

## SCGH ED Guidelines

### Burns in Adults: Assessment & Management Charlie's ED Guideline

#### **Purpose:**

To utilise the current best available evidence in the assessment and management of burn injuries presenting to Sir Charles Gairdner Hospital ED.

#### **Indications:**

- Chemical, thermal & electrical burns
- Minor burns
- Inhalation injuries in facial, neck & upper trunk burns
- Major burns

#### **Burns history/modality:**

- Burns modality:
  - Chemical – what concentration, potentially contact poisons information 131 126 for more specific information about the agent involved
  - Electrical – voltage, single, triple phase versus high current, length of contact, size of contact, thrown away or locked onto contact
  - Thermal – water, oil, air, solids or mixed materials, temperature and length of exposure, whether or not material had ignited/explored or adhered
- Duration of burn process – how long in contact with agent?
- Time that burn occurred
- Confined space- was there associated smoke inhalation/burning material? If yes, this greatly increases the chance of airway and/or inhalation burn to the airway, as well as risk of potential CO<sub>2</sub> poisoning or cyanide poisoning (from burning plastics)
- Sudden flash burn or blast that may have occurred while inhaling
- Any associated explosion resulting in potential blast injury or trauma from being thrown/falling?

#### **First aid for burns:**

- First aid is effective up to **3hrs** post burn, it can reduce the size & depth of the burn injury
  - Stop the burning process
  - Remove clothing & jewellery
  - Apply cool running water to burn area for 20 minutes
  - Keep patient warm
  - DO NOT APPLY ICE

#### **First aid for chemical burns (skin & eyes):**

- First aid minimises chemical concentration and burn penetration injury caused by exposure to acid/alkaline or hydrofluoric agents
  - Remove contact lenses if worn in eyes
  - Remove clothing & jewellery on skin exposure cases
  - Washing burn with a hypertonic solution of amphoteric chelating agent like DIPHOTERINE (spray, eye wash, extinguisher) for acid/alkaline burns

Updated by NP N O'Mahony 2<sup>nd</sup> June 2021

Approved by Dr. Lindsay Showers

Due for further review: June 2024

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immediately on arrival (within the first minute if possible) and use the container full contents to wash the injury

- Washing burn with a hypertonic solution of chelating agent like HEXAFLUORINE (spray, eye wash, extinguisher) for hydrofluoric acid and fluoride burns immediately on arrival (within the first minute if possible) and use the container full contents to wash the injury

### **First aid for frostbite (injuries with liquefied Petroleum Gas cold burns):**

- First aid minimises tissue loss and reducing chemical irritation
  - Stop the burning process
  - Remove clothing & jewellery
  - Rapid re-warming in a bath of water between **40-42<sup>o</sup> C** for 15-30 minutes
  - Active motion whilst rewarming is recommended
  - Avoid massaging the affected area during rewarming
  - Cool running water to burn area is **CONTRAINDICATED**

### **First aid for bitumen burns:**

- No attempt should be made to remove the bitumen prior to arrival to the FSH ED.
  - Cool the burn area immediately by running under cold water
  - Remove any constrictions such as belts and rings that are under contact with the bitumen. This should only be done if the action will not damage the affected area
  - Continue cooling the area until the bitumen has hardened and cooled
  - When hot bitumen completely encircles a limb or any other body part, the burns may swell under the cool & hardened bitumen causing a tourniquet effect. If neurovascular observations indicate a reduction of circulation, splitting of the bitumen may be required
  - Avoid hypothermia whilst cooling the affected area. Cool the burn but warm the patient
  - Adherent bitumen should only be removed in the hospital under the direction of a burns specialist

### **Background history:**

- Pre-existing co-morbidities or impaired function
- Past medical history
- Allergy/medications
- Tetanus immunisation status – burns are considered high risk wounds, therefore Tetanus Toxoid should be given if the patient is not currently covered, or status unknown
- Social drug/alcohol use
- Collateral history from family friends
- Management and progress since burn injury occurred

**Assessment of Burn injury: PRIMARY SURVEY**

- **Airway:**
  - Check airway patency
  - Check for inhalation injury in all patients with burns to face, neck & upper trunk
    - Singed facial hair
    - Blistering on mouth/lips
    - Reddened or oedematous oral mucosa
    - Sooty sputum
    - Coughing wheezing or stridor
    - Hoarseness
    - Dyspnoea or tachypnoea
  - If airway burns are suspected or the patient has facial, neck or upper chest burns:
    - Nurse patient in an upright position (unless cervical spine injury suspected)
    - Liaise with doctor regarding need for endotracheal intubation for patients with burns to the face or neck early
    - Liaise with doctor for carboxyhaemoglobin level to be performed (Carbon monoxide binds with haemoglobin displacing oxygen. High carboxyhaemoglobin levels result in tissue anoxia and a decreased conscious state. >10% inhalation injury & >15% systemic intoxication)
  - Airway burns grading:
    - Above the larynx
    - Below the larynx
    - Systemic intoxication

