

# How to treat

RURAL

Australian Rural Doctor. PULL-OUT SECTION

JULY 2006

## Burns – assessment and triage

### Part 1

Each year in Australia, burn injuries affect about 1% of the general population. Of these 200,000 people, 10% will be hospitalised and 10% of those will need to go to a burns unit for specialist care. These statistics reveal that most burn injuries will be managed by the GP or at home.

It is vital to get the management of the burn right from the point of injury, as every intervention influences the scar worn for life. Therefore, everybody who assists in the management of that patient becomes a member of the burns care team.

If the best care is given in the first 24 hours, the outcome for a burns patient can be significantly improved.

In a rural setting, this care is usually delivered by the rural GP, who must be able to provide first aid, accurately assess and manage the burn and the patient and decide on the need for transfer.

The importance of burns prevention and first aid cannot be underestimated and the

role of the GP in educating patients about prevention and first aid is crucial.

This is the first of a two-part series on burns. This part will concentrate on how to assess and triage a patient with burns. In the next issue, part two will detail the physical and psychological management of the burns patient.

### Incidence of burns

There are three peaks in incidence of burns: 0-5 years, 25-39 years, and 65 years and over. In the middle age group, burns are often work related and commonly electrical or chemical injuries.

In older people, co-morbidities, such as stroke, blackouts or hypoglycaemic episodes, are involved.

Knowing these factors allows education to be targeted to the high-risk groups. Even simple messages such as turning saucepan handles inwards or keeping hot drinks out of reach of toddlers make a difference.

### Risk factors for burns

- Low socioeconomic status is the most important risk factor for sustaining a burn.
- The indigenous population is over-represented in burn injuries. WA studies have found that the indigenous population has three times the rate of burns compared with the Caucasian population and accounts for 50% of the major burns in the state.
- Alcohol, cigarettes and drug abuse are all important risk factors for burns in

both the adult and the paediatric population. About 10% of adult burns are associated with substance abuse.

- Residential factors often contribute to burns. By far the most common burn injury is a scald, usually caused by spilt tea or coffee. Flame and contact burns account for most other burns. Ovens and stoves are still a common cause of severe burns. Heaters and electrical appliances also cause a significant number of burns.



Photo courtesy of Westmead Children's Hospital

### CASE HISTORY

This 14-year-old boy was playing with kerosene-like fuel to accelerate the burning of a pile of leaves. He and his friends were crowded around the pile when it ignited with a flash.

His friends smothered the flames and the boy's burnt face and upper body were cooled with wet towels.

He arrived at a burns unit an hour later. He was talking normally at this early stage. The burns covered the anterior part of the face, scalp, neck, upper chest, abdomen and both arms. His eyes were not involved.

*Case outcome, page 20*

**RURAL  
HEALTH**  
EDUCATION FOUNDATION

The text and photographs in this How to Treat article have been adapted from a recent Rural Health Education Foundation program on rural perspectives in burn injury, which was presented by:

- Dr Fiona Wood AM, head of Royal Perth Hospital's burns unit and director of the Western Australia Burns Service.
- Dr Erik La Hei, paediatric burns surgeon, The

- Children's Hospital at Westmead, NSW.
- Dr David Crompton, psychiatrist, area director, mental health services, Hunter New England Health Service, NSW.
- Ms Michelle McSweeney, senior occupational therapist, burns unit, Concord Hospital, NSW.
- Dr David Rosenthal, rural GP, Renmark, SA, and deputy chair, Rural Health Education Foundation.
- Dr Peter Maitz, medical director, burns unit,

Concord Hospital, NSW, was the consultant for the program.

For more information on Rural Health Education Foundation Programs, go to [www.rhef.com.au](http://www.rhef.com.au) or call (02) 6232 5480.

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**HOW TO TREAT**

# Assessing the burn

**HOME TRUTH**

- Cool the burn surface with cold running water for at least 20 minutes as soon as possible after the injury. This is effective for up to three hours. Take care to avoid hypothermia.

