

# H10: Burns

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## Introduction

Burns are the result of damage to cellular membranes, producing widespread injury to the integumentary system. This damage can cause severe fluid loss, place patients at heightened risk for infections, and lead to hypothermia. Soft tissue burns can be caused by thermal injuries, chemical exposure, electrical contact, and exposure to ionizing radiation. The mainstay of treatment for burns involves cooling, fluid resuscitation, and pain management. Burns are optimally managed at an appropriate trauma receiving hospital.

## Essentials

- It is critically important to maintain the airway. Burned patients should receive supplemental oxygen, and paramedics must be keenly aware of the potential for rapid development of airway compromise, either from upper airway obstruction or pulmonary edema. Signs of airway burns include cough, voice changes, and soot in the mouth or nose, or in the sputum. Consider early advanced airway management in these cases.
- Patients must be decontaminated where applicable. Remove clothes and flush burns with sterile saline if possible. Hair, hands, and face should be cleaned with water and baby shampoo.
- Cooling burns quickly may limit the extent of injury. Avoid cooling the entire patient, as this may result in hypothermia. Limit cooling to 1 to 2 minutes.
- Burned patients lose fluids rapidly. In the immediate aftermath of a burn, patients should receive up to 2 liters of fluid to maintain a systolic blood pressure above 120 mmHg.
- For partial thickness or deeper burns, estimate the body surface area involved using the Lund and Browder chart.

## Additional Treatment Information

- Burns are often associated with other types of trauma. Fluid therapy to manage shock due to blood loss must strike a balance between the patient's fluid requirements resulting from the burn and the need to not promote further bleeding from the traumatic injury.
- In any fire environment carbon monoxide is a by-product of combustion and is one of the many chemical products in smoke. Carbon monoxide poisoning should be suspected in any patient who was in an enclosed space. Provide high-flow supplemental oxygen, and monitor SpCO where available.
- Critical care paramedics should follow Trauma Services BC's Provincial Burn CPG ([available from the Trauma Services BC Web site](#)).

## Referral Information

All patients with major burns should be transported to the closest appropriate trauma receiving hospital per local trauma destination guidelines.

## General Information

- Trauma Services BC defines a major burn as any of the following:
  - > 20% TBSA partial and/or full thickness, any age
  - > 10% TBSA partial and/or full thickness age < 10 or > 50
  - Burns to hands, face, feet, genitalia, or joints
  - Full thickness burns > 5% TBSA, any age
  - Electrical burns
  - Chemical burns
  - Inhalation injury

- Any burns associated with major trauma
- The American Burn Association classifies burns as minor, moderate, and major, based upon burn depth and size. The traditional classification of burn depth as first, second, third or fourth degree is being replaced by a system reflecting the future treatment requirements in the continuum of care, although “fourth degree” is still used to describe the most severe burns.
- Superficial burns involve only the epidermal layer of the skin and are painful, dry, red and blanch with pressure. Superficial partial-thickness burns involve the epidermis and superficial portions of the dermis and are painful, red and weeping, usually from blisters, and also blanch with pressure.
- Deep partial-thickness burns extend into deeper dermis, damaging hair follicles and glandular tissue. They are painful to pressure only, and almost always blister, are wet or waxy dry, and have variable colour from patchy white to red.
- Full thickness burns extend through and destroy the dermis – they are usually painless. The skin can vary in appearance from waxy white to leathery grey, to charred and black.
- Fourth degree burns extend through the skin to underlying tissues of the fascia or muscle.

## Interventions

### First Responder

- Maintain awareness of airway patency
  - [→ B01: Airway Management](#)
- Remove burned clothes and decontaminate patient as required
  - [→ J01: Approach to Toxic Exposures](#)
  - [→ PR05: Patient Decontamination](#)
- Cool burned areas for 1-2 minutes using normal saline. Avoid cooling the entire patient to prevent hypothermia.
- Provide supplemental oxygen for patients with potential airway burns or inhalation injuries
  - [→ A07: Oxygen and Medication Administration](#)

### Emergency Medical Responder – All FR interventions, plus:

- Estimate total surface area
- Consider ACP intercept

### Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access
  - [→ D03: Vascular Access](#)
- If hypotensive:
  - Consider other causes of shock
  - Fluid bolus 500 mL up to maximum of 2 L
  - Consider use of Ringers Lactate instead of normal saline
- In prolonged transport cases:
  - Ongoing fluid maintenance calculation
    - $(\text{Patient weight in kg}) \times (\text{total burned surface area in \%}) \times 1.5 \text{ ml} = (\text{volume to be administered over eight hours})$
- Analgesia as required:
  - [→ E08: Pain Management](#)
  - If no inhalation injury, [nitrous oxide](#) to effect
  - Intranasal [KetAMINE](#)

### Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Provide analgesia as required:
  - [FentaNYL](#)

- [KetAMINE](#)
- Consider induction and anesthesia maintenance strategy if airway management is predicted. Ketamine is the preferred induction agent. Phenylephrine must be available for peri-intubation hypotension. Post-induction analgesia is likely to be required.
  - → [PR18: Anesthesia Induction](#)
- Consider early surgical airway (FONA) if deterioration predicted.
  - → [PR22: Surgical Airways](#)

#### Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Norepinephrine to maintain MAP > 65 mmHg
- Change to balanced fluids (Plasmalyte / Ringers)
- Neuromuscular blockade as required for induction and to facilitate mechanical ventilation. Rocuronium is the preferred agent.
  - Warning: succinylcholine is contraindicated in burns over 24 hours old.
- Suspect cyanide toxicity and provide [hydroxycobalamin](#) if two of the following are present:
  - SBP < 90 mmHg
  - Lactate > 9 mmol/L
  - Decreased level of consciousness
  - Measured cyanide > 39
- Apply Trauma BC provincial burn guidelines for interfacility transports in consultation with transport advisor

## Evidence Based Practice

[Burns \(fire/flame\)](#)

[Chemical Splash/Burn](#)

[Electrocution/Electrical Burns](#)

[Possible Airway Burns](#)

## References

1. Alberta Health Services. AHS Medical Control Protocols. 2020. [\[Link\]](#)
2. Alberta Health Services. AHS Medical Control Protocols: Algorithm #5 - Burns. 2020. [\[Link\]](#)
3. BC Emergency Medicine Network. Major Burns Trauma. [\[Link\]](#)
4. Vancouver General Hospital. Burn CPGs. [\[Link\]](#)

