BELMATT

HEALTHCARE TRAINING

# Burns and First Aid Awareness

# Session Aims and Objectives

**AIM:** The aim of this session is to provide an overview of burns and current burn care & treatment.

**Learning Objectives**

- Describe the types, depth and classification of burns
- Understand the causes of different types of burns
- Understand the importance of first aid in managing burns
- Develop knowledge of appropriate burn dressings
- Understand burns unit referral criteria

# Burns: the scale/scope…
# 4% TBSA burn

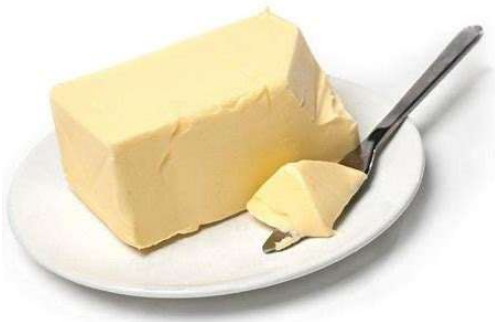
- A 4% superficial TBSA burn to the back of a fit adult: treated safely and appropriately as out patient.
- If deeper: skin grafting: short hospital stay
- A deep 4% TBSA injury to both hands= complex reconstruction and rehabilitation. Could lead to amputation and long term disability
- 4% facial injury could be associated with smoke/vapour inhalation injury: High dependency environment- +/- intubation risk
  - International Burn Injury Database –annual report 2014/15

# Prevalence

- Across the board (children & adults) scalds are the most common cause of burn injury, representing 43% of acute burn injuries
- It is estimated that on average 110 children per day are seen in emergency departments with burn injuries – 46 as a result of a hot cup of tea or coffee spill
- The majority of burn injuries occurring to children are between 3 and 6pm
- The most common place of injury for children is in the home – 49% of whom are burnt in the kitchen
- The average cost to the NHS for a major burn is £168,155
- Burn cooling is critical in the initial first aid response to injury – applying cool running water for 20 minutes is considered best practice

Ref: www.cbtrust.org-uk


What ‘first aid’ have
you seen used ???




Sudocrem®
HEALING CREAM (ZINC OXIDE 15.25% W/W)
• Nappy Rash • Abrasions
• Mild Eczema and Dermatitis
400g NET
AUST L 96541
SOOTHES, HEALS AND PROTECTS


