Clinical Guidance

Paediatric Critical Care:
Early Management of Burns

Summary
Explanation regarding management of a child with burns. This does not cover pre-hospital first aid and initial management of chemical burns.

Document Detail	
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Approved by, date	Evelina London Guideline Committee, March 2022
Superseded documents	PICU: Early management of burns v3.0
Related documents	Pain assessment and management
Keywords	Burns, PICU, TBSA, total burn surface area, Parkland Formula, STRS, Paediatric Critical Care
Relevant external law, regulation, standards	London South East Burn Network (LSEBN) LSEBN identification of burn type LSEBN management of severe burns
This clinical guideline has been produced by the South Thames Retrieval Service (STRS) at Evelina London for nurses, doctors and ambulance staff to refer to in the emergency care of critically ill children. This guideline represents the views of STRS and was produced after careful consideration of available evidence in conjunction with clinical expertise and experience. The guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient.	

Change History		
Date	Change details, since approval	Approved by
03/2022	Sit upright if facial burn,10mL/kg fluid bolus, blood products if trauma, exposure section expanded-first aid, hypothermia, intranasal diamorphine	ELCCG March 2022

Paediatric Critical Care

Burns (early management)

- Mandatory multidisciplinary assessment in all cases – including plastic surgeons & anaesthetists
- Referral criteria link:

South Thames RETRIEVAL SERVICE

CONTACT NUMBERS FOR BURN CENTRES:
Chelsea & Westminster (London) 0203 3152500
ICU*: Chelmsford- 01245 516038/037 (direct ITU sister)
***Burns ICU if intubated (any reason) or TBSA >25%

If chemical burn ensure fully decontaminated

Airway*:

- C-spine protection if any possibility of spinal injury
- Maintain patent airway
- Keep all children with facial burns sitting upright
- Early intubation if anticipated airway problems (*see right)
- Rapid Sequence Induction with rocuronium (NOT suxamethonium)
- CUFFED and UNCUT endotracheal tube (rides up with oedema)
- Consider suture or wire to teeth in major facial burns to secure

Breathing:

- Ensure adequate oxygenation and ventilation, maintain sats >95%
- Respiratory failure can be due to chest trauma, inhalational injury or restrictive chest wall eschar formation

Circulation:

- Early access - 2x large bore cannulae or intraosseous
- Blood Gas (lactate, O_2Hb, COHb, MetHb), x-match, glucose, U&Es, CK; urine b-HCG if female adolescent
- Burns fluid resuscitation using **Parkland Formula**
- **If shocked:** 10mL/kg balanced crystalloid bolus' titrated to cardiovascular response
- Refractory hypotension, consider other causes e.g. trauma (may require additional resuscitation inc. blood products)
- Electrical burn: Baseline 12 lead ECG & monitor for arrhythmias
- Maintain urine output ≥1mL/kg/h (early catheterisation)

Parkland Formula

- **Applicable to burns > 10% TBSA**
- Fluid requirement starts at time of burn
- Aim to replace fluid lost from burned surface in first 24 hours
- Total volume (first 24hrs) of balanced crystalloid solution

4ml x weight (kg) x %TBSA

50% volume in first 8 hrs→ 0.25ml/kg/%TBSA/h

50% volume in next 16hrs→ 0.125ml/kg/%TBSA/h

Neurological status:

- Assess and document GCS, pupil size & blood glucose
- Reduced GCS may be multifactorial: consider CT head

Exposure / Environment:

Note time of incident, duration of contact, and, if electrical, voltage

- First Aid – ensure burn cooled for 20 minutes (effective up to 3 hours post-injury) with running water or serial wet cloths
- Remove any non-adherent clothing (leave adherent clothing in place)
- Risk of hypothermia: proactively maintain normothermia
  - (cool the burn, warm the child)
- Examine head to toe, front and back
- Check distal perfusion, pulses, temperature & colour: consider escharotomy for circumferential limb burns or chest wall injury
- Use Lund & Browder chart to document percentage + depth of burn. Do not count erythema (estimate if no chart: Child's palm =1% BSA)
- Cover burn area with longitudinal cling film (**avoid** circumferential dressings and face)

