



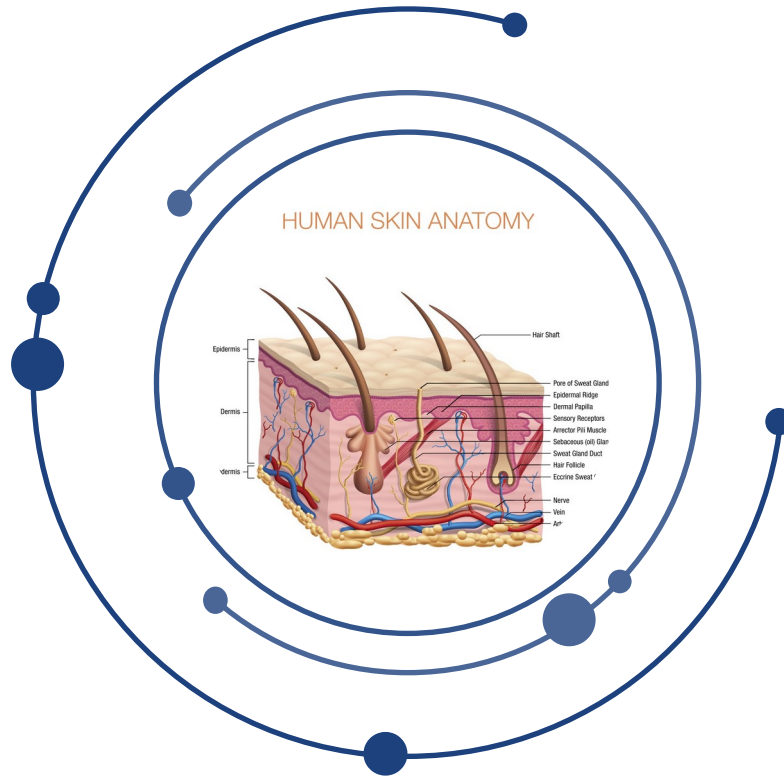
—BELMATT—
HEALTHCARE TRAINING

BURNS

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SESSION OBJECTIVE

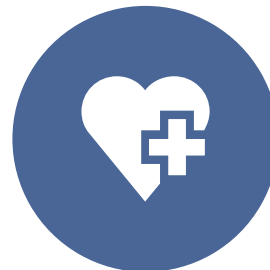
This session aims to develop your knowledge and skills in assessing and managing burns..



To understand anatomy and physiology of the skin and the impact of a burn on skin functioning.



Use a structured approach to assessing a burn wound and the different types of burns



Develop skills in clinical decision-making when treating burn wounds.

PREVALENCE

- In the UK, it is estimated that :
 - 250,000 people receive burn injuries each year.
 - 175,000 people with burns attend Accident and Emergency departments.
 - 16,000 people are admitted to hospital for specialist burns care.
- In the UK, about 90% of burn injuries are non-complex wounds

PREVALENCE

- Children under 5 years and the elderly are more at risk of burn injury — the latter group may be at increased risk due to reduced mobility, sensory impairment, and slowed reaction times .
 - Burns are the eleventh most common cause of death in children aged 1–9 years.
 - Burns are the fifth most common cause of non-fatal childhood injuries.
 - Boys are more likely to be affected than girls.

PROGNOSIS

- Superficial epidermal burns typically heal within 7 days with conservative management and do not result in scarring.
- Superficial dermal burns typically heal within 14 days with conservative management and do not result in scarring.
- Deep dermal burns may need surgical intervention to heal and may result in some contraction and scarring.
- Full thickness burns that are complex usually need surgical intervention to heal and result in considerable contraction and scarring.
- 300 people each year die in the UK as a result of their burn injury

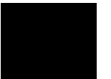
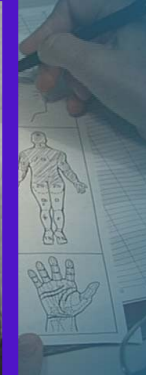


Burn injury assessment

- **AREA OF BURN**
 - Percentage of the Total Body Surface Area burnt (%**TBSA**)
- **DEPTH OF BURN**
 - Severity of tissue damage/capacity to heal
- **RESUSCITATION**
 - Resuscitation percentage /fluid management
- **INHALATION INJURY**
 - Upper/lower airway injury

Determine Burn Severity

- % BSA involved
- Depth of injury
- Age
- Associated/pre-existing disease or illness
- Burns to face, hands, genitalia



- Soot, blisters, adherent clothing or debris obscure wound
- Burns are dynamic...Progression is always a risk

**Difficulties
with accurate
initial
assessment of
burn size &
depth**

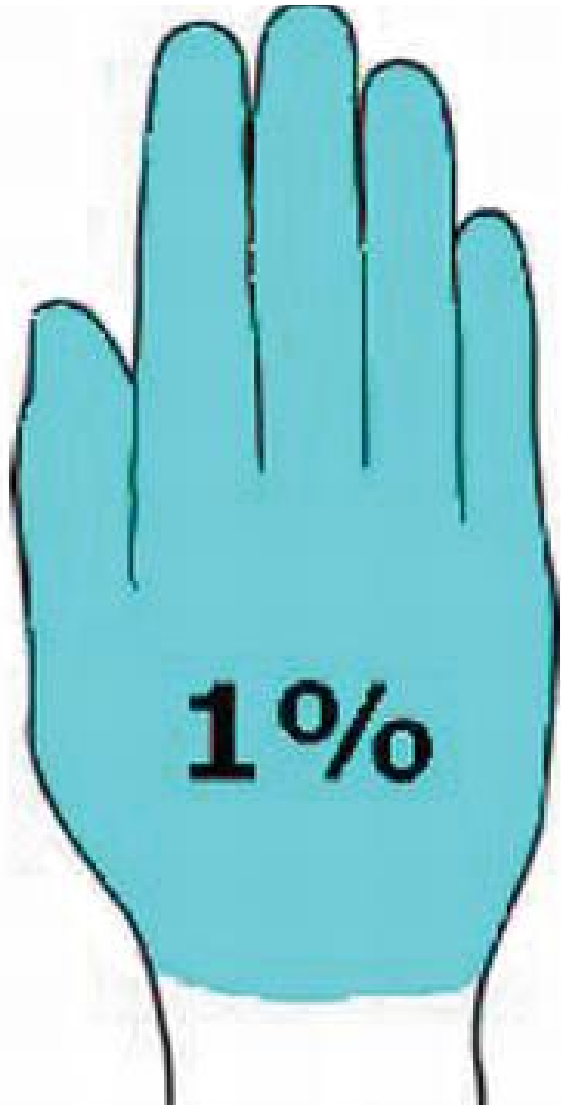
Burn Extent

- Total Body Surface Area (TBSA)?
- Patients palm = about 1% TBSA
- Rule of nines
- Lund and Browder chart



