

BURNS

# Outline

- Epidemiology
- Etiology
- Classification of Burns
  - Burn Extent
  - Burn Severity
- Treatment
- Surgical interventions
- Complications

# Epidemiology

- In the US, ~ **500,000** people treated annually.
- ~ **4,000** people die as a consequence of injuries caused by fire and smoke inhalation
- In 2011, there were **45,000** hospitalizations, of which **25,000** were in **specialized burn centers**

# Definition & Etiology

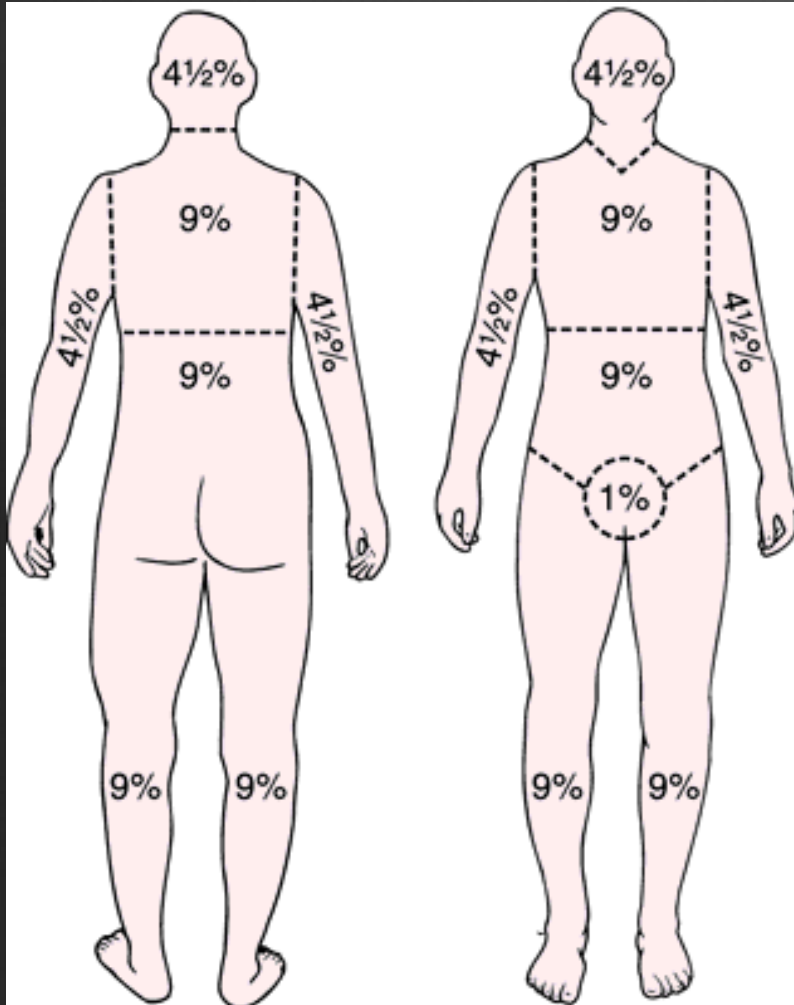
- Injuries to tissues (typically skin) caused by:
  - Heat (majority of cases)
    - Fires
    - Scalding (from steam or hot liquids)
  - Electricity
  - Chemicals
    - Strong acids or bases, oxidants
  - Radiation
    - Sunburn, medical radiation treatment

# Classification

# Classification- Burn Extent

- Determined by **total body surface area (TBSA)**
  - **Rule of 9's** used to quickly estimate TBSA
  - Lund and Browder chart- more specific
  - 'Palm' method

