

Full Title of Guideline:	<i>Management of Patients with Burns on Adult Critical Care</i>
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Explicit definition of patient group to which it applies (e.g. inclusion and exclusion criteria, diagnosis):	Applies to all adult patients requiring Critical Care admission for the management of burns. <i>Excludes:</i> All paediatric cases
Changes from previous version (not applicable if this is a new guideline, enter below if extensive):	Updated referral and management flowcharts; updated Midlands Burns Network information and contacts Updated advice on thromboprophylaxis, cooling Acetylcysteine and propranolol removed Urinary protein removed Added bronchoscopic scoring of inhalational injury
Summary of evidence base this guideline has been created from:	Peer reviewed by: NUH critical care consultants; critical care governance. Up to Date: Overview of the management of the severely burned patient. Accessed July 2021. Mr O'Boyle, Burns Surgeon Dr Joannes Herman, Haematologist Emily Bridge, Rosalind Burnett, Dietetics Anthony Fletcher, Burns Anaesthetist
<i>This guideline has been registered with the trust. However, clinical guidelines are guidelines only. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician. If in doubt, contact a senior colleague or expert. Caution is advised when using guidelines after the review date or outside of the Trust.</i>	

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Referral of adult burns patient to City ICU

- 1. All referrals must initially go through Plastics Surgery Registrar or Consultant**
- 2. Admission must also be discussed with City ICU consultant on call**

Admission criteria

- >18 years
- Burns <50% TBSA, including: Head and neck burns; Possible inhalational injury

Note – City ICU does not routinely admit

- >50% TBSA burns
- Polytrauma / explosive injuries
- High voltage electrical / chemical injuries
- Pregnant patients
- Immunocompromised patients
- Toxic epidermal necrolysis / SJS syndrome
- Burns requiring complex reconstructive surgery

When there are exceptional bed pressures City ICU may care for patients with some of the above exclusion criteria after discussion with Birmingham Burns Centre

See Midlands Burns Operational Delivery Network referral flowchart in Appendix One

Transfer

It is the responsibility of the referring hospital to ensure safe transfer

The following patients must be assessed by an anaesthetist prior to transfer:

- Airway injury or facial burns
- Carboxyhaemoglobin >10%
- Hypoxia
- Significant chest injury
- Cardiovascular compromise

If there is any concern request that the following be considered:

- Intubation prior to transfer (tube left uncut, size 8 or 9 if possible) – NB it is unusual for unintubated patients to be admitted directly to the ICU
- If COHb >6 leave on FiO₂ of 100% for transfer
- 2x large bore IV access

Fluid resuscitation and patient warming should be commenced in ED.
Arterial line, nasogastric tube and urinary catheter may be inserted if time allows.
Insertion of a CVC prior to transfer is NOT required.

See Midlands Burns Delivery Network Network ED management protocol in Appendix Two

Initial management of adult burns patient on ICU

On admission to City ICU:

- An ICU consultant or senior trainee will assess the patient
- The burns team will be informed and will come and assess the patient



The burns team will assess and document:

- Burn Surface Area (TBSA), depth and location, any requirement for urgent surgery

The burns team will organise/prescribe:

- Fluid resuscitation using NUH burns resuscitation fluid guideline (fluid resuscitation starts from time of injury)
- Any swabs, photographs, dressings, the booking of any surgery and prescribing of tetanus booster if required



The ICU team will take a detailed history and perform and document a full tertiary survey examining Airway, Breathing and Circulation as well as looking for evidence of trauma, compartment syndrome, rhabdomyolysis



Airway / Ventilation

- Unintubated patients should be discussed with the ICU consultant
- Intubated patients should have position and safety of the ETT checked
 - If the tube is cut or size <8 d/w ICU consultant
- The ETT position at the teeth or gums should be documented
- Patients at risk of inhalational injury (direct thermal injury / enclosed-space fires) should have a bronchoscopy within first 12 hours to assess extent of injury
 - See bronchoscopy scoring system later in document
- If inhalational injury is present prescribe
 - Nebulised saline and carbocysteine (750mg NG TDS)
 - Nebulised heparin 5000units TDS (unless pulmonary haemorrhage)
- Keep FiO₂ at 100% until COHb <5