Extent of Burns

- Patient's palmar surface (hand + fingers) = 1% TBSA



Palmar method

1 Closed fist palm = 1% TBSA (Total body surface area)

Do not count erythema

Inaccurate in large burns or patients with greater than normal body mass.

The Palm and the Assessment of TBSA #1 Problem

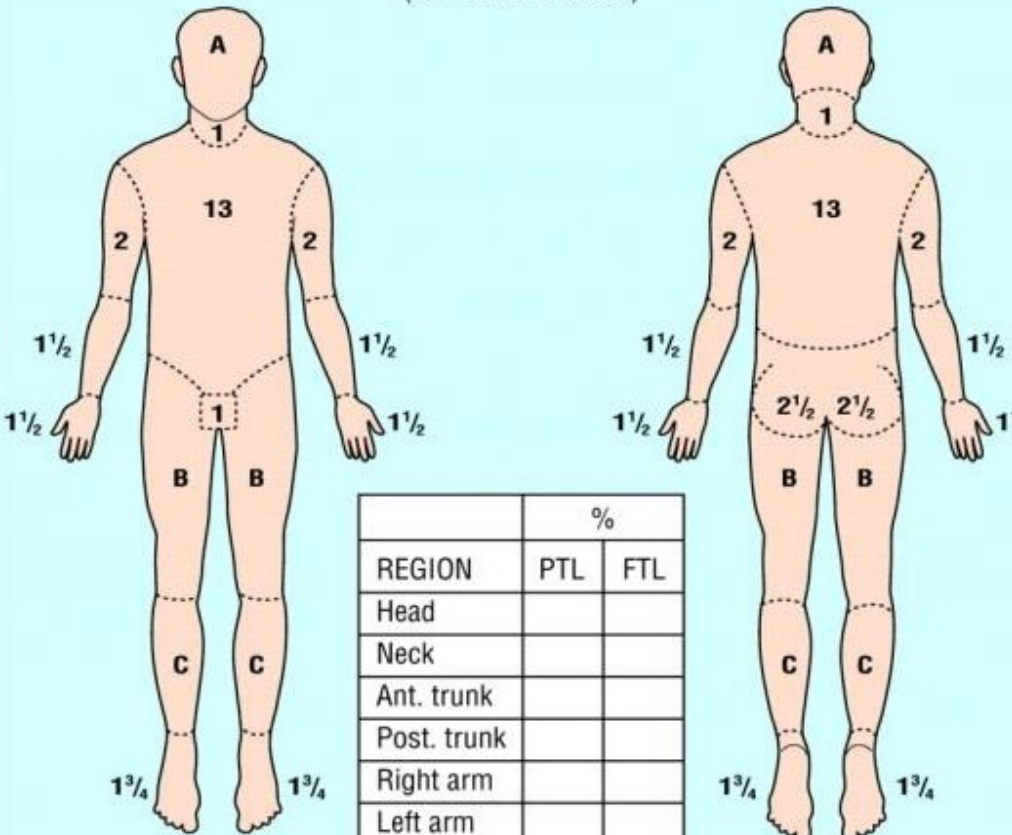
- The area of the palm alone is
 - 0.5 percent TBSA in males
 - 0.4 percent TBSA in females
- Whereas the area of the palm plus the palmar surface of the five digits is
 - 0.8 percent BSA in males
 - 0.7 percent BSA in females
-

Therefore, if a hand alone is used to assess the size of a burn, the percent BSA is overestimated.



% Total Body Surface Area Burn

Be clear and accurate, and do not include erythema
(Lund and Browder)



	%	
REGION	PTL	FTL
Head		
Neck		
Ant. trunk		
Post. trunk		
Right arm		
Left arm		
Buttocks		
Genitalia		
Right leg		
Left leg		
Total burn		