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	Type of Inhalation	Timing	Signs / Symptoms
1.	Above the Larynx	4 to 24 hours –	Increasing stridor Hoarseness or weak voice Brassy Cough Restlessness Respiratory difficulty Respiratory Obstruction Death
2.	Below the Larynx	Immediate –  Gradual onset – 12 hours to 5 days	Restlessness Life threatening anoxia Death  Increasing hypoxia Pulmonary oedema / ARDS Respiratory failure
3.	Intoxication	Death at scene Worse initially –  Improve with time –	Obtundation / unconsciousness Stupor  Confusion Drowsiness Poor mentation Visual disturbances Headache

After the initial assessment the subsequent clinical course can be altered by the onset of the known complications of inhalation injury.

These include:

- Airway obstruction
  - Deteriorating consciousness
  - Retained secretions
  - Deteriorating oxygenation, and
  - Respiratory failure
- **Breathing:**
    - Tachypnoea or dyspnoea could have a possible inhalation injury
    - Check arterial blood gases
    - Humidified oxygen should be commenced as soon as possible
  - **Circulation:**
    - Check capillary refill (<3 seconds)
    - Insert 2x wide bore IV Cannulae
    - Commence IV Fluids (Hartmanns solution) in Major burns (>15 TBSA) as per fluid resuscitation formula to replace the fluid loss from the circulatory system in the first 24hrs post burn injury
    - Areas of circumferential burns or full thickness burns may cause constriction to circulation and underlying structures that may progress to compartment syndrome or progressive extremity ischaemia
      - Elevate limb to aid oedema management and may prevent the need for escharotomy

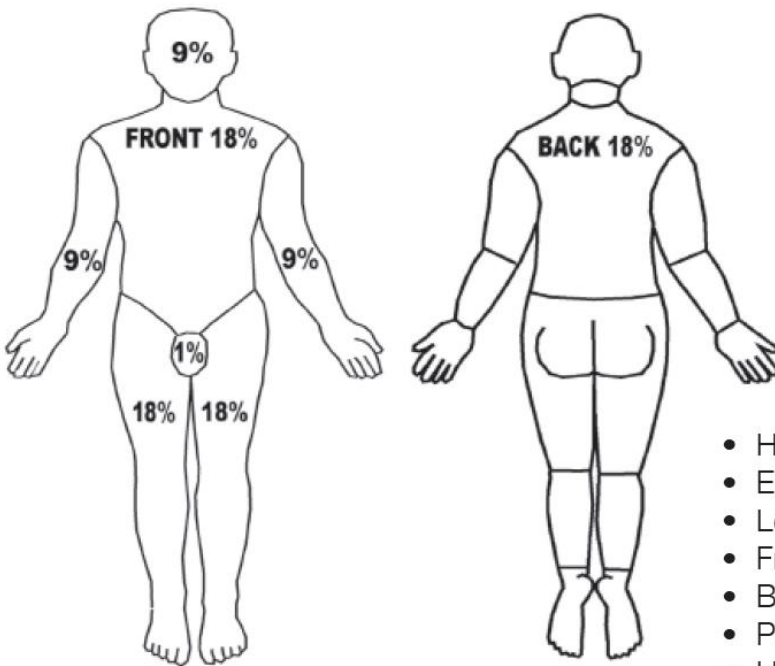
Updated by NP N O'Mahony 2<sup>nd</sup> June 2021

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- Perform 30 minutes neurovascular obs (skin colour, skin temperature, pulses, movement & sensation). An unusually cool extremity may be indicative of decreased arterial supply to the area. A hot extremity may indicate inadequate venous return
- Escharotomy may be required to ensure adequate circulation and prevent permanent damage
- **Assessment of Burn size:**
  - The percentage surface area of a burn is the basis for calculation of the fluid replacement therapy for the patient.
  - Using the Wallace Rule of Nine chart determines whether a burn injury is a major injury involving more than 15% of total body surface area in adults



- Head - 9%
- Each arm - 9%
- Leg (whole leg) -18%
- Front of the trunk - 18%
- Back of the trunk - 18%
- Perineum -1%
- Hand/palm and fingers -1%

