

## Emergency Burn Care – Dead, Dead, & Dead

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*"If all that changes slowly is explained by life... all that changes quickly is explained by fire"*

1. Incredibly exciting, but necessary review of skin anatomy
  - a. Epidermis
  - b. Dermis
  - c. Subcutaneous
  - d. Muscle
  - e. Bone
2. Contents of skin - hair follicles, nerve endings, sweat glands, sebaceous glands, capillary beds, and blood vessels
3. Functions of the skin
  - a. **Infection protection**
  - b. **Body fluid loss protection**
  - c. **Temperature maintenance**
  - d. Sensory functions (**pain**, temp, pressure)
  - e. Vitamin D production
  - f. Oil & Sweat secretion
  - g. Appearance
4. Assessment of burn severity
  - a. First degree
  - b. Second degree (partial thickness)
  - c. Third degree (full thickness)
  - d. Fourth degree?

5. Mortality associated with pediatric burns
  - a. LD50 TBSA (how much are they burned where 50% of patients survive)
    - i. 1940 30% TBSA burn
    - ii. 1960 40% TBSA burn
    - iii. 2000 86% TBSA burn
6. Associated injuries and/or history - "What makes a *not so bad* burn bad & a *bad burn*, really bad?"
  - a. Mechanism of injury
  - b. Fractures
  - c. Head injury
  - d. Shock in the prehospital setting is not secondary to the burn, but caused by some other injury

"It has always been my rule never to smoke when asleep & never to refrain when awake"  
Mark Twain

- e. Inhalation injury
  - i. Eyebrows
  - ii. Nose
  - iii. Mouth
  - iv. Neck
  - v. Face
  - vi. Lung sounds/sputum
  - vii. History
  - viii. Smoke + **CO**, NO, Cyanide, +...
    - (1) Carbon monoxide (CO) poisoning until proven differently

- (2) Need to do carbon monoxide levels
- (3) Arterial & venous CO levels are the same (don't need to do an arterial stick just for CO levels)
- (4) Pulse oximetry only measures hemoglobin saturated with "something"
  - (a) Pulse oximetry doesn't differentiate between Hgb with O<sub>2</sub> vs Hgb with CO
  - (b) "Real" O<sub>2</sub> sat determined by subtracting CO level from O<sub>2</sub> sat
    - (i) 100% O<sub>2</sub> saturation
    - (ii) 30% CO level
    - (iii) "Real" O<sub>2</sub> saturation is only 70%
- (5) If a person is not out of a house fire in 4 minutes, they are not coming out! CO starts to take over your level of consciousness in approximately 27 seconds... if alcohol is involved, this time is reduced to 15 seconds!

- f. Cardiac, renal, *respiratory* disease history
- g. Age - "The very young & the very old"
- h. "Where are they burned?" - Special area burns
  - i. Face
  - ii. Hands/Feet
  - iii. Genitalia
  - iv. Torso/Extremities

7. "How much are they burned"

- a. Big parts & little parts...
  - i. Big parts get 18%
  - ii. Little parts get 9%

- b. Adult rule of 9's
    - i. Head (9%)
    - ii. Chest/Abdomen (18%)
    - iii. Each arm (9%)
    - iv. Each leg (18%)
    - v. Genitalia (1 vs 100%)
  - c. Pediatric rule of 9's - "Big heads & little bodies"
    - i. **Head (18%)**
    - ii. Chest/Abdomen (18%)
    - iii. Each arm (9%)
    - iv. Each leg (14 vs 18%)
    - v. Genitalia (1 vs 100%)
  - d. Palm vs whole hand measurements
    - i. Patients hand, not yours
    - ii. Each whole hand size = 1% Burn
    - iii. Nice for "patchy" burns
8. Treatment of the burned patient
- a. Remove from burning site, remove clothing & jewelry-  
*-Cool the burn, not the patient-*
  - b. ABC's with full spinal immobilization
  - c. 100% O2 for everyone until carbon monoxide & pulse oximetry levels obtained (if smoke involved)
  - d. Intubate early if airway concerns (Especially in children)
  - e. Monitor lead placement - ECG leads don't stick to burned tissue