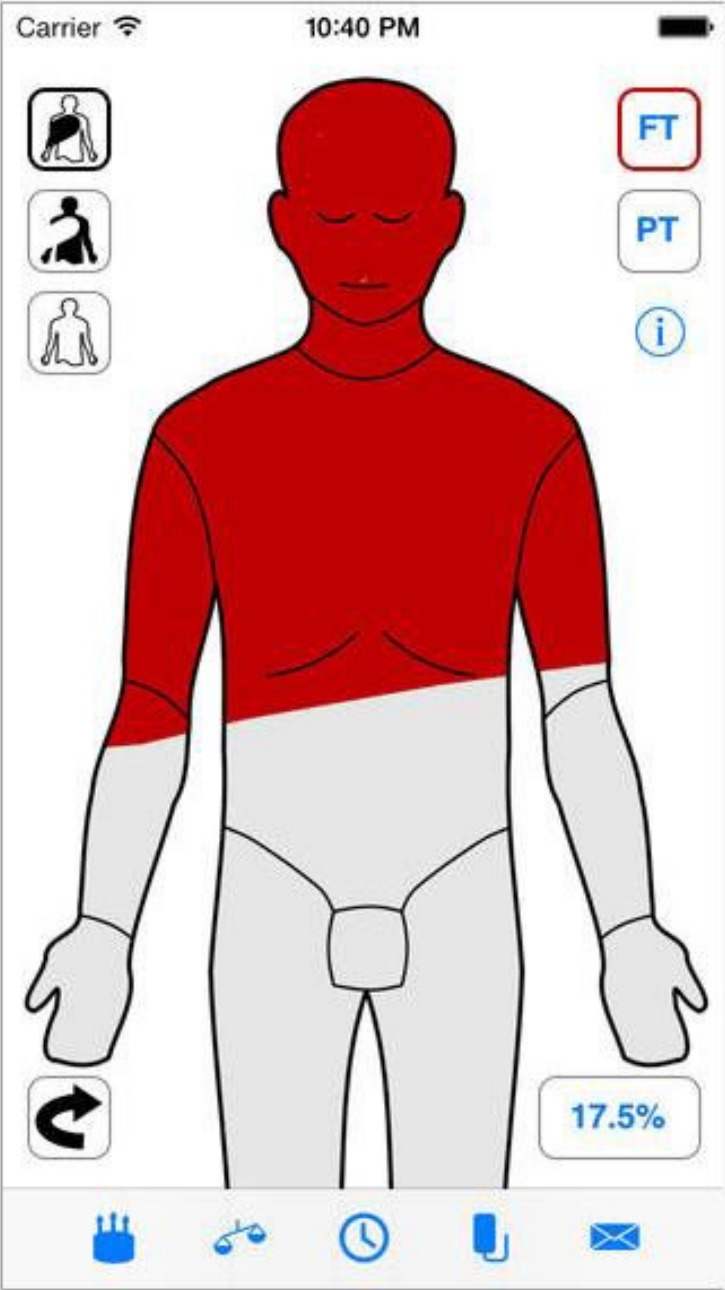
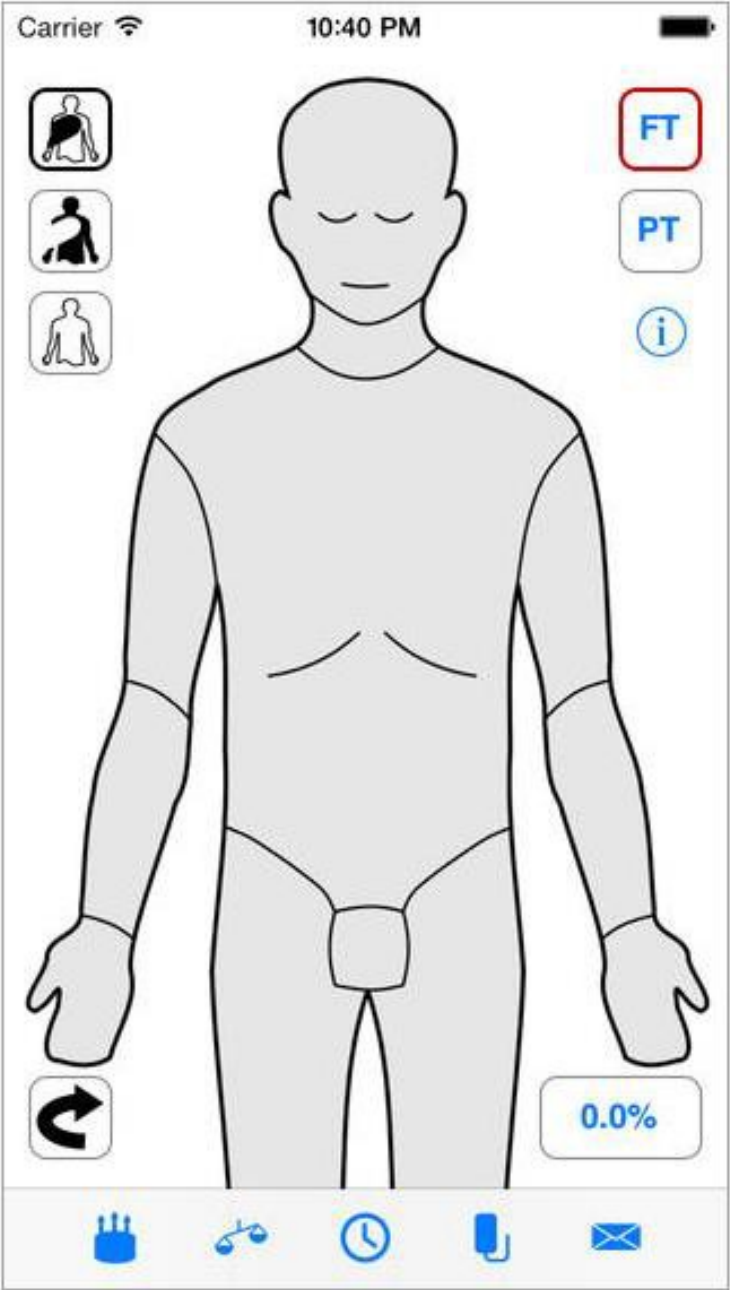
AREA	Age 0	1	5	10	15	Adult
A = 1/2 OF HEAD	9 1/2	8 1/2	6 1/2	5 1/2	4 1/2	3 1/2
B = 1/2 OF ONE THIGH	2 3/4	3 1/4	4	4 1/2	4 1/2	4 3/4
C = 1/2 OF ONE LOWER LEG	2 1/2	2 1/2	2 3/4	3	3 1/4	3 1/2

Lund and Browder

- If used correctly, most accurate method.
- Compensates for variation in body shape with age.
- Requires accurate plotting of the burn injury

