MORE ABOUT . . . EMERGENCY MEDICINE

MORE ABOUT BURNS

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The burn patient has the same priorities as all other trauma patients.

A full assessment should include:
Airway
Breathing (beware of inhalation and rapid airway compromise)
Circulation (fluid replacement)
Disability (compartment syndrome)
Exposure (% burn).

ESSENTIAL MANAGEMENT POINTS

- Stop the burning.
- ABCDE, then determine the percentage area of burn (rule of nines).
- Good IV access and early fluid replacement.

The events surrounding the burn should be thoroughly elucidated, since this information will influence early diagnostic and therapeutic intervention. Specific attention should be given to:

- mechanism of injury
- duration of and location of exposure
- source of burn, e.g. fire, hot water, paraffin, kerosene, etc.
- type of combustible material
- history of drug or alcohol ingestion
- history of associated mechanism of injury.

It is important to identify inhalation injury at an early stage. Clinical indications of inhalation injury include:

- facial burns
- singeing of the eyebrows and nasal vibrissae
- carbon deposits and acute inflammatory changes in the oropharynx
- carbonaceous sputum
- hoarseness, rasping or cough
- glottic oedema
- history of impaired mentation
- confinement in a burning environment
- explosion with burns to head and torso
- carboxyhaemoglobin level greater than 10% in patient who is involved in fire.

Pitfall

A pulse oximeter will give a falsely high reading for oxygen saturation in the presence of carboxyhaemoglobin, due to bound haemoglobin.

The symptom of stridor is an indication for immediate endotracheal intubation. Electrical burns are often more serious than they appear. Remember that damaged skin and muscle can result in acute renal failure.

EXTENT OF THE BURN

The extent of a burn is estimated with the 'rule of nines' (Fig. 1). Only second-, third- and fourth-degree burns are taken into account (head 9%, anterior torso 18%, posterior torso 18%, arms 9% each, legs 18% each, perineum 1%). For children below the age of 6 a modified 'rule of nines' is applied (Fig. 2). For each year below 6, deduct 1% from each leg and add it to the head. In scattered burns use the patient's palm (1%) to assess extent.

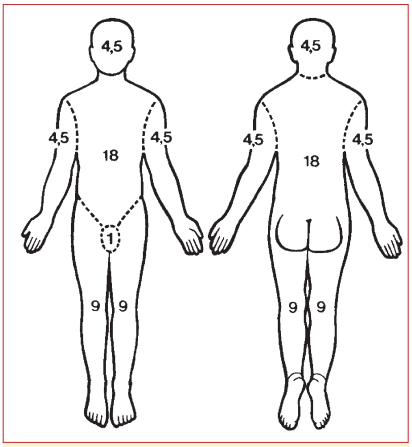
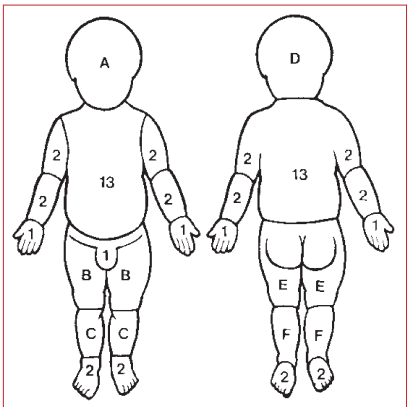


Fig. 1. Wallace 'rule of nines'.



Age in years	0	1	5	10
Head (A/D)	10	9	7	6
Thigh (B/E)	3	3	4	5
Leg (C/F)	2	3	3	3

Fig. 2. Extent of burn in children.

DEPTH OF THE BURN

The depth of a burn is most commonly estimated in terms of degree.

- First-degree (superficial) burns damage the epidermis alone. There is erythema and pain.