1
Egg White
fab HOW

# Causes of burns ?

# Causes of burns

Flames
Dry heat

Radiation

Scalds – Wet heat

Friction


Chemicals

Contact- dry heat

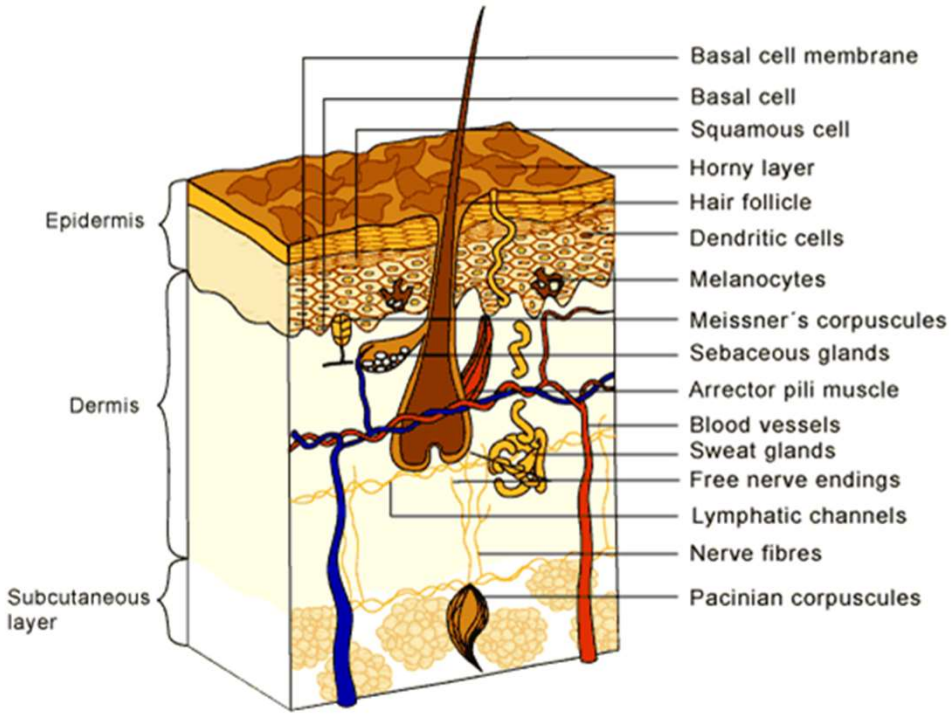
Electricity

Inhalation

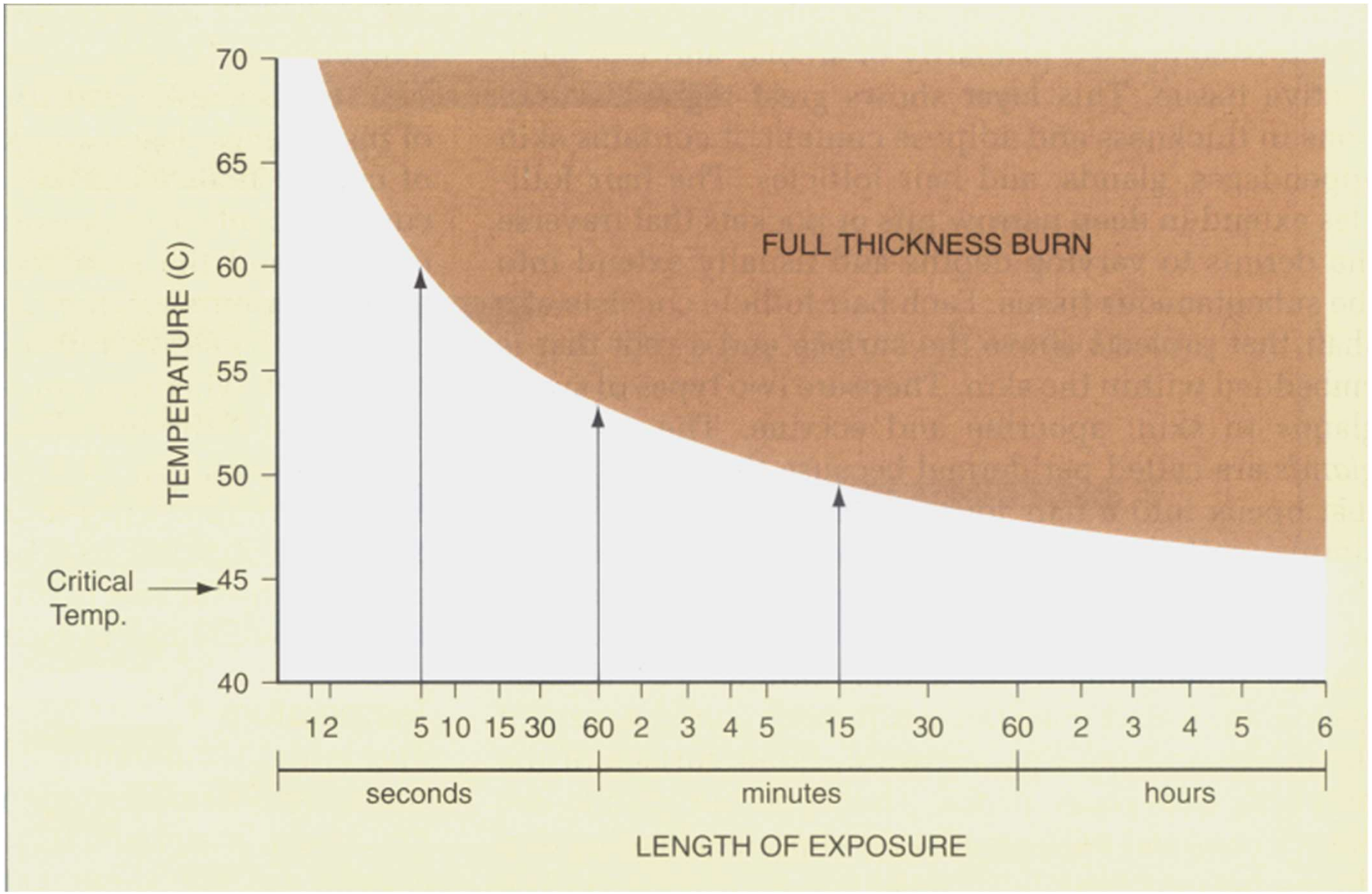
Cold Burns

# CLASSIFICATION

- Extent (by % TBSA)
- Depth
  - Described by layers of skin involved
    - Epidermis
    - Dermis
    - Subcutaneous layers
  - Classification
    - Superficial/Erythema
    - Partial thickness
    - Deep dermal
    - Full thickness



# TIME TO BURN


70
65
60
55
50
45
40
TEMPERATURE (C)
Critical
Temp.
FULL THICKNESS BURN
1 2
5 10 15 30
60
2 3 4 5
15
30
60
2 3 4 5
6
seconds
minutes
hours
LENGTH OF EXPOSURE

# Temperatures

- Steam from hot car radiator: 90° C and 105° C, enough to cause a severe burn in less than a second.
- Cooking oil can easily exceed 190° C
- Hot motor oil can reach 135° C
- Molten sugar used for making candy can easily exceed 170°C.
- Paraffin wax melts at around 50°C (eg. Waxing wax,
    - candles at around 60°CF, but some higher
    - Beeswax  melts at 65°C or higher

# First aid

***20 min running cool water (2-15°) as soon as possible but up to 3 hours post injury***

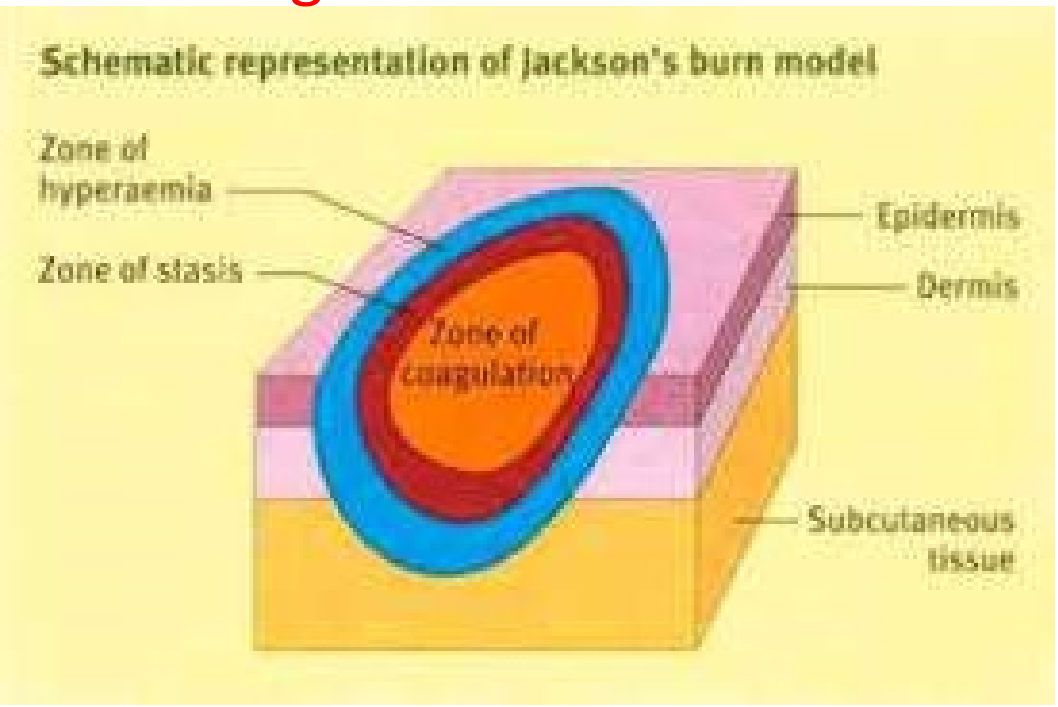
No ice → vasocontraction.

No hydrogels as first aid !

Cuttle & Kimble, 2010)

# Jackson's burn model

**Zone of coagulation**:
Unsalvageable




**Zone of hyperaemia:**
Reversible increase in blood flow and inflammation.

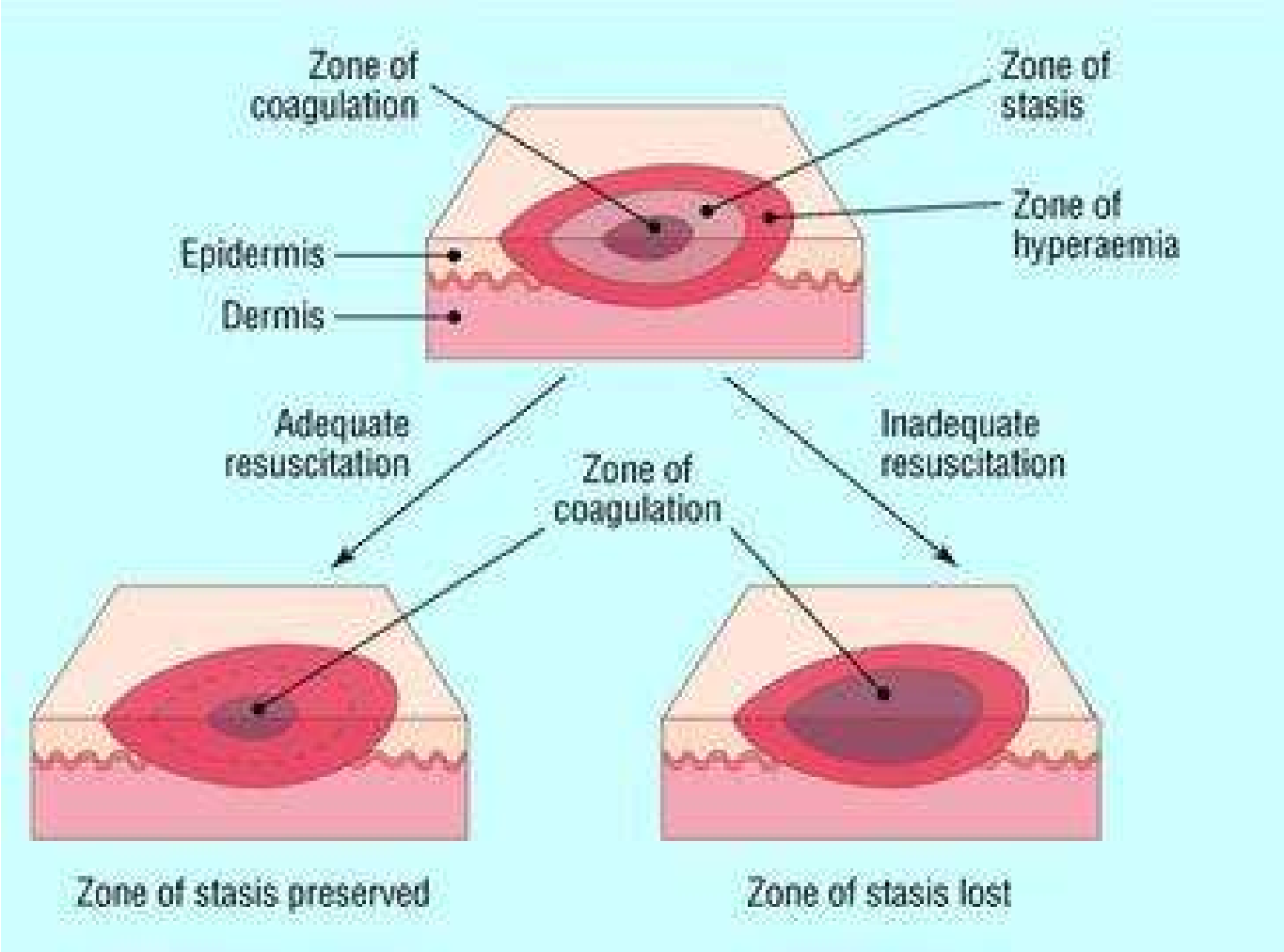
**Zone of stasis:**
Tissue ischemia in which there is a reduction in the dermal circulation. This is damaged but potentially viable tissue. affected with static blood flow amenable to:

