

First aid and emergency management of burns

2020 Practice Guidelines

Central Adelaide Local Health Network

Royal Adelaide Hospital | Burns Unit

Contents

<u>Resources available through RAH Burns Service</u>	4
> Burns assessment team	4
> Education	4
> Clinical guidelines	4
> Clinical services	4
<u>RAH criteria for Burn Unit referral</u>	4
> First aid: General	6
> Flame burns	7
> Scalds	7
> Chemical injury	7
> Bitumen burns	8
> Electrical injury	8
<u>Emergency management</u>	9
<u>Appendix A – Community first aid protocol for thermal injury</u>	11
<u>Appendix B – Protocol for the management of chemical skin injuries</u>	12
<u>Appendix C – Electrical burn injury</u>	13
<u>Appendix D – Escharotomy</u>	14
<u>Appendix E – Management of small thermal burns <15%</u>	15
<u>Appendix F – Dressing guidelines for minor burn injuries in adults</u>	16
<u>Appendix G – Modified Lund and Browder chart (Adult)</u>	19
<u>Appendix H – Modified Parkland fluid resuscitation formula</u>	20
<u>Appendix I – Protocol for burn depth assessment</u>	21
<u>Appendix J – Protocol for Hydrogel cooling products use</u>	22
<u>Appendix K – Primary burn wound care guidelines</u>	23
<u>Appendix L – Lower airway injury</u>	24
<u>Appendix M – Upper airway injury</u>	25
<u>Appendix N – Facial burn</u>	26
<u>Appendix O – Management of foot burns</u>	27
<u>Appendix P – Management of hydrofluoric acid burns <2%</u>	28
<u>Appendix Q – Management of hydrofluoric acid burns >2%</u>	29

Resources available through RAH Burns Service

Burns assessment team

- > A full medical/nursing team is available as an adjunct to MedSTAR in multiple burn casualty situations.
- > A nurse specialist is available for situations where immediate up-skilling of staff in burn dressing management is required.

Staff education

The Burns Team can provide education sessions tailored to your needs. Current options include:

- > A biannual Burns Education Day with education sessions aimed primarily at nursing and allied health staff, with breakout sessions for therapy groups, operating room staff etc.
- > All day education sessions in regional settings primarily aimed at nursing and emergency services.
- > Evening sessions for GPs/practice nurses – normally run the night before the above all day session.
- > Burns Link Nursing and Link Therapist program which incorporates both online and in person training to eligible staff in rural/regional South Australia.

Clinical Services

- > Provide advice for the following:
 - Acute burn management
 - Scar management
 - Wound management
 - Psychosocial issues and concerns
 - Occupational therapy
- > Review of scarring/contractures to provide advice and assistance

RAH - criteria for Burn Unit referral

(Including telephone consultations and patient transfers for persons aged 16 years and over)

1. Burns greater than 10% of total body surface area (TBSA)
2. Burns of special areas – face, hands, major joints, feet and genitalia
3. Full thickness burns
4. Electrical burns – to allow for full assessment
5. Chemical burns – to allow for full assessment
6. Circumferential burns of limbs or chest
7. Burns at the extremes of age (children and elderly)
8. Burn injury in patients with a pre-existing medical disorder (or other disability) which could complicate management, prolong recovery or increase risk of mortality
9. Burns with associated inhalation injury
10. Any burn patient with concomitant trauma
11. Any patient with pre-existing psychiatric disorder that may compromise management
- 12. Any other burn that the referring department is not happy about or confident to send home.**

These criteria are based on the Australian and New Zealand Burn Association guidelines for Burn Unit referral.

General first aid

(See appendix A)

- D- Danger- ensure your own safety and wear appropriate personal protective equipment
 - Stop the burning process
 - Cool the wound
- A- Airway (protect the cervical spine)
- B- Breathing (add oxygen)
- C- Circulation (add haemorrhage control)

Minor Burn

- > Irrigation with cool/cold running water for 20 minutes
- > Keep non-burn area warm
- > Cover with non-adherent dressing
- > Seek medical advice

Major Burn

- > **Do not delay transfer**
- > Contact the Burns Unit for advice re. appropriate cooling techniques
- > Cold water treatment to burn for up to 20 minutes
- > Wrap loosely in cling wrap and clean dry linen (do not cling wrap the face or chemical burns)
- > Keep patient warm to prevent hypothermia
- > Transport patient to closest hospital (rural) or to the RAH (metropolitan)
- > If transfer is delayed for any reason (>4hours), refer to 'Primary burn wound care guidelines – Adults' (Appendix L) and Escharotomy (Appendix D)
- > **Do not hesitate to contact Burns Unit for clarification if required**

Ice should never be used for burn wound cooling – it causes vasoconstriction leading to further burn tissue damage and systemic hypothermia.

