

# \* Management of burns in ED

## BURN WOUND ASSESSMENT

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\* Amount of tissue damage depends on:

- **Temperature**

  - above 50 degrees => necrosis

- **Strength** of the burn agent

- Length of **time** the agent is in contact with the skin

\* Seriousness of a burn depends on:

- **Percentage** of TBSA

- **Depth** of the burn

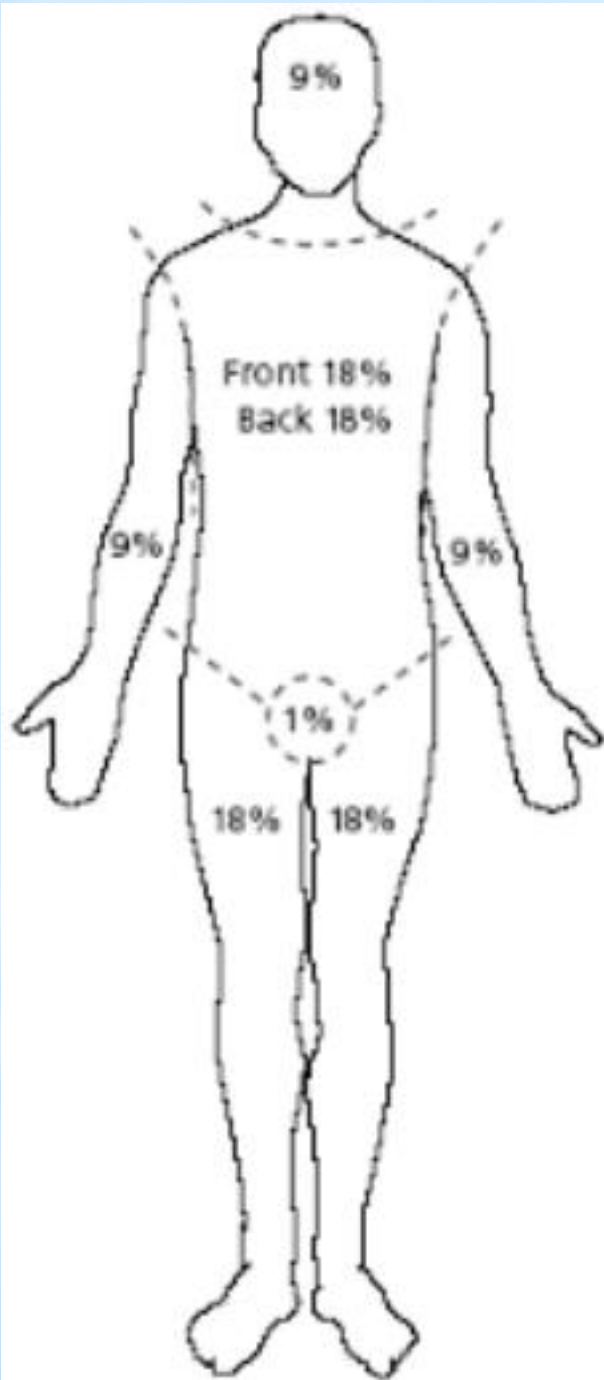
\* Impact of the burn on the patient depends on:

- Seriousness of the burn ^^

- Physiology of the patient- extremes of age (young or old) and pre-existing illness.