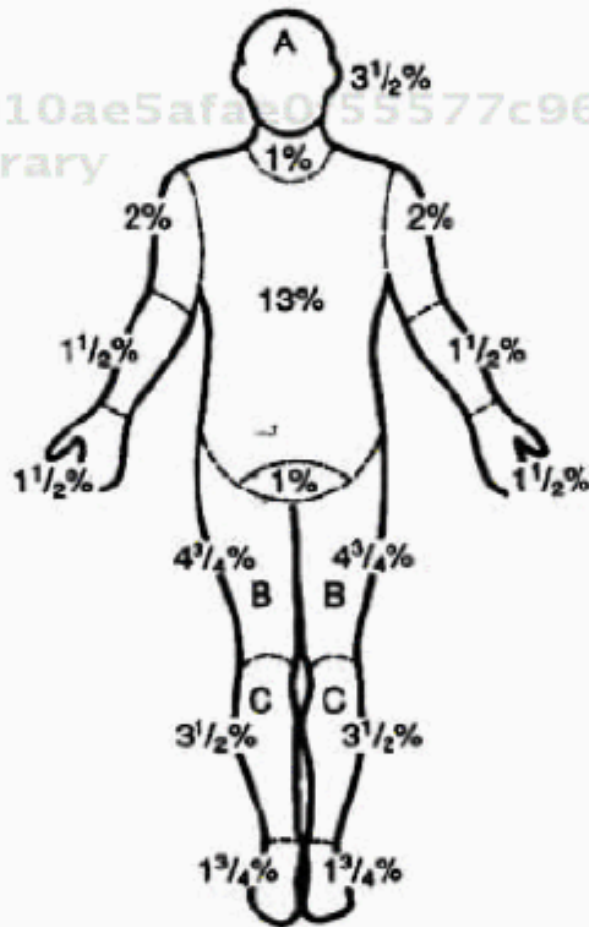
# Wallace Rule of 9's



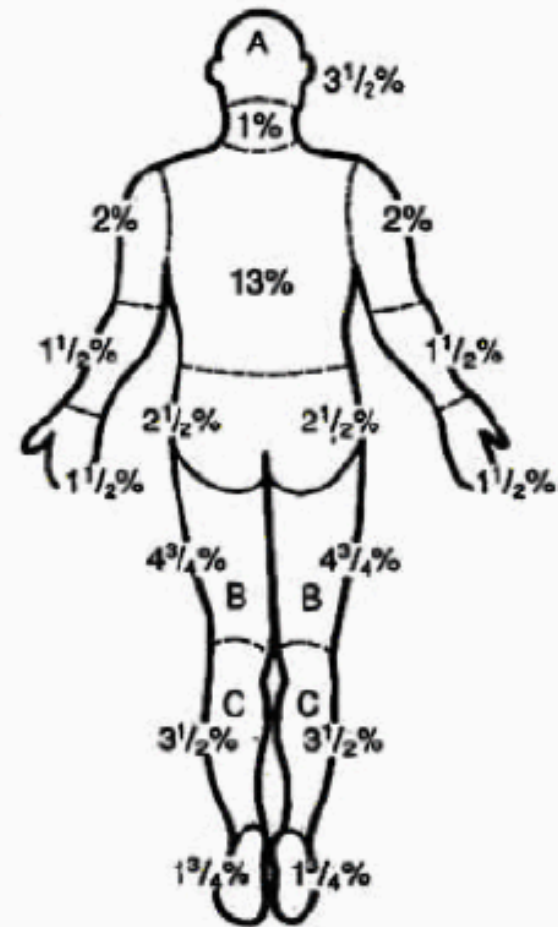
- Head & neck = 9%
- Thorax (front) = 9%
- Abdomen (front) = 9%
- Each upper limb = 9%
- Each lower limb (front) = 9%
- Genitalia = 1%
- *Patient's palm surface = 1%*

# Lund and Browder Estimation of Burns

Age	0-1	1-4	5-9	10-14	15
A - 1/2 of head	9 1/2%	8 1/2%	6 1/2%	5 1/2%	4 1/2%
B - 1/2 of one thigh	2 3/4%	3 1/4%	4%	4 1/4%	4 1/2%
C - 1/2 of one leg	2 1/2%	2 1/2%	2 3/4%	3%	3 1/4%