- f. Fluid resuscitation & IV placement
  - i. **Initiation of IV fluids greater than 2 hours after the burn is statistically associated with acute renal failure & mortality**
  - ii. Adult Parkland/"Pumpkin"/Consensus (2-4cc/kg/BSA of 0.9NS or LR)
  - iii. Pediatric Parkland/"Pumpkin"/Consensus (2-4cc/kg/BSA of 0.9NS or LR)
    - (1) ESTIMATED amount of fluid required in first 24 hours after burn (not arrival in ED)
      - (a) ½ of amount given in first 8 hours after burn
      - (b) Remaining ½ over next 16 hours
    - (2) 4cc of LR or 0.9NS ("Count your arms & legs")
    - (3) Kg ("Big child vs little child")
    - (4) BSA burn ("Whole body burn vs. tip of finger burn")
  - iv. Fluids titrated to urine output - may need more than just what the Parkland formula recommends
  - v. Remember - pediatric patients also need maintenance IV fluids (in addition to "Parkland" amounts)
  - vi. Prehospital fluid resuscitation (20 cc/kg bolus)
  - vii. Mannitol & Bicarbonate indications (only per burn unit request)
    - (1) Prevent & treat rhabdomyolysis/myoglobinuria
    - (2) Prevent & treat "Pepsi Pee"
- g. Dressings
  - i. Wet vs. dry?
  - ii. Goop vs. no goop?
  - iii. Not bad vs. bad burns?

- iv. What about Water Jel? ([www.waterjel.net](http://www.waterjel.net) (Europe), [www.waterjel.com](http://www.waterjel.com) (US), [www.waterjel.com.au](http://www.waterjel.com.au) (Australia), & [www.jackson-allison.co.nz](http://www.jackson-allison.co.nz) (NZ))
- h. Pain relief - **IV** Morphine 0.1mg/kg
  - i. Screaming
  - ii. Not screaming
  - iii. Not breathing
- i. Keep 'em warm!!!
- j. NPO
- k. Does every burn patient need a Foley (urinary catheter)?
  - i. Burns to the genitalia
  - ii. “Bad burns”
- l. NG placement
  - i. Intubated pt
  - ii. >20% burns
  - iii. Prevent & treat Curling's ulcer & paralytic ileus
- m. Fasciotomy &/or escharotomy indications
  - i. Impairment of circulation
  - ii. Impairment of ventilation

*“As a child, I was more afraid of tetanus shots, than, for example, Dracula!”*

Dave Barry

- n. Tetanus immunization status
9. Differences with electrical & lightning injuries
- a. Electrical injuries

- i. Electricity loves nerves & where are the nerves located
    - ii. What you see on the outside may not be indicative of the inside damage
    - iii. Trauma implications
  - b. Lightning injuries
    - i. Electricity loves nerves...
    - ii. Trauma implications
    - iii. Cardiac arrest implications
- 10. Special burns
  - a. Eye burns
    - i. Ophthalmology consult
    - ii. Are they wearing contact lenses?
  - b. Chemical burns
    - i. 3% of all burns
    - ii. 30% of all burn deaths
  - c. Tar burns
  - d. History of event
- 11. Transport to burn center
  - a. >10-20% partial or full thickness burns
  - b. >10% full thickness burns
  - c. "Special Areas" burns
  - d. Electrical/Chemical burns
  - e. Inhalation injuries
  - f. Compounding history factors

12. Cory
  - a. 3 year old with 98% full-thickness burns
  - b. Books vs blessings
13. Summary of pediatric emergency burn care: "**Dead, Dead, & Dead**"
  - a. Airway
  - b. Shock & hypothermia
  - c. Pain control

### Fireman's Prayer

*Lord, when I am called daily to duty, whatever flames may rage, give me strength to save some life, whatever be its age. Help me embrace a little child before it's too late or save an older person from the horror of that fate. Enable me to hear the weakest shout & quickly & efficiently to put the fire out. I want to fill my calling & to give the best in me to guard my every neighbor & protect his property. & if according to your will, I have to lose my life - please bless with your protecting hand my children & my wife.*

***Full list of journal references for this presentation available upon E-mail request***

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