**First aid**

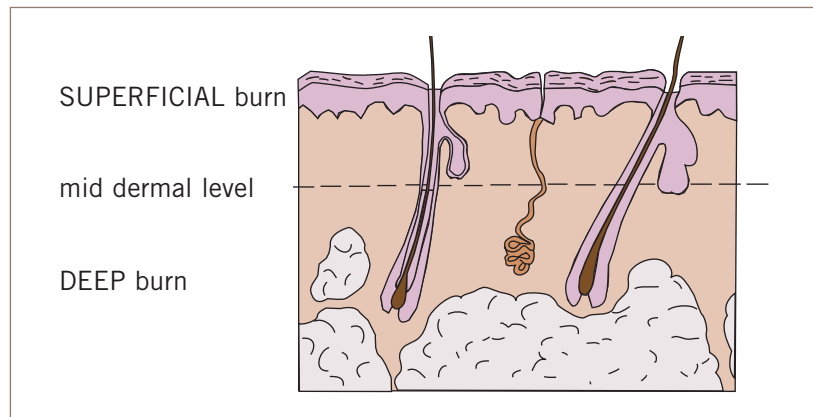
Before making complex decisions about a burns patient, provide first aid (full details in part 2).

1. Stop the burning process, but do so in a safe way. This is especially important for chemical and electrical burns. Ensure you do not include yourself in the electrical circuit.
2. Immediately remove all clothing and cover unburnt areas with dry clothes or a blanket to avoid hypothermia.
3. As soon as possible, cool the wound for 15-20 minutes, with cold tap water directly onto the burn.

If this is done within three hours of the point of injury, it will have an impact on the scar. There is good evidence that it will reduce the depth of injury by 80 per cent. Never use ice or iced water to cool a burn injury.

To provide best management to a burns patient, accurately assess the burn by:

1. Estimating the percentage of surface body area affected (see below).
2. Identifying the depth of the injury.
3. Understanding the implications of the body site involved. For example, a hand burn has a significantly greater impact than the same percentage body surface area in the middle of the back.
4. Considering a number of special circumstances that will affect management decisions.
5. Deciding on whether the patient needs resuscitation and transfer.



Cross-section of skin.

**Classifying burn depth**

Burns are classified into four depths:

- **Epidermal:** the most superficial, such as sunburn. There is no loss of the epithelium, the skin is intact and the surface is dry. The burn can blister, usually on the second day or later.
- **Superficial partial thickness**
- **Deep partial thickness**
- **Full thickness:** when all elements of the skin have been destroyed.

heal in 10 days (usually epidermal or superficial partial thickness burns), follow a conservative management path. If not, consider surgical intervention to achieve scar minimisation (usually deep partial thickness or full thickness burns).

In the diagram, the cross-hatched section at the top shows the epidermis, which is damaged in an epidermal burn. The dermal burn is classified into superficial and deep partial thickness, according to the extent of dermal damage. This is often not evident until a few days after the injury.

The assessment of depth is crucial and needs to be re-evaluated over days as the wound evolves. The condition of the patient also needs to be freshly reviewed. You may have to communicate repeatedly with the burns team until the final management decisions are made.

If you think the burn injury will

The dotted line that runs through the dermis is an artificial dotted line. Above that line the wound is going to heal spontaneously without the need for any surgery. Below that line the wound is deeper and will have a better final cosmetic and functional result with debridement and a split skin graft.

**Assessing body surface area burnt**

**Rule of nines**

A good rapid method of assessing the percentage of the body area burnt is the rule of nines.

For example, if the entire front half of the torso is involved, 18% of the body is burnt and each arm accounts for 9% of body surface area. This rule does not apply to electrical injuries. Ignore simple erythema in the calculation.