Screenshots

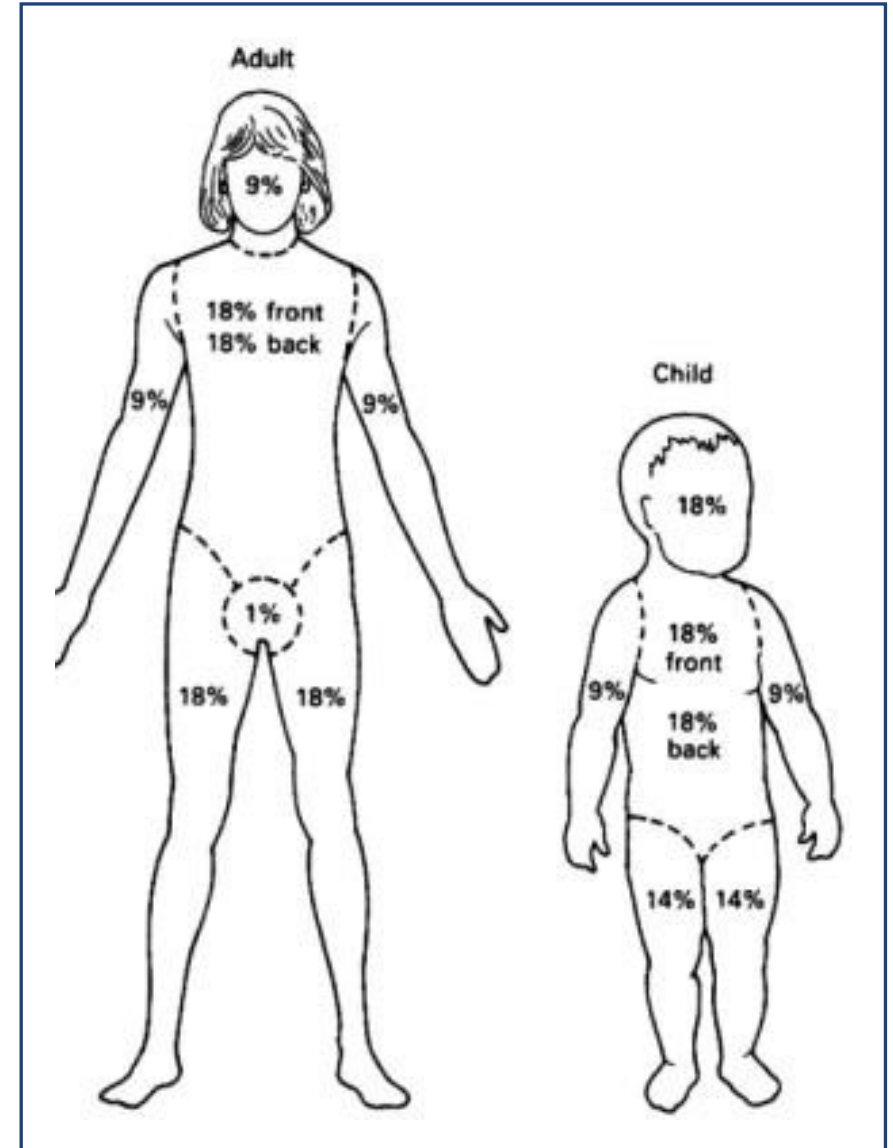
iPhone iPad



Mersey Burns App

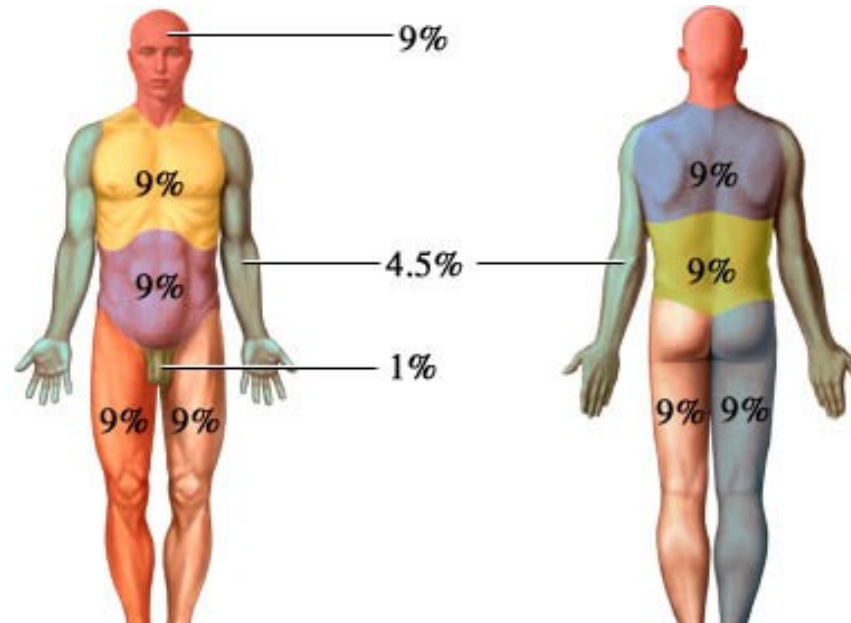
Wallace rule of nines

- Quick tool for estimating medium to large burns.
- Body is divided into areas of 9%.
- Modified version for children, head starts at 18% and legs at 14%. Subtract 1% from the head for every year the child ages and + 0.5% to each leg.





The Rule of Nines Isn't Always the Rule



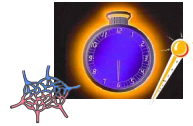
The Rule of Nines Isn't Always the Rule

- The Rule of Nines provides reasonable estimates of body surface area for patients ranging from 10 to 80 kg.
- For obese patients weighing more than 80 kg, a **rule of fives** is proposed:
 - 5% body surface area for each arm
 - 5 x 4 or 20% for each leg
 - 10 x 5 or 50% for the trunk
 - and 2% for the head



Burn Depth

- Factors
 - Temperature
 - Duration of contact
 - Dermal thickness
 - Blood supply
 - Special Consideration: Very young and very old have thinner skin



Burns begin at 44 degrees C



6 hours for burns to occur at

111 degrees F (44 C)



1 second of burns to occur at

140 degrees F (60 C)

Time For Full Thickness Burns To Occur In Scalds

- 5 seconds in water @ 140 F (60 C)
- 30 seconds in water @ 130 F (55 C)
- **5 minutes in water @ 120 F (49 C)**



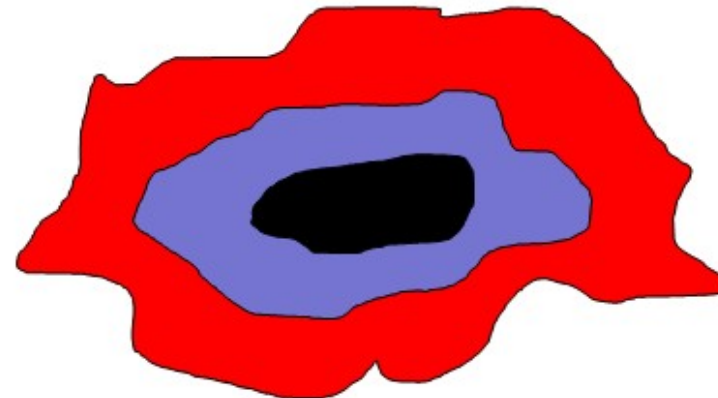
Pain control

Ice Pack-----DO NOT USE EVER

- DOES NOT
 - Reverse temperature
 - Inhibit destruction
 - Prevent edema
- DOES
 - Delay oedema
 - Reduce pain

