Burns
for Pharmac Seminar
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Overview

- Mechanism of injury
- Emergency Management
- Local and general response to burn injury
- Burn wound assessment
- Burn wound management
Burns

- A wound is a disruption to the tissue and cellular process
- In a burn there is a disruption of cellular structures due to thermal insult (either hot or cold), electricity, chemical action or radiation.
- Burns are significant because it interferes with all five major functions of the skin
Five Major Functions

- Temperature regulator
- Sensory interface
- Immune response
- Protection from bacterial invasion
- Control of fluid loss

A burn wound is very dynamic and not all areas of the burn are necessarily of equal depth.
## Causes of burns
- in Australia and New Zealand (1975-1994)

<table>
<thead>
<tr>
<th>Adults</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explosion &amp; Flame</td>
<td>48</td>
</tr>
<tr>
<td>Scald (Oil &amp; Water)</td>
<td>33</td>
</tr>
<tr>
<td>Contact</td>
<td>8</td>
</tr>
<tr>
<td>Electrical</td>
<td>5</td>
</tr>
<tr>
<td>Chemical</td>
<td>3</td>
</tr>
<tr>
<td>Friction</td>
<td>2</td>
</tr>
<tr>
<td>Sunburn</td>
<td>1</td>
</tr>
<tr>
<td>Scalds</td>
<td>60</td>
</tr>
<tr>
<td>Flame</td>
<td>25</td>
</tr>
<tr>
<td>Contact</td>
<td>10</td>
</tr>
<tr>
<td>Electrical</td>
<td>2</td>
</tr>
<tr>
<td>Chemical</td>
<td>2</td>
</tr>
<tr>
<td>Sun</td>
<td>1</td>
</tr>
</tbody>
</table>
At-Risk Groups

- Young children – 45%
  - Scalds
  - Bath-immersion
  - Pull-over
At-Risk Groups

- Older Children
  - Boys
  - Flammable liquids
  - Fire (works)
  - Electricity
At-Risk Groups

- Elderly
  - Over 75 years
  - Heaters / cookers
  - Scalds
  - Slow reaction time
  - Thinner skin
At-Risk Groups

- Pre-disposing conditions
  - Epilepsy
  - Alcohol
  - Drugs
  - Mental disease
    - Self-inflicted burns
Suspicious burn injuries in children

- Any burn injury involving a child
- Burns in a pattern
- History and physical findings inconsistent with the burn injury
- Burn injuries incompatible with child’s development level
- Burns to buttocks, perineum, or genitals
- Excessive delay in seeking treatment
- Burns involving immersion into hot tap water
- Multiple old and new burns in different stages of healing
- Presence of splash marks, areas of skin that weren’t burned, and burns that are symmetrical in a stocking or glove distribution
- Burns involving the bottom of the feet
- Presence of other non-burn injuries
- Inconsistent story over time
Fire Injury
Electrical Injury
Chemical Injury
Inhalation Injury
Thermal Injury
Local response to burn injury

Figure 3.1

JACKSON'S BURN WOUND MODEL

- Zone of coagulation
- Zone of stasis
- Zone of hyperaemia
Zone of Coagulative Necrosis

- Nearest to the heat source
- The heat can not be conducted away rapidly enough to prevent immediate coagulation of cellular proteins
- There is rapid cell death
Zone of status

- An area of tissue where the damage is less severe than that required to produce immediate cell death
- The circulation in this area of skin and subcutaneous tissue is compromised due to the microcirculation
- The circulation in this area is sluggish
Zone of Hyperaemia

- Zone where damage to the tissues causes production of inflammatory mediators which causes production of inflammatory mediators
- This causes widespread dilatation of the blood vessels
General response to a burn injury

- In a burn greater than 20% TBSA virtually every organ in the body is affected.
- Interstitial edema develops in distant organs and soft tissue.
- After resuscitation, a hypermetabolic response occurs with near doubling of cardiac output and resting energy expenditure.
- The gut, hormone levels, immune responses, and lungs are all affected.
Referral to Burns Unit

- Burn greater than 10% TBSA in adults
- Burn greater than 5% TBSA in children
- Burns to Special areas – Face, Hands, Genitalia, Joints.
- Full thickness burn greater than 5% TBSA
- Electrical, Chemical burns
- Burn with inhalation injury
- Circumferential burns
- Burns at extremes of age / Burn injury with pre-existing medical disorders / Burns associated with trauma
Determinants of Prognosis