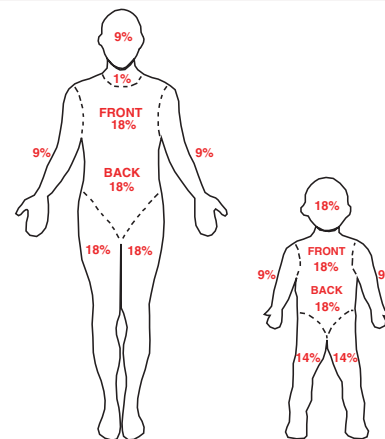
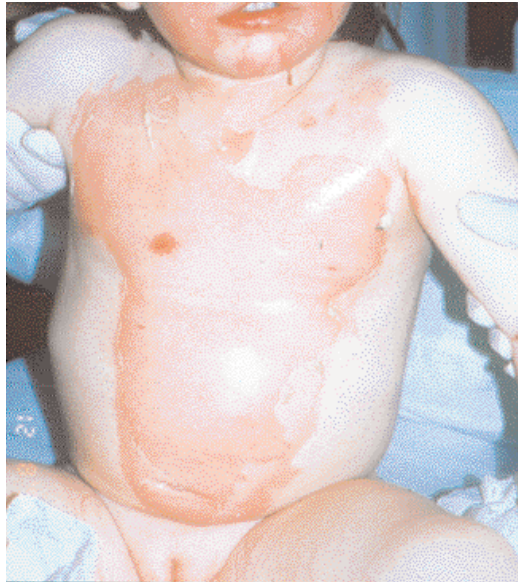


Diagram courtesy of <http://www.skinhealing.com>

# Types of burns



Superficial partial thickness burn. In this toddler, the blisters have disappeared. The distribution of the injury over the chin and the front of the chest is typical of the spill scald.



Deep partial thickness burn. This shows the typical cherry red appearance with mottling. There is marked swelling with ischaemia of the fingertips.



A deep full thickness burn with classic features of a white leathery appearance and absence of blanching. There is a large amount of deep partial thickness burn around the rim and some superficial partial thickness burn. It is common to find many different depths of burn in each patient.

## Superficial partial thickness burns

- salmon pink in colour
- moist and can blister
- extremely painful, even when exposed to the air.

Use a clean finger inside a sterile glove to press on the burn. Look for good capillary return and blanching.

## Deep partial thickness burns

- cherry red
- mottled
- sluggish or no capillary return
- discomfort/pain.

It is difficult to estimate the time taken to heal in deep partial thickness burns. Scalds in children are typical of this group of burns and usually take between 10 days and three weeks to heal.

To distinguish a deep partial thickness from a superficial partial thickness burn, look for the typical cherry red appearance, rather than a salmon pink appearance. It can be mottled. If you press on the burn with a glove you'll find that there is sluggish or no capillary return.

Even though it looks quite red as though it has good vascularity, the tissue is dead. The haemoglobin molecules that have left the circulation and are trapped in the dead tissue account for the colour.

It is said that these burns have less pain and more discomfort although this is probably not a good differentiator.

They tend not to have the same sort of exposure tingling pain of superficial partial thickness burns.



The burnt hand (pictured top) after an escharotomy.

## Full thickness burns

- white or charred
- leathery, firm
- dry
- no blanching
- insensate.

Full thickness burns take more than three weeks to heal and need immediate debridement and split skin grafting.

While the centre of these burns is insensate, this doesn't mean that the burn isn't painful, as typically less damaged areas are also present.

## Site of the burn

Burns to the perineum, the hands, the feet, the face, major joints and burns that involve a circumferential limb influence the quality of survival with respect to function, cosmesis and psychological impact.

With circumferential burns, the constricting eschar can stop the blood supply to the distal limb.

A circumferential burn can also have airway implications if it's around the abdomen or the chest, which can restrict breathing.

## HOW TO TREAT

# Special considerations

### THE GEMS

- Even the suspicion of an inhalational injury needs immediate communication and almost certain transfer.
- Circumferential burns must be treated cautiously, as circulation and respiration can be compromised.
- Remember that the site of the burn is critical and that certain body areas require special treatment.
- Have a low threshold to refer the very old and the very young, and consider non-accidental injury.
- Consider co-morbidities in the management plan.
- If you think the burn injury will heal in 10 days, follow a conservative management path.
- If not, consider surgical intervention to achieve scar minimisation.