*** Anticipate airway problems:**

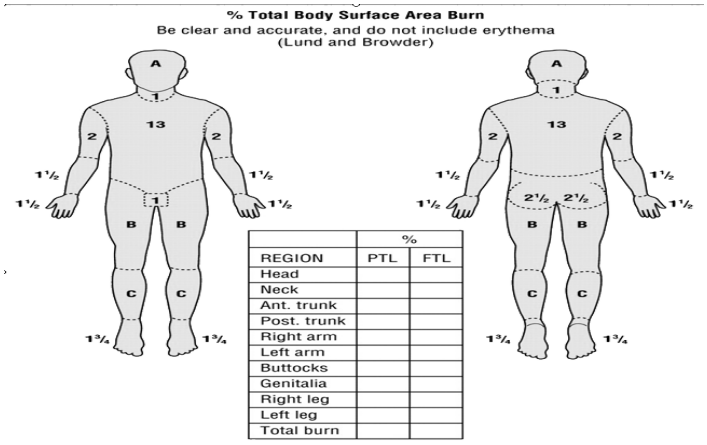
1) **Airway burn &/ or Inhalation injury:** history of exposure, burns involving face or neck, singed nasal hair, carbonaceous debris in/ around mouth or nose & in sputum, stridor, wheeze, change in voice, respiratory distress
2) **Reduced or falling level of consciousness**
3) **Large burn ≥ 25%**
4) **Electrical burns**

Carbon Monoxide (CO) poisoning:

- Pulse oximetry unreliable (false high SpO_2 despite arterial hypoxia)
- Arterial blood gas (normal COHb levels 1-3%)
- Use 100% O_2 - CO clears in 3-5 hrs
- CO Hb level >20% may benefit from Hyperbaric Oxygen Therapy

Cyanide poisoning: (aerosolisation of upholstery and fabrics)

- Features: metabolic acidosis (esp. if lactate >10mmol/L) despite 100% O_2 & adequate fluid resuscitation in first 2 hours of presentation; arteriovenous saturation difference <5%
- Treatment: Hydroxycobalamin (Cyanokit) 70mg/kg IVI (max 5g) **or** 50% sodium thiosulphate 0.5mL/kg over 10mins* (max 50ml/12.5g)
- Discuss with burns centre & on-call consultant toxicologist



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 = ½ OF HEAD	9½	8½	6½	5½	4½	3½
B = ½ OF ONE THIGH	2¾	3¼	4	4½	4½	4¾
C = ½ OF ONE LOWER LEG	2½	2½	2¾	3	3¼	3½

See LSEBN website for pictures of different types of burn

For specialist advice, photos can be uploaded at **www.trips.nhs.uk**

Analgesia: (Dosing & guidelines according to STRS webpage/ formulary)

- Assess and document pain score using age appropriate tool
- Intranasal diamorphine can be given (use local guideline)
- IV morphine infusion preferred to obtain baseline control of pain & boluses as required
- IV ketamine for procedures with anaesthetic support
- Regular paracetamol

Other:

1) Consider Non-accidental Injury 2) No antibiotics/ steroids 3) Tetanus prophylaxis/ vaccination 4) Emerging evidence for propranolol use to dampen catecholamine response 5) Eye Care

Reference: LSEBN 2020; Gill P & Falder S Early Management of Paediatric Burn Injuries, Paediatrics and Child Health 2020; Ojeda S. Propranolol J. of Burn Care & Research 2018; Sen S. Inhalation Injury Burns & Trauma 2017. *dosing for cyanide poisoning from BNFc for cyanokit, if not available then discuss thiosulphate dose with toxicologist