Circulation

- Commence maintenance crystalloid (plasmalyte or Hartmann's) 1 mL/kg/hr
 - Insert arterial line; for significant burns also insert CVC
 - Commence cardiac output monitoring (LiDCO) for all burns >15% TBSA
- Target parameters include UOP >0.5mL/kg/hr
SVV <10% (only accurate if not spontaneously breathing), or CI > 4L/min/m²
Lactate <2 mmol/L
- Fluid boluses of 250-500mls as required – it is unusual to require vasopressors within the first 24 hours if fluid resuscitation is adequate



Blood tests

- ABG (inc. lactate, glucose, COHb)
- FBC, U&E, LFT, Mg²⁺, PO⁴⁻, CK, Coagulation screen, Vitamin D, Bone Profile
- Salicylate and paracetamol if self-injury (save urine sample for toxicology)
- βHCG if childbearing potential



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Other

- The sedation of choice for significant burns is morphine and midazolam
- Examine the patient's eyes, if they are involved prescribe celluvise 1% 2 hourly and topical chloramphenicol TDS; refer to ophthalmology ASAP in working hours
- Keep the patient warm (keep room >30°C, insert temperature probe, start forced air heating to achieve body temp >37)
- Insert NG feeding tube, (if the burn >15% TBSA or if person is intubated), commence PPI and feed as per the "Enteral Feeding in the Burn Injured Adult" guideline.
- Prescribe prophylactic enoxaparin at "burns" dose:
 - Do NOT use TEDS or flowtrons if there are leg burns
- Check
 - Group and save (smaller burns), X-match 2-4 units (burns >10% TBSA)
 - CXR
 - ECG if electrical injury suspected

Fluid resuscitation formulas

FOLLOW NUH BURNS RESUSCITATION GUIDELINE – AVAILABLE ON INTRANET

Parklands

Use IV Hartmann's or plasmalyte
1st 24 hrs requirement = (Body weight x TBSA x 2-3ml)
Give ½ over 8 hrs and ½ over next 16 hrs

Muir and Barclay

Use IV colloid (human albumin solution 4.5%)
1st 4 hrs requirement = (Body weight x TBSA x ½ml)
Give this fluid volume 6 times in the first 36 hours following the injury over the following lengths of time 4,4,4,6,6 and 12 hours

Burns thromboprophylaxis dosing of enoxaparin

Renal function	Weight			
	<50kg	50-100kg	100-150kg	>150kg
Cr Cl <u>≥</u> 30ml/min	20mg BD	40mg BD	60mg BD	80mg BD
Cr Cl 15-30ml/min*	20mg OD	40mg OD	60mg OD	80mg OD
Cr Cl <15ml/min or RRT*	20mg OD			
Take anti Xa blood test 3 days after first dose and then every Monday (sample should be taken 3-4 hours post dose and expected range is 0.2-0.4)				
Revert to standard dosing on stepping down to non-critical care ward				

Abbreviated Injury Scale (AIS) Bronchoscopic Gradation of Inhalation Injury

Grade		Findings (any combination of)
Grade 1	low-grade injury	Minor or patchy areas of erythema, carbonaceous deposits in proximal or distal bronchi
Grade 2	moderate-grade	Moderate degree of erythema, carbonaceous deposits, bronchorrhea, with or without compromise of the bronchi
Grade 3	high-grade	Severe inflammation with friability, copious carbonaceous deposits, bronchorrhea, bronchial obstruction
Grade 4		Evidence of mucosal sloughing, necrosis, endoluminal obliteration