### WHEN TO REFER A BURNS PATIENT

#### ANZBA referral criteria

- burns greater than 10% of total body surface area
- burns greater than 5% of total body surface area in children
- full thickness burns greater than 5%
- burns to special areas
  - hands, feet, face, perineum, major joints
  - circumferential burn of limb
- burns with an inhalation injury
- electrical burns or chemical burns
- burns with pre-existing illness
- burns associated with major trauma
- burns at the extremes of age (children, elderly)
- suspicion of non-accidental injury
- pregnancy with cutaneous burns.

Australian and New Zealand Burns Association  
Criteria for referral of a burns patient.

When assessing the burn, a number of special considerations will affect management decisions.

#### Inhalation injuries

Don't underestimate the severity of an inhalation injury. With any sort of burn injury that occurs in an enclosed space, such as in a car accident, assume there is a smoke inhalation component. Assume inhalational injury, even if cutaneous burns are not present. A suspicion of an inhalational injury needs immediate communication and almost certain transfer.

#### Co-morbidities and age

The burn must be considered in the context of the health of the patient, which may complicate management. For example, diabetes will influence healing and major cardiac problems will influence fluid resuscitation. This is often the reason to refer the elderly.

Patients at the extremes of age are very vulnerable. Any burn in a child less than five is best assessed and managed in a burns unit.

It is important to consider non-accidental injury either by neglect or intent – the baby placed in bath water that is too hot or the elderly patient who presents with cigarette burns.

#### Types of burns

**Electrical burns:** These are difficult to assess and can be dangerous because



This boy has every type of burn. Note the salmon pink of the superficial partial thickness, the deep cherry red of the deep partial thickness and the whiter patches of the full thickness burn.

the surface might not show the full extent of the damaged tissue.

There can be muscle necrosis up an arm, for instance, and the external injury is just a small entry site. An electrical burn is a strong referral criteria to a tertiary burn referral centre.

There is no easy way to assess the severity of an electrical burn from history alone. Knowing the voltage involved in the injury is very helpful as the severity of the burn increases with increasing voltages.

Patients with significant electrical

burns should be urgently referred to a tertiary centre as there may be cardiac implications requiring monitoring in an intensive care unit.

As well, the renal implications in an electrical burn can be profound. If there is a significant amount of muscle necrosis, the myoglobinuria produced can quickly lead to acute renal failure.

Early referral to a burns unit and an aggressive approach to hydration aiming for a minimum of 2mL/kg/hr urine output is the ideal.

**Chemical burns:** These burns can also be difficult to assess and manage, especially if the eyes or the face are involved. Always irrigate the eyes liberally before attempting to assess the severity of an ocular burn. Ideally use normal saline or Hartmann's solution, but water will do in the first instance.

There is no upper limit for the amount of time to irrigate eyes – some patients have continuous irrigation for 24 hours. Topical antibiotics will help prevent secondary infection.

#### Resuscitation and transfer

Resuscitation of the burns patient will be discussed in part 2.

When considering transfer, weigh up your skill level, the available equipment and the needs of the patient. Use the ANZBA criteria to decide on referral of the patient (see table this page).

### CASE OUTCOME

#### From page 17

On arrival at hospital, the boy's burns were aggressively cooled with saline-soaked sponges, which were at room temperature and replenished every three minutes.

With obvious facial burns and his face and neck beginning to swell, he was electively intubated. His BP was 130/80, PR 130, temp 36.4°C, RR 28 and oxygen saturation 98 per cent. He was resuscitated with Hartmann's solution according to the Parkland formula (see part 2, next issue).

A naso-gastric tube and urinary catheter were placed and an intravenous morphine infusion commenced.

Using the rule of nines, it was calculated that 30 per cent of his total body surface area was burnt. Capillary

return to the fingers was good and they were splinted in the neutral position. His arms were elevated to minimise oedema.

There was some sluggish blanching of the burns on the face, which were assessed as between superficial partial and deep partial thickness. These were dressed with Transcyte. Acticoat was used on the chest, neck and arms, as these areas had deeper burns.

Most of his face healed spontaneously, but he required four major operations for debridement and split skin grafting to the neck, chest, arms, fingers and one ear. After physiotherapy and use of pressure garments, he is again playing rugby.