



CLINICAL PRACTICE

South African Burn Society burn stabilisation protocol

Jonathan S Karpelowsky, Lee Wallis, A Madaree, Heinz Rode

Minimal criteria for transfer to a burn centre

(Modified from the Australian and New Zealand Burn Association (ANZBA) protocol)

Burn injury patients who should be referred to a burn unit include the following:

- All burn patients less than 1 year of age
- All burn patients from 1 - 2 years of age with burns > 5% total body surface area (TBSA)
- Patients in any age group with third-degree burns of any size
- Patients older than 2 years with partial-thickness burns greater than 10% TBSA
- Patients with burns of special areas – face, hands, feet, genitalia, perineum or major joints
- Patients with electrical burns, including lightning burns
- Chemical burn patients
- Patients with inhalation injury resulting from fire or scald burns
- Patients with circumferential burns of the limbs or chest
- Burn injury patients with pre-existing medical disorders that could complicate management, prolong recovery or affect mortality
- Any patient with burns and concomitant trauma
- Paediatric burn cases where child abuse is suspected
- Burn patients with treatment requirements exceeding the capabilities of the referring centre
- Septic burn wound cases.

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Treatment protocol

Assess airway/breathing

1. Careful airway assessment must be done where there are flame or scald burns of the face and neck. Intubation is generally only necessary in the case of unconscious patients, hypoxic patients with severe smoke inhalation, or patients with flame or flash burns involving the face and neck. Indications for airway assessment include presence of pharyngeal burns, air hunger, stridor, carbonaceous sputum and hoarseness.
2. All patients with major burns must receive high-flow oxygen for 24 hours.
3. Patients with carbon monoxide poisoning may have the following symptoms: restlessness, headache, nausea, poor co-ordination, memory impairment, disorientation, or coma. Administer 100% oxygen via non-rebreathing face mask. Useful laboratory test: Blood gases including carboxyhaemoglobin level.
4. If breathing seems to be compromised because of tight circumferential trunk burns, consult with the burn centre surgeons immediately.

Circulation

1. Stop any external bleeding.
2. Identify potential sources of internal bleeding.
3. Establish large-bore intravenous (IV) lines and provide resuscitation bolus fluid as required in all compromised patients, using standard ATLS® protocols. Perfusion of potentially viable burn wounds is critical.

Remove any sources of heat

1. Remove any clothing that may be burned, covered with chemicals or that is constricting.
2. Cool any burns less than 3 hours old with cold tap water for at least 30 minutes and then dry the patient.
3. Cover the patient with a clean dry sheet or blanket to prevent hypothermia.
4. Use of Burnshield® is a very effective means of cooling and dressing the injury for the first 24 hours.
5. Rings and constricting garments must be removed.



Estimate the percentage total body surface area (%TBSA) burned (Fig. 1)

Initially, use the Rule of Nines. In the case of all paediatric patients and for a more accurate assessment, use the Berkow diagram or the patient's unstretched open hand representing 1% of TBSA.

Reminder: Accurate estimation of burn size is critical to ongoing fluid replacement and management.

Ongoing losses (once the patient has been stabilised)

1. Patients with < 10% TBSA burns can be resuscitated orally (unless the patient has an electrical injury or associated trauma). This needs ongoing evaluation and the patient may still require an IV line.
2. In the case of patients with burns 10 - 40% TBSA, secure a large-bore IV line; add a second line if transportation will take longer than 45 minutes.
3. Burns > 40% TBSA require 2 large-bore IV lines.
4. If the transfer will take less than 30 minutes from the time of call don't delay transfer for an IV line.

Reminder: IV lines may be placed through the burned area if necessary (suture to secure). Avoid the saphenous vein if at all possible, and avoid cut-downs through unburned skin if possible. An intra-osseous line is an excellent alternative in the hypovolaemic child.

5. Initiate fluids for ongoing resuscitation and fluid losses using the Parkland formula:

$$4 \text{ ml Ringer's lactate} \times (\text{kg of body weight}) \times (\% \text{ burn}) = \text{ml in first 24 hours,}$$

with half of this total given in the first 8 hours post injury.

Children must have their daily maintenance fluids added to the volume of fluids calculated using the Parkland formula (including dextrose).

Example: In the case of a patient weighing 70 kg with a 50% TBSA burn: $(4 \times 70 \times 50) = 14\,000 \text{ ml}$ needed in the first 24 hours. Seven thousand millilitres are needed in the first 8 hours so IVs are initially started at 900 ml/hour.

Reminder: Do not give dextrose solutions (except for maintenance fluids in children) – they may cause an osmotic diuresis and confuse adequacy of resuscitation assessment. Ideally use Ringer's lactate or Plasmalyte B for ongoing fluid losses and a 5% dextrose balanced salt solution for the child's maintenance.

This is only a guide, and ongoing evaluation is essential as patients may need more fluids than calculated.

Assess urine output (this is the best guide to resuscitation)

1. Insert a Foley catheter in patients with burns >15% TBSA. Adequate urine output is 0.5 ml/kg/h in adults and 1.5 ml/kg/h in children.

Reminder: Lasix and other diuretics are never given to improve urine output; fluid rates are adjusted to increase urine output.

2. Observe urine for burgundy colour (seen with massive injuries or electrical burns). There is a high incidence of renal failure associated with these injuries, requiring prompt and aggressive intervention.

Reminder: If the urine is red or brown consult a burn centre.

