CSOP 015 – Burns

Version No: 1.7 Effective date: 22/10/2021

APPROVALS

Original Document Author:	Name Dr Neil Thomson	Date June 2011	Signature
Revised Document Prepared by:	Dr James Sen		
Reviewed by:	Danny Evans, Paramedic Phil Bridle, Head of Operations		
CGG Approval:	Dr Justin Squires, Deputy Clinical Lead		
Next Review Date:	October 2023		

HISTORY

Effective Date	Version No.	Summary of Amendment
31/05/2011	1.1	First Draft Neil Thomson
26/06/2011	1.2	Minor amendments following circulation amongst principle reviewers
18/07/2014	1.3	Reviewed, no amendments.
05/08/2014	1.4	Minor amendments incorporating midland burns operational network referral guidance.
April 2018	1.5	Review
Dec 2018	1.6	Review and amendments
July 2021	1.7	Major amendments to include recommendations from FPHC Consensus Statement. Update to chemical burns section also.

CSOP 015 – Burns

Version No: 1.7 Effective date: 22/10/2021

REFERENCES

Document Reference Number	Document Title
1	JRCALC Clinical Practice Guidelines 2017
2	Alison K, Porter K, consensus on the pre-hospital approach to burns patient management EMJ 2004;21:112-114
3	Department of Health (2011) NHS Emergency Planning Guidance: Planning for the management of burn-injured patients in the event of major incident http://www.dh.gov.uk/prodconsumdh/groups/dhdigitalassets/documents/digiralasset//dh125842.pdf
4	Toxbase – CO Poisoning
5	https://www.mcctn.org.uk/resources.html
6	British Burn Association First Aid Clinical Practise Guidelines https://www.britishburnassociation.org/wp-content/uploads/2017/06/BBA-First-Aid-Guideline-24.9.18.pdf
7	FPHC & British Burn Association Consensus Statement: Management of Burns in prehospital Trauma care
8	Chemical Incidents BJA Education 2021;21(4):126-132

1. Purpose

Burns are often serious or life threatening. They are almost always very painful, and often distressing.

CSOP 015 – Burns

Version No: 1.7 Effective date: 22/10/2021

Concomitant injuries and/or pre-existing medical conditions often add to the complexity of these cases.

This CSOP covers the assessment, immediate management and triage of the burn victim. Although it focuses on management of the serious injury, the principles apply to all degrees of injury.

2. Definitions/Acronyms:

Abbreviations/Acronyms	Definitions
RSI	Rapid Sequence Induction
ED	Emergency Department
IV	Intravenous
IO	Intraosseous
IM	Intramuscular
CO	Carbon Monoxide
Burns Centre	Burns specialists, Burns ITU capable of taking most serious cases
Burns Unit	Burns specialists, Burns ITU take upto 40% body surface area
Burns Facility	Plastic surgery capable of looking after smaller burns (<10% adult, <5% child and no involving critical areas) No burns ITU capability.

3. Appendix

Appendix	Title
1	Midland Burn Operational Delivery Network

CSOP 015 – Burns

Version No: 1.7 Effective date: 22/10/2021

Scene Management

Safety, risk assessment and risk mitigation are of paramount importance. This is usually the responsibility of the fire and rescue services and TAAS members should liaise with the senior fire officer before approaching a scene involving fire/smoke/chemicals. It is also advised to liaise with the HART team leader if they are present.

4. History

The history and mechanism of a burn injury are very important, and guide both the pre-hospital and subsequent management of the patient. The following facts need to be identified as soon as possible, handed over to the receiving medical team and documented on the Patient Report Form:

a) Time of burn
b) Mechanism of burn injury
c) Duration of exposure to heat
d) Evidence, or risk, of other injuries? i.e. How did the patient get out of the house?
e) Was there any type of explosion?
f) Was the person in a confined space such as a closed room?
g) The nature of the combustible materials

5. Clinical Assessment & Management

Stopping the burning process is vitally important, and must be commenced immediately if this has not already been done. Cool, running water is preferred, but great care must be taken to prevent systemic hypothermia while cooling the burn injury.
Greater emphasis is being put on ensuring 20 minutes of cooling, even if treatment commences some time after injury. It may sometimes be appropriate to extend scene time to provide thorough cooling of the injury, but this must be considered carefully in the context of the patient, other injuries, transfer time and nature of the scene.