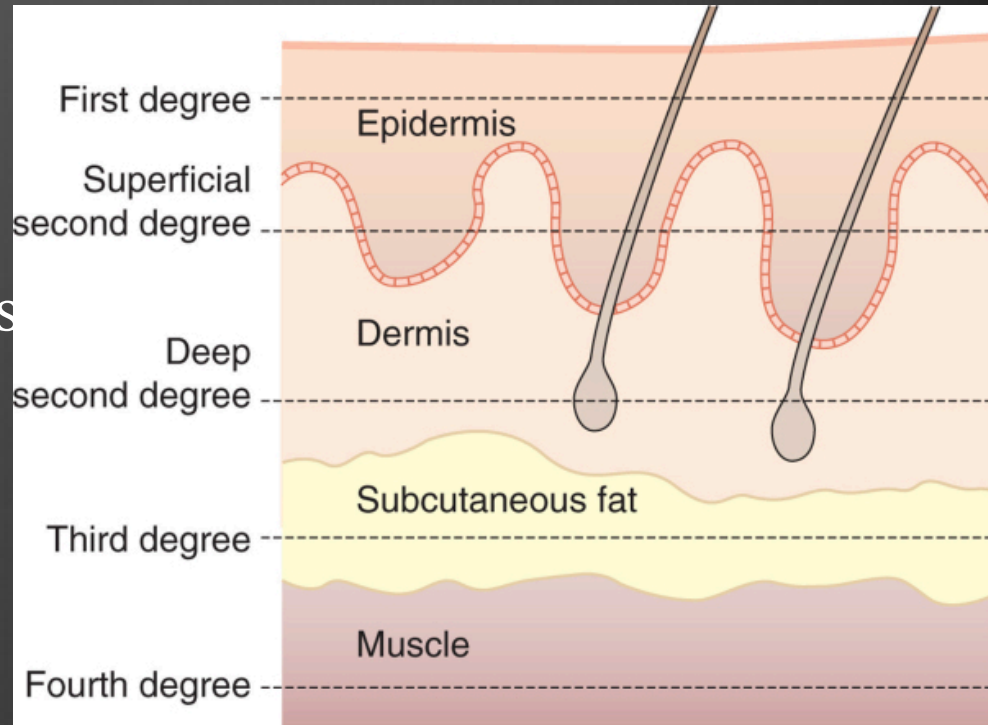


Adult



# Classification- Burn Severity

- 1<sup>st</sup> degree (superficial)
- 2<sup>nd</sup> degree (partial thickness)
- 3<sup>rd</sup> degree (full thickness)
- 4<sup>th</sup> degree (full thickness)



# Burn Severity

- First degree (superficial)
  - Limited to **epidermis**
  - Commonly due to scalding or sunburn
  - Erythema, pain, edema, but **no blistering**
  - Heals in <1wk
  - **No scarring**



# Burn Severity

- Second degree (partial thickness)
  - Involves epidermis with variable **dermal involvement**
  - Very painful
  - Erythema, **blistering**/raw skin
  - Takes weeks to heal
  - Complications include local infection/cellulitis
- Difference between superficial and deep partial thickness:
  - Superficial: **blanches with pressure**
  - Deep: does **not blanch with pressure**



Superficial partial thickness



Deep partial thickness

# Burn Severity

- **Third degree (full thickness)**
  - Loss of epidermis and dermis
  - Painless
  - Usually has a stiff, **white-brown appearance**
  - May have significant edema surrounding burn
  - Loss of ability to re-epithelialize **scarring**
  - Needs debridement, excision and **grafting**



# Burn Severity

- **Fourth degree (full thickness)**
  - Loss of epidermis, dermis and subcutaneous tissue
  - Damage of muscles, fascia and/or bone
  - Appears **black and charred**



# Complications

# Complications

- **Infection**
  - Common organisms:
    - Pseudomonas
    - Streptococcus, S. aureus, E. coli
  - Check tetanus immunization status
- **Hypermetabolic state**
- **Acute tubular necrosis**
- **Contractures**
- **Hypertrophic scarring**
- **Respiratory distress**
- **Edema\***
  - Compartment syndrome
  - Airway obstruction