First aid – burn type specific

Flame burns (see Appendix A)

- > For flame burns instruct the person to 'stop, cover, drop and roll' – extinguish flames with a blanket
- > Remove the heat source (PPE) as soon as safe
- > Apply cool running water to the burn until the burned skin feels cool (20mins)
- > Resuscitation (if necessary)
- > Remove non-adherent clothing and potentially constricting jewellery

Scalds (see Appendix A)

- > Remove all soaked clothing instantly – every second counts as clothing soaked in hot water retains heat.
- > A scald is deepest:
 - where the clothing is thicker
 - where the liquid is held in a natural fold of the skin
 - where the clothing is compressed in the natural creases of the body.
- > Immediately cool the burn with running cold water for 20 minutes.

Chemical (see Appendix B)

- > First aid givers must be wearing protective clothing before beginning treatment
Remove all contaminated clothing immediately
- > Powdered agents should be brushed from the skin with care
- > Areas of contact should be irrigated with copious amounts of tepid/ lukewarm running water (this is decontamination not cooling). **Avoid washing chemical over unaffected skin.** Remove footwear to avoid retention of the chemical in the shoes
- > Chemical eye injuries require continuous irrigation until ophthalmological review is available – always ensure that the unaffected eye is uppermost when irrigating to avoid contamination.

Special cautions exist with the use of hydrogels – see Appendix K

Bitumen (see Appendix B)

- > Immediately drench with cold water until the bitumen has lost all of its heat
- > Leave bitumen intact unless it is compromising the airway or circulation.

Electrical (see Appendix C)

- > **Turn off the source of electricity – mains power, power point or generator.**
- > Remove patient from electricity source, remembering your own safety
- > **Ensure C-spine protection is in place** – this is of particular importance as fractures of the spine may occur following the violent muscular contractions that occur during the conduction of electrical current through the body
- > **Cervical spine protection** is mandatory
- > **ECG**

Emergency management

1. First aid (see Appendix A)

2. Airway management (see Appendix M and N)

- > Introduce cervical spine protection
- > Assess for signs of inhalation injury. Endotracheal intubation is advisable early if signs of inhalation injury are present.
- > Administer oxygen to all patients with a major burn.

3. Circulatory management

- > Burns >15% should be given formal intravenous fluid resuscitation as per the Modified Parkland Formula (see Appendix I)
- > Insert two large bore (16G) peripheral cannulae (through damaged tissue if necessary)

4. Insert naso-enteric tube

- > For patients with burns >20 %

5. Pain relief

- > Introduce small doses of IV morphine, titrated to pain and sedation scores
- > Intramuscular, subcutaneous and oral analgesics are absorbed unreliably in burn injury due to fluid shifts and GI stasis.

6. Urinary catheter

- > All patients receiving intravenous fluid resuscitation should have a urinary catheter inserted.

7. Assess capillary return and neurovascular perfusion regularly

- > Circumferential extremity burns may obstruct venous return and capillary flow to a level resulting in muscle ischaemia and necrosis
- > Elevate limbs
- > Contact Burns Unit urgently for advice re management
- > Escharotomy may be necessary (see Appendix D)

8. Assess effectiveness of ventilation

- > Circumferential chest burns may restrict ventilatory excursion and a chest escharotomy may be necessary. Contact the Director of the Burns Unit through RAH switchboard for advice, (08) 7074 0000.

9. Emotional support

- > Severe burns often occur under stressful circumstances and cause distress to patients, friends and relatives. Reassurance and good communication are the most important tools at this time. Local support services should be accessed for ongoing support.
- > The Burns Unit social worker or clinical psychologist may be contacted through the Burns Unit for advice and assistance.
- > Emergency service personnel and hospital staff may also require support and local critical incident response protocols should be initiated if appropriate.
- > The Burns Unit social worker or clinical psychologist may be contacted through the Burns Unit for advice and assistance.