CSOP 015 – Burns

Version No: 1.7 Effective date: 22/10/2021

Assessment	Management
Airway	
The classic textbook signs/symptoms are included here for completeness, but are poor predictors of clinical course and often absent. A high index of suspicion must be maintained. Signs & Symptoms of Airway Compromise: • Respiratory Distress • Agitation • Stridor • Hoarse voice • Swelling in and around the mouth, face and neck • Burns in and around the mouth • Thick, carbonaceous sputum History, signs and symptoms suggestive of possible or potential airway compromise: • Explosive mechanism • Trapped in a confined space • Suicidal/deliberate self-harm • Cough • Singed hair on the face and nose • Soot in and around the mouth	1. Immediate RSI and intubation is indicated in patients with signs of airway compromise. If this cannot be achieved by the team on scene, the patient must be conveyed to the nearest emergency department without delay. 2. Consider early/semi-elective anaesthesia and intubation in patients with signs of impending airway compromise, especially if the journey is likely to be prolonged. 3. Practitioners should be prepared to perform a surgical airway if endotracheal intubation fails. 4. A longitudinal skin incision should be used for the surgical airway where there is tissue oedema or overlying burnt skin present. 5. ET tubes should be left uncut to allow for tissue swelling. 6. ET tubes should have as large an internal diameter as practical. This will allow bronchoscopy and pulmonary toileting during future hospital management. 7. Where a surgical airway is required, tube length should be left much longer than usual, or left uncut. 8. Burn patients often have high analgesic and anaesthetic maintenance requirements: ensure that the patient is monitored closely for signs of awareness such as tachycardia, lacrimation and hypertension. Ketamine is advantageous in that it has both anaesthetic and analgesic properties. 9. Conduct of anaesthesia should assume significant hypovolaemia and agents/doses chosen accordingly.

CSOP 015 – Burns

Version No: 1.7 Effective date: 22/10/2021

Assessment	Management
Breathing	
Respiratory distress is common, and suggests either airway or lung damage, shock or severe pain. Respiratory failure is more likely to be associated with exposure to Carbon Monoxide, Cyanide or other chemicals. Features of CO poisoning include: • Lethargy • Irritability • Severe temporal headache • Muscle weakness • CNS depression It is important to note that standard pulse oximeters cannot differentiate between carboxyhaemoglobin and oxyhaemoglobin. This means that CO poisoning may be present with normal pulse oximetry results.	1. All patients with a serious burn, or exposure to a burning environment should receive high-flow oxygen immediately. This is to generate a concentration gradient to "off-gas" CO and other poisonous agents - not just for oxygenation. 2. Patients in respiratory failure should be ventilated. If this cannot be achieved on scene, the patient should be conveyed to the nearest emergency department without delay. 3. Consider escharotomy in tight/restrictive circumferential burns to the chest, where effective ventilation is proving impossible despite a definitive airway and adequate muscle relaxation. 4. Escharotomy should be performed following mid-axial lines through burnt skin only. They may lead to significant external haemorrhage, requiring further treatment. 5. By default, maintain a high FiO2 to encourage excretion of CO etc.

CSOP 015 – Burns

Version No: 1.7 Effective date: 22/10/2021

Assessment	Management
Circulation & Fluids	
Overt signs and symptoms of hypovolaemic shock and coagulopathy are uncommon in the very early phase of a burn, and suggest another cause of fluid loss. Although large volume fluid resuscitation confers it's own problems, burns patients rapidly develop profound intravascular hypovolaemia, and can deteriorate quickly. Anaesthetised patients in particular will have their compensatory mechanisms attenuated, and are at risk of cardiovascular collapse. Obtaining IV access can be difficult in the burns patient and so IO access should be considered. Infusion rates may be low via this route so dual IO access may be required.	1. Fluid administration should be small (250ml) boluses in adults (10ml/kg in children), aimed at reversing severe hypotension or tachycardia, and maintaining central perfusion. 2. Other than where there has been a considerable delay in accessing the patient (several hours) calculating replacement needs by the Parkland Formula can wait until arrival at hospital. 3. The Quinflow fluid warmer should be considered in patients who require volume resuscitation. 4. In the anaethetised patient consider the use of continuous oesophageal temperature monitoring to guide the prevention and/or treatment of hypothermia.

CSOP 015 – Burns

Version No: 1.7 Effective date: 22/10/2021

Assessment	Management
Neurological Assessment	
A reduced level of consciousness following a burn is seldom due to the burn alone, and suggests either trauma, exposure to a hypoxic environment or toxic chemicals, or pre-existing medical condition.	1. Consider, and measure, CO levels in all patients with significant burns. 2. Consider the possibility of other causes of reduced consciousness, and manage accordingly. 3. Measure blood glucose levels in every seriously injured patient.

CSOP 015 – Burns

Version No: 1.7 Effective date: 22/10/2021

Assessment	Management
Burn Severity & Burn Cooling	
Assessing the depth and surface area of burns in the immediate phase is difficult and inexact. The use of a Lund & Browder chart has been shown to be the most reliable method for accurately determining burn TBSA severity. This chart is available electronically but when access to it is difficult; use either the rule of nines (in the Flight crew Aide Memoire) or serial halving to estimate the area. Remember to only include partial and full thickness burns in your estimation and take note of any circumferential burns, or burns to hands, feet, axillae, groin or neck.	1. Cool running water for 20 minutes duration has beneficial effects on burn healing outcome. 2. Cool water temperature should be below 20°C and above 8°C with the optimal temperature 12°C. 3. Water should preferably be drinkable to avoid the risk of infection. 4. Fluid volumes will range between 20-120 litres of water and an application rate of at least 1-1.5L per minute. 5. Cooling is effective up to 3 hours after injury and should be applied as soon as possible, ideally within 10 minutes. Cooling should only be delayed or omitted in life threatening circumstances or severe traumatic complications. 6. Following the cooling dress all thermal burns in cling film, applied lengthways (not circumferentially) and held in place with a loose gauze or elastic bandage. 7. Burnshield and WaterGel type dressings are no longer recommended.