Treatment

# Treatment

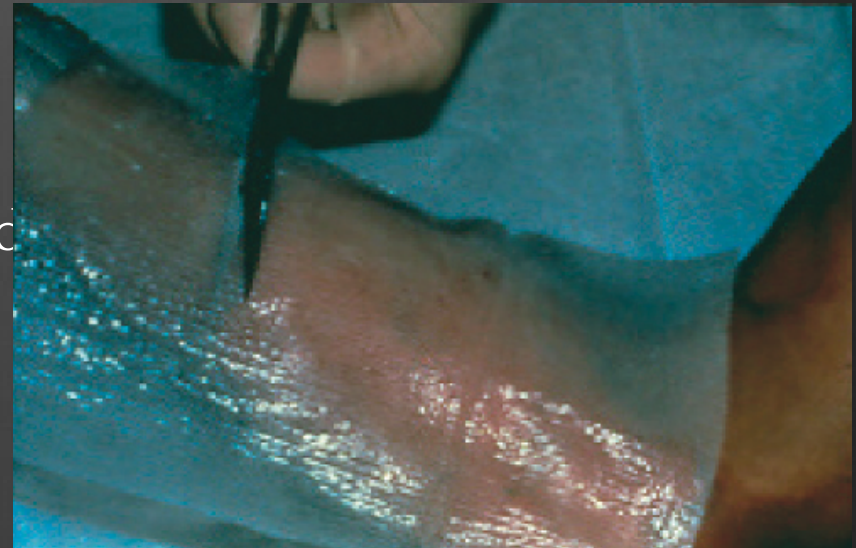
- American Burn Association criteria for **transfer to burn center**:
  - 2<sup>nd</sup> degree burns > 10% TBSA
  - 3<sup>rd</sup> degree burns
  - Burns to face, hands, feet, genitalia, perineum
  - Electrical burns (including lightning injury)
  - Chemical burns
  - Inhalation injury
  - Patients with pre-existing conditions

# Treatment

- 1<sup>st</sup> degree burns
  - None required
  - Moisturizers
  - Topical anesthetic

# Treatment

- 2<sup>nd</sup> degree burns:
  - Debridement
  - Topical antibiotic
    - Silver sulfadiazine (for dirty wounds)
    - Petroleum jelly + gauze
    - Temporary skin substitute
    - Dressing changes as necessary
    - Pain management
    - HBOT



# Treatment

- 3<sup>rd</sup> and 4<sup>th</sup> degree burns:
  - Stop any continuing burn injury
  - Airway management
    - Intubate before respiratory problems
    - FiO<sub>2</sub> 100%
    - Check ABG, and CO level (carboxyhemoglobin >10% significant)
  - Temperature regulation (keep patients warm)
  - Fluid resuscitation (if > 20% TBSA)
  - Topical antibiotics
  - Surgical treatment
    - Excision of burned area followed by skin grafting
  - Enteral nutrition
  - HBOT

# Treatment

- Fluid resuscitation for adults
  - **Parkland formula**: calculates amount of resuscitation fluid required for the first 24 hrs \*\*does not apply to larger burns

