



# Putting Out the Fire: Treating Burn Victims

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## Patient presentation

- A 24-year-old presents to the emergency department (ED) with facial burns.
- States his Bunsen burner exploded in front of him in his chemistry lab 20 minutes earlier.
- The flame was self-limited and the patient immediately covered his face with water.
- The patient's only complaint is of facial pain.
- He denies any change in voice, shortness of breath or other injury.
- Vital signs are normal, with oxygen saturations of 98% on room air.
- Exam reveals burns confined to the head and neck only (Figure 1).



Figure 1. Patient showing burns to the head and neck.

## Questions & Answers

### 1. Why do facial burns require rapid assessment and management?

The most immediate and lethal threat to a burn-injured victim is airway damage from inhalation injury. Inhalation of gases and particles at high temperatures can cause edema of both the upper and lower respiratory tracts and can rapidly produce progressive respiratory distress. Facial burns are associated with inhalation injury and require rapid assessment and management.

### 2. How should facial burns be assessed in the emergency department (ED)?

Initial assessment of any burn patient should be performed systematically according to the Advanced Trauma Life Support primary and secondary survey guidelines.

Patients with facial burns require accurate and repeated airway assessment, with elective intubation if there is any suspicion of respiratory insufficiency. Mucosal tissues of the upper and lower airways are extremely vascular and exposure to inhaled heat can result in progressive swelling.

The extent of total body surface area (TBSA) involved in the burn should also be assessed. Burns are classified into first, second and third degrees based on the depth of tissue damage (Table 1). The TBSA can be estimated by various methods, including corresponding the patients palm area to the size of the burn (the palm is equal to approximately 1% of TBSA). Specialized charts are available for both documentation and calculation of the extent of the burns for patients of various ages.

### 3. What are the indications for emergent airway management?

Edema brought on by inhalation injury can progress quickly with deadly results; immediate attention is required (Table 2). Pre-emptive intubation is needed if physical evidence of upper airway edema is present or if there are signs of upper airway injury (stridor, wheezing, inspiratory grunts, tachypnea). Oxygen administration by a non-rebreather mask is indicated if the patient exhibits dyspnea, altered mental status or if there is suspected carbon monoxide toxicity.

Table 1

### Clinical characteristics of burns

	Colour	Skin texture	Sensation
1st degree	Red	Small, dry blisters	Painful
2nd degree	Pink or mottled red	Bullae or moist & weeping surface	Painful
3rd degree	Pearly white, charred or translucent ± visible, thrombosed vessels	Dry, inelastic	Insensate

Table 2

### Indicators of inhalation injury

#### History

- Fire or explosion in small area
- Loss of consciousness
- Complaints of headache

#### Physical exam

- Dyspnea
- Confusion
- Low oxygen saturation
- Facial or neck burns
- Facial and nasal hair burns
- Carbonaceous sputum
- Stridor
- Inflamed nares

#### Lab exam

- Elevated carboxyhemoglobin

### Back to our patient...

- The patient has no evidence of inhalation injury.
- He remains stable in the ED for three hours.
- Sixteen hours after the injury, the patient develops respiratory distress.
- He is intubated and transferred to the intensive care unit (ICU).
- Bronchoscopy reveals widespread mucosal edema.
- After three days in the ICU, the patient is extubated and subsequently discharged.


## 4. How is inhalation injury diagnosed and managed?

Management of inhalation injury involves providing humidified oxygen at a concentration of 40% to 100% at 10 L/min. Intubation is required if patients exhibit any respiratory difficulty or if the physician feels there is a high likelihood of airway compromise.

The definitive test for diagnosing this condition is fiberoptic bronchoscopy, which is simple, safe and accurate. Using this method, the anatomic level and severity of upper airway involvement can be assessed and erythema, edema, ulceration and hemorrhage can be visualized.

Arterial blood gases, serial pulmonary function tests and chest X-rays should not be used to diagnose inhalation injury.

## 5. What should the disposition of patients with facial burns be?

Patients with facial burns require admission to hospital for observation. Significant burns requiring intubation and specialized burn care should be transferred to a centre with expertise in burn care. 

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*This department covers selected points to avoid pitfalls and improve patient care by family physicians in the ED. Submissions and feedback can be sent to [diagnosis@sta.ca](mailto:diagnosis@sta.ca).*