Later management of adult burns patient on ICU

Airway	Check and document the position of ET every day • If the tube is difficult to secure discuss the possibility of wiring the tube to the teeth with the burns team • If this is done wire-cutters MUST be kept available at the bedside
Breathing / Ventilation	If there is inhalational injury: • Consider regular therapeutic bronchoscopy If there is a pleural effusion: • Do NOT routinely drain pleural effusions where there is chest burn present (risk of infection)
Nutrition and Faecal Wound Protection	Establish enteral feeding as soon as possible. Refer to NUH guideline 2689: Enteral feeding in the burn injured adult for further details. Dieticians will prescribe specialist nutrition and request specialist blood tests. • Oxandrolone may be prescribed by the burns team to control a hypercatabolic state Use prokinetics if required • If aspirates remain high, consider requesting if Gastroenterology can insert an NJ tube • Parenteral nutrition possibly carries a higher-than-normal risk of infection Patients with proximal lower extremity or perineal burns should have a faecal management system inserted • Commence on lactulose and docusate stool softeners
Regular blood tests and Infection investigations	Daily FBC, U&E, PO⁴⁻, Mg are required • Hb should be maintained at >70g/L • PO⁴⁻ levels often drop significantly in the first few days after a burn and need daily replacement Weekly TPN5 bloods (selenium, copper, zinc – in red top tube) required for burns >10%TBSA • Supplementation may be requested by the dietitian Take anti-Xa level 3 days after first dose of enoxaparin and then every Monday (sample should be taken 3-4 hours post dose and expected range is 0.2-0.4). Infection screens: • Wound swabs should be taken at dressing changes • Septic screen (line cultures, urine and sputum cultures) is required if: ○ New fever (>38°C) or new hypothermia (<36.5°C) ○ Pyrexia with any of: ▪ New tachycardia (>110 bpm) ▪ New tachypnoea (RR>25 ; or ▪ Increasing O₂ requirement ▪ New thrombocytopaenia (<100x10⁹)

	▪ New hyperglycaemia ▪ New failure to absorb feed; or new diarrhoea Procalcitonin can be considered on microbiology ward rounds
Sedation and analgesia	• Once patients are weaning enteral opiates may be prescribed. • Other analgesics include gabapentin and ketamine infusions Burns dressings changes • These may be performed on the ICU and an anaesthetist may be required to bolus analgesia ○ IV ketamine or a remifentanil infusion are sometimes required • NexoBrid™ dressings may be applied to some burns. These dressings need to stay on for several hours and can be very painful and may require deep sedation/analgesia. ○ Patients may be admitted to ICU in order to receive prolonged sedation and ventilation after NexoBrid™.
Temperature control	• Use both central (urinary or oesophageal temperature probes) and peripheral (skin) temperature sensors ○ Urinary catheters with temperature probes are preferred as they are more secure • Aim for core-peripheral temperature gradient of $<2^{\circ}\text{C}$ to improve skin perfusion ○ Peripheral warming with an air-blower may be required Hyperpyrexia ($>39.5^{\circ}\text{C}$ for > 1 hour) is an emergency and must be treated with active cooling measures, such as: • Stop and peripheral warming • Consider removing burns dressings (d/w burns team) • Cooled IV fluids and/or bags of ice in the groins or axillae • Paracetamol • Ibuprofen - this is a consultant-only decision • Intravascular cooling (CoolGuard) – this is a consultant-only decision balancing the risk of hyperpyrexia against the increased risk of DVT • N.B. for most burns, surface cooling with the Arctic Sun is thought NOT to be appropriate as it will inhibit skin perfusion and delay healing
Preparation for surgery	The Burns MDT is on Mondays at 12:00, in the Plastic Surgery Department meeting room. Following the meeting patients are normally scheduled for theatre on Tuesdays and Fridays. Urgent cases may need to be fitted in between these days. It is essential that the ICU team liaise with the burns team and Consultant burns anaesthetists to ensure that appropriate blood products are made available. This is best done by speaking directly to blood transfusion services on the day prior to surgery to ensure that supplies of RBCs, FFP and platelets are prepared. Fitness for theatre can only be confirmed by the MDT on the morning of surgery. Ensure that a full set of bloods, including clotting and fibrinogen are requested at 06:00 hours so that they are available for the 08:00 Burns ward round.

Information useful to nursing staff

Prepare the bed space prior to an admission to Critical Care

- Gold standard will be to prepare a cubicle for the admission of a Level 3 Burn injured patient. The room must be heated >30 ° with the door closed.
- Ring Estates for extra floor heaters.
- Ensure the Burns Nurses and Burns Consultant are aware of the expected time of arrival so a timely assessment of TBSA, depth and classification of burn can be achieved prior to dressing the wounds.
- Maquet Ventilator is set up and ready to use.
- Blood bottles available for routine bloods (Carboxyhaemoglobin will be measured on ABG), multiple wound swabs for all potential burnt areas for wound surveillance.
- Prime a double transducer set for arterial and central line monitoring
- Equipment for monitoring both Core and Peripheral temperature.
- Preparation of Analgesia and sedation infusions.
- All documentation is ready.
- A disposable bronchoscope might be required.
- Cardiac Output monitoring is likely to be needed.