~~First 24h - Lactated Ringer's solution 4mL/kg/% burn~~

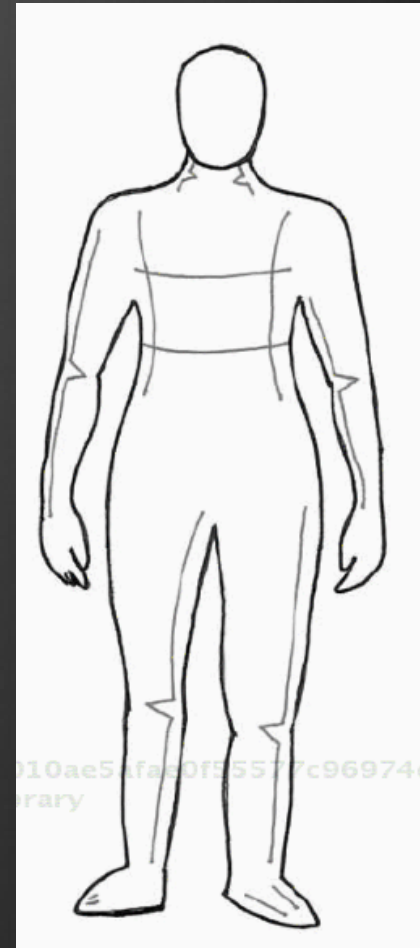
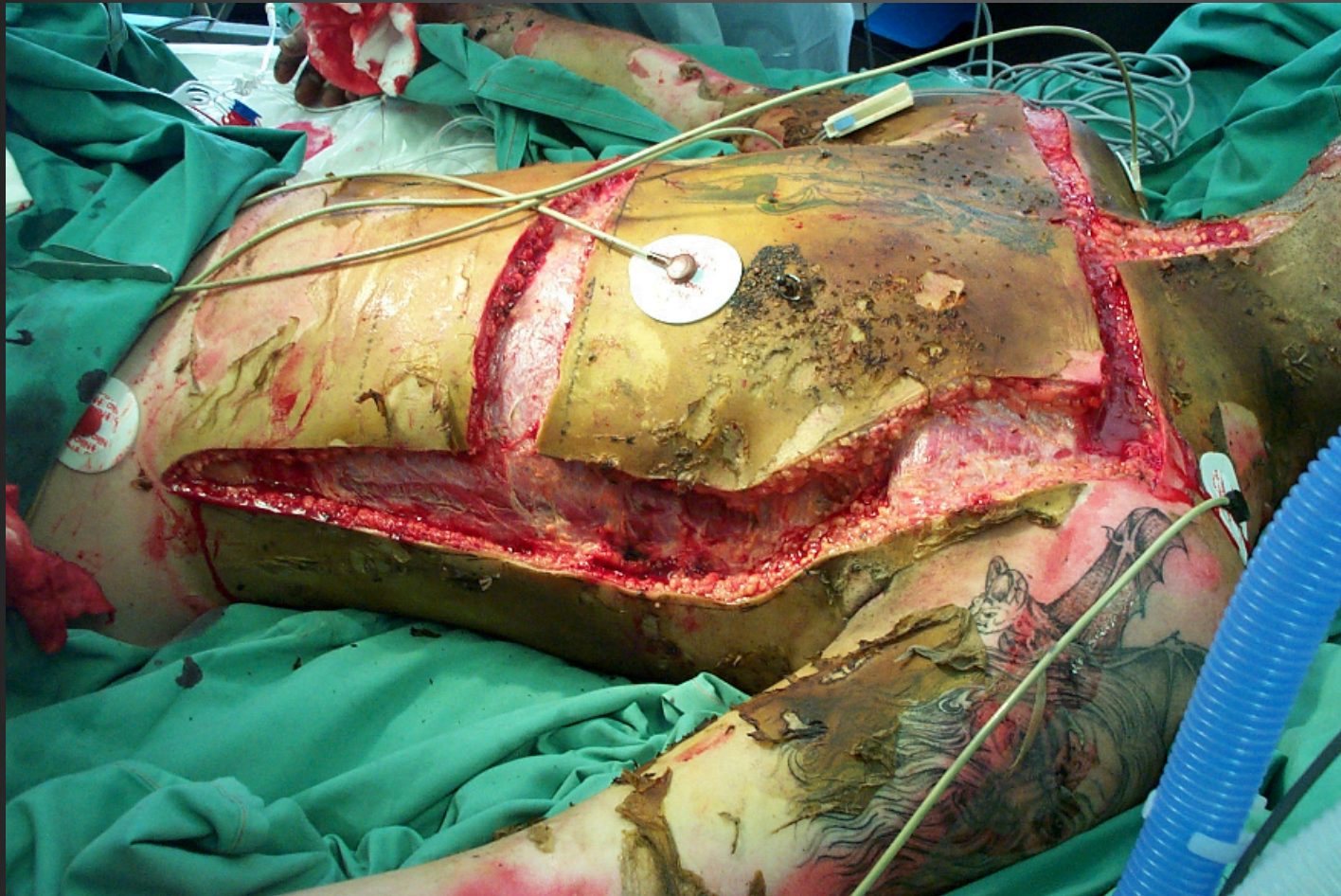
- Give **first half** resuscitation volume over **first 8 hours**
- Give **second half** resuscitation volume over **next 16 hours**
- ~~Monitor urine output: 30-50 cc/hour~~
  - After 24h – Lactated Ringer's solution 1 mL/kg/% burn daily