- Second-degree (partial thickness) burns damage the entire epidermis and a variable depth of the dermis. They are characterised by a red or mottled appearance with associated swelling and blister formation. The surface is wet and painfully hypersensitive, even to air currents. They will probably need skin grafting.
- Third-degree (full thickness) burns cause complete destruction of the epidermis and dermis. All the skin appendages, including hair follicles, sweat and sebaceous glands and sensory fibres are destroyed. This results in an initially painless, insensate dry surface that may appear either white and leathery or charred and cracked with exposure of underlying fat.
- Fourth-degree burns involve fascia, muscle and bone.

FLUID ADMINISTRATION

Fluid is administered intravenously to all patients with > 20% body surface area (BSA) burn. A 14G cannula should be placed, if necessary through the burn. The estimated crystalloid requirement for the first 24 hours after injury is calculated based on the patient's weight and percentage BSA burn. Usually the Parklands formula is recommended. Ringer's lactate is used.

Volume required = 4 ml x BSA (second-, third- or fourth-degree burns only) x body weight (kg).

One half of the calculated volume is given during the first 8 hours after injury, and the remaining volume is infused over the next 16 hours. It should be emphasised that the formula is only an estimate, and more or less fluid may be required to maintain adequate tissue perfusion as measured by rate of urine output (1 - 2 ml/kg/h). It is helpful to monitor the haematocrit (HCT). A normal level is about 40%. If the haematocrit is rising, e.g. to 45% or 50%, this implies haemoconcentration, and the rate of fluid infusion is increased. Conversely, if the HCT falls below 40%, then the rate can be reduced.

ADJUNCTS

- Analgesia — adequate analgesia (preferably morphine) should be given intravenously.
- Bladder catheterisation if burn > 20%
- Nasogastric drainage
- Tetanus prophylaxis
- Antibiotics — there is no place for routine systemic antibiotic prophylaxis
- Escharotomies may be required for ventilation and prevention of compartment syndrome.

The local care of the burn wound includes appliance of local antimicrobial agents, early tangential excision of the burn tissue and skin grafting.

ELECTRICAL BURNS

Possible problems can include cardiac arrest or arrhythmias, extensive muscle damage (often the external injury is minor), compartment syndrome, fracture of long bones or spine, renal failure due to myoglobin. ECG, cardiac enzymes and radiography for suspected fractures are necessary investigations. It is important to hydrate the patient and secure good diuresis to prevent renal failure, and to excise the dead tissue and check viability of the underlying muscle.

REHABILITATION IN A NUTSHELL

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What is the aim of rehabilitation?

Physical rehabilitation aims to achieve maximum functional independence for the patient in all activities of daily living. These activities include dressing, grooming, bathing, toileting, feeding and walking as well as functioning in the work or family environment within the restrictions of the disability.

Which patients are suitable for rehabilitation?

Patients with the following conditions will benefit from rehabilitation:

- cerebrovascular accidents (CVA)
- head injury (HI)
- neurological disorders, e.g. Guillain-Barré syndrome
- burns
- joint replacements
- polytrauma
- amputations
- spinal cord injury (SCI).

What makes a patient unsuitable for rehabilitation?

- coma
- Inability to co-operate and respond to therapy
- severe infection
- respiratory distress.

Patients may benefit from a period in a 'step down' facility at this stage, and then be reassessed for rehabilitation suitability.

What does rehabilitation involve?

- Initial assessment by a trained assessor to evaluate if the patient is suitable for rehabilitation.
- Full assessment on admission by the multidisciplinary 'team', consisting of:
  - doctor
  - physiotherapist
  - occupational therapist
  - speech therapist
  - social worker.
- Planning of treatment, length of stay and planning for discharge.
- Full involvement of family, with regular feedback at 'family' meetings.
- Involvement of other professionals as required, e.g. urologist, dietician, psychologist (including sexual counselling), psychiatrist.
- Full nursing support for all general care, particularly with bladder, bowel and pressure area care.

What is the average length of stay (excluding complications)?

- CVA: 3 - 6 weeks
- HI: up to 12 weeks