Nursing care of a thermal injured patient

Airway

- Ensure patient has an uncut Endotracheal Tube in-situ to allow for facial oedema and it is secured by being wired to the teeth or ETT tapes with Jelonet gauze under the tapes to ensure tapes do not adhere to the face.
- A disposable bronchoscope might be required to be set up to ascertain erythema, oedema, and mucosal damage and acknowledge if there is presence of soot in the upper and lower airways demonstrating the patient has an inhalation injury.
- Use torch to observe oral cavity for signs of oedema and soot.

Breathing and Ventilation

- Discuss ventilator lung prevention strategies with the Consultant Intensivist to ensure that appropriate settings are set.
- If a patient has been in an enclosed space and has a high risk of an inhalational injury then a bronchoscopy will need to be carried out to assess airway damage.
- Regular Nebulisers of Saline, Salbutamol, Heparin, and may be required.

- Observe for signs of circumferential burns as this will constrict lung compliance, and may require escharotomies to chest or neck.
- Arterial Blood gases to be checked as condition dictates.

Cardiovascular

It may be difficult to apply ECG monitoring when a patient is heavily bandaged. Heart rate can be obtained through the pulse oximetry probe

On admission, patients may have large bore peripheral cannulas but no central or arterial lines. These are usually both required

Routine bloods including electrolytes will be required on admission; hyperkalaemia may be present due to potassium release from damaged tissue

Core and peripheral temperature monitoring is required; core temperature monitoring via a urethral catheter or oral probe, peripheral monitoring through a sticky probe placed on unaffected skin. Bair hugger blankets will be required to maintain body temperature as well as heating in the patient's room

Appropriate fluid management is the foundation of acute burns management. Without early and effective treatment, burns involving greater than 15% TTBSA will result in hypovolemic shock. The aim is to prevent the development of burn shock and to minimise disruption to physiologic parameters in the face of ongoing cellular and hormonal responses. Several formulae have been developed to optimise fluid delivery whilst preventing over-resuscitation and subsequent pulmonary oedema, fluid creep and potentially compartment syndrome in unburned limbs or abdomen.

The NUH Adult Burns Fluid Resuscitation guideline is on the Trust website and should be followed in the initial 36 hours after burn injuries. It must be remembered that the calculated fluid volume for infusion is a starting point and that additional fluids may be required, as dictated by physiologic parameters. Cardiac Output monitoring, urine output and heart rate are the primary modalities for monitoring fluid therapy in patients with burns.

Inotropes may be required once appropriate fluid resuscitation and maintenance has been established.

Cardiac Output monitoring is likely to be needed.

An Escharotomy may be required if chest or limb circulation is compromised. This may result in blood loss requiring transfusion of blood products.

Nutrition

Prompt and continuous nutrition support is an integral aspect of burn care, especially with increasing severity of injury. Burns patients are recommended to receive enteral feeding, within 6-12 hours of injury where possible, to moderate the hypermetabolic response (up to 3x normal) and minimise nutritional losses. NUH Burn service supports enteral feeding through theatre to minimise nutrition losses, especially if the

patient has a nasojejunal (NJ) feeding tube. Prior to surgery, please liaise with the Burn Anaesthetist to determine if enteral feed is to be continued or held.

NUH has a specific burn enteral feeding guideline (2689) to support the nutritional needs of burn injured adults. This differs from the critical care starter feeding regimen and should be used to initiate appropriate and safe nutrition for burn patients on Critical Care.

All burn injured adults who are intubated, nutritionally compromised or have $\geq 10\%$ TBSA should be referred to the Dietetic service, on admission, via Nervecentre. The Burn Specialist Dietitian will assess the patient within 1 working day of receipt of referral and review as clinically indicated.

Neurological

Patients with burns injuries are sedated with morphine and midazolam and often require larger amounts of these.

Additional sedation is often required when the patient is undergoing dressing changes on CCD. It is advisable to discuss with the CCD Consultant what additional analgesia may be required for dressing changes, ketamine infusions/ boluses of sedation are often required.

A patient's GCS is often difficult to assess due to high levels of sedation and analgesia. Additional care should be taken when assessing pupils. Eyelids often become swollen making it difficult to assess and ophthalmology advice is required in the care of patients with burns, particularly those with ophthalmic involvement. Upper limbs are elevated in Bradford slings and lower limbs are frequently heavily bandaged making movement difficult.

