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Date: March, 2019
Purpose: To ensure a consistent approach to the management of a patient with burns.
Scope: Applies to Queensland Ambulance Service (QAS) clinical staff.
Population: Applies to all ages unless stated otherwise.
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Most burn injuries are a result of flame burns or scalds, while electrical and chemical burns are less common. Concurrent blast injuries can accompany explosions and need to be considered when assessing a patient with major burns.

Burns can cause a wide range of injuries. In the acute setting, airway burns and inhalation injury can lead to respiratory compromise. With major burns, fluid and electrolyte abnormalities develop over several hours, that can lead to shock.

Fires in enclosed spaces pose further danger from the production of potentially lethal toxic gases (e.g. carbon monoxide and cyanide).

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### Clinical features

#### Depth of burn

Accurate burn-depth assessment can be difficult, as most burns usually have a mixture of different depths. Burn depth assessment has implications in guiding treatment, but lengthy assessment in the pre-hospital setting is not required.

<table>
<thead>
<tr>
<th>Depth</th>
<th>Appearance</th>
<th>Sensation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial</td>
<td>Erythema, brisk cap refill</td>
<td>Painful</td>
</tr>
<tr>
<td>Superficial dermal</td>
<td>Moist, reddened with blisters, brisk cap refill</td>
<td>Painful</td>
</tr>
<tr>
<td>Deep dermal</td>
<td>White slough, reddened and mottled, sluggish or absent cap refill</td>
<td>Painful</td>
</tr>
<tr>
<td>Full thickness</td>
<td>Dry, charred, whitish, absent cap refill</td>
<td>Painless</td>
</tr>
</tbody>
</table>
Risk assessment

Ensure safety for self and bystanders.

Life threats

Respiratory compromise can manifest quickly in airway and inhalation burns. Early endotracheal intubation is required to ensure airway patency.[5]

Consider the possibility of an airway or inhalation burn in the presence of:

- Facial/oral burns
- Singed nasal hair
- Carbonaceous sputum
- Tachypnoea, stridor, hoarseness

Hypovolaemia does not manifest from burns acutely but develops over many hours. The presence of circulatory shock in the early stages of a burn implies an associated injury (e.g. blast injury).

However, major burn patients are at risk for multi-organ failure due to fluid losses and inflammatory processes. Fluid resuscitation should commence as soon as it is safe to do so. For airway and facial burns, fluid resuscitation should commence as soon as the airway is secure.

Features of carbon monoxide and cyanide toxicity should be sought if the patient was trapped in an enclosed space with the potential for significant smoke inhalation.[3]

Circumferential burns to the torso may restrict ventilation, requiring urgent surgical intervention.

Major burns without airway involvement is also a life-threatening injury.

Limb threats

Deep dermal and full thickness burns cause inelastic dead tissue, referred to as eschar. Circumferential burns may compromise limb vascular supply leading to ischaemia if untreated. Limbs with circumferential burns are at risk of vascular compromise.[4]

Additional information

- Burns requiring management in a dedicated burns unit:[6,7]
  - Partial thickness burns > 20% all ages; or > 10% in patients younger than 10 or older than 50.
  - Full thickness burns > 5%
  - Burns involving face, eyes, ears, hands, feet, genitalia, perineum or overlying a major joint
  - All inhalation burns
  - All significant electrical burns
  - Burns in people with significant co-morbidities (e.g. heart failure)

- IV fluids should not be administered to patients with significant facial, neck or upper chest burns with high potential for airway or ventilation compromise, before the airway is formally secured. Large volumes of fluid increase the risk of interstitial oedema and tissue swelling, potentially increasing the difficulty of endotracheal intubation.[5]

- If there is no airway or ventilatory concerns, fluid resuscitation should be commenced as soon as possible.

- Hypothermia must be avoided in major burn injury.[5]

- In the paediatric population, consider non-accidental causes as a mechanism for burn injuries.[8]

- Escharotomies are surgical incisions through burnt eschar to release tissue pressure in circumferential limb or thoracic burns. They are best performed in hospital by electrocautery as the wounds tend to bleed. They may be necessary in the pre-hospital environment in situations where there is imminent limb or ventilatory compromise.[4]
Estimation of surface area affected

The total area burnt can be estimated with the rule of nines, or the more complicated, but more accurate, Lund Browder burn chart. Do not include skin with just isolated erythema in the calculation. The area over the patient’s palm can also be used to approximate 1% total body surface area (TBSA).[6]

### Rule of nines

<table>
<thead>
<tr>
<th>AREA</th>
<th>Age 0</th>
<th>Age 1</th>
<th>Age 5</th>
<th>Age 10</th>
<th>Age 15</th>
<th>ADULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: half of head</td>
<td>9.5</td>
<td>8.5</td>
<td>6.5</td>
<td>5.5</td>
<td>4.5</td>
<td>3.5</td>
</tr>
<tr>
<td>B: half of one thigh</td>
<td>2.75</td>
<td>3.25</td>
<td>4</td>
<td>4.5</td>
<td>4.5</td>
<td>4.75</td>
</tr>
<tr>
<td>C: half of one leg</td>
<td>2.5</td>
<td>2.5</td>
<td>2.75</td>
<td>3</td>
<td>3.23</td>
<td>3.5</td>
</tr>
</tbody>
</table>
Consider:
- Oxygen
- IPPV
- Early airway assessment and management if required
- Analgesia

Consider:
- Other injury (e.g. blast, cyanide toxicity)
- Analgesia
- IV fluid
- Frequent airway assessments

Consider:
- Active cooling (first 20 min only)
- Analgesia
- Midazolam

Transport to hospital
Pre-notify as appropriate

Note: Officers are only to perform procedures for which they have received specific training and authorisation by the QAS.