

Guideline on the Initial Assessment & Management of Burn-Injured Patients

This guideline covers the initial assessment and management of burn-injured patients in the following settings:

- At the scene of injury
- During transfer to hospital
- On arrival at a Major Trauma Centre/Unit or Emergency Department
- During transfer to a specialised burns service

The guidance is applicable to burn injuries of any size and from any source, but emphasises the assessment and management of major injuries.

IF IN DOUBT, PLEASE CALL YOUR NEAREST SPECIALIST BURNS SERVICE FOR ADVICE

At the Scene of Injury

Immediate First Aid (FA) reduces the severity of burn injury and improves outcome.

A sensible, evidence-based approach to FA is outlined in the British Burns Association pre-hospital approach to burn patient management.¹

Transfer to Hospital

SAFE approach to the patient	• Shout/call for help (if appropriate) • Assess the scene for potential danger to rescuers • Free the patient from danger • Evaluate the patient
STOP the Burning Process	• Remove burnt/burning clothing (unless stuck to the patient) • Remove jewelry • Brush dry chemical crystals off the patient's skin with a gloved hand
COOL the Burn Wound	• Cool the burn for up to 20 minutes using cool water • Water should not be ice cold • Keep the patient warm, especially children and the elderly
Temporary DRESSINGS	• Cover burnt area with a clean dressing or cling film • Be aware of possible constrictive effect of wrapped dressings

Patients should be transferred promptly to the nearest Major Trauma Centre/Unit or Emergency Department.

Treatment at the Scene of Injury	• Any treatment carried out at the scene of injury should be as brief as possible (eg limit attempts at cannulation to 2 only).
Fluids	• Fluid replacement may be started if a paramedic estimates the burn injury to be >25% Total Body Surface Area (TBSA) and the estimated time to reach hospital is > 1 hour. • Warmed Hartmann's solution (Ringer Lactate) is the fluid of choice.
Analgesia	• If the patient has IV access, intravenous opiate analgesia given in small aliquots at a frequency tailored to the patient's response should be considered.
Warming	• Patients should be kept warm during transfer.

SPECIALISED BURNS SERVICES

The Welsh Burns Centre & Paediatric Unit

Morriston Hospital, Swansea
Tel: 01792 703 802
Switch: 01792 702222

8:00-17:00: Burns Consultant of the day
17:00-08:00: Burns Consultant on call

SW Paediatric Burns Centre

Bristol Royal Hospital for Children
Tel: 0117 342 7901
Switch: 0117 923 0000
(Burns on-call) Bleep 6780

Bristol Burns Unit

Southmead Hospital
Tel: 0117 414 3100/3102
Switch: 0117 950 5050
(Burns on-call) Bleep 1311

Salisbury Burns Unit

Salisbury District Hospital
Tel: 01722 345 507
Switch: 01722 336262
(Burns on-call)

Plymouth Burns Facility

Derriford Hospital, Plymouth
Switch: 01752 202082
(Plastics Trauma Team) Bleep 0024

In Hospital (Major Trauma Centre/Unit or Emergency Department)

An accurate history and detailed examination of the patient are vital in achieving the best outcome; they determine subsequent treatment and referral pathway. Courses such as Emergency Management of Severe Burns (EMSB)² or Advanced Trauma Life Support (ATLS)³ set out a safe framework for assessing burn-injured patients.

1. Assessment & Management of Imminently Life-Threatening Problems

A rapid initial primary survey using an ABCDE approach should be undertaken to identify and treat life-threatening problems. These may arise due to complications of the burn or from other non-burn injuries. Particular care should be taken in assessing neurologically obtunded or unconscious patients.

AIRWAY	Suspect inhalation injury if the patient has: • respiratory distress (dyspnoea, stridor, wheeze) • voice changes • signs of upper airway oedema • deep facial burns • sooty sputum • a history of burn in enclosed space • raised COHb level Seek review by a senior anaesthetist Consider need for early intubation (DO NOT cut tube) Sit patients with facial burns upright
BREATHING	Administer 100% FiO₂ Establish baseline ABGs and SaO₂ (goal >95%) If circumferential FT burns to torso, consider escharotomy
CIRCULATION	Insert 2 large bore peripheral IV lines in unburned skin Take blood for U&E, FBC, LFT, CK, X-Match, Drug/Tox, calcium & clotting If circumferential FT burns to limbs: • Assess perfusion distal to burn • Elevate limbs • Consider escharotomy
DISABILITY	Assess level of consciousness Assess pain score • Administer IV opiate analgesia according to patient's needs
EXPOSURE	Remove dressings, loose clothing, jewellery or nappies. • Leave any adherent clothing If no First Aid already applied and within 3 hours of injury, cool wounds for 20 mins • Use running water or wet compresses Clean with normal saline or tap water Assess extent of burn as %TBSA using Lund & Browder chart. • Do not include erythema in the estimation Assess depth of the burn Send photos to specialised burn service if possible Cover with loose strips of cling film • Do not apply cling film to face Implement active warming measures to prevent heat loss