- First aid
- Resus measure
- Wound care

This ischemic zone may progress to full necrosis unless the ischemia is reversed.

Vicburns- 2016

# IMPACT OF 1ST AID




Effective up to 3 hours post injury – the quicker first aid is administered first aid the better

Hettiaratchy, 2014

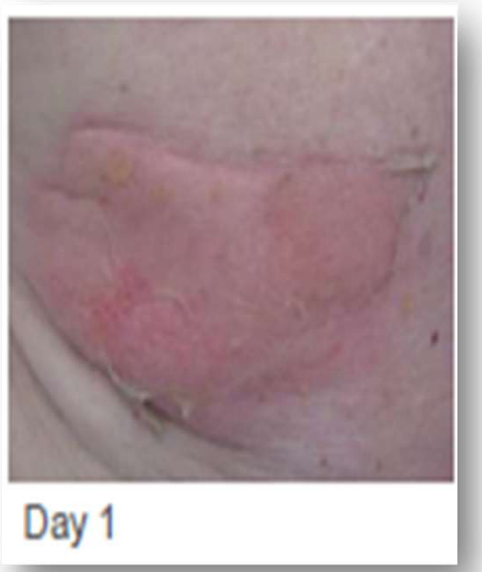
# DIPHOTERINE

- Normal skin is mildly acidic with a PH between 4.5 -5.5.
- Chemical burns changes pH of skin
- Diphoterine® is a washing solution designed for eye and skin chemical splashes.
- Diphoterine® has several properties
  - aims to minimise the development and severity of chemical burns.

- Diphoterine binds chemically opposite compounds thus limiting their ability to cause further damage.
- Hypertonic meaning it has a drawing out effect and can therefore assist to try and help remove some of the chemical that has already penetrated into the tissue.
  - Comparatively, water is hypotonic and has very little drawing effect on the chemical, limiting its ability to draw the chemical out of the deeper tissues.

Ref: Chelsea & Westminster Burns Unit

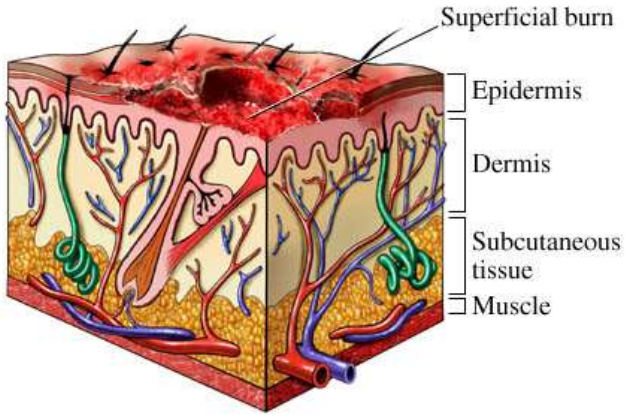
# Burns are dynamic wounds
# The first impression may not be the most accurate





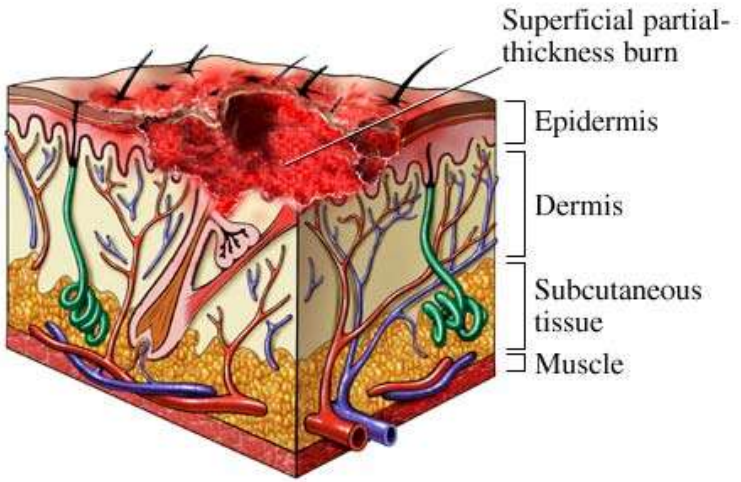

Reproduced from QVH Burns Update 2022

# Superficial burns



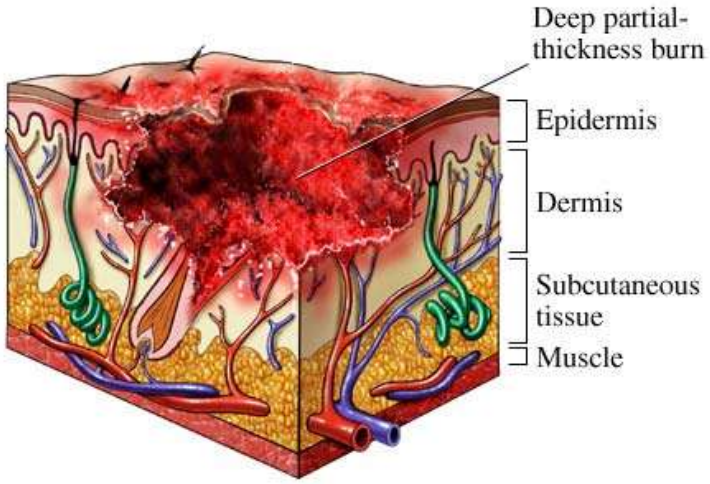

- Damage to outer stratum of epidermis
- Reddened area with or without oedema
- Painful to touch
- Refills under light pressure quickly = Cap refill <2 sec
- Heals 3-7 days
- No scar