6. Analgesia

Burns are painful injuries and analgesia should be administered as soon as possible. Cooling and dressing the wound to exclude contact with air are very helpful at reducing pain.

Unless immobilisation of the spine is considered essential, allow the patient to position him/herself in the most comfortable position for transport.

CSOP 015 – Burns

Version No: 1.7 Effective date: 22/10/2021

There is benefit to using multiple agents to control severe pain, although non-steroidal anti-imflammatory drugs (NSAIDs) are not recommended.

Do not underestimate the value of oral or intra-nasal analgesia in the child with severe pain.

7. Triage & Hospital Selection

Immediate threat to airway or breathing that cannot be corrected on scene, and where getting additional resources to scene will take longer than transport to the nearest ED.	Immediate transport to the **NEAREST TU (Exceptionally LEH)**, preferably by road, with a pre-alert requesting a senior anaesthetist to be waiting on your arrival.
Minor Burn • Less than 10% Body Surface Area (5% in children or elderly/unwell) • Not relating to electricity, chemicals or friction. • Not involving airway, lungs or 'special areas'	**NEAREST TU** for the age of the patient.
Major Burn • >10% (5% in children or elderly/unwell)[5,6] • Any burn involving special areas, airway or lungs. • Any burn associated with suspected inhalational injury. • Any burn associated with trauma, prolonged exposure to heat or explosion • Any burn associated with injury or severe mechanism (fall from height etc) • Any burn in a patient with severe or unstable co-existing illness.	Usually transferred to a **Major Trauma Centre** as per triage tool. See notes on this in the narrative below.

CSOP 015 – Burns

Version No: 1.7 Effective date: 22/10/2021

---

8. Burns, Facilities, Units and Centres

Unfortunately the Major Trauma Network, and National Burns network are not well matched in terms of destination hospitals.

Transferring patients direct to the burns centre/unit often presents problems in terms of the receiving unit's capacity to investigate and treat other injuries. Equally, prolonged transfers confer a degree of risk in this group, in terms of the ability to maintain adequate fluid resuscitation and other therapy, and the danger of clinical deterioration.

There is no absolute indication to transfer burned patients directly to burns centres or units, especially if they are not co-located with a Major Trauma Centre (MTC). In the Midlands there are burns units/ centres that are co-located with MTCs[5]. Where a choice between 2 MTCs is possible, then it is reasonable to choose the one with the burns service, for a patient with burns. These include:

1. University Hospital of Birmingham (Queen Elizabeth)
2. Birmingham Children's Hospital
3. Nottingham (Burns unit not co-located on MTC site)

West Midlands Ambulance Service current guidelines (Appendix 1) suggest that any patients who fall into the Major Burn category above should be transferred to Queen Elizabeth Hospital, Birmingham. TAAS clinicians should be aware of this, but the final decision re. destination hospital should based on geographical location, nature of associated injuries, and clinical state of the patient.

9. Transport by Air

Extreme agitation is a feature of impending airway loss. Patients who are at risk of losing their airway should not be transported by air.

Patients who have sustained burns as a result of deliberate self-harm or attempted suicide must not be transported by air unless anaesthetised, or in exceptional circumstances which must be agreed with the pilot and crew.

10. Specific Burn Types

The underlying principles of burn treatment are the same in all patients, regardless of the cause of the injury.

CSOP 015 – Burns

Version No: 1.7 Effective date: 22/10/2021

Chemical Burns

- "Acid attacks" are becoming more common, and have been seen by TAAS. They involve a range of agents, both acid and alkaline. Exposure to chemicals may also occur in the workplace and identification of the agent should be sought as soon as possible.
- Decontamination should be implemented as soon as possible and begins with disrobing (capable alone of removing upto 90% of contaminants).
- Improvised wet decontamination is used for exposure to caustic or irritant chemicals. The 'rinse-wipe-rinse' technique is used, and it should take approximately 90 s to complete one cycle: rinse the affected areas with clean water from the highest point downwards, wipe the affected areas with a sponge or brush soaked in the detergent mix, and then rinse this off again with clean water.
- Although not carried by TAAS, when exposure to a chemical occurs in a workplace, amphoteric solutions may be available and their use should be encouraged. They are likely to be safe and at least as effective as alternative irrigation.
- Have a very low threshold for calling on specialist advice from the Fire Service and HART, especially if there are multiple patients, and particularly if the chemical is still leaking or there is a risk of further contamination.
- Identify the type of chemical involved if possible, and the first-aid measures advised by the manufacturer, which should be on either the container or Material Safety Data Sheet (MSDS) held by the transporter or storer. Referral to TOXBASE resource should be considered, given that some caustic chemicals, eg hydrofluoric acid used in manufacturing, can have systemic toxidromes that are life-threatening without prompt intervention.

End of Document