Adapted from: [London and SE Burns Network](#)⁴

As much relevant information about the burn and the circumstances surrounding it should be gathered, including:

- Details of the mechanism and time of injury
- Length of exposure to the burning agent
- Details of any chemicals involved
- Environment in which the burn occurred
- Tetanus immunisation status
- Features suggestive of non-accidental injury (NAI)

This is followed by a more detailed assessment of the burn wound and a 'top-to-tail' secondary survey.

2. Assessment of the Burn Wound

Burn wounds should be fully exposed and assessed under good lighting by an experienced clinician.

Patients who are unable to direct the examiner to all the areas burned (e.g. ventilated patients) should undergo examination of their whole skin. This requires a 'log roll'.

Care must be taken to avoid hypothermia during examination.

2.1 Burn Area Assessment

Lund & Bowder charts provide the most accurate means of burn area assessment in children and adults [Figs. 1 & 2]. All areas of blistering are included, while areas of erythaema without blistering are excluded.

Fig. 1 Paediatric Lund & Bowder Chart

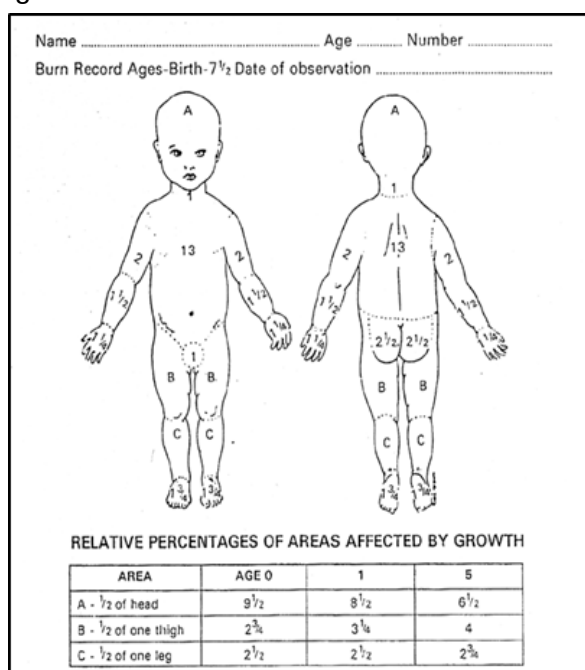
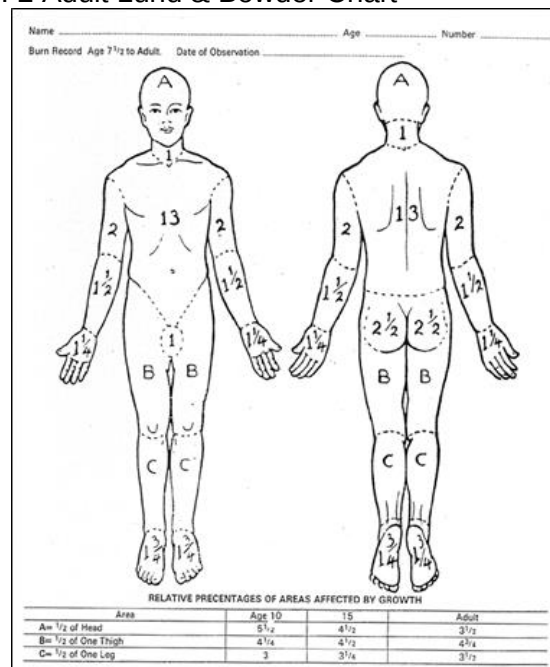
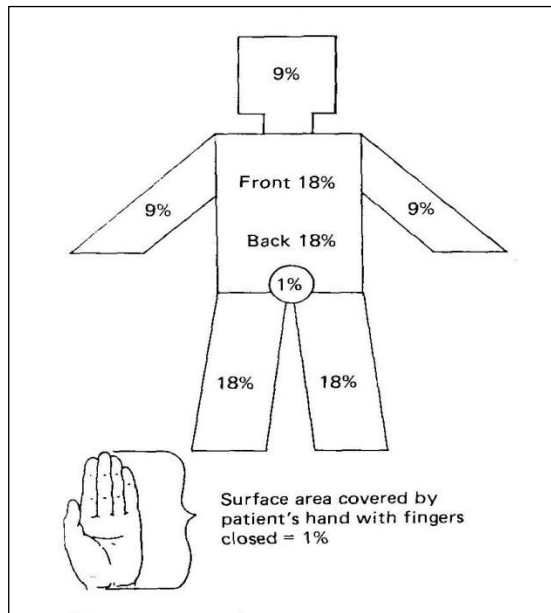