# Partial thickness burn



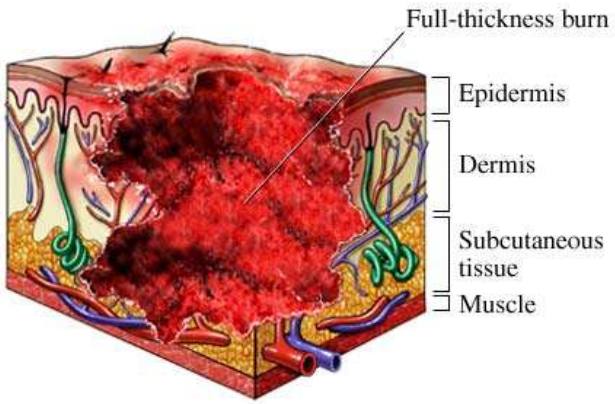

- Damage to epidermis and upper third of dermis
- Red, blistered and extremely painful
- Cap refill- brisk
- Heals 10-21 days
- Possible scar

# Deep partial thickness (deep dermal)




- Damage to deep dermal tissue
- Mottled/white or deep red appearance with waxy dry surface
- Diminished sensation- cant distinguish between dull & sharp
- Cap refill-slower
- Heals 30 days or more – usually needs grafting
- Scars visible

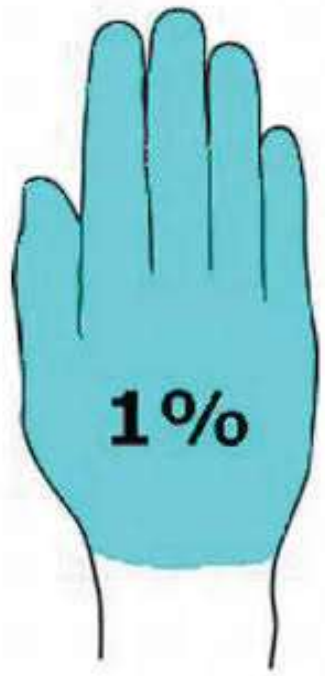
# Full thickness




- Destruction of all dermal structures and may extend to subcutaneous tissue, muscle or bone
- Black, dark brown/tan or cherry red dry leathery surface
- No sensation
- No cap refill
- Requires grafting
- Will scar

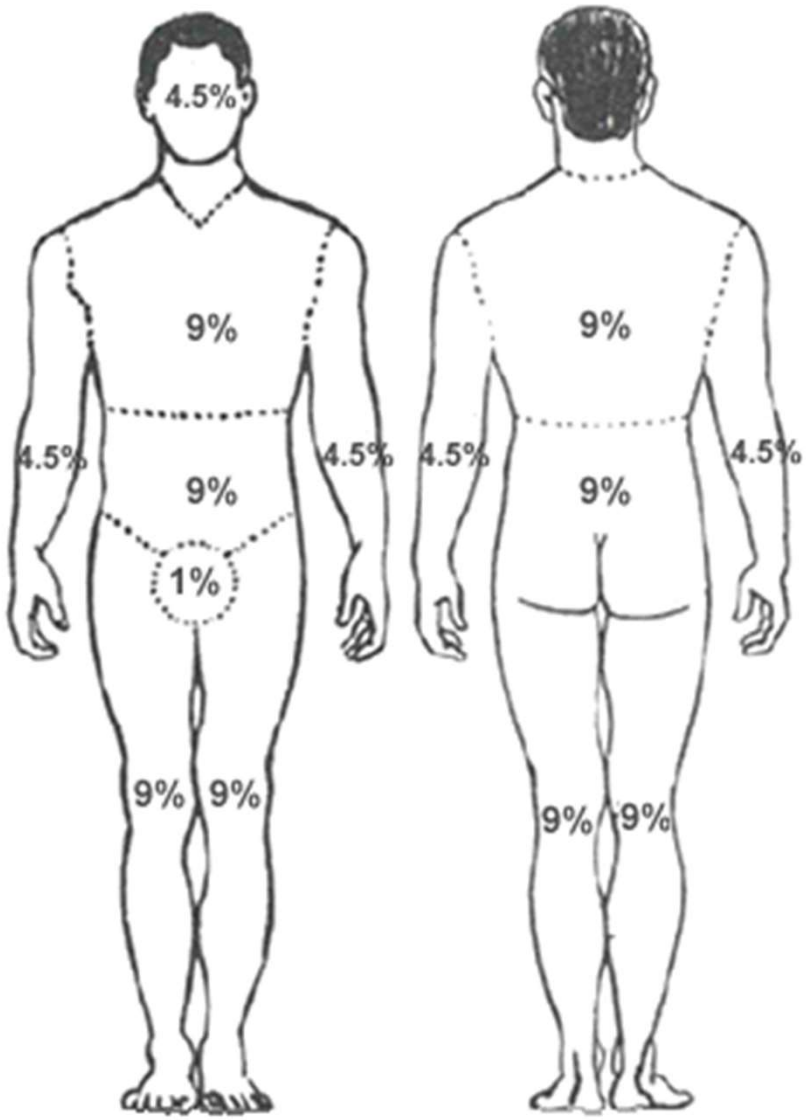
# Assessing the extent of a burn

- Calculate the total body surface area affected
- Crude assessment- patients palm 1%
    - Useful assessment up to 5%

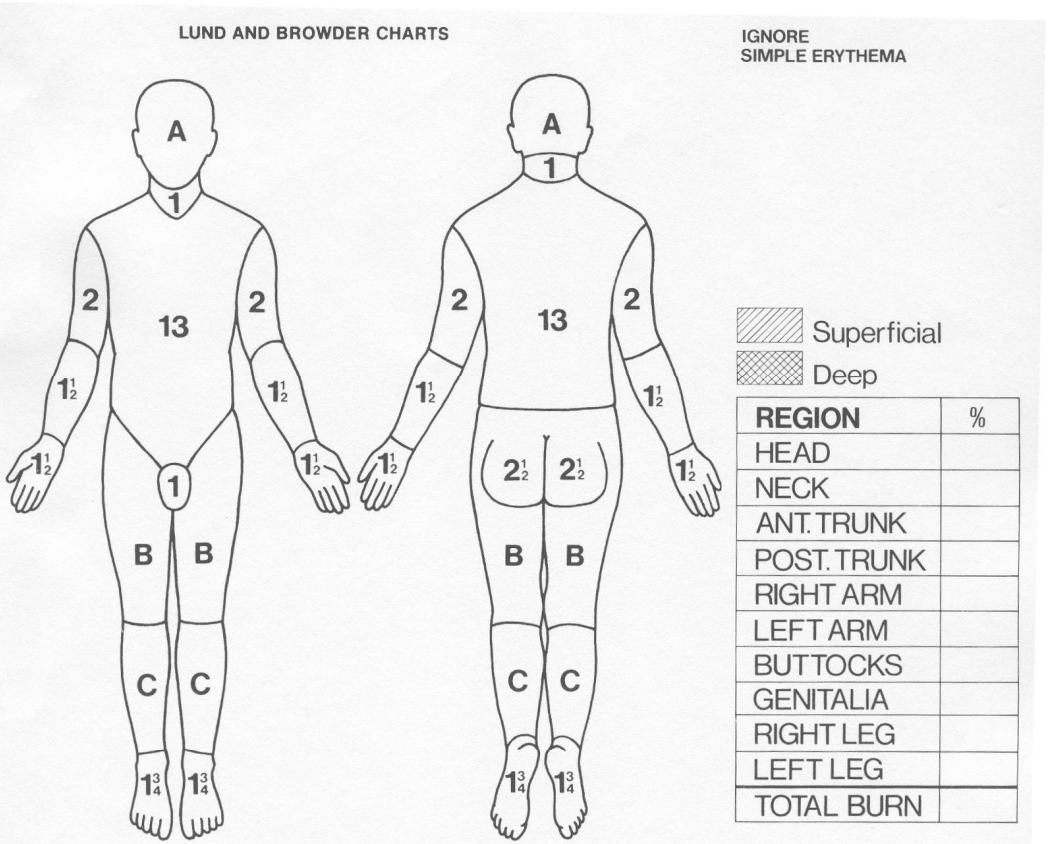



- Discount erythema !!
    - if unsure rub burn, if skin slips include
- **>15% burns Adult**
- **>10% burns Children**
    - Need I.V. fluid replacement and usually referral to a burns unit (special consideration may also be needed for the elderley