- **Assessment of Burn Depth:**

Burn Depth	Superficial	Superficial partial	Deep partial	Full thickness
<b>Wound appearance</b>	<ul style="list-style-type: none"> <li>• Involves the epithelium</li> <li>• Pink, red</li> <li>• Painful</li> </ul>	<ul style="list-style-type: none"> <li>• Epidermis and superficial (papillary) dermis destroyed</li> <li>• Very painful</li> <li>• Often blistered (as fluid collects at epidermis-dermis interface)</li> <li>• Pink, moist</li> <li>• Blanches</li> </ul>	<ul style="list-style-type: none"> <li>• Involve epidermis and reticular dermis</li> <li>• May blister</li> <li>• Mottled pink or white</li> <li>• Fairly dry after day two</li> <li>• “Discomfort” rather than pain</li> <li>• Slow or no capillary refill</li> </ul>	<ul style="list-style-type: none"> <li>• Involves epidermis, dermis, and may include fat</li> <li>• Do not blanch</li> <li>• May be mottled, dry, translucent, black or pale appearance</li> <li>• Full thickness scalds may have red non blanching appearance</li> </ul>
<b>Healing scarring</b>	<ul style="list-style-type: none"> <li>• Complete, scarless healing within seven days</li> </ul>	<ul style="list-style-type: none"> <li>• Heals by epithelial migration within two weeks</li> <li>• Can convert to deeper injury</li> </ul>	<ul style="list-style-type: none"> <li>• Will take more than three weeks to heal</li> </ul>	<ul style="list-style-type: none"> <li>• Will not heal, unless very small wound (scarring ++)</li> <li>• Early excision and grafting reduce scarring and contracture</li> </ul>

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- The burn wound is assessed on admission and daily for the first 3 days for progression to wound healing or conversion to a deeper burn
- Conversion to deeper wound is dependent on the following factors:
  - Adequate first aid provided within the first 3 hours of injury
  - Adequate fluid resuscitation administered within 36hrs post injury if indicated
  - Presence of infection which may increase the depth of a burn wound
  - Appropriate antimicrobial dressings not applied to the burn in the immediate resuscitation period

### Assessment of Burn Severity: **SECONDARY SURVEY**

- Secondary Survey to be conducted immediately following Primary Survey, after life threatening conditions has been addressed.
  - **Concurrent injuries:** fractures, lacerations, loss of consciousness etc...
  - **Severity of burn injury:**
    - Assess the patient for any of the following factors:
      - Adequacy of burn first aid
      - Elderly implications
      - Burns >15% TBSA
      - Deep partial burns/full thickness burns
    - Severity of the burn injury is influenced by the following factors:
      - First aid which should be performed within the first 3 hours of burn injury, it should be with cool running tap water or cold wet towels for at least 20 minutes continuously
      - In the elderly and infants, skin is thinner and even a minor burn injury may have significant detrimental effects to the whole system
    - Percentage of burn: The larger the burn size, the more significant effect on the body, more procedures, more prone to infection & immunosuppression and more lasting adverse effects for quality of life.
    - Depth of burn: The deeper the burn injury, the more significant the consequences (e.g. Skin grafting, longer rehabilitation periods to normal activities)
    - Co-morbidity factors: This refers to the general health of the patient at the time of burn injury and plays a significant role in the recovery of the patient
  - **Special burn areas:**
    - Burns to the face, neck, joints, hands, feet, perineum, buttocks require specialist management
    - Circumferential burns to the neck, chest, hand, finger, arm, toe, foot, leg or penis require specialist management
    - Elevate, loose dressings, close monitoring and may potentially require escharotomy following consultation with the on-call Burns Consultant

## Management of Burns

- **Analgesia:** In major burns all analgesia, opioids and opioids-like, to be given intravenously. Minor burns as prescribed. Good analgesia both initially and throughout ongoing treatment has been shown to be effective in reducing time to heal (Miller et al, 2011)
- **Major burns:**
  - Insert two large bore cannulae and commence fluid resuscitation
  - Insert urethral catheter and monitor urinary output hourly
  - Insert a nasogastric tube and commence gradual enteral feeding over 24hrs
  - Document all fluid administration and urinary output.
- **Fluid management for major burns (Adult >15% TBSA):**
  - Formula:  $2 \times \% \text{ TBSA} \times \text{pre burn body weight (in kg)} = \text{Volume}$ 
    - 50% to be given in first 8hrs from time of burn
    - 25% to be given in next 8hrs
    - 25% to be given in last 8hrs
    - The normal daily fluid intake of the patient i.e. 2000mls must be given with the above volume in the same time period

**FSH Fluid Resuscitation Formula** - this is the fluid that will be lost from the circulatory system in the first 24 hours post burn injury. To prevent the onset of circulatory shock, FSH Burns Service recommends resuscitation starts immediately with Hartmanns Solution (Normal Saline if no Hartmanns solution is available).