# \* 1. ESTIMATE THE AREA OF THE BURN

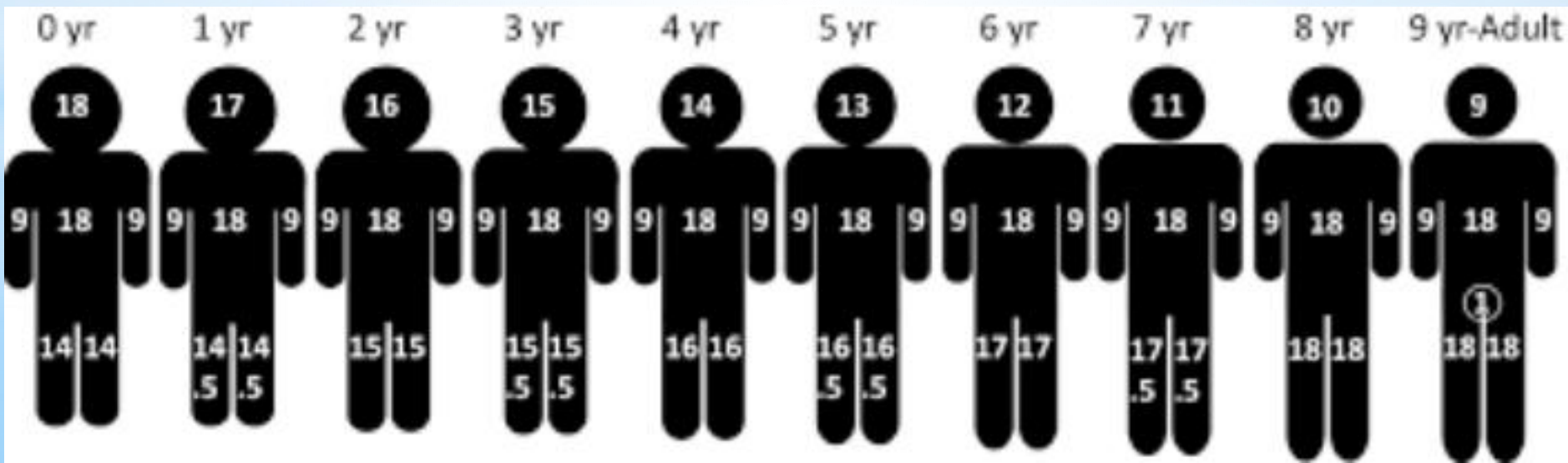
- \* “Rule of Nines” is a quick and easy guideline to use to estimate TBSA.
- \* “Rule of Nines” divides the body into areas of 9%.
- \* For smaller areas or scattered burns use the palmer surface (palm crease to finger tips) of your hand to estimate 1%.



# \* ADULT TSBA ASSESSEMENT



- \*The “Rule of Nines” changes for children due to their different body proportions.
- \*Inaccurate calculations can lead to incorrect management of the wound and incorrect intravenous fluid resuscitation.
- \*For each year 1% should be deducted from the head and divided between the legs



## \* 2. Estimate depth of the burn

- Depth of the burn is directly affected by the amount of *heat* applied and *time* applied.

Depth	Colour	Blisters	Cap refill	Sensation	Healing
Epidermal	Red	No	Present	Present	Yes
Superficial dermal	Pale pink	Present	Present	Painful	Yes
Mid-dermal	Dark pink	Present	Sluggish	+/-	Usually
Deep dermal	Blotchy red	+/-	Absent	Absent	No
Full thickness	White	No	Absent	Absent	No

## \* 2.a Epidermal burns

- \* Common causes are sun burns and flash burns from explosions.
- \* Due to inflammatory mediators being released it causes increased blood flow creating the redness to the skin.
- \* Moisturisers are the only necessary treatment.

## \* 2.b Superficial dermal burns

- \* A key sign of a superficial dermal burn are blisters.
- \* Brisk capillary refill with good sensation.
- \* The exposed papillary dermas is pink and has exposed nerves meaning these burns are quite painful.
- \* If healing is longer than 14 days then consider that the burn may be deeper than originally thought.
- \* These burns produce more exudate, therefore, will need frequent dressing changes.
- \* Silver dressings, silicon or hydro-colloid dressings are recommended.

## \* **Mid-dermal burns**

- \* Due to the burn being deeper, the cells ability to spontaneously heal does not occur.
- \* Sensation to light touch is dull/absent but pain is present due to damage to the cutaneous nerves.

## \* **Full thickness burns**

- \* Both epidermis and dermis are destroyed.
- \* The sensory nerves are destroyed and there is little to no sensation.
- \* The most accurate assessment can be completed 3-5 days post burn.



# \* Management of burn wounds

- \* To properly assess and treat a burn we need to know the mechanism and extent of the burn.
- \* Do not assume that all areas of the burn are equally deep and that they will stay the same as when initially assessed.
  - \* Some burns will continue to burn further into the dermis.
- \* Stopping the burn process reduces tissue damage.
  - \* Remove burnt clothing or jewellery.
- \* Cooling the wound reduces inflammatory mediator production and further damage.
  - \* Run under cold water for 20mins as soon as possible. This also acts as an analgesic.
  - \* Ice or cold baths should not be used- increased risk of hypothermia and tissue death.
- \* To prevent hypothermia it is important to cool the wound but to keep the rest of the patient warm.

# \* Management of burn wounds...cont

- \* Once first aid has been applied the wound can be cleaned with soap and water, saline or 0.1% chlorhexidine solution.
- \* Cling wrap is a good option for a temporary dressing.
- \* No dressing is to be applied *circumferentially*.
- \* Elevating the affected area improves tissue perfusion and nutrition and can delay the need for an escharotomy.
- \* Special areas.
  - \* Inhalation and upper airway burns, perineal, head, neck, hands and feet.
- \* A nasogastric tube is recommended at the earliest possible time and is to run on free drainage in adults >20% TBSA and children >10% TBSA.

