



## AUSTRALIAN RESUSCITATION COUNCIL

### GUIDELINE 9.1.3

#### BURNS

##### DEFINITION

A burn is an injury caused by heat, cold, electricity, chemicals, gases, friction and radiation (including sunlight).

A significant burn for the purpose of this document includes:

- burns greater than 10% of total body surface area (TBSA)
- burns of special areas—face, hands, feet, genitalia, perineum, and major joints
- full-thickness burns greater than 5% of TBSA
- electrical burns
- chemical burns
- burns with an associated inhalation injury
- circumferential burns of the limbs or chest
- burns in the very young or very old
- burns in people with pre-existing medical disorders that could complicate management, prolong recovery, or increase mortality
- burns with associated trauma.

**All infants or children with burns should be medically assessed.**

##### AIMS

The aims of first aid treatment of burns should be to stop the burning process, cool the burn (thereby providing pain relief) and cover the burn.

##### INITIAL APPROACH

- Ensure safety for rescuers, bystanders and the victim.
- Do not enter a burning or toxic atmosphere without appropriate protection.
- The victim should be removed to a safe environment as soon as possible.
- Stop the burning process.
  - Stop, Drop, Cover and Roll
  - Smother any flames with a blanket
  - Move away from the burn source
- Assess the adequacy of airway and breathing.

- Check for other injuries.
- If safe, give oxygen to all victims with smoke inhalation or facial injury (see ARC Guideline 10.1.2).
- Call for an ambulance (Dial Triple Zero - 000).

## **GENERAL MANAGEMENT PRINCIPLES**

Immediate cooling of the affected area with flowing water may be necessary depending on the cause of burn injury.

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 to minimise swelling.

Cover the burnt area with a loose and light non-stick dressing, preferably clean, dry, lint free (non-fluffy) material e.g. plastic cling film.

Water is always the first choice for cooling a burn injury<sup>1,2,3,4,5</sup>. If water is not available, hydrogel products are an alternative to water<sup>6</sup>.

- DO NOT peel off adherent clothing or burning substances.
- DO NOT use ice or ice water to cool the burn as further tissue damage may result.
- DO NOT break blisters.
- DO NOT apply lotions, ointments, creams or powders other than hydrogel.

## **HEAT/THERMAL BURNS**

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

### **Flame**

- IMMEDIATELY run cool tap water directly onto the burn for at least 20 minutes to reduce further tissue damage and to help relieve pain.

### **Scald**

- IMMEDIATELY run cool tap water directly onto the burn for at least 20 minutes (see rationale).
- Keep the rest of the victim warm; remove wet clothing and cover unburnt areas.
- If cool water is not available, remove all wet, non-adherent clothing immediately because clothing soaked with hot liquids retains heat.

### **Inhalation Burn** (See also ARC Guideline 8.13)

An inhalation burn should be suspected when an individual is trapped in an enclosed space for some time with hot or toxic gas or fumes produced by a fire, a leak, chemicals etc. An inhalation injury may result from irritant gases such as ammonia, formaldehyde, chloramines, chlorine, nitrogen dioxide and phosgene. These agents produce a chemical burn and an inflammatory response.

Always assume inhalation injury 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, hoarse voice and/or breathing difficulties may indicate damage to the airway.

Do not assume the burn victim is stable following an inhalation injury simply because the victim is breathing, talking and able to get up. Some agents produce delayed pulmonary inflammation which may develop up to 24 hours later.

- Give oxygen if possible. (See ARC Guideline 10.1.2)
- Call for an ambulance (Dial Triple Zero – 000)

### **Electrical Burns.**

Electrical burns, including lightning strike, are often associated with other injuries including involvement of the cardiac and respiratory systems, loss of consciousness and trauma.

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

- isolate the power supply without touching the victim
- commence cardiopulmonary resuscitation if required according to the ARC Basic Life Support Flow Chart - Guideline 7
- cool burns if safe to do so
- give oxygen if possible (See ARC Guideline 10.1.2)
- call for an ambulance (Dial Triple Zero – 000).

High-voltage injuries are associated with arc burns and flash burns.

Lightning may cause cardiac arrest.

- Commence cardiopulmonary resuscitation if required according to the ARC Basic Life Support Flow Chart - Guideline 7

### **Radiation Burns.**

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

Cool any locally burnt areas with water up to 20 minutes.

### **Chemical Burns.**

- avoid contact with any chemical or contaminated material (e.g. use gloves)
- if available, refer to Material Safety Data Sheets (MSDS) for specific treatment
- refer to instructions on the container for specific treatment
- call the Poisons Information Centre on 13 11 26 for further advice
- remove the chemical and any contaminated clothing as soon as practical
- brush powdered chemicals from the skin
- IMMEDIATELY run cool tap water directly onto the area for at least 20 minutes.
- if chemical enters the eye, open and flush the effected eye(s) thoroughly with water for at least 20 minutes and refer the victim for urgent medical attention.

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

## **Phosphorus**

Dress wounds from phosphorus injured victims with saline soaked dressings to prevent re-ignition of the phosphorus by contact with the air.

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

## **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 dangerous and corrosive acids which cause a full thickness skin burn and excruciating pain: even a small area or persistent pain needs urgent medical assessment and may become life threatening if untreated.

Early and copious irrigation with water is needed. If available, it is critical to apply calcium gluconate gel as soon as possible.

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

## **Bitumen**

Bitumen should not be removed from the victim's skin because this may cause more damage.

Bitumen continues to hold heat therefore irrigation with cool water should continue for at least 30 minutes.

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

## **Petroleum Products**

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

## **REFERENCES**

1. McCormack R.A., La Hei E.R., Martin H.C.O. First-aid management of minor burns in children: a prospective study of children presenting to the Children's Hospital at Westmead, Sydney. *MJA* 2003. **178** (1): 31-33.
2. Yuan J., Wu C., Holland A.J., Harvey J.G., Martin H.C., La Hei E.R., Arbuckle S., Godfrey T.C. Assessment of cooling on an acute scald burn injury in a porcine model. *Journal Burn Care Research*. May-Jun 2007. **28** (3):514-20.
3. Jandera V., Hudson D.A., de Wet P.M., Innes P.M., Rode H. Cooling the burn wound: evaluation of different modalities. *Burns*. May 2000. **26**(3):265-70.
4. Sawada Y., Urushidate S, Yotsuyanagi T., Ishita K. Is prolonged and excessive cooling of a scalded wound effective? *Burns*. Feb 1997. **23**(1):55-8.
5. Allison K., Porter K. Consensus on the pre-hospital approach to burns patient management. *Injury*. Aug 2004. **35**(8):734-8.
6. Osti E., Cutaneous burns treated with hydrogel and a semipermeable adhesive film. *Archives of Surgery*. 2006. **141**:39-42.

## **LEVEL OF EVIDENCE**

Expert Consensus Opinion.

## **CLASS OF RECOMMENDATION**

Class A – Recommended.

## **FURTHER READING**

ARC Guideline 2 Priorities in an Emergency

ARC Guideline 8 Cardiopulmonary Resuscitation

ARC Guideline 9.2.3 Shock

ARC Guideline 9.3.1 Electric Shock

ARC Guideline 9.3.3 Hypothermia: First Aid and Management

ARC Guideline 9.5.2 Emergency Management of Victims of Inhalational Incidents

ARC Guideline 9.5.3 Cyanide Poisoning

ARC Guideline 10.4 Use of Oxygen in Emergencies