- **Urine output:**
  - Fluid therapy regime is titrated to the amount of urine measured hourly in order to maintain the urine output at 0.5-1ml per kg body weight per hour with a specific gravity 1020
  - For electrical burns maintain urine output at 1-2ml per kg body weight per hour to flush out myoglobin. People who have an inhalation burn are dehydrated or intoxicated have a greater intravenous fluid requirement
  - Patients receiving fluid resuscitation require very close monitoring and observation
  - The above formula is a guide only and must be adjusted accordingly to patient condition and urine output
- **Wound management:**
- Burns wound management aims to prevent infection, promote healing, absorb exudate and ultimately aid optimal scar outcome for each patient
  - Keep the patient warm at all times, heat the resuscitation room if necessary – Keep the core temperature at 36.5°C
  - Wash the burns and remove any blisters and devitalised skin – use chlorhexidine 4% liquid soap and tap water
  - If anticipated transportation time is **2hrs or less** (from time of injury to the time to arrival at the Burn unit), wrap the burnt area with saline soaked

Updated by NP N O'Mahony 2<sup>nd</sup> June 2021

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- dressings or towels and cover the patient with a warm blanket (i.e. cool the burn, warm the patient)
- If anticipated transportation time is **2hrs or more** (from time of injury to the time to arrival at the Burn unit), cover the wound surface with **antimicrobial dressings (Acticoat is the preferred dressing, apply Acticoat dressing moistened with sterile water followed with sterile water compresses, Jelonet and dry gauze)**. Cover the patient with a warm blanket
  - Do not use plastic or 'Gladwrap' alone. This retains heat and may increase the risk of infection
  - Minor burns wounds that do not require transfer to the Burn unit need to be dressed with **antimicrobial dressings (Acticoat is the preferred dressing, apply Acticoat dressing moistened with sterile water followed with Intrasite gel and Duoderm CGF)**. Requires change of dressings every 2 days. Or Intrasite, Acticoat, with water compress. Cover with Jelonet, dry gauze and bandage or Tubigrip. This needs to be changed daily
  - NOTE: Burns to the face should be treated with 4 hourly wash and application of emollient ointment, plus investigate for signs of possible inhalation and/or eye injury
- **Referral criteria to state Adult Burn Unit at FSH:**
    - Burns greater than 10% total body surface area
    - Circumferential partial thickness or full thickness burns
    - Inhalation burns
    - Chemical burns
    - Electrical burns
    - Special area burns i.e. face, neck, hands, feet, perineum, joints
    - Burns with concurrent injuries or co-morbidities
    - Contact FSH Consultant or Burn Fellow via switch 6152 2222
    - To refer patient to the Burns Clinics contact: 6152 0342 or fax: 6152 4407 email: [fsb.burnstelehealth@health.wa.gov.au](mailto:fsb.burnstelehealth@health.wa.gov.au)
    - To refer patient to the Burns acute clinic Mon-Fri. Fax referral 6152 4407 or give patient paper referral and request them to present to the clinic FSH main building Level 4, orange lifts at 1000AM.

### Acknowledgement to the FSH Burns unit.

### References:

Fiona Stanley Hospital 2015 *Bitumen Burns*

<https://healthpoint.hdwa.health.wa.gov.au/policies/FSH%20Policies/Bitumen%20Burns.pdf>

Fiona Stanley Hospital 2015 *Burns Service of Western Australia Initial Assessment and Management of the adult and paediatric burn poster*

Fiona Stanley Hospital 2015 *Management of Minor burns in Adults Guideline*

Fiona Stanley Hospital 2015 *Nursing Practice Standard For the Initial Assessment of Burns Injury*

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<https://healthpoint.hdwa.health.wa.gov.au/policies/FSH%20Policies/Initial%20Assessment%20of%20Burns%20Injury%20NPS.pdf>

Hall, A. H. Burgher, F. & Mathieu, L. 2010 *Chemical splashes Diphotering/Hexafluorine. Principles and indications for use manual.*  
<https://www.prevor.com>

Miller, K. Rodger, S. Kipping, B. & Kimble, R. 2011 *A novel technology approach to pain management in children with burns: A prospective randomized controlled trial.* Burns 37(3), 395-405. [https://www-clinicalkey-com-au.qelibresources.health.wa.gov.au/service/content/pdf/watermarked/1-s2.0-S030541791000327X.pdf?locale=en\\_AU&searchIndex](https://www-clinicalkey-com-au.qelibresources.health.wa.gov.au/service/content/pdf/watermarked/1-s2.0-S030541791000327X.pdf?locale=en_AU&searchIndex)