- Depth
  - FT longer to heal / sepsis
  - Muscle / Renal failure

- Area

- Site
  - Perineum / pseudomonas / sepsis

- Age

- Associated injuries

- Treatment and response
  - Fluid / Anti-sepsis / early excision
  - 1 failed organ – 70% mortality
Debriding

- Early tangential excision for deep dermal & full thickness burns – delays allow infection to intervene & morbidity & mortality rates rise
Assessment of Area
# Burn Wound Assessment - Diagnosis of Depth

<table>
<thead>
<tr>
<th>Depth</th>
<th>Colour</th>
<th>Blister</th>
<th>Capillary Refill</th>
<th>Sensation</th>
<th>Healing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epidermal</td>
<td>Red</td>
<td>No</td>
<td>Present</td>
<td>Present Painful</td>
<td>Yes</td>
</tr>
<tr>
<td>Superficial Dermal</td>
<td>Pale Pink</td>
<td>Small</td>
<td>Present</td>
<td>Painful</td>
<td>Yes</td>
</tr>
<tr>
<td>Mid-Dermal</td>
<td>Dark Pink</td>
<td>Present</td>
<td>+/-</td>
<td>+/-</td>
<td>Usual</td>
</tr>
<tr>
<td>Deep-Dermal</td>
<td>Blotchy Red</td>
<td>+/-</td>
<td>Absent</td>
<td>Absent</td>
<td>No</td>
</tr>
<tr>
<td>Full Thickness</td>
<td>White</td>
<td>No</td>
<td>Absent</td>
<td>Absent</td>
<td>No</td>
</tr>
</tbody>
</table>
Epidermal

**Example:** UV light, very short flash

**Appearance:** Dry and red, blanches with pressure, no blisters

**Sensation:** may be painful

**Healing time:** within 7 days

**Scarring:** no scarring

**Treatment:** a cream can be used for comfort

(New Zealand Guideline Group, 2007).
Superficial dermal

**Example:** scald (spill or splash), short flash

**Appearance:** pale pink with blistering, blanches with pressure

**Sensation:** usually extremely painful

**Healing time:** within 14 days

**Scarring:** no scarring

**Treatment:** Dressing with antimicrobial should be used on all burns for the first 72 hours

(New Zealand Guideline Group, 2007).
**Mid dermal**

**Example:** scald (spill), flame, oil or grease

**Appearance:** dark pink with large blisters. Capillary refill sluggish

**Sensation:** may be painful

**Healing time:** 14-21 days

**Scarring:** moderate risk

**Treatment:** Dressing with antimicrobial should be used on all burns for the first 72 hours

(New Zealand Guideline Group, 2007).
Deep dermal

Example: scald (spill), flame, oil or grease

Appearance: blotchy red, may blister, no capillary refill. In children, may be dark lobster red with mottling

Sensation: no sensation

Healing time: over 21 days, grafting usually required

Scarring: High risk

Treatment: usually grafting

(New Zealand Guideline Group, 2007).
Full thickness

**Example:** scald (immersion), flame, steam, oil, grease, chemical, high voltage electricity

**Appearance:** white, waxy or charred, no blisters, no capillary refill. In children, may be dark lobster red with mottling

**Sensation:** No sensation

**Healing time:** no

**Scarring:** will scar

**Treatment:** grafting

(New Zealand Guideline Group, 2007).
The Burn Wound – First Aid

- Stop the burning process
  - Extinguish fire
  - Remove charred clothing

- Cool the Burn wound (< 3 hours after injury)
  - Running cool water – 15°C
  - 20 minutes
  - Avoid hypothermia
Blisters
– to pop or not to pop?
Management of blisters and oedema

Management of blisters
- Preferably leave small blisters intact unless likely to burst or interfere with joint movement.
- If necessary, drain fluid by snipping a hole in the blister.

Management of oedema
- Where possibly, elevate affected area.
- Remove jewellery or constricting clothing.

(New Zealand Guideline Group, 2007).
Dressings
- SSD
- Hydrocolloids
- Transparent films
- Hydrogels
- Alginates
- Hydrofibre
- Foams
- Silver Dressing
- Biobrane


