



AUSTRALIAN RESUSCITATION COUNCIL

GUIDELINE 8.5

BURNS

DEFINITION

A burn is an injury resulting from heat, chemical, electrical or radiation energy, or a combination of these agents.

A significant burn for the purpose of this document includes:

- a flame or scald injury greater than the size of the victim's palm or of any size involving hands, face or perineum;
- chemical burns;
- electrical burns;
- inhalational injuries.

All infants or children with burns should be medically assessed.

GENERAL PRINCIPLES OF MANAGEMENT.

Ensure safety for both the rescuers and bystanders.

Do not enter a burning or toxic atmosphere without appropriate protection. This role will be the province of fire fighting authorities.

Stop the burning process (refer to following text).

A rescued person should be removed to a safe, cool environment as soon as possible.

Assessment and management of the airway, breathing, and circulation takes priority (following Guideline 7).

Call an ambulance to facilitate rapid transfer of victims with significant burn injury to hospital.

Ascertain the mechanism of the burn injury to determine the likelihood of other coincident injuries, or the inhalation of hot gases, flame, or toxic substances.

Give oxygen, if available, to all victims with a significant burn injury (see Guideline 10.1.2).

Immediate cooling of the affected area with water may be necessary depending on the cause of burn injury (see below).

If possible, remove all rings, watches, jewellery or other constricting items from the affected area without causing further tissue damage.

Where feasible elevate burnt limbs.

Cover the burnt area with a loose and light non-stick dressing, preferably sterile or clean, dry lint free (non-fluffy) material eg. plastic cling wrap, handkerchief, sheet, or pillow case.

DO NOT peel off adherent clothing or other substances.

DO NOT use ice to cool the burn because frostbite (causing further tissue damage) may result.

DO NOT break blisters.

DO NOT APPLY lotions, ointments, gels, creams or powders.

THERMAL BURNS

Thermal burns include flame, scald, blast (hot gas), inhalation injury and direct heat contact.

Flame

STOP, DROP, and ROLL the victim to put out the flames.

Smother flames with a blanket, coat, or other appropriate item and force the victim to lie on the ground or floor.

IMMEDIATELY cool the area with cool water for up to 20 minutes to reduce further tissue damage and to help relieve pain (see rationale).

If water is not available, remove smouldering clothing if it is not adherent to the skin. Synthetic fabric burns at a high temperature and melts into a hot plastic residue which will continue to burn the casualty. Avoid pulling burnt clothing across the victim's face or unburnt areas.

Scald

IMMEDIATELY cool the burnt area with cool water for up to 20 minutes (see rationale). After covering the burn the casualty may then be warmed in a blanket.

If cool water is not available, remove all wet, non-adherent clothing immediately because clothing soaked with hot liquids retains heat.

Take care when removing hot, wet clothing across the victim's face or unburnt areas. Hot liquid may be retained in natural body creases, eg. neck or groin, thus delaying the dispersion of heat.

Inhalation Injury (See also Guideline 8.13)

Inhalation of flames or superheated gases can cause severe damage to the upper and lower airways resulting in swelling and possible airway obstruction. This may not be obvious by external inspection but should be assumed if there are burns to the face, nasal hairs, eyebrows or eyelashes, or if there is evidence of carbon deposits in the nose or mouth. Coughing of black particles in sputum and/or a hoarse voice may indicate damage to the airway.

The inhalation of toxic gases from combustion of plastics or chemicals, or incomplete combustion of any carbon containing compound (eg wooden material), is potentially life threatening. This is more likely to involve, but is not confined to, fires in an enclosed space. The toxic chemicals which cause inhalational injury include carbon monoxide, chlorine, hydrochloric acid, ammonia, nitrogen oxides and cyanide.

Give oxygen (if possible), and refer the victim for urgent medical assessment (See Guideline 10.1.2)

ELECTRICAL BURNS.

Typically, electrical burn injuries are more severe than is apparent from external appearance. Electrical injuries are associated with low or high voltage, (the latter being defined as greater than 1000 volts), and either direct (DC) or alternating (AC) current. Electrical injuries from direct current are unusual unless very high voltages and currents are involved: lightning is an example of this. Household supply in Australia is 240 volts AC at 50 cycles per second (hertz).

High current flow may be associated with an entry and exit wound where the current density is highest, but most of the damage is to the deep and unseen tissues which can be severely and extensively damaged by heat.

Current flow through the heart, particularly AC, may cause a cardiac arrest.

The priorities in the management of the electric shock victim are to:

- ensure safety for rescuer and bystanders
- disconnect the victim from the power source without directly touching the victim
- administer oxygen and commence cardio-pulmonary resuscitation if required according to the ARC Basic Life Support Flow Chart - Guideline 7
- use water to cool entry and exit wounds or the wounds from electrical flash burns (see rationale).

