



University of Missouri Pediatric Service Line

Pediatric Emergency • Clinical Practice Guidelines

Pediatric Burn Management

Patient <18y with burn injury

Determine evaluation location based on estimation of TBSA

R Bay	Class 1: Burns involving estimated TBSA > 35% or confirmed/suspected inhalational injury
	Class 2: Burns involving estimated TBSA 15-35%
Peds ED	Burns involving TBSA < 15%

Complete Primary Trauma survey

Airway and Breathing

IF respiratory distress, hypoxia, and/or burns to face, mouth, nares

Intubate based off Denver criteria^a
Give 100% FiO₂ if concern for CO poisoning^b
Albuterol for smoke inhalation bronchospasm
Escharotomy for circumferential thoracic burns per ACS

Circulation

IF >10% TBSA, hypotensive or bleeding

IV x 2 through unaffected skin (IO if IV unobtainable)
Send burn labs^c
Give 20 mL/kg bolus of LR^d

Disability

IF mental status change or gag reflex absent

Obtain POC glucose
Consider Head CT and C-spine precautions
Consider hyperbaric treatment^b and Cyanokit^e

Exposure

IF severe burns or life-threatening injury

Remove clothing, jewelry, debris
Cover burns with simple dry dressings or sheets
Maintain temperature >35°C
Consider Running Water Cooling^f

Secondary Exam

Calculate TBSA and determine burn depth^g

Initiate transfer to Burn Center if criteria met^h

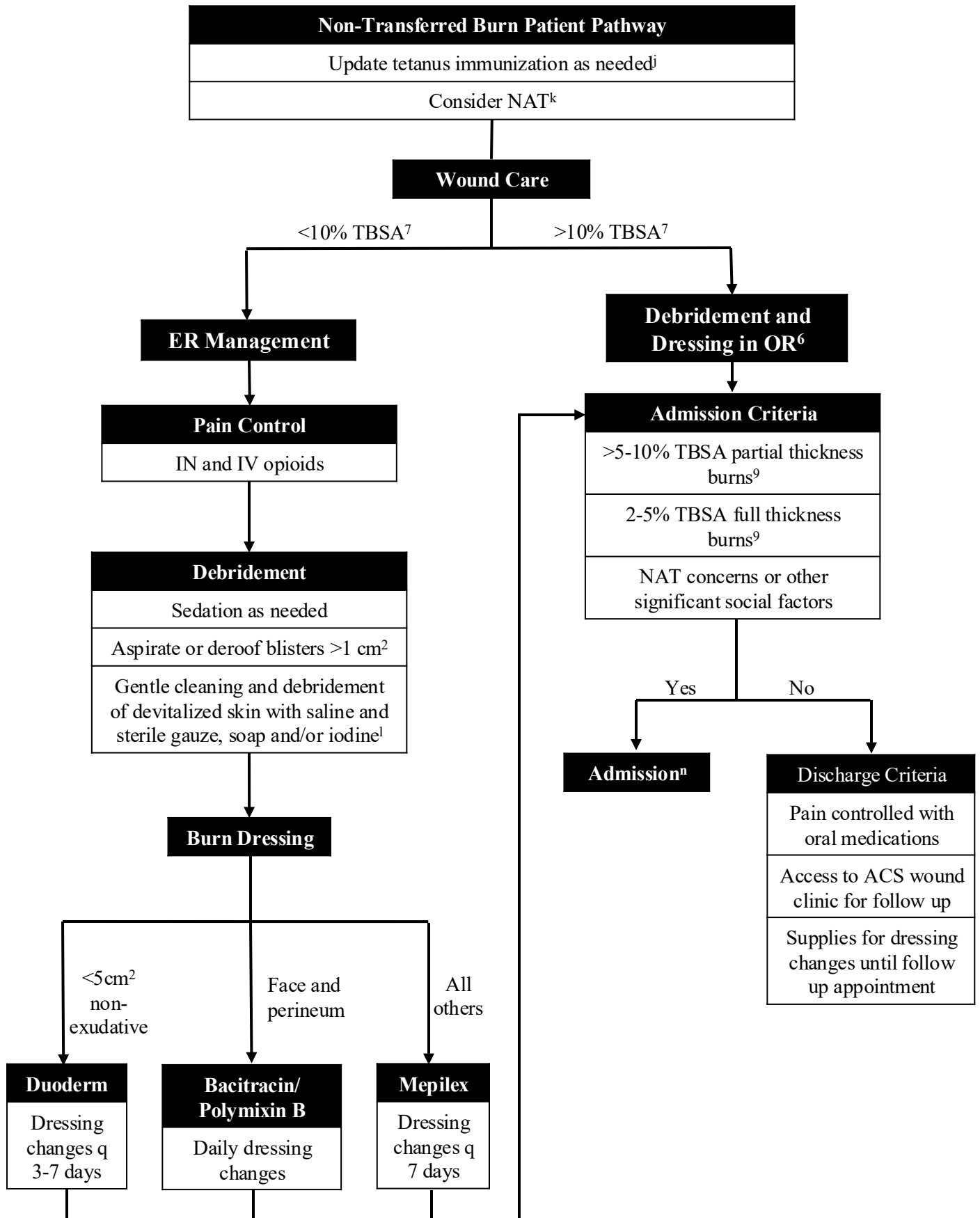
Initiate multimodal pain control including opioids as needed