Burn patients may experience pain that is multifaceted and constantly changing as the individual undergoes repeated procedures and wound manipulation. Although there is no universal treatment standard for pain management, opioid doses often significantly exceed recommended standard dosing guidelines.

Breakthrough pain is addressed with short-acting agents via an appropriate route. Ketamine can be used for extensive burn dressing changes.

Patients' blood glucose are often elevated due to the stress response of their injury. Sliding scale insulin is used to maintain their blood glucose less than 10mmol/l

Exposure

Critical care nurses must liaise with Burns nurses on a daily basis to facilitate dressing changes of the burn wound. These can take between 2-3 hours and require a large team of staff. Critical Care nurse to care for the ventilated patient and observe vital signs, an Anaesthetist to give boluses of sedation and additional analgesia, burns physio to perform hand and leg exercise whilst dressings are removed and finally 2 burns nurses to complete full sets of swabs and complete dressing changes. Burn injuries are dressed and heavily packed with Gamgee padding and bandages. This is to soak up the large exudate that comes away from the burn wound.

Upper limbs are supported in Bradford slings which hang from a drip stand and elbows are supported on the bed by pillows. Elevating the arms will help to reduce oedema. Arms must be removed from the slings every 2 hours and limbs placed at heart level with pillows on the bed to help prevent frozen shoulder.

The patient's face will need cleaning with sterile gauze and saline every few hours to clean excess serous fluid. Apply Yellow soft paraffin ointment.

Eyes to be cleansed with saline soaked gauze, do not prize open the eyes if very oedematous. Observe for Scleral oedema. Titrate eye cleaning around the prescribed eye drops and ointment.

Catheter care is essential to reduce the risk of infection and a bowel management system (Flexiseal) will be put in place to prevent soiling of bandages and burn wounds and donor areas.

Donor areas are usually thighs, lower leg, arms, back, trunk and any spare skin.

Donor sites can be very painful and heavily bandaged and can take 10 days to heal. When dressings become wet, the outer parts of the dressing should be removed down to the layer in direct contact with the skin. This contact layer (Silflex/Acticoat/Jelonet/Kaltostat) should not be removed, as it will be extremely painful and you will disrupt the epithelialisation. New outer parts of the dressing are then applied.

Burns dressings will be done by the Burns Nurses. You will need to support them with the lengthy dressing changes. Ensure you have Anaesthetic cover as patient will need to have more sedation and analgesia.

Bowel Management system will be in place to protect the Burn wounds from infection and dressings being soiled.

Family support is essential as their loved one is critically unwell and often disfigured with oedema making them unrecognisable. Encourage families to bring in patient photographs, and write in patient diary (if being used).

Hyper metabolic syndrome

The hypermetabolic response to injury is mediated by hugely increased levels of circulating catecholamines, prostaglandins, glucagon and cortisol and is characterized by a hyperdynamic circulatory response, increased protein and lipid catabolism, and peripheral insulin resistance, which increase resting energy expenditure and body temperature and decrease total body protein, leading to muscle wasting. These responses occur in all trauma, surgical, or critically ill patients, but the magnitude to which they occur and duration are particularly severe and sustained for burn patients.

Early excision and grafting of the burn wound is the most important intervention for treating patients with moderate-to-severe burn injuries, substantially reducing resting energy requirements. It also reduces the risk of burn wound infection and sepsis, length of hospital stay, and burn-related mortality. In addition, increasing the ambient temperature from 25 to 33°C diminishes resting energy expenditure.

For adults with moderate-to-severe burns oxandrolone may be considered. Oxandrolone increases lean body mass (LBM) gain and decreases hospital stay.

Propranolol attenuates the hypermetabolism and reverses muscle-protein catabolism. Currently, there is no evidence to support the routine use of propranolol in adult burn patients.

Because burn injuries cause one of the most intense and prolonged types of pain, pain management is important to attenuate the hypermetabolic response.

For stress-related hyperglycemia is common in burn patients without a past history of diabetes, we recommend treatment with insulin. Insulin significantly lowers the incidence of sepsis and mortality in those patients with good glucose control compared with those who had poor control.

