Guideline on Burns Intensive Care - The First 48 Hours

South West UK Burn Care
Operational Delivery Network

SPECIALISED BURNS SERVICES

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National Burns Bed Bureau
24 hr help line to find a burns bed nationally
Tel: 01384 679 036

This document is intended to provide clinicians with a framework to support the intensive care management of patients with severe burn injuries in the first 48 hours post injury.

The framework highlights the key differences that can be expected in burn-injured patients compared to non-burned patients who require intensive care.

1. Airway

1.1 See Airway Management document for information on who and how to intubate, including initial management of intubated and non-intubated patients.

1.2 In the intubated patient, the **ETT can be easily displaced** either in or out:

- **Out:** Cut tubes can “disappear” into the mouth. The ETT can also be pulled out by the tube ties as the face swells;
- **In:** On moving the patient, the ETT can migrate into the right main bronchus. This is more likely to occur with uncut tubes.

Key Recommendations:

* Record the length of the ETT at the teeth, not lips;
* Check ETT length regularly and readjust ties if necessary;
* Remember facial oedema formation is accelerated by fluid resuscitation and by lying the patient flat;
* Reintubation may be very difficult / impossible. Always have a plan B for airway management.

2. Breathing

2.1 For initial management of smoke inhalation injury, see the SWUK ODN Guidelines on the Management of Smoke Inhalation and Airway Injury in Burn Injured Patients.

2.2 Inhalation injury in combination with a burn, increases the fluid resuscitation requirements.

2.3 Fluid overload can exacerbate ventilation difficulties in smoke injured lungs.

2.4 Difficulty with ventilation can also be caused by:

- ETT displacement - see above;
- Bronchorrhoea and bronchoconstriction caused by smoke inhalation injury;
- Blast Lung Injury: Consider lung contusions and haemopneumothorax. Further imaging may be indicated;
- Circumferential burns to the chest and abdomen. These may require escharotomy.

3. Blast Lung Injury (BLI)

3.1 **Clinical features of Blast Lung Injury include:** Acute respiratory failure - dyspnoea, cough, hypoxia, tachypnoea, cyanosis, wheezing, haemoptysis, pneumothorax, haemothorax.
3.2 **Severe BLI:** Massive intrapulmonary haemorrhage +/- DIC.
3.3 **Diagnosis of BLI:** High index of suspicion, enclosed space, ear is the most sensitive to blast injury followed by lungs, perforation of ear drum has been suggested as a useful marker for BLI, signature injuries associated with blast (limb amputation).
3.4 **Investigations:** CXR (contusions develop within hours), delicate bronchoscopy (mucosal petechial haemorrhages, blood), CT, ABG (severity of blast is reflected in the degree of hyperaemia and acidosis).
3.5 **Treatment:** Don't ventilate unless you have to (non-homogenous pulmonary compliance, localised over inflated alveoli), 100% oxygen if air embolism suspected until signs subside or 24 hours, otherwise normal ventilatory guidelines. Consider prophylactic chest drains.

4. Carbon Monoxide Poisoning

4.1 Affinity of Carbon Monoxide (CO) for Hb is 240x that of oxygen.
4.2 CO dissociates from Hb very slowly. Half-life in air > 4 hours. Half-life in 100% oxygen 40 mins. Use 100% oxygen until COHb <5%.
4.3 COHb causes a functional anaemia and displaces the oxygen dissociation curve to the left, worsening tissue hypoxia.
4.4 Signs and symptoms are essentially those of reduced oxygen delivery to the tissues i.e. shock.
4.5 **Pulse oximeter is unreliable in the presence of COHb**. Use a co-oximeter.
4.6 See the SWUK ODN Guidelines on the Management of Smoke Inhalation and Airway Injury in Burn Injured Patients document for further information.

5. Circulation

5.1 Expect tachycardia. Up to 2 x normal expected heart rate is common.
5.2 **Hypovolaemia with oliguria and acidosis secondary to massive fluid loss** from the intravascular space is expected. Use fluid resuscitation guidelines to aid treatment.
5.3 The aim of resuscitation is to improve oxygen delivery to the tissues, particularly the skin. **Measure skin temperature if possible and aim to keep it within 2-3 degrees of the core temperature.** Improving skin blood flow will help to promote healing in the damaged, but potentially still viable areas of skin and can have a massive impact on the eventual size of burn that needs excision.
5.4 Lines Considerations:

- Central lines will be required for drug infusions;
- Arterial lines are often essential;
- Place through **unburned skin when possible**, the femoral site is often spared;
- Stitches can cut out of burned or oedematous skin
- Lines can be kinked by oedema formation especially if sited at an acute angle;
- **Beware of line migration with oedema formation**. Consider the use of longer lines.

6. Cyanide Poisoning

6.1 Cyanide gas (HCN) is 20 x more toxic that carbon monoxide.
6.2 Suspect in all cases of smoke inhalation, but particularly in patients with significant lactic acidosis and raised venous oxygen.

6.3 See the SWUK ODN Guidelines on the Management of Smoke Inhalation and Airway Injury in Burn Injured Patients document for treatment.

7. Hypermetabolism

7.1 Burn injuries of more than 20% TBSA result in a hypermetabolic response. This is characterised by hyperdynamic circulation, increased body temperature, catabolism and inefficient energy substrate cycling.
7.2 Cardiac output and heart rate can often increase by 150–200%. The patient will also typically have a hyperglycaemic insulin resistant state and often require insulin supplementation.
7.3 Manage in a thermoneutral environment. Early excision of deep burns where possible.

8. Hyperpyrexia

8.1 Defined as a core temperature greater than 39°C.
8.2 Patients with major burns are often hyperthermic.
8.3 Core temperature of up to 38.5°C can be considered normal, secondary to the massive SIRS response to thermal injury.
8.4 Even a short period of very high temperature can cause significant morbidity.
8.5 Temperatures of 41.6 to 42°C can cause irreversible cell damage in as little as 45 minutes.
8.6 Management of core temperature >39°C:
- Septic screen, check U&E, CK;
- Antipyretics;
- Open burn wound dressings (discuss with burn surgeon first if possible);
- Consider ice packs to axilla and groin;
- Refrigerate NG/NG feed and flush.

8.7 Management of core temperature >40°C for more than 6 consecutive hours:
- As point 8.6 plus - commence CVVHDF.

8.8 Management of core temperature >41°C for more than 2 consecutive hours
- As point 8.6 plus - commence CVVHDF.

8.9 Stop active cooling measures when the core temperature reaches 38.5°C.

9. Infection

9.1 Burns patients are vulnerable to infection in the early stages due to loss of the protective skin layer and immunosuppression secondary to major trauma.
9.2 Isolation in a single cubicle and an ante-room is the gold standard.
9.3 Stringent infection control precautions cannot be over emphasised. All clinical staff should follow hospital standards for hand washing and wear aprons and gloves as a minimum.
9.4 The massive SIRS response in major burns makes diagnosis of sepsis challenging. A high index of suspicion is essential.

Version number: 2.0
First Published: 2017
Updated: July 2018
Prepared by: South West UK Burn Care ODN (including South Wales)
Classification: OFFICIAL