Insert a nasogastric tube

Insert a nasogastric tube in any patient with burns > 30% TBSA, or any patient who is unresponsive, shocked or with burns > 20% if preparing for air or long-distance transportation.

Decompression incisions (escharotomy)

Assess for circumferential full-thickness burns of the extremities or trunk. Elevate the burned extremities on pillows above the level of the heart. If transfer will be delayed, discuss indications and methods for decompression incisions (escharotomies) with a burn surgeon.

Medication

1. Give tetanus immunisation.
2. After fluid resuscitation has been started, pain medication may be titrated in small intravenous doses (not intramuscular). Blood pressure, pulse, respiratory rate and state of consciousness should be assessed after each increment of IV morphine.

Wound care

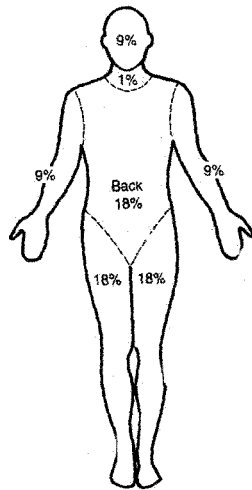
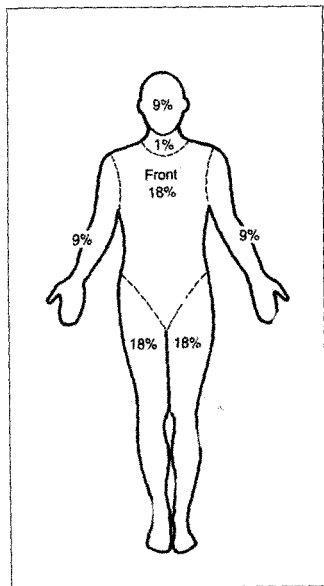
1. Debridement and application of topical antimicrobials are usually unnecessary. Transport the patient wrapped in a dry sheet and blanket, keeping the patient warm.
2. Apply a thin layer of silver sulfadiazine to open areas if transportation will be delayed for more than 12 hours.
3. Use of Burnshield® is a very effective means of cooling and dressing the injury in the first 24 hours.

General items

1. A history, including details of the accident and pre-existing diseases/allergies, should be recorded and sent with the patient.
2. Copies of all medical records, including all fluids (calculation of fluids administered) and medications given, urine outputs and vital signs must accompany the patient. These specific



<u>Patient name and date of birth</u>	<u>Date completed</u>	<u>Type of burn</u>
	<u>Date and time of burn</u>	



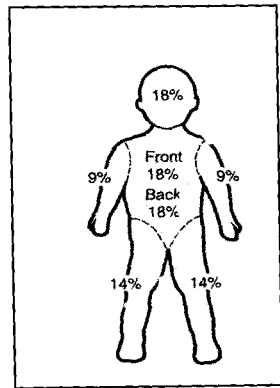
<u>Superficial</u> _____ %	=	<u>Total % burn</u> _____ %
<u>Indeterminate or deep</u> _____ %		

Superficial
(Pink, painful, moist)

Indeterminate or deep
White, mottled, dark red or black, leathery

Paediatric adjustments

- Weight approximated to (8 + age x 2)
- < 1 year – Head and neck are 18% and each leg 14% of BSA
- > 1 year – For each year of life
 - Head decreases by 1% of BSA
 - Leg increases by 0.5% of BSA



Fluids

- Total % burn _____ X weight _____ X 3.5 ml = total fluid in 24 hours _____
- Total fluid in 24 hours _____ / 2 = volume in first 8 hours since burn _____
Volume in next 16 hours since burn _____
- In children, add maintenance fluid to the above calculated volume _____

Note:
If urine output is not adequate, increase fluids for the next hour to 150% of calculated volume until urine output is adequate.

Fig. 1. South African Burn Society Burn Assessment Form.



<u>Patient name and date of birth</u> 	<u>Date completed</u> 	<u>Type of burn</u>
<u>Date and time of burn</u> 		

Superficial
_____ %

+

Indeterminate or deep
_____ %

=

Superficial
(Pink, painful, moist)

Total % burn
_____ %

Indeterminate or deep
White, mottled, dark red or black, leathery

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details may be recorded on the back of the burn size assessment sheet.

3. The burn centre will arrange transport if appropriate.
4. In the case of paediatric patients not accompanied by a parent, obtain consent in consultation with your burn centre.

Special considerations with chemical burns (consult burn centre)

1. Remove all clothing.
2. Brush powdered chemicals off the wound, then flush chemical burns for a minimum of 30 minutes using copious volumes of running water. Be careful to protect yourself.

Reminder: Never neutralise an acid with a base or vice versa.

3. Irrigate burned eyes using a gentle stream of saline. Follow with an ophthalmology consultation if transportation is not imminent.
4. Determine what chemical (and what concentration) caused the injury.

Special considerations with electrical injuries (consult burn centre)

1. Differentiate between low-voltage (< 1 000 v) and high-voltage (> 1 000 v) injuries
2. Attach a cardiac monitor; treat life-threatening dysrhythmias as needed.
3. Assess for associated trauma; assess central and peripheral neurological function.
4. Administer Ringer's lactate; titrate fluids to maintain adequate urine output or to flush pigments through the urinary tract (see urine output above).

Useful laboratory test: arterial blood gas levels with acid/base balance.

5. Using pillows, elevate burned extremities above the level of the heart. Monitor distal pulses.

Acknowledgements:

- American Burn Association
- Australian and New Zealand Burn Association