Fig. 2 Adult Lund & Bowder Chart



When these are not available, the 'Rule of Nines' may provide a pragmatic alternative [Fig. 3]. This should NOT be used when assessing burns in children.

Fig. 3 The Rule of Nines



2.2 Burn Depth Assessment

Burn depth assessment can be difficult. The depth and appearance of a burn wound may change with time. Initial assessment should attempt to differentiate superficial and deep burns.^{5,6}

Superficial	Blistered. Painful. Soft. Pink with blanching on pressure
Deep	Pale, charred, red or black appearance Firm 'leathery' texture. No blanching on pressure

2.3 Circumferential full-thickness burns

Circumferential full-thickness burns of the limbs or torso may have constrictive effects on distal limb perfusion or on chest expansion as the underlying tissues swell. Decompression (i.e. surgical escharotomy) may be required to prevent this.

The need for surgery prior to transfer to a specialised burns service is dealt with in the South West Burn Care Network document ['Standards for the Need for Surgery prior to the transfer of Burns Patients within the in the South West UK Burn Care Operational Delivery Network'](#).

3. Intravenous Fluid Resuscitation

Intravenous fluid resuscitation may be initiated at this stage if the burn wound is thought to be over the accepted severity threshold. An accurate assessment of burn area is required to calculate precise fluid requirements (see 2.1).

3.1 Adults (≥ 16 years)

Adults with burn injury exceeding 15% TBSA should receive intravenous fluid resuscitation using warmed Hartmann's solution (Ringer Lactate).

The volume and timing of resuscitation fluid is calculated using the Parkland formula. The total fluid to be given in the 24hr period from the time of the burn injury is:

3-4 mls/kg/%TBSA Burn

Half is given in the first 8 hours from the time of the burn and half over the subsequent 16 hours.

3.2 Children (<16 years)

Children with burn injury exceeding 10% TBSA should receive intravenous fluid resuscitation using warmed Plasmalyte or Hartmann's solution.

10 – 20% TBSA

Maintenance fluid should be given via 1 cannula until the injury is assessed by a specialised burn service.

>20% TBSA

The volume and timing of resuscitation fluid is calculated using the following formula:

2 mls/kg/%TBSA Burn

Half is given in the first 8 hours from the time the burn is sustained and half over the subsequent 16 hours. Maintenance fluid is also required.

4. Smoke Inhalation Injury

The assessment and management of airway injury from smoke inhalation is dealt with in the South West Burn Care Network document ['Management of Smoke Inhalation and Airway Injury of the Burn Injured Patient'](#)⁸.

5. Burn Wound Management

Burn wounds should be cleaned with sterile water and Chlorhexidine (Hibiscrub) as soon as possible, to allow complete wound assessment. Loose blisters should be removed. If referral to a specialised burn service is anticipated, temporary dressings should be re-applied. Cling film serves this purpose well, but other dressings are acceptable. Flamazine or other adherent dressings should be avoided as they may make subsequent assessment more difficult.

6. Analgesia

Adequate analgesia should be provided as wound management is likely to be painful. If the patient has IV access, intravenous opiate analgesia given in small aliquots at a frequency tailored to the patient's response should be considered. Otherwise, oral opiate analgesia should be considered.

7. Referral to a Specialised Burns Service

Contact the nearest specialised burns service for advice on the most appropriate burn service to refer the patient too.

If you are confident in your assessment of the burn size and depth, contact the burn service appropriate to the severity of burn injury (see Appendix 1 for further guidance on paediatric referrals and Appendix 2 on adult referrals).