Calculate IVF with Modified Parkland if >15% BSA burn⁵



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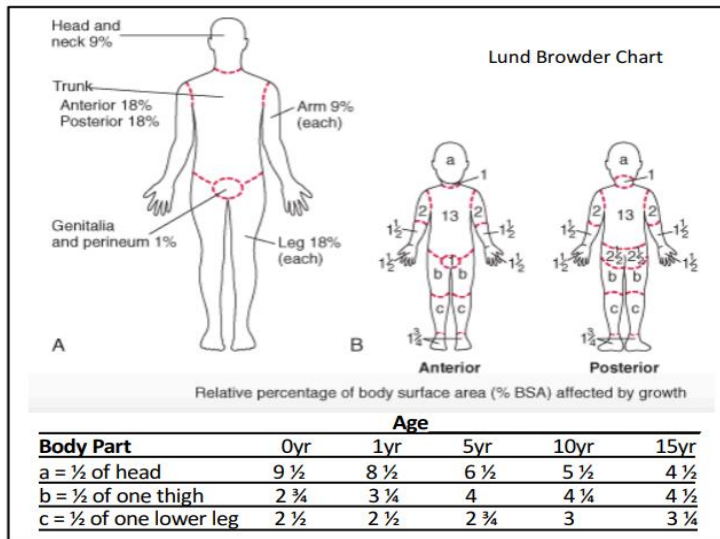


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Footnotes:

- a. Denver **Criteria for Intubation!** include any of the following:
 - Deep dermal and full thickness facial burns
 - Stridor
 - Burn TBSA >40%
 - Respiratory distress
 - Decrease level of consciousness with loss of protective reflexes
 - Significant risk of edema in airway (consider consult to ENT for fiberoptic laryngoscopy if unsure)
 - *Singed facial hair and suspected smoke inhalation should be considered for intubation based off of ABA criteria; these have not been sensitive for necessary intubations alone
- b. Indications for **hyperbaric treatment**: loss of consciousness at the scene, persistent neurologic symptoms (i.e. seizure), evidence of cardiac injury (i.e. cardiac arrest), or significant elevation of carboxyhemoglobin levels (>25-40%)
- c. Burn **Labs**: CBC, CMP, VBG/CoOximetry (Carboxyhemoglobin level), cyanide level, CK, UA (myoglobinuria), PT, PTT, lactate
- d. Consider colloids if nonresponsive to crystalloids²
- e. Cyanide poisoning must be treated before the quantitative level is available. Indications to consider 70mg/kg IV **hydroxocobalamin (Cyanokit)** treatment include history of fire in a contained area with need for CPR and/or intubation or if altered mental status, abnormal vital signs, evidence of hypoxic injury, and severe metabolic acidosis (elevated lactate).
- f. Cool running water over burns for at least 20 minutes within 3 hours after the initial injury has been shown to reduce full-thickness depth, hospital admissions, and the need for operative interventions including skin grafting.³ Consider for hemodynamically stable patients with close monitoring of body temperature.
- g. Total Body Surface Area (**TBSA**) and Depth Estimation:



- h. **Burn transfer criteria:**⁴
 - Partial thickness >10% TBSA in children <10y
 - Partial Thickness >20% TBSA in >10y
 - Deep partial burn to face, hands, feet, genitals, perineum, or major joints
 - Electrical burns and lightning strikes
 - Chemical burns
 - Inhalation injury
 - High risk individuals with pre-existing conditions
 - Burns with traumatic injury when burn is leading risk of mortality
- i. **Modified Parkland Formula:**⁵ 4 mLs LR x Kg x TBSA = total mLs over 24 hours; Give ½ in first eight hours and ¼ next two hours
 - Titrate fluid rates to reach urine output:
 - 0.5-1 mL/kg/hr of urine output if <30 kg
 - 1-2 mL/kg/hr of urine output if >30 kg
 - Give maintenance fluids with dextose if <20 kgs



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Footnotes (cont):

- j. Tetanus prophylaxis:
 - TIG for patients who have not had 3 doses of DTaP or are unsure of vaccination status
 - Tetanus booster for those who have not received a tetanus vaccine in the last 5 years (DTaP if < 7 years of age, TDaP if > 7 years of age)
- k. NAT concerns
 - Suspicious markings
 - Delayed presentations
 - Patterned burns
 - Immersion burns: suspect if clearly demarcated, circumferential, symmetric burns of hands/wrists and or feet/ankles/lower legs (stocking and glove distribution), and/or buttocks and perineum with sparing of both knees, popliteal fossa and thighs
- l. How to derroof blisters⁸
 - Sterile techniques, small cut and drain fluid, cut away epidermis from near the base, stay away from base and floor
- n. Location of admission for pediatric patients with burns will be made on a case-by-case basis. In general, ACS will admit to the ACS service if admission is needed for pain control and/or wound care. Burn care including dressing changes will be managed by ACS. The pediatric service can consult for medically complex patients. For children requiring extensive burn care, or for admission primarily due to child abuse concerns, transfer to Children's Mercy pediatric burn unit in Kansas City should be considered.

References:

1. Budulak et al, Defining the criteria for intubation of the patient with thermal burns, *Burns*. 2018
2. Greenhalgh et al, Burn Resuscitation Practices in North America: Results of the Acute Burn Resuscitation Multicenter Prospective Trial (ABRUPT), *Annals of Surgery*. 2023
3. Griffin et al, Cool Running Water First Aid Decreases Skin Grafting Requirements in Pediatric Burns: A Cohort Study of Two Thousand Four Hundred Ninety-five Children, *Ann Emergency Medicine*. 2020
4. Bettencourt et al, Updating the Burn Center Referral Criteria: Results From the 2018 Delphi Consensus Study, *Burn Care & Research*. 2020
5. Harshman, Roy, and Cartotto, Emergency Care of the Burn Patient Before the Burn Center: A Systematic Review and Meta-analysis, *Burn Care & Research*. 2019
6. Chung et al, Resuscitation of severely burned military casualties: fluid begets more fluid, *Journal of Trauma* 2009
7. Griffin et al, Early non-excisional debridement of paediatric burns under general anaesthesia reduces time to re-epithelialisation and risk of skin graft, *Scientific Reports*. 2021
8. Ro et al, Effectiveness of aspiration or derroofing for blister management in patients with burns, *Medicine*. 2018
9. Jamshidi and Sato, Initial assessment and management of thermal burn injuries in children, *Pediatrics in Review*. 2013