# \* Escharotomy

- \* If a burn affects the dermis the skin is not able to expand to allow for oedema, therefore, a surgical incision may be required down to the subcutaneous fat layer to accommodate the excess fluid.
- \* If a burn is extensive to the trunk it will become rigid and not allow adequate rise and fall of the chest leading to hypoventilation. This is made worse if the burn is circumferential.
- \* If a limb is burnt circumferentially it increases pressure and can reduce circulation to the distal portions of the limbs.
  - \* Ischaemia may be hard to detect due to the burn, therefore, a Doppler should be used to detect pulses in a circumferential burn site.

# \* Indication for referrals

S- Size	>10% TBSA
	>5% TBSA child
	>5% TBSA full thickness
P- Person	Pre-existing illness
	Pregnant
	Extremes of age (child or elderly)
A- Area	Face, hands, feet, perineum, major joints
	Circumferential
	Inhalation
M- Mechanism	Chemical or electrical
	Major trauma
	Non-accidental



# \* Burns in children

- \* Differences between a child and adult:
  - \* Size and difference in body proportions
  - \* Thickness of skin
  - \* Changing epidemiology of burns in different age groups
  - \* Larger surface area to body weight ratio
    - \* Higher metabolic rate
    - \* Greater evaporative water loss
    - \* Greater heat loss
- \* An accurate history is important with special attention to inconsistencies and potential for non-accidental injuries.
- \* Depth of the wound is affected by the amount of heat applied and duration of the heat applied to the skin. A child's skin is thinner, therefore, more easily damaged.

# \* Burns in children...cont

- \* Risk of hypothermia is greater in children.
- \* Fluid loss can occur in children at a greater extent and can occur quicker than in adults.
- \* Children have good compensatory mechanisms, therefore, signs of circulation compromise indicate a late phase and potential shock.
- \* Intra-osseous access is acceptable.
- \* Trunk escharotomies are more likely to be needed in children as they use their diaphragms more than adults even if the burns are not circumferential.
- \* A nasogastric tube is strongly recommended for children as they tend to suck in air when crying which leads to gastric dilation. Children are also not able to go as long without food as adults, therefore, enteral feeding will be required.

# \* Burn shock and fluid resuscitation

- \* Burns cause fluid displacement to the immediate and surrounding area, however, if the burn is  $>20\%$  TBSA then the fluid displacement becomes systemic.
- \* Generalised oedema causes decrease plasma volume.
- \* Due to this volume loss there is intravascular hypovolaemia which can cause multi organ failure, particularly to the kidneys.
- \* Mediators are produced and released at the burn site which increases membrane permeability leading to generalised oedema followed by hypovolaemic shock.
- \* A crystalloid solution (Plasmalyte at WDHB) is recommended for fluid resuscitation.



# \* Calculating fluid resuscitation

- \* Estimating the amount of fluids needed for resuscitation is dependant of the TBSA affected.
  - \* Adults >20% TBSA and >10% in children need fluid resuscitation.
- \* X2 large bore IVL need to be established.

**3mls crystalloid fluid X  
weight in kg X %TBSA**

- \* Half of the total calculated volume is to be given in the *first 8 hours* post injury, and the remaining volume is to be given over 16 hours.
- \* This can be changed according to patient needs and urine output and level of hydration.



# \* Maintenance fluids in children

- \* Children have less reserve and a greater surface area to mass ratio, therefore the threshold for fluid resuscitation (10%) is less than adults (20%).
- \* Children have a calculated resuscitation and maintenance fluid.
- \* Children have limited glycogen storage ability, therefore, IV fluids need to have glucose.
- \* 4:2:1 rule for maintenance fluids
  - 4mls X weight in kg X hr up to 10kg**
  - 2mls X weight in kg X hr up to 11-20kg**
  - 1ml X weight in kg X hr for each kg over 20kg**
- \* The preferred fluid is 0.9% normal saline with 5% glucose.
- \* Regular glucose and electrolyte levels should be checked.

# \* Adequacy of fluid resuscitation

- \* Most reliable way to monitor fluid resuscitation is urine output.

**Adults: 0.5mls/kg/hr**

**Children: 1.0/kg/hr**

- \* Low urine output indicates poor tissue perfusion and potential cell injury.
- \* If urine output is low increase fluid administration with boluses if needed.
- \* An IDC is highly recommended, and inserted ASAP.
- \* Bloods pressure readings could be inaccurate due to oedema formation, therefore, arterial lines could be utilised when possible.
- \* Serum electrolytes should be checked regularly.