In the longer term, patients with moderate-to-severe burns, a balanced physical therapy program to restore metabolic variables, prevent burn wound contracture, improve body mass, and increase muscle strength should be included in the treatment plan.

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Appendix One Midlands Burns Network referral guidance

Guidance can be found at:

<https://nebula.wsimg.com/29cc7b484b2bc77bae005dab53eb3871?AccessKeyId=71C7B1EA5618F4C499E1&disposition=0&alloworigin=1>

Summary guidance from that document is as below:

Service Type	% TBSA	Comment
Burn Facility	< 10 % TBSA	Non complex burn injuries
Burn Unit	>25% TBSA >25% TBSA + inhalation injury < 40 % TBSA < 50 % TBSA	Inform BC Discuss with BC and consider referral Deep dermal or full thickness burns With no inhalation injury
Burn Centre	All	All ages and severity of burn injury including those requiring complex intensive care

Nottingham is a BU (Burns Unit)

Birmingham QEHB is a BC (Burns Centre) tel. 0121 371 2730

Appendix One Midlands Burns Network ED guideline

Midland Burn **NHS**
Operational Delivery Network
Burns Management in the Emergency Department
(Referral Proforma)

Referring ED Department

Date

/Time of injury (24hr)

Please affix patient label or complete:

Patient Name:

DoB:

NHS / Hospital (K) Number:

**Please remember to protect C-spine until
clinically cleared as stable**

Airway

Administer high flow oxygen

Is there any suggestion this patient has an **Airway injury?** Has this patient any of the following: (underline if present)

- Stridor
- Injury in an enclosed space
- Soot in airway
- Singed nasal hair
- Facial burn
- Change in voice
- Brassy cough
- Carbonaceous sputum

Yes / No

***If yes please seek senior
anaesthetic review immediately***

If intubation is required use an uncut ETT to allow for facial oedema

URGENT AIRWAY MANAGEMENT MAY BE NECESSARY- DO NOT DELAY

Breathing

Is there any suggestion of **Breathing impairment?**

Has this patient any of the following: (underline if present)

- Circumferential chest burns: ***Needs immediate discussion with local burns service***
- O₂ saturation lower than expected
- Respiratory rate outside expected limits
- Any other evidence of broncho-pulmonary or chest wall injury
- Carbon Monoxide >10% (available with ABGs)
- Elevated lactate, arrhythmias, reduced GCS and reduced arterial-venous oxygen saturation difference: Consider Cyanide poisoning. Use of antidote recommended

MBODN Clinical Advisory Group
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Circulation

Is there any suggestion of a **Circulation problem**?

Has the patient any of the following? (Underline if present)

- Tachycardia
- Tachypnoea
- Reduce level of consciousness
- Central and peripheral capillary refill time >2seconds
- Cool peripheries
- Circumferential limb burn. **Absence of peripheral pulses requires immediate contact with local burns service as an escharotomy may be required. ***
- *IV fluid resuscitation should be commenced as per ATLS protocol. If this does not improve parameters repeat primary survey looking for causes of shock.*

All patients requiring fluid resuscitation should have two large-bore intravenous cannulae through the burn if necessary, and an indwelling urinary catheter attached to an hourly urine collection bag.

REMEMBER TO TAKE BLOOD FOR FBC, U&E, ABG, G&S, CK, Clotting screen and BHCG

If you consider that the patient requires an escharotomy the following actions need to be undertaken

- **You must Contact Plastic & Burns Surgery team – Consultant or SpR grade if need for escharotomy is suspected.**
- Escharotomies are performed by plastic surgeons in Operating Theatres, except when required immediately to allow ventilation.
- All escharotomy procedures must be carried out with diathermy immediately available.
- In immediate escharotomy, only carry out chest incisions, until satisfactory ventilation is achieved, then stop.
- Local anaesthetic and adrenaline infiltration along incision lines will reduce blood loss and improve comfort.
- Escharotomy may cause bleeding and damage to underlying structures. Do NOT perform a fasciotomy.
- All escharotomy wounds must be dressed with appropriate haemostatic dressings, e.g. calcium alginate (Kaltostat) and overlying absorbent dressings. Take care to avoid tight dressings.

Disability

Does the patient have a GCS <9 and are pupils equal and reacting to light?