UW HEALTH BURN CENTER

Zones of burn injury



ASSESSING A BURN

- The timing, type, and cause of the burn (for example flame, scald, contact burn, electrical, or chemical), and mechanism of injury.
 - Scalds are frequently due to spilling of hot drinks and liquids, and immersion in a hot bath or shower. They usually cause superficial or superficial dermal injuries.
 - Contact burns occur when the skin touches an extremely hot object (for example, in industrial accidents), or a less hot object for a prolonged time (such as an iron, oven door, or radiator). They usually cause deep dermal or full-thickness burns.
 - Electrical burns occur when electricity flows through the body from an entry to exit point. Heat energy from the electric current damages tissue along its path of flow. Low-voltage (domestic current) burns typically cause small, deep contact burns at the entry and exit points.
 - Flash burns occur when a person is exposed to an arc of high voltage current, but it does not enter the body. They typically cause superficial burns to the face, neck, hands, and upper limbs.
 - Chemical burns result from corrosive agents such as acids, alkalis (in household cleaning agents, bleaches, and cement), and organic products (such as bitumen). They tend to cause deep dermal or full-thickness burns.



Depth assessment

Superficial/Erythema

- Superficial partial thickness
- Deep dermal
- Full thickness



TYPES OF BURNS



Superficial Burn

The affected area becomes red, dry, and painful. These areas also tend to blanch, turning white as [blood flow](#) is restricted with compression.



Superficial Partial Thickness

[Burns](#) can be red with clear [blisters](#); wet, as if they are weeping; and are even more painful than first-degree [burns](#), but still blanch.



Deep Dermal

May vary in [color](#) from yellow or white to red; have [blisters](#); and can be wet or dry. Because of damage to blood vessels and nerve endings, [burns](#) of this degree may not blanch and there may only be pain due to pressure

[nerve damage](#)



Full Depth

waxy white to leathery [grey](#) or black; and dry. Again, blanching doesn't occur and the pain may only feel like deep pressure - in other words, they can be relatively painless. Additionally, the [elastin](#) damage causes the [burn](#) to be stiff or inelastic.

Superficial/erythema

- Involves epidermis only
- Redness/Erythema – NO SKIN LOSS
- Brisk capillary refill
- Resolves within 3-7 days with analgesia & moisturizer





Superficial Partial Thickness (SPT)

- Pale pink/red
- Brisk Capillary refill
- Intact or collapsed blisters
- Exudate
- Most Painful
- Should heal within 14-21 days with conservative management (non-adherent + absorbent dressings)



Deep Dermal

- •Dark pink, Mottled, fixed red staining, cherry red
- •Sluggish or absent capillary refill
- •Dull or altered sensation
- •Surgical intervention may be required
- •Urgent review of circumferential injuries