# The rule of nines-pre hospital mainly



# Lund and Browder Chart

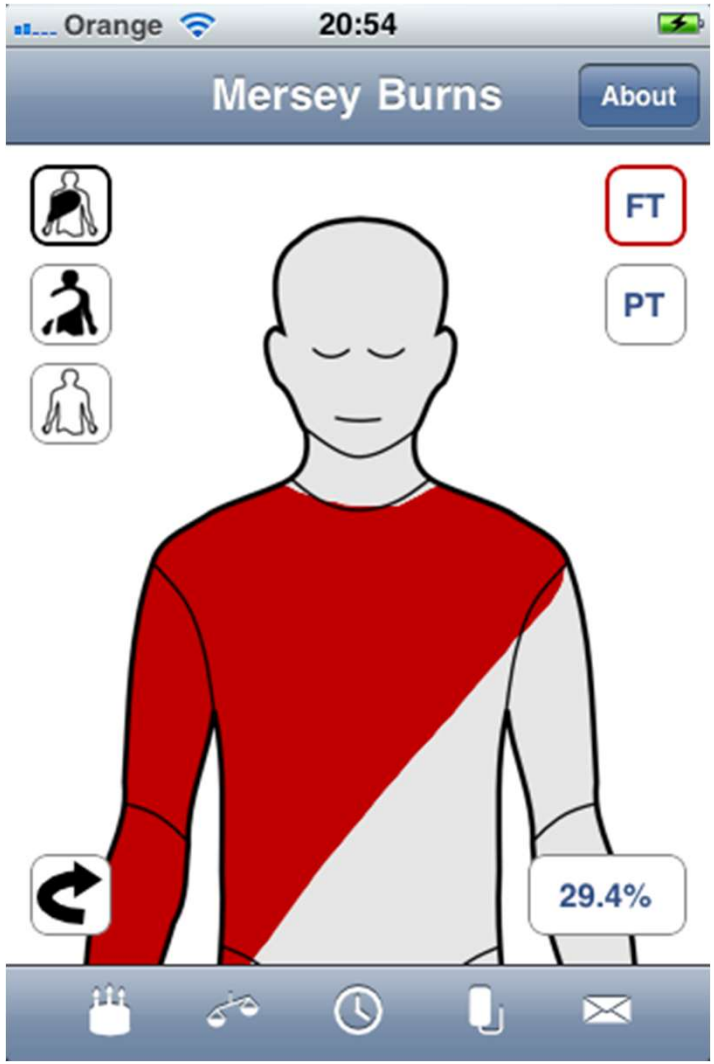



| REGION | % |
|---|---|
| HEAD | |
| NECK | |
| ANT. TRUNK | |
| POST. TRUNK | |
| RIGHT ARM | |
| LEFT ARM | |
| BUTTOCKS | |
| GENITALIA | |
| RIGHT LEG | |
| LEFT LEG | |
| TOTAL BURN | |

RELATIVE PERCENTAGE OF BODY SURFACE AREA AFFECTED BY GROWTH

| AREA | AGE 0 | 1 | 5 | 10 | 15 | ADULT |
|---|---|---|---|---|---|---|
| A = ½ OF HEAD | 9½ | 8½ | 6½ | 5½ | 4½ | 3½ |
| B = ½ OF ONE THIGH | 2¾ | 3¼ | 4 | 4½ | 4½ | 4¾ |
| C = ½ OF ONE LEG | 2½ | 2½ | 2¾ | 3 | 3¼ | 3½ |

# Mersey Burns App



# Paediatric considerations: Physical, psychological and social differences…

- Scalds in younger- flame in older children
- Scalds: liquid splashes
- Peak age 18/12-3 years
- Skin is thinner
- Lose proportionately more fluid
- More prone to hypothermia
- Mount greater systemic inflammatory response.
- Long term treatment: eg scar release as growing
- Family burden

- Infants and children: temp as low as 40 can rapidly cause significant injury
- TSS id a rare but seen in children with burns:.
  - Pyrexia 39C,
  - Rash,
  - Shock
  - Diarrhoea, vomiting, or both
  - Irritability,

Fenton & Nene, 2007

# Paediatric considerations: the danger of the home ….


# Sweets….. ???

# “Self inflicted” burns

**Tide Pod Challenge**


**Salt-Ice Challenge**

**“ Frosties”….**

# ? NAI…

Forced submersion in a flexed position

'Zebra' stripe

'Doughnut hole' sparing

Ref:: plastic Surgery Key

- Burns that look older than the history would suggest
- The existence of other injuries
- Symmetrically distributed burns
- Burns localized to the perineum/buttocks
- Burns suggestive of immersion: no splash marks, clear tide levels, stocking- or glove-pattern burn
- Wounds necessitating skin grafting or intensive care
- Sparing of flexor creases
- Burns of posterior head or back
- Multiple burn sites
- Burns consistent with the following mechanisms of injury: brands/contact burns, cigarette burns, scalding immersion, stun guns, fork tines, light bulb, iron or grill markings