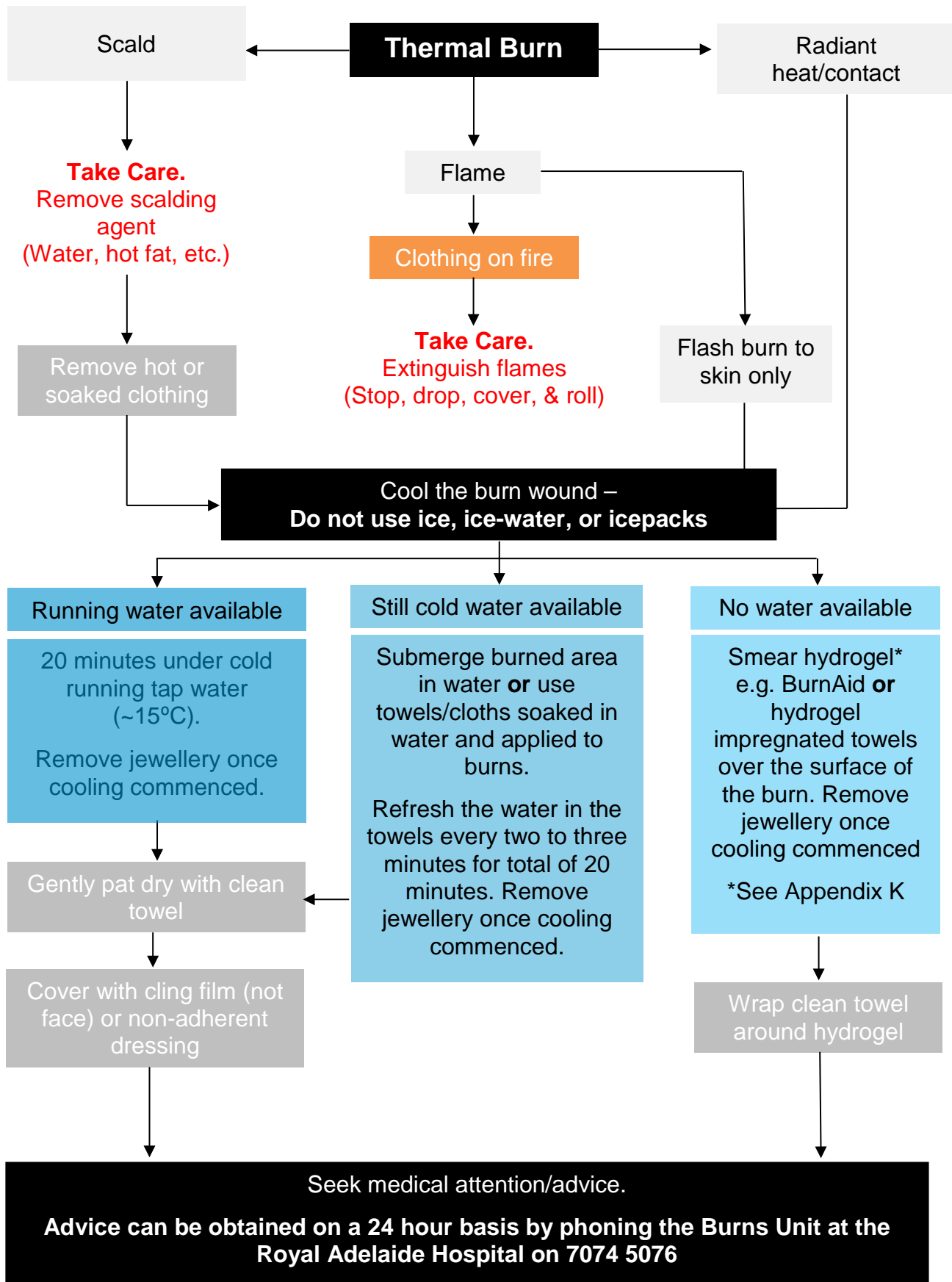
10. Initial laboratory investigations

- > The following investigations should be undertaken following a burns presentation:
 - Baseline Hb
 - Haematocrit
 - Electrolytes including blood glucose
 - Urinalysis
 - Trauma series x-rays