National guidance on the referral pathway of burn-injured patients is also given in ['The National Burn Care Referral Guidance' \(2012\)](#) published by the National Network for Burn Care (NNBC).⁹

8. Transfer to a Specialised Burns Service

Transfer protocols should comply with Intensive Care Society Guidance on ***“The Transfer of the Critically Ill Adult”***¹⁰ and the Paediatric Intensive Care Society (PICS) ***‘Standards of Practice for the Transport for the Critically Ill Child’***.¹¹

When transferring a patient to a specialised burns service, please remember:

- If in doubt, intubate. Don't cut the tube
- Central access is preferable for drug infusions
- Arterial lines are more reliable than NIBP in oedematous patients
- Hypothermia increases mortality, keep the patient warm
- Distances involved in the transfer may be great. Make sure you have enough oxygen and fluids for the journey
- Keep a legible record of the observations, fluids and drugs given.

9. Management of Patients with Non-Survivable Burns

In some adult patients with massive burn injury, the injury may be deemed to be non-survivable. Before this judgement is made, it is crucial that the following actions are taken:

1. An accurate assessment of burn area is undertaken by the most experienced doctor available. Ideally, this would be a Consultant in Burn Surgery, Plastic Surgery, Trauma & Orthopaedics or Emergency Medicine.
2. An airway assessment +/- bronchoscopy is undertaken by an experienced anaesthetist, to assess smoke inhalation injury.
3. The case is discussed with a Consultant Burns Surgeon and transferred to a Burn Service if this is deemed appropriate.

The palliative care of patients with non-survivable burns should adhere to local guidelines and policies, but should include the following:

1. Analgesia and symptom relief
2. Communication with the patient (if possible) and family members
3. Psychological support for the patient, family members and staff.

10. References

1. First Aid Clinical Practice Guidelines. British Burn Association. April 2018
<https://www.britishburnassociation.org/pre-hospital-approach-to-burns-patient-management/>
2. Emergency Management of the Severe Burn (EMSB) course. British Burn Association.
<https://www.britishburnassociation.org/emsb-courses/>
3. Advanced Trauma Life Support® (ATLS®). Royal College of Surgeons.
<https://www.rcseng.ac.uk/education-and-exams/courses/search/advanced-trauma-life-support-atls-provider-programme/>
4. Initial Management of Severe Burns. London & South East Burns Network.
<http://www.lsebn.nhs.uk/website/X13911/files/LSEBN%20Initial%20management%20of%20SEVERE%20burns.pdf>
5. Quick Guide to Burn Depth Assessment.
<https://www.southwest-burncare-network.nhs.uk/page1.aspx?p=22&t=1>
6. Mersey Burns App - <https://merseyburns.com/>
7. Standards for the Need for Surgery prior to the transfer of Burns Patients within the in the South West Burn Network
<https://www.southwest-burncare-network.nhs.uk/page1.aspx?p=22&t=1>
8. Management of Smoke Inhalation and Airway Injury of the Burn Injured Patient
<https://www.southwest-burncare-network.nhs.uk/page1.aspx?p=22&t=1>
9. The National Burn Care Referral Guidance. The National Network for Burn Care (NNBC). February 2012
<https://www.britishburnassociation.org/wp-content/uploads/2018/02/National-Burn-Care-Referral-Guidance-2012.pdf>
10. Guidance on the Transfer of the Critically Ill Adult. The Intensive Care Society. 2019.
https://www.ics.ac.uk/Society/Guidance/PDFs/Patient_Transfer_Guidance
Standards of Practice for the Transport for the Critically Ill Child. Paediatric Intensive Care Society. 1991.
<http://picsociety.uk/wp-content/uploads/2015/10/PICS-Transport-Standards-1991.pdf>