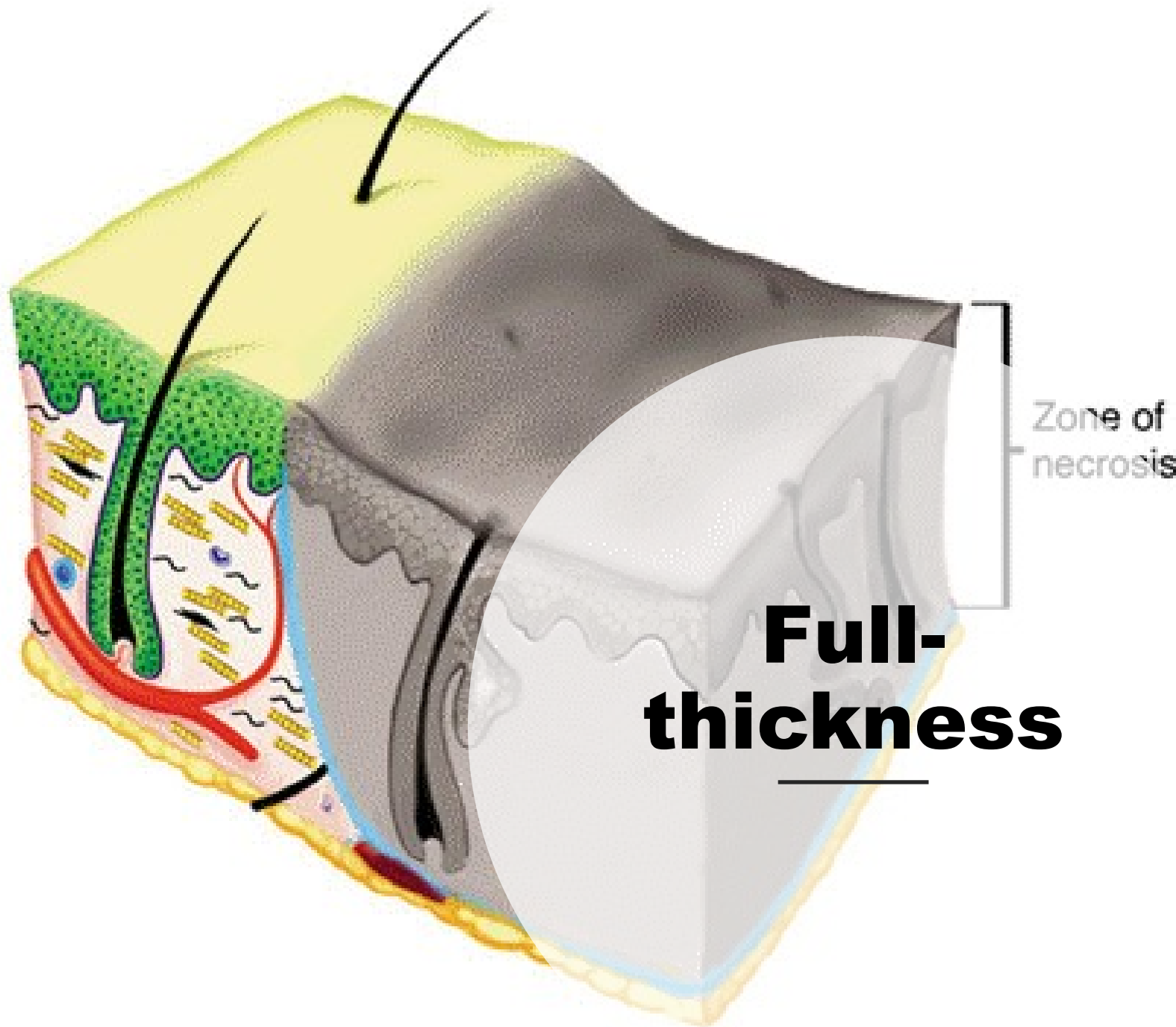
Full Thickness: 3rd degree

- May go into fat or deeper
- Red, white, brown, black
- Inelastic and leathery
- painless or numb
- Heals only from the periphery
- Always excise and graft

Full Thickness Burn

Characteristic

No remaining
viable dermis



Full thickness

- White, brown, black, yellow
- Dry and leathery
- Thrombosed vessels may be visible
- No capillary refill
- No feeling
- Surgical intervention & scar management required
- Urgent review of circumferential burns





First aid

Remove non-adherent clothing and jewellery.

- Cool with running water for 20 Minutes, within 3 hours of injury.
- If no access to running water, apply a cool compress + change frequently over 20 Minute period.
- Irrigate chemical from skin with warm running water for at least 15 mins.
- Irrigate chemical from eyes with Hartmann's/NaCl
- Remember PAIN MANAGEMENT

Scald from black tea – no first aid



3 Days post injury



Blister management

- Small non-tense blisters (<6mm) LEAVE INTACT
- Thick-walled blisters
- Large + thin-walled blisters DEROOOF
- Ruptured Blisters + loose skin

Do not perform blister needle aspiration as bacteria may be introduced and incite infection!

Mechanical debridement with moist gauze for thin walled blisters





Sharp dissection with scissors and forceps

Selecting an appropriate dressing

- Immediate transfer = Clingfilm/hand bags
- •< 24 hours = Jelonet
- •>24 Hours = non-adherent silicone layer
- Primary layer + Absorbent layer + Bandage



When to refer?



Electrical Burns

- •Low voltage <1000volts
- - <500 voltage - damage contained to contact site
- •High voltage <1000volts
- •Consider concealed injury:
 - -Rhabdomyolysis
 - -Compartment syndrome
 - -Cardiac infarct
 - -Fracture/dislocation
- •CK level if electrical injury suspected
- -Elevated in high voltage injuries
- -Increase fluid resuscitation to help flush kidneys
- -May impact decision to perform early fasciotomy



ELECTRICAL BURNS

- If the person has been injured by a low-voltage source (for example 220–240 volts, domestic electricity supply), safely switch off the power supply, or remove the person from the electrical source using a non-conductive material (such as a wooden stick or wooden chair).
 - Note: do not approach a person connected to a high-voltage source (1000 volts or more).
- Arrange immediate admission to the nearest major Emergency department (from where transfer to a regional burns unit may be arranged, if necessary), depending on local referral pathways.



Chemistry Flash Backs

- Tar Burns
 - “Likes dissolve likes”
 - Excellent removal with butter
- Wet Cement
 - CaOH^-
 - Treat like an ocular alkali burn
- Hydrofluoric Acid Burn

Dissolve 10% calcium gluconate solution in 3 times the volume of a water-soluble lubricant.

For burns to the fingers, retain gel in a latex glove.



CHEMICAL BURNS

- Determine the causative chemical, where possible.
- Remove affected clothing, brush the chemical off the skin if it is in a dry form, and copiously irrigate the burn with water for an hour.
 - Note: do not attempt to neutralize chemicals as additional heat will be generated, which may increase tissue damage.
- Arrange immediate admission to the nearest major Emergency department (from where transfer to a regional burns unit may be arranged, if necessary), depending on local referral pathways.

Chemical Burn



- Average skin PH 4.5 - 5.5
- Acid
- Alkali
- Typically deeper due to lack of immediate stimuli to perform first aid
- Thorough history
- Chemical
- Concentration
- Time
- First aid
- Ocular involvement
- Urgent ophthalmology review
- Cement + Bitumen
- Olive or Arachis oil to remove

Inhalation Burns



- Inhalation injury “nonspecific”
 - Thermal injury
 - Upper airway
 - Heat and toxic fumes
 - Local chemical irritation
 - Throughout airway
 - Primarily toxic fumes
- Systemic toxicity
 - CO

Signs and symptoms

- Lacrimation
 - Cough
 - Hoarseness
 - Dyspnea
 - Disorientation
 - Anxiety
 - Wheezing
-
- Conjunctivitis
 - Carbonaceous sputum
 - Singed hairs
 - Stridor
 - Bronchorrhea

Pathophysiology

- *The* main factor responsible for mortality in thermally injured patients
- Carbon monoxide the most common toxin
 - 200 times greater affinity
 - Competitive inhibition with cytochrome P-450

Factors that Predict the Need for Intubation in Patients with Smoke Inhalation Injury

- No statistically significant correlation was found between intubation and any of the “classic symptoms” of smoke inhalation:
 - stridor
 - hoarseness
 - drooling
 - dysphagia

Factors that Predict the Need for Intubation in Patients with Smoke Inhalation Injury

- Conclusion
 - Patients with
 - soot in the oral cavity,
 - facial burns, or
 - body burns
 - have a higher likelihood of laryngeal
 - oedema and the need for intubation.