LIGHTNING BURNS

The mechanism for lightning burns can be either a direct strike or a side flash.

A direct strike will be associated with high current flow and heating. Lightning is direct current (DC) with voltages in the order of 100,000,000 volts and a current flow of up to 200,000 amps.

A side flash is a current flow between a object struck by lightning and a nearby person. This current can travel on the surface of the body causing superficial spidery patterned burns to the skin.

The priorities for management of the lightning burns victim are to:

- commence resuscitation if required according to A.R.C. Basic life Support Flow Chart - Guideline 7
- cool superficially burnt areas with cool water for up to 20 minutes
- assess and manage any associated injuries

RADIATION BURNS.

May be caused by solar ultraviolet radiation (sunburn), welder's arc, lasers, industrial microwave equipment, nuclear radiation

Management

Cool any locally burnt areas with water up to 20 minutes (see rationale).

Offer drinks of clear fluid.

CHEMICAL BURNS.

Acids and alkalis react with body tissue causing direct tissue damage and releasing heat. Alkali burns are more serious than acid burns as they penetrate more deeply.

The important priorities of management for the rescuer are to:

- **avoid contact with any chemical or contaminated material (e.g use heavy duty or industrial gloves)**
- remove the chemical and any contaminated clothing as soon as practical taking care to avoid contact with the chemical
- brush powdered chemicals from the skin prior to flooding the area with copious amounts of water, preferably with shower or hose, for 20 to 30 minutes. This will allow maximum dilution of the chemical

DO NOT attempt to neutralise either acid or alkali burns, because this will increase heat generation which may cause more damage.

Chemical burns to the eyes require continuous irrigation until medical advice has been obtained.

BURNS REQUIRING SPECIAL CONSIDERATION

Phosphorus

Phosphorus may be found in flares, fireworks, or made in chemistry laboratories. When exposed to the air, phosphorus may ignite spontaneously.

It is therefore important to keep the area wet, if possible by immersion in water. If forceps are available, remove any obvious particles. **Do not use fingers.**

Hydrofluoric acid

Hydrofluoric acid is used as a cleaning agent by jewellers, in glass etching and in other industries. It is one of the most penetrating and tissue reactive acids which causes a full thickness skin burn and exceptional pain - even a small area or persistent pain, needs urgent medical assessment.

Early and copious irrigation with water is needed.

If available, an early application of calcium gluconate gel to the affected areas may form an insoluble salt and reduce further pain and damage. **Do not use fingers.**

Calcium gluconate should be available at all worksites where hydrofluoric acid is used.

Bitumen

Bitumen should not be removed from the victim's skin unless it is obstructing the airway because it may cause more damage. As it will hold much more heat, irrigation with cool water should continue for 30 minutes.

Consider scoring or cracking the bitumen if it is encircling a limb or digit.

Petroleum Products

Petroleum "burns" (not flame) may cause chemical burn due to direct toxic effects. Prolonged contact has been associated with organ failure and death. Copious irrigation with water is required.

RATIONALE

Cooling of the burnt area in thermal and radiation burns may reduce tissue damage.

Prolonged cooling of a small area of burn may help relieve pain.

Cooling of larger burn areas for more than 20 minutes may result in hypothermia.

REFERENCES

1. Leditschke JF, 1996. Burns and Scalds. In:(Ed.J Pearn et al). Science of First Aid, Canberra, St John Ambulance Australia pp. 117-124.
2. Cooper AC, Andrews CJ, 1995. Lightning Injuries. In (Ed.PS.Auerbach). Wilderness Medicine Third edition - St Louis. Missouri. Mosby pp. 261-289
3. Tintinalli, Ruiz & Krome. Emergency Medicine a Comprehensive Study Guide 4th Edition. Chapter Authors, Marcus Martin & Fred Harchelroad.
4. Victorian Medical Postgraduate Foundation. Protocol for the Triage & Early Management of Patients with Burn Injury in Victoria, 1994.

FURTHER READING

ARC Guideline 2.2 General Principles of Management of the Collapsed Person
ARC Guideline 2.3 Moving an Injured Victim
ARC Guideline 7 Cardiopulmonary Resuscitation
ARC Guideline 8.3 Electric Shock
ARC Guideline 8.4 Shock
ARC Guideline 8.8 Hypothermia: First Aid and Management
ARC Guideline 8.13 Emergency Management of Victims of Inhalational Incidents
ARC Guideline 8.14 Cyanide Poisoning
ARC Guideline 10.1.2 Use of Oxygen in Emergencies