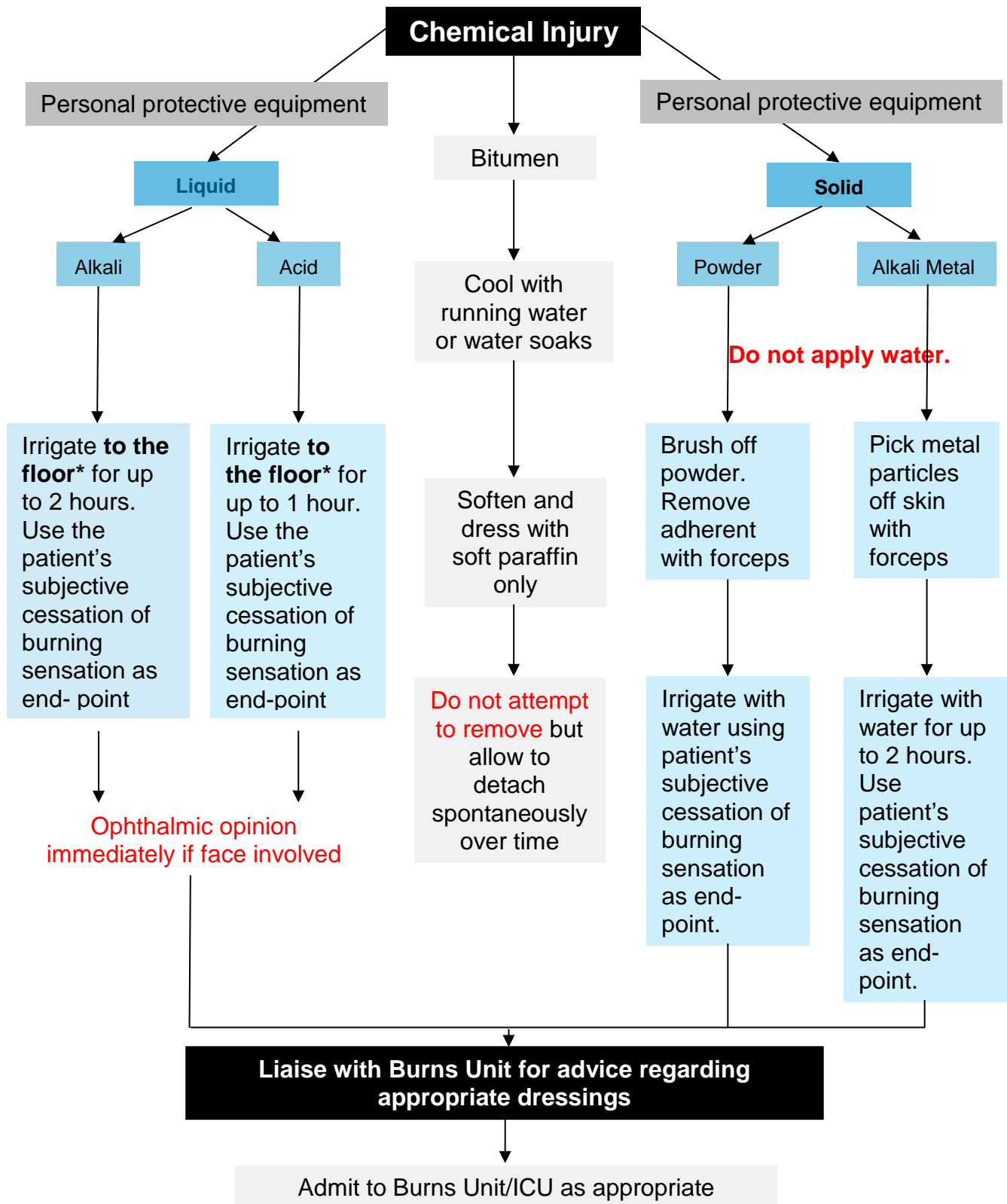
11. Tetanus immunisation

- > Burns are a tetanus-prone wound
- > Follow the NHMRC guidelines outlining tetanus immunisation
- > *Australian Immunisation Handbook 8th Edition for tetanus prophylaxis*