REFERRAL THRESHOLDS FOR:		BURNS SERVICE	
FACILITY	TBSA / DEPTH	OTHER FACTORS	
	<u>TBSA</u>: $\geq 2\%$ $< 5\%$ <u>DEPTH</u>: Full thickness	Site: Significant burn to special areas (hands, feet, face, perineum, genitalia) Mechanism: Chemical, electrical, friction, cold injury Other: Unhealed after 2 weeks Unwell/Febrile child with burn Any other co-morbidities that may affect treatment or healing of burn Anything $> 1\%$ TBSA contact the Children's Assessment Unit	Derriford Hospital PLYMOUTH Children's Assessment Unit Tel: 01752 245122 Switch: 01752 202082 (Plastics Trauma Team) Bleep 0024
UNIT	<u>TBSA</u>: $\geq 5\%$ $< 30\%$ or <u>TBSA</u>: $< 15\%$ & <u>AGE</u>: under 1 year or <u>TBSA</u>: $\geq 1\%$ <u>DEPTH</u>: Full thickness & <u>AGE</u>: under 6 months or <u>TBSA</u>: $\geq 2\%$ <u>DEPTH</u>: Full thickness & <u>AGE</u>: under 10 years	Site: Significant burn to special areas (hands, feet, face, perineum, genitalia) Site: Any circumferential burn Other: Any predicted or actual need for HDU/PICU (including support required other than for burn injury (ie, smoke inhalation) Any significant deterioration in physiology Any burn with suspicion of non-accidental injury All children with a Major Trauma + Burn Injury within unit thresholds Any burn injury in a neonate should be discussed with a Burn Unit or Centre Patients with a skin loss disease (eg, Staphylococcal Scalded Skin Syndrome)	Salisbury District Hospital SALISBURY Tel: 01722 345 507 Switch: 01722 336262 (Burns on-call) Bleep 1029 The Welsh Burns Centre Morriston Hospital SWANSEA Tel: 01792 703 802 Switch: 01792 702222 8:00-17:00: Burns Consultant of the day 17:00-8:00: Burns Consultant on call
CENTRE	<u>TBSA</u> $\geq 30\%$ or <u>TBSA</u>: $\geq 15\%$ & <u>AGE</u>: under 1 year or <u>TBSA</u> $\geq 20\%$ & <u>DEPTH</u>: Full thickness	Other: All those predicted to require assisted ventilation specifically for their burn injury for more than 24 hours. Any child who is physiologically unstable as a result of burn injury All children requiring respiratory support All children with Major Trauma + Burn Injury within Centre thresholds Any burn injury in a neonate should be discussed with a Burn Unit or Centre Patients with a skin loss disease (eg, Staphylococcal Scalded Skin Syndrome)	Bristol Royal Hospital for Children BRISTOL Tel: 0117 342 7901 Switch: 0117 923 0000 (Burns on-call) Bleep 6780

Each service can accept burn referrals up to their designated threshold.
 If in doubt – call your nearest burns service and they will be able to offer advice

REFERRAL THRESHOLDS FOR:		OTHER FACTORS		BURNS SERVICE	
FACILITY UNIT CENTRE	TBSA / DEPTH				
	<u>TBSA</u>: ≥3% <10% <u>DEPTH</u>: Partial Thickness All Deep Dermal & Full Thickness Burns	Site: Any burn to special areas (hands, feet, face, perineum, genitalia) Mechanism: Any chemical, electrical, friction, cold injury Other: Unhealed after 2 weeks Any other co-morbidities that may affect treatment or healing of burn i.e immuno-suppression, diabetics, pregnancy	Derriford Hospital PLYMOUTH Tel: 01752 792274 Switch: 01752 202082 (Plastics Trauma Team) Bleep 0024		
	<u>TBSA</u>: ≥10% <40% or <u>TBSA</u>: ≥10% <25% with inhalation injury or <u>TBSA</u>: ≥5% <40% if non-blanching	Site: Significant burn to special areas (hands, feet, face, perineum, genitalia) Site: Any non-blanching circumferential burn Other: Any predicted or actual need for HDU/ITU level care Any burn with suspicion of non-accidental injury should be referred to a Burn Unit/Centre for expert assessment within 24 hours. Any significant deterioration in physiology Patients who are pregnant All patients with a Major Trauma + Burn Injury (post treatment within Major Trauma Centre) when burn meets unit level thresholds Any concerns regarding an inhalation injury with any size burn should be discussed with a Burn Centre Patients with a skin loss disease (eg, TENS)	Salisbury District Hospital SALISBURY Tel: 01722 345 507 Switch: 01722 336262 (Burns on-call) Bleep 1029 Southmead Hospital BRISTOL Tel: 0117 414 3100/3102 Switch: 0117 950 5050 (Burns on-call) Bleep 1311		
<u>TBSA</u> ≥40% or <u>TBSA</u>: ≥ 25% + <u>AGE</u>: > 65 yrs discuss	Other: All patients with a Major Trauma + Burn Injury (post treatment within Major Trauma Centre) when burn meets Centre level thresholds Patients assessed as requiring end of life care should be discussed with a Consultant Burns Specialist at a Burn Centre Patients with a skin loss disease (eg, TENS)	The Welsh Burns Centre Morriston Hospital SWANSEA Tel: 01792 703 802 Switch: 01792 702222 8:00-17:00: Burns Consultant of the day 17:00-08:00: Burns Consultant on call			

Each service can accept burn referrals up to their designated threshold.
 If in doubt – call your nearest burns service and they will be able to offer advice