If so:

- Consider CO poisoning
- Exclude other injuries
- Contact an ANAESTHETIST
- Ensure ABC normalised

GCS ... / 15

Pupils: reactive / unreactive

Exposure, Environment and Evaluation

Measure core temperature and maintain >36C

Assess Total Burn Surface Area (TBSA) %

Use Lund and Browder Chart below to document findings. **Ignore simple erythema.** The patient's hand including fingers is 1% TBSA.

This knowledge can be used to calculate the total area of small burned or unburned areas.

% Total Body Surface Area Burn

(Lund and Browder)

Be clear and accurate, and **do not include erythema**

CHART FOR ESTIMATING SEVERITY OF BURN WOUND

NAME _____ WARD _____ NUMBER _____ DATE _____
AGE _____ ADMISSION WEIGHT _____

LUND AND BROWDER CHARTS

IGNORE
SIMPLE ERYTHEMA

Partial thickness loss (PTL)
Full thickness loss (FTL)

REGION	%	
	PTL	FTL
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=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 LEG	2 1/2	2 1/2	2 3/4	3	3 1/4	3 1/2

For further supplies of this pad or of Flamazine* Cream for the prevention and treatment of infection in burns contact Ingrebourne (04023) 49333 or your Smith & Nephew Pharmaceutical representative.

*Trade mark

Smith & Nephew

Fluid resuscitation with Hartman's solution

ADULT >15% OF TBSA burned require IV fluid resuscitation
CHILDREN >10% OF TBSA burned require IV fluid resuscitation

Use the Parkland Formula to calculate an estimate of the amount of fluid required in the form of Hartmann's over the first 24 hrs calculated from time of injury

4mls x %TBSA burn x weight (kg) = Total Fluid Volume	TFV over 1 st 24hrs from time of injury
☐ Fluid for 1st 8hrs TFV ÷ 2 = ☐ Fluid for 9 – 24hrs TFV ÷ 2 =	

Maintenance fluids	Urine output target	Catheterise and attach an hourly urine device
Adults No maintenance fluids Children Calculate as normal, give as Dextrose- Saline (0.45%) Saline +5% Dextrose)	Adults 0.5 ml/ kg/hr Children And Infants 1- 2 ml/ kg/hr	

FLUID RESUSITATION IS ONLY A GUIDE AND INFUSION RATE SHOULD BE ADJUSTED TO DELIVER APPROPRIATE URINE OUTPUT

Wound Cover and Ambulance Transfer

Cover the burn wounds in loose cling film prior to transfer.

If transfer is going to be delayed, clean the burn wounds then cover with a non-adherent dressing e.g. Jelonet.

All ambulance transfers for resuscitation burns must be performed by crews who can and will continue to provide

- on-going fluid resuscitation
- thermal regulation and
- monitoring throughout transfer

Please attach any X-rays and blood results to the patient's notes.

Midland Burn Care Services Contact details

Hospital	Level of Service	Description of patients treated and cared for in service	Contact Telephone Number Address
University Hospitals Birmingham NHS Foundation Trust	Burns Centre	Adults with minor, moderate, severe and complex severe burns	Tel: 0121 627 2000 Queen Elizabeth Hospital Birmingham Mindelsohn Way Edgbaston Birmingham B15 2WB
Birmingham Children's Hospital NHS Foundation Trust	Burns Centre	Children with minor, moderate, severe and complex severe burns	Tel: 0121 333 9999 Birmingham Children's Hospital Steelhouse Lane Birmingham B4 6NH
Nottingham University Hospitals NHS Trust	Burns Unit	Adults City Hospital campus: Adults with minor, moderate and severe burns Children Queens Medical Centre: Children with minor and moderate burns	Tel: 0115 969 1169 Nottingham City Hospital Hucknall Road Nottingham NG5 1PB Tel: 0115 924 9924 Queens Medical Centre Derby Road Nottingham NG7 2UH
University Hospitals of Leicester NHS Trust	Burns Facility	Adults and Children with minor burns	Tel: 0300 303 1573 Leicester Royal Infirmary, Infirmary Square, Leicester, LE1 5WW
University Hospitals of North Midlands NHS Trust	Burns Facility	Adults and Children with minor burns	Tel: 01782 715444 Royal Stoke University Hospital, Newcastle Road, Stoke-on-Trent, ST4 6QG

NATIONAL BURN BED BUREAU TELEPHONE NUMBER

01384 215576