S. National Library of Medicine, 13 Feb. 2023, [www.ncbi.nlm.nih.gov/pmc/articles/PMC9959609/](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC9959609/).
- Alabdrabalnabi, Fatimah, et al. "Early release of constricting amniotic band of the lower limb followed by reconstruction using multiple Z-plasty." *Journal of Pediatric Surgery Case Reports*. 75. 102054. 10.1016/j.epsc.2021.102054.