# Surgical Interventions

# Surgical Interventions



# Surgical Interventions



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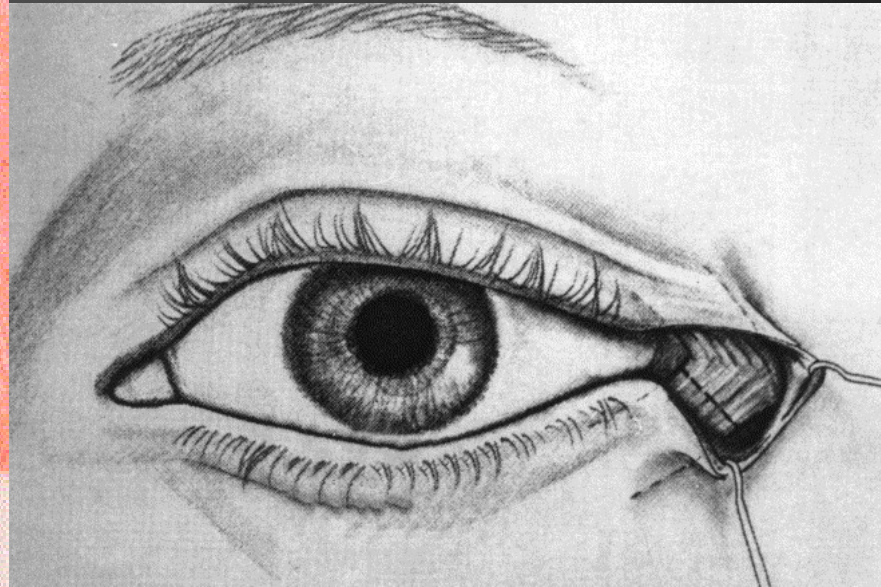
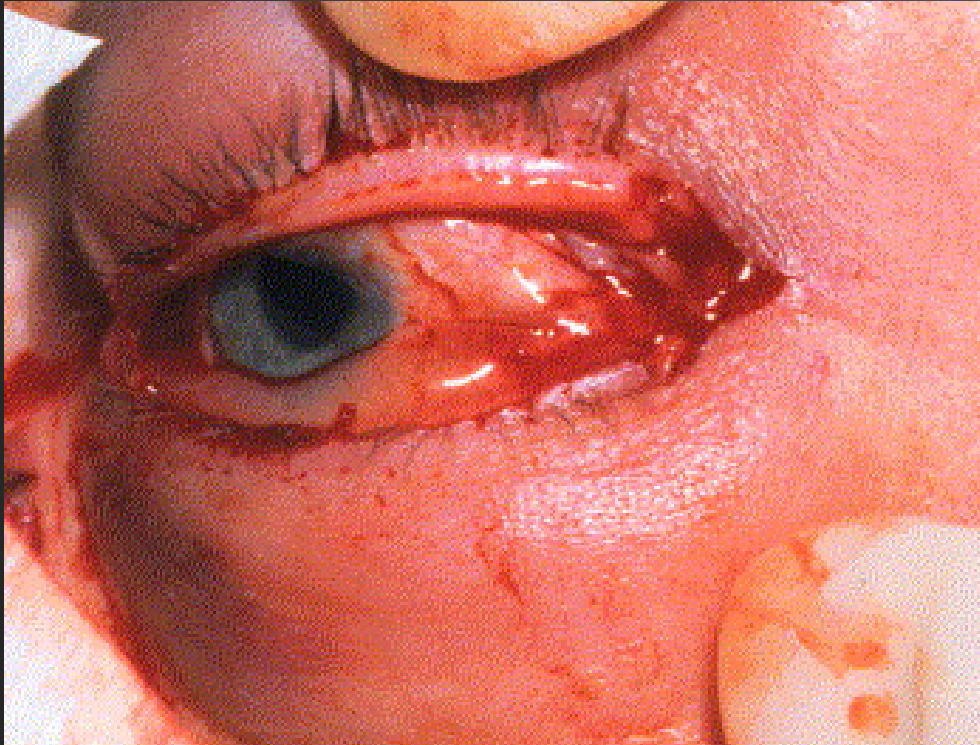
# Surgical Interventions



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# Surgical Interventions



# Prognosis

**Table 1 – Abbreviated burn severity index.**

Variable	Patient characteristic	Score	
Sex	Female	1	
	Male	0	
Age in years	0–20	1	
	21–40	2	
	41–60	3	
	61–80	4	
	81–100	5	
	Inhalation injury		1
Full thickness burn		1	
TBSA %	1–10	1	
	11–20	2	
	21–30	3	
	31–40	4	
	41–50	5	
	51–60	6	
	61–70	7	
	71–80	8	
	81–90	9	
	91–100	10	
Total burn score	Threat to life	Survival probability	
	2–3	Very low	>99
	4–5	Moderate	98
	6–7	Moderately severe	80–90
	8–9	Serious	50–70
	10–11	Severe	20–40
	12–13	Maximum	<10

# Prognosis

- With regard to prognostic scoring systems for burns:
  - “There is no evidence to support their use at the bedside for decision-making.” -Sheppard, NN, 2011

# Questions