# Assessment of patients with burn injuries

A. **Airway** maintenance with cervical spine control

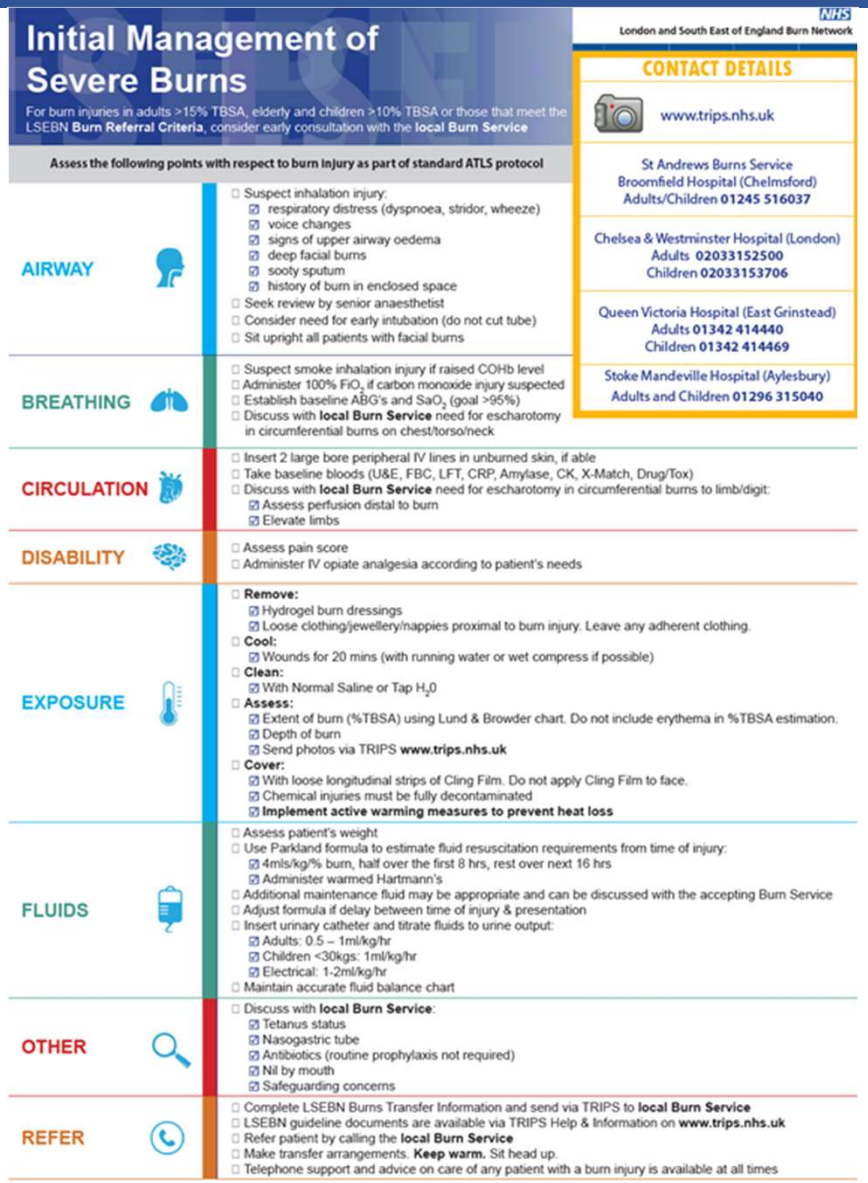
B. **Breathing** and ventilation

C. **Circulation**

D. **Disability** (neurological status)

E. **Exposure** (environmental control)

F. **Fluid** resuscitation proportional to burn size



## Initial Management of Severe Burns

London and South East of England Burn Network

For burn injuries in adults >15% TBSA, elderly and children >10% TBSA or those that meet the LSEBN **Burn Referral Criteria**, consider early consultation with the **local Burn Service**

**CONTACT DETAILS**

www.trips.nhs.uk

St Andrews Burns Service
Broomfield Hospital (Chelmsford)
Adults/Children **01245 516037**

Chelsea & Westminster Hospital (London)
Adults **02033152500**
Children **02033153706**

Queen Victoria Hospital (East Grinstead)
Adults **01342 414440**
Children **01342 414469**

Stoke Mandeville Hospital (Aylesbury)
Adults and Children **01296 315040**

**Assess the following points with respect to burn injury as part of standard ATLS protocol**

**AIRWAY**
- ☐ Suspect inhalation injury:
  - ☑ respiratory distress (dyspnoea, stridor, wheeze)
  - ☑ voice changes
  - ☑ signs of upper airway oedema
  - ☑ deep facial burns
  - ☑ sooty sputum
  - ☑ history of burn in enclosed space
- ☐ Seek review by senior anaesthetist
- ☐ Consider need for early intubation (do not cut tube)
- ☐ Sit upright all patients with facial burns

**BREATHING**
- ☐ Suspect smoke inhalation injury if raised COHb level
- ☐ Administer 100% $FiO_2$ if carbon monoxide injury suspected
- ☐ Establish baseline ABG's and $SaO_2$ (goal >95%)
- ☐ Discuss with **local Burn Service** need for escharotomy in circumferential burns on chest/torso/neck

**CIRCULATION**
- ☐ Insert 2 large bore peripheral IV lines in unburned skin, if able
- ☐ Take baseline bloods (U&E, FBC, LFT, CRP, Amylase, CK, X-Match, Drug/Tox)
- ☐ Discuss with **local Burn Service** need for escharotomy in circumferential burns to limb/digit:
  - ☑ Assess perfusion distal to burn
  - ☑ Elevate limbs

**DISABILITY**
- ☐ Assess pain score
- ☐ Administer IV opiate analgesia according to patient's needs

**EXPOSURE**
- ☐ **Remove:**
  - ☑ Hydrogel burn dressings
  - ☑ Loose clothing/jewellery/nappies proximal to burn injury. Leave any adherent clothing.
- ☐ **Cool:**
  - ☑ Wounds for 20 mins (with running water or wet compress if possible)
- ☐ **Clean:**
  - ☑ With Normal Saline or Tap $H_2O$
- ☐ **Assess:**
  - ☑ Extent of burn (%TBSA) using Lund & Browder chart. Do not include erythema in %TBSA estimation.
  - ☑ Depth of burn
  - ☑ Send photos via TRIPS **www.trips.nhs.uk**
- ☐ **Cover:**
  - ☑ With loose longitudinal strips of Cling Film. Do not apply Cling Film to face.
  - ☑ Chemical injuries must be fully decontaminated
  - ☑ **Implement active warming measures to prevent heat loss**

**FLUIDS**
- ☐ Assess patient's weight
- ☐ Use Parkland formula to estimate fluid resuscitation requirements from time of injury:
  - ☑ 4mls/kg/% burn, half over the first 8 hrs, rest over next 16 hrs
  - ☑ Administer warmed Hartmann's
- ☐ Additional maintenance fluid may be appropriate and can be discussed with the accepting Burn Service
- ☐ Adjust formula if delay between time of injury & presentation
- ☐ Insert urinary catheter and titrate fluids to urine output:
  - ☑ Adults: 0.5 – 1ml/kg/hr
  - ☑ Children <30kgs: 1ml/kg/hr
  - ☑ Electrical: 1-2ml/kg/hr
- ☐ Maintain accurate fluid balance chart

**OTHER**
- ☐ Discuss with **local Burn Service**:
  - ☑ Tetanus status
  - ☑ Nasogastric tube
  - ☑ Antibiotics (routine prophylaxis not required)
  - ☑ Nil by mouth
  - ☑ Safeguarding concerns

**REFER**
- ☐ Complete LSEBN Burns Transfer Information and send via TRIPS to **local Burn Service**
- ☐ LSEBN guideline documents are available via TRIPS Help & Information on **www.trips.nhs.uk**
- ☐ Refer patient by calling the **local Burn Service**
- ☐ Make transfer arrangements. **Keep warm.** Sit head up.
- ☐ Telephone support and advice on care of any patient with a burn injury is available at all times

# Escharotomies

Dead burnt skin is called an eschar which is dry and inelastic.

When a burn is circumferential and full thickness the skin cannot expand causing neurovascular compromise

Escharotomy is an incision through burnt skin to allow for swelling

All burnt limbs must have regular neurovascular observations

# CHEMICAL AGENTS

- Acids and alkalis by far the commonest
- Degree of injury depends on strength of agent, its concentration and duration of contact with skin
- Early and copious irrigation is key in minimising injury
- Removal of contaminated clothing: cut this if possible
- Risk of absorption and systemic effect
- Risk of inhalation of fumes etc.