Carbon Monoxide Poisoning

- 10% COHb – asymptomatic, seen most often in smokers, truck drivers, traffic police
- 20% COHb - headache, nausea, vomiting, loss of dexterity
- 30% COHb - confusion & lethargy, possible ECG changes
- 40-60% COHb - coma
- 60% + - usually fatal

Chemistry Flash Backs

- Microwaves cause “superheating”
 - Heating a liquid to a temperature above its normal boiling point, making it unstable.
- Microwave energy burns are based on the water content of tissue
- Muscle burns more than fat
- Delay between time of injury and signs of skin damage or pain

THERMAL BURNS

- :Stop the burning process (for example extinguish flames using 'drop and roll' or smother them with a blanket), and remove non-adherent clothing and potentially restricting jewellery.
 - Do not attempt to remove tar stuck to the skin.
- Within 20 minutes of the injury, irrigate the burn with cool or tepid running water for 20–30 minutes.
 - Note: do not use ice or very cold water, as this may cause vasoconstriction and may deepen the wound.
 - If water is not available, use wet towels or compresses.
 - Ensure the person is kept warm with coats, sheets, or blankets to avoid hypothermia, especially if cooling large areas of skin in children and the elderly.
- Immediately after cooling, cover the burn using cling film, layered onto the burn rather than wrapped circumferentially, to reduce the risk of vasoconstriction. Consider using a clean, clear plastic bag for burns to the hand.
 - If cling film is not available, use a clean, cotton sheet.
 - Note: do not use wet dressings or topical creams.
- Elevate the affected area if possible, to reduce the risk of oedema.
- Offer pain relief, such as paracetamol or ibuprofen for mild-to-moderate pain. Consider adding codeine for more severe pain.
- [Assess](#) the burn to guide whether immediate specialist [referral](#) is needed, or whether the burn can be managed in primary care.

- **WOUND MANAGEMENT**

Clean with soap and water or sterile saline

Povidine Iodine has been shown to delay wound healing

Irrigate acidic chemical burns continuously for 20-30 minutes and alkaline burns for hours

Neutralising an acid with a base is contra-indicated as it can cause further damage.

Eschar or necrotic tissue should be debrided as the dead tissue

Debridement is done in a tangential method, meaning that thin layers of the necrotic tissue should be removed until there's [uniform capillary](#) bleeding throughout the wound. This indicates that you've reached viable tissue.

An important aspect of preventing infection is giving antibiotics, but because [blood flow](#) is often compromised at the necrotic [burn](#) area, systemic antibiotics may not adequately reach it.

Therefore, [topical](#) antibiotics are usually preferred, with a large number of options to choose from.

WOUND MANAGEMENT

- The choice of dressing will depend on the site, size, and depth of the wound, level of exudate, infection risk, and on local formulary availability.
- An appropriate size and type of dressing should be selected to avoid stretching or applying dressings under tension.
- The wound should be covered with a non-adherent dressing, such as paraffin gauze, silicone-coated nylon dressing, polyurethane film, or hydrocolloid dressing.
- A secondary non-fibrous absorbent dressing such as a dressing pad should then be applied and secured well with a lightweight conforming bandage or tubular gauze bandage.
- Dressings should be changed regularly to encourage wound healing. Once burn depth is accurately estimated, the frequency of dressing change may be reduced to minimize the risk of bacterial contamination and trauma to the wound. If appropriate, the person or a carer can be supported to change their own dressings.
- Appropriate analgesia should be taken by the person before dressing changes.
- Note: do not use systemic or topical prophylactic antibiotics, antimicrobial-impregnated dressings, antimicrobial creams such as silver sulfadiazine, or other topical preparations routinely.



WHEN TO REFER

- **Arrange immediate admission** to the nearest major Emergency department (from where transfer to a regional burns unit may be arranged, if necessary), depending on clinical judgement and local referral pathways: All [complex burn](#) injuries.
- All [full thickness burns](#) in any age group and any extent.
- [Deep dermal burns](#) affecting more than 5% of total body surface area in adults, and all deep dermal burns in children.
- All chemical and electrical burns (including lightning injuries).
- Any high-pressure steam injury.
- Any burn associated with suspected [non-accidental injury](#), regardless of the complexity of the burn.
- Burns affecting the face, hands, feet, genitalia, or perineum, any flexural surface such as neck, axilla, elbow, or knee.
- Circumferential deep dermal burns in any age group.
- Burns associated with suspected [inhalation injury](#).
- Burns associated with [co-morbidities](#) that may affect wound healing or increase the risk of [complications](#).
- Burns associated with significant other injuries or trauma (such as crush injuries, fractures, head injury, or penetrating injuries).
- Burns associated with sepsis.
- People who may require admission due to social circumstances, inadequate pain control, or if dressings are difficult to manage in primary care.
- Children under 10 years of age, or adults with significant co-morbidities or clinically adjudged to be at risk of complications.

Specialist Referral

- Arrange referral to a specialist burns unit or seek specialist advice for any wound that is not healing as expected, or has not healed within two weeks of initial injury, depending on clinical judgement.
- Be aware that non-complex burns do not usually require specialist referral, however burns have the potential to progress into a complex wound over time