**ACID: Coagulative necrosis**

- Limits penetration
- Immediate burning sensation

- **ALKALINE: liquefative necrosis**
  - Deep
  - No immediate burning sensation

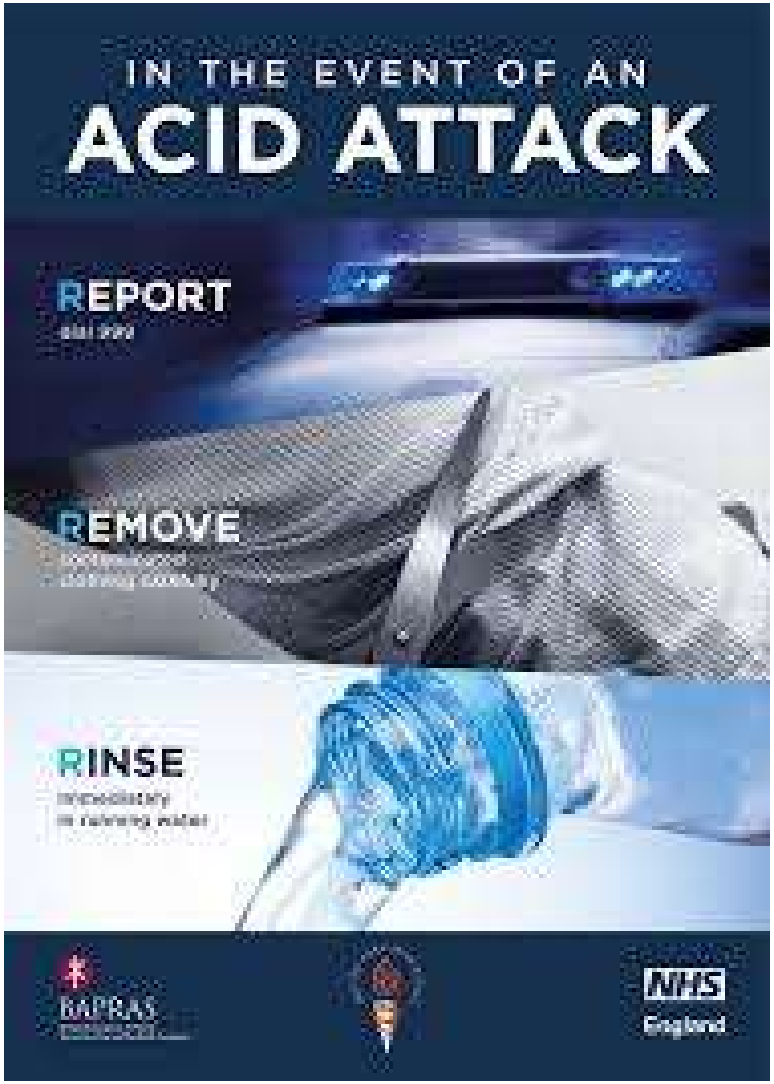
# CHEMICAL AGENTS: ACIDS

- Cause coagulation necrosis: tends to limit damage
- E.g.: sulphuric acid drain cleaner, acetic acid in hair straightening products
- NHS England figures : acid attacks on the rise-
  - 2014: 250 reported attacks
  - 2017: 1000 reported attacks (Frontier Economics 2018)

Number of patients requiring specialist medical help:

- 2014, 16 people
- 2015: 25
- 2016: 32

***NEW GUIDANCE published August 2017***



# CHEMICAL AGENTS: Alkalis

- Cause saponification by combining with fats in tissues
- Alkali remains active within this and burning may continue for many hours relatively painlessly
- Greater risk of systemic absorption
- E.g.: Sodium Hydroxide in oven or drain cleaners, cement in powder or liquid form.

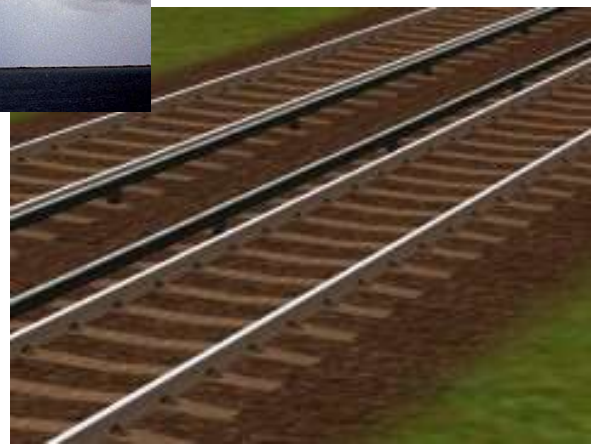
# CHEMICAL AGENTS

## Hydrofluoric acid

- **Small hydrofluoric acid burns = life threatening cardiac dysfunction –as systemic absorption causes hypocalcaemia: refer ED immediacy and apply calcium carbonate gel antidote immediately**
- Extremely corrosive agent used in industry e.g.: glass etching, 'chip' manufacture, dyes, plastics etc.
- Behaves as an alkali
- Both corrosive and toxic
- Extremely painful burns
- Copious irrigation followed by Calcium gluconate gel for small areas (as a first aid measure on site ideally)

# Electrical burns

Low Voltage
240V



High Voltage
11,000 – 33,000V

# Extent of injury depends on

- Nature of circuit
- Type of current (AC can cause muscle spasm)
  - Low voltage – < than 1000v.
  - High voltage – >1000v.
    - severe injury.
    - Generally full thickness
- Duration of exposure
- Pathway electricity takes through the body –entry and exit points
- If clothing is ignited
- Associated trauma

**Always refer to burns unit**

# Electrical burns

- Heat energy from the electric current damages tissue (nerves, skin, muscle) along its path of flow.
- Low-voltage (domestic current) burns typically cause small, deep contact burns at the entry and exit points.
- These burns are often full and may have a relatively small surface area and can lead to underestimation of internal burns produced by the current pathway.

Patients must be fully examined and observed for entry and exit burns. All electrical burns should be discussed with burns unit as per guidelines-

Ref: RCEM(2019)

# Electrical Burns

**CARDIAC PROBLEMS**

**LOW VOLTAGE** : Risk of dysrhythmias (eg VF or VT) is greatest at time of injury although incidence is probably low and RCEM recommends base line ECG and if normal, no need for further monitoring.