Non-accidental Injuries

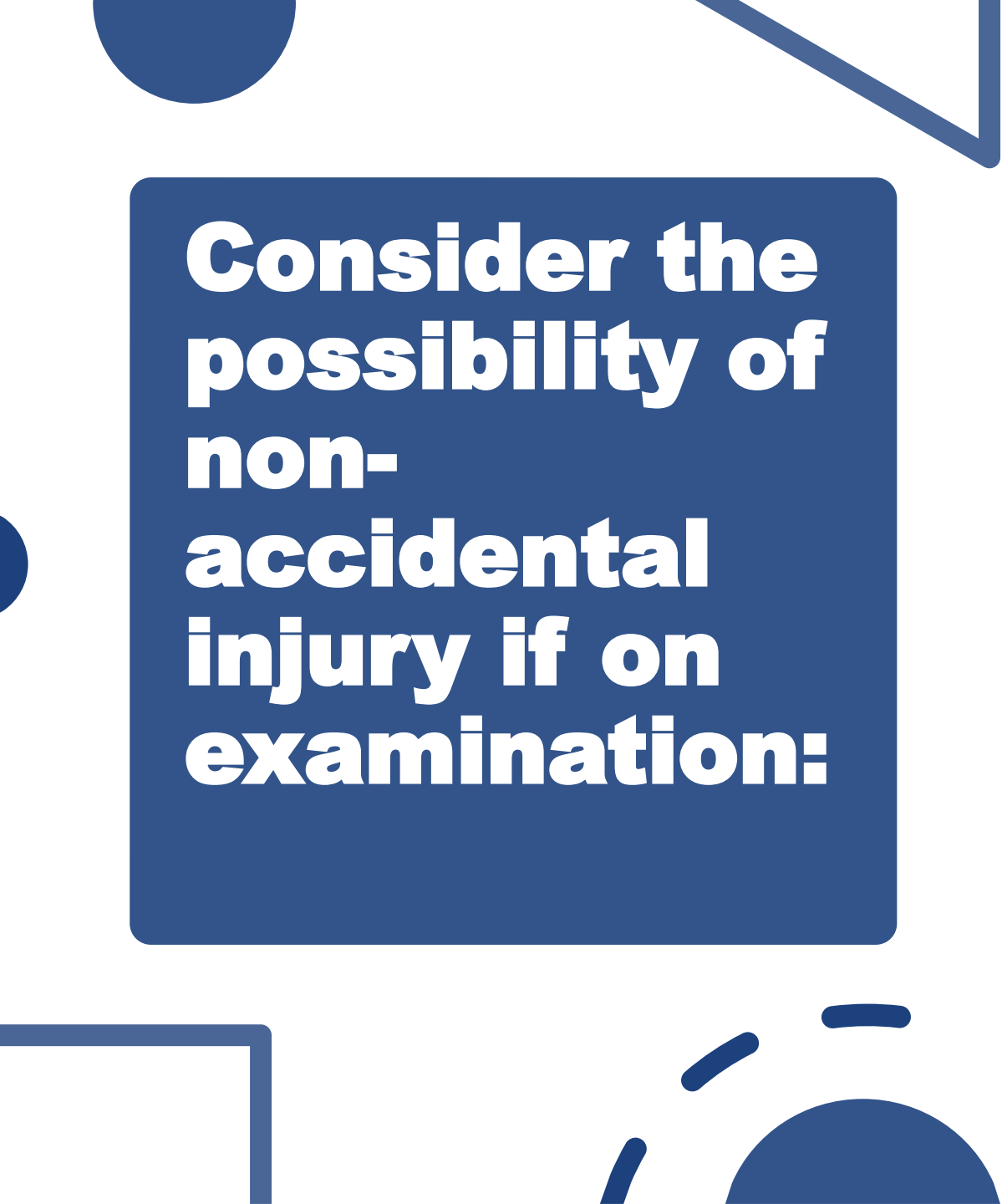
- 2% of all burns are NAI
- 10% of abused children suffer from burns
- **Accident** a lapse of usual protection given to the child
- **Neglect** inadequate or negligent parenting: failing to protect the child
- **Abuse** deliberately inflicting injury (•Ensure immediate and effective action is taken in all suspected cases)

What are the red flags for non-accidental injury?

- **Suspect non-accidental injury if a child or adult has a burn or scald with any of the following:**
 - Explanation for the injury is absent or unsuitable.
 - The person is not independently mobile.
 - The injury is on any soft tissue area that would not be expected to come into contact with a hot object in an accident (for example, the backs of hands, soles of feet, buttocks, back).
 - The injury is in the shape of an implement (for example, cigarette, iron in contact burns).
 - The injury indicates forced immersion, for example, scalds:
 - To the buttocks, perineum, and lower limbs.
 - To limbs in a glove or stocking distribution.
 - To limbs with a symmetrical distribution.
 - With sharply delineated borders.

Consider the possibility of non-accidental injury if there is:

- Delayed presentation in seeking medical attention. Note: this may be due to effective first aid measures masking the severity of the injury.
- An unrelated adult presenting the child to healthcare services.
- Evasive or changing history.
- A trigger event such as soiling, enuresis, or minor misbehaviour by the person.
- History inconsistent with assessed development.
- A lack of parental or carer concern.
- A lack of appropriate supervision of a vulnerable person (may indicate neglect).
- Failure to engage with healthcare appointments or health promotion programmes (may indicate neglect).



Consider the possibility of non-accidental injury if on examination:

- The history given is incompatible with examination findings.
- There are no splash marks in scald injuries (a fall into the bath will usually produce splash marks).
- There are signs of restraint on upper limbs.
- There is sparing of the flexion creases (suggests the child was in the fetal position when burnt).
- There is central sparing of the buttocks (the 'doughnut sign'), may be found in submersion injuries if a person has been forcibly held down.
- There are associated unrelated injuries (such as bruises of various ages).

When is tetanus prophylaxis indicated?

- All people at high risk of tetanus should be given human tetanus immunoglobulin for immediate protection, irrespective of the person's tetanus immunization history. Burns that are at high risk of tetanus infection include those:
 - That need surgical intervention that is delayed for more than six hours.
 - That have a significant degree of devitalised tissue or have been associated with a puncture-type injury, particularly where there has been contact with soil or manure (material likely to contain tetanus spores).
 - Containing foreign bodies.
 - Associated with compound fractures.
 - In people with sepsis.

**In addition,
assess the
need for
(combined)
tetanus
vaccine to
protect against
future
exposure to
tetanus if:**

- The person is fully immunized (that is, has received the recommended five-dose schedule of tetanus vaccine at appropriate intervals) — tetanus booster not needed.
- Primary immunization is complete, boosters incomplete but up-to-date — tetanus booster is not needed but may be given if booster is due.
- Primary immunization is incomplete, or boosters not up-to-date — give tetanus booster and further doses as needed to complete the recommended schedule. If the primary course is interrupted it should be resumed but not repeated. Add human tetanus immunoglobulin and give this at a different site to tetanus booster.
- The person is not immunized or immunization status is uncertain — give an immediate dose of tetanus vaccine. Add human tetanus immunoglobulin and give this at a different site to tetanus vaccine. Arrange further doses of (combined) tetanus vaccine as needed to complete the recommended five-dose schedule

Questions?