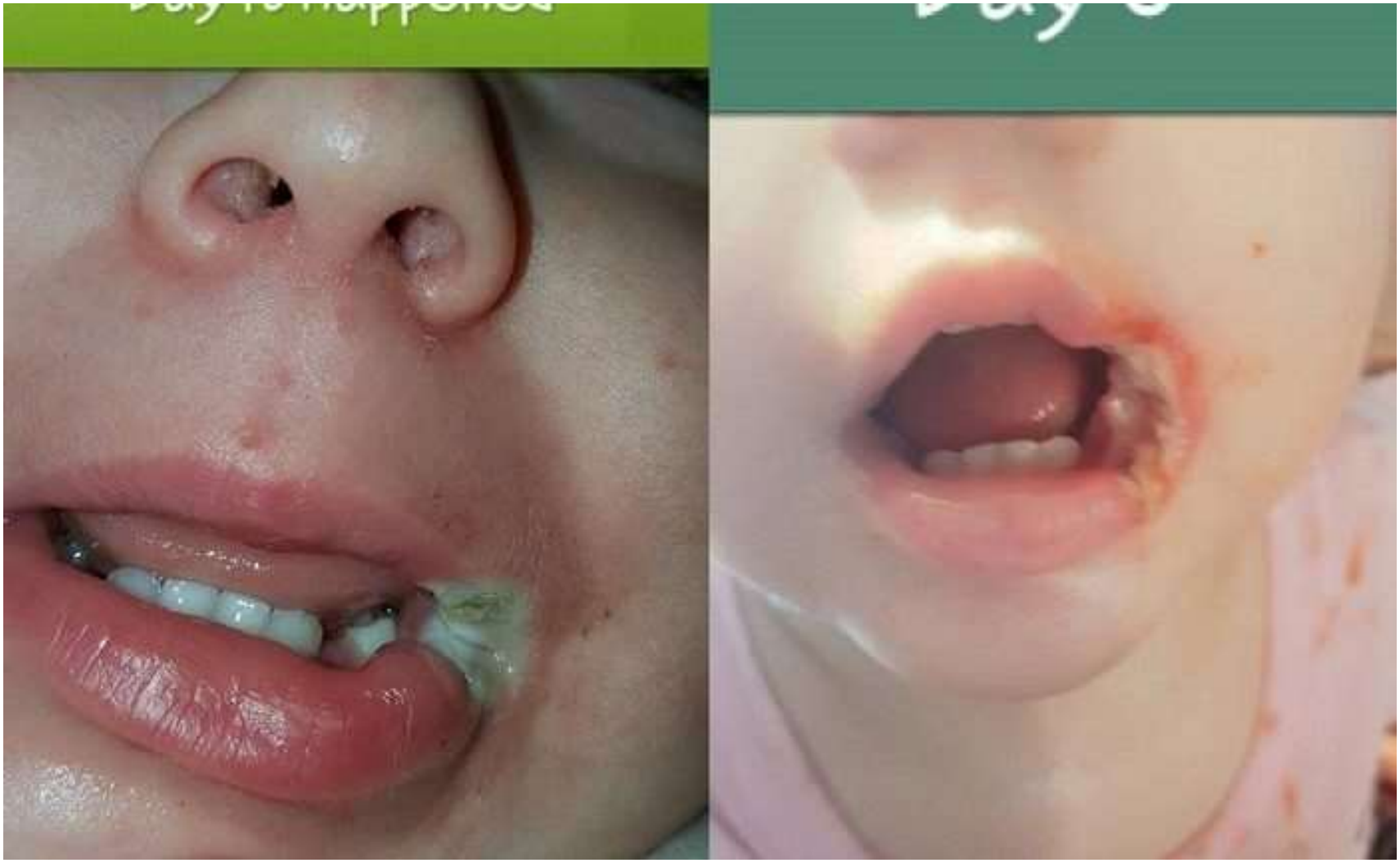
**HIGH VOLTAGE**: Many die at scene – Unlikely to self-present but if they do, needs immediate streaming to ED .

**In standalone units**: Immediate ECG and emergency ambulance

**OTHER COMPLICATIONS:**

- Peripheral circulation occlusion due to-
  - Thrombosis
  - Compartment syndrome
  - Circumferential burns
- Neurological, renal, rhabdomyolysis
- Muscle and tissue damage

# “A few seconds bite on phone charger lead”



# COLD BURNS

- Rapid warming
  - 37-39°C
- Pain Relief
- Anti inflammatory

- Spa Treatment: ’bubbles’ can help circulation

# INFECTION CONTROL

- General principles of prevention of cross infection apply
- The risk of infection in a minor burn is no greater than that of a minor wound
- The main potential source of infection is the hospital environment and the health professionals
- Prophylactic antibiotics both systemically and topical are not recommended nor are topical antibacterial agents, in minor burns

**Cling film for transfers**

# Erythema and superficial burns

- 100% Aloe Vera liquid
- Prevent friction
- Vapour permeable dressings
- Review- dynamic nature of burns

# Wound management

- Cleansing
  - Shower /irrigation
- Use of emollients
  - Factor 50 for life/up to a year

**RISK OF SCAR**

Healing time:
<2 weeks: ~25%
2-3 weeks: ~50%
3-4 weeks: ~7%&
>4 weeks: will scar
*But depending on:*
Skin type/skin tone/Hypertrophic scarring

- Review 24-48 (72) due to dynamic nature of burn
- Dressing choice (exudate management
- Bandage hands
- Blister management
- Tetanus

# Optimal Burn Dressing

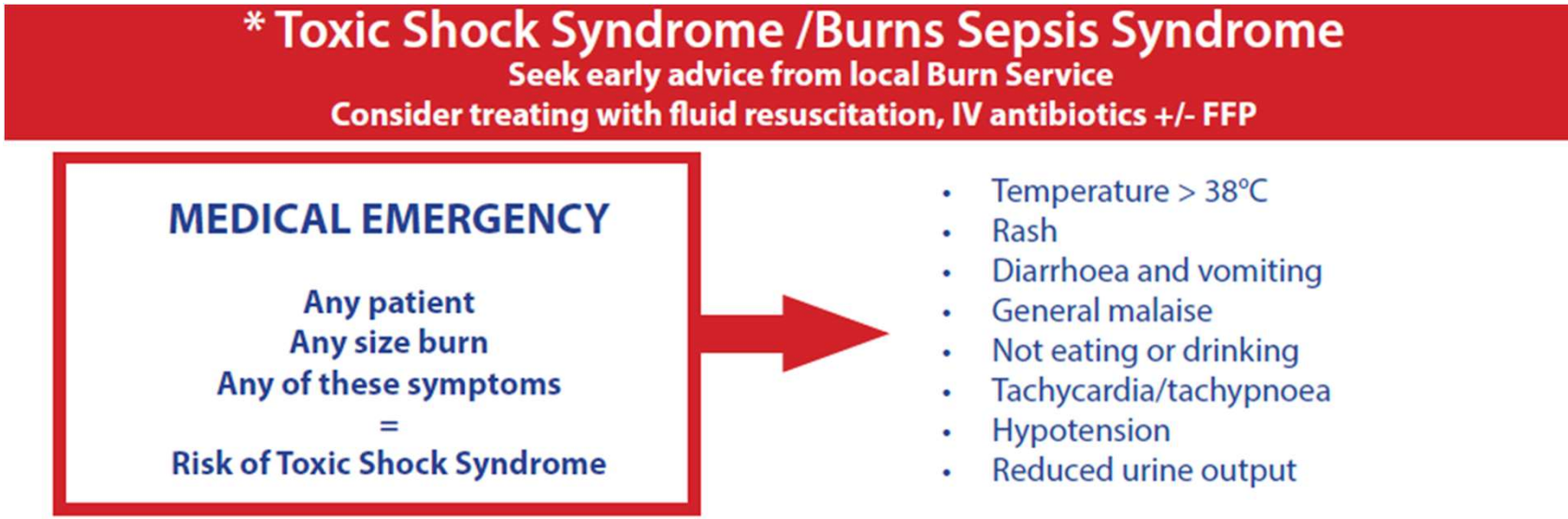
- Primary
  - Atrauman or Jelonet
    2 layers –avoid heavy layers as mesh too fine
  - KerraCel cool
    - Useful for first 24 hrs on SUPERFICAL /low exudating burns

- Secondary
  - Apply over primary as absorbent to present maceration

- **BURNS WILL PRODUCE HIGH LEVEL OF EXUDATE IN THE INITIAL 72 HRS**

***Use bandages to hold dressing in places to prevent too much adhesive on skin : can cause irritation***

# Toxic Shock Syndrome



# Conclusion

- Do a full Assessment
- Start first aid immediately
- Provide analgesia
- Refer if unsure of depth of wound