Community First Aid Protocol for Thermal Injury

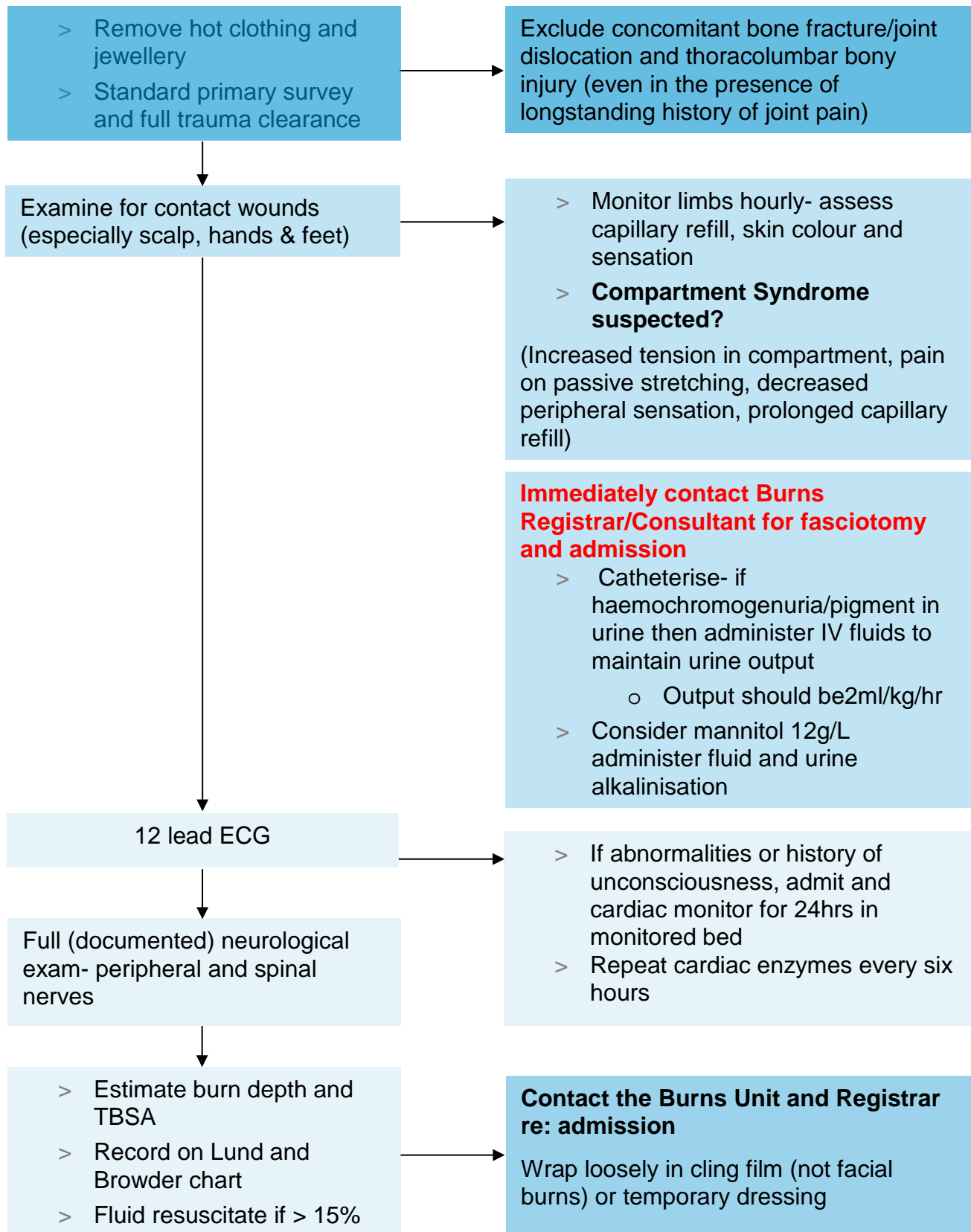


Emergency Dept. Protocol for the Management of Chemical Skin Injuries



*From contaminated area to floor directly to avoid run off injury to other areas if possible

Emergency Department protocol for electrical burns (low voltage = A/C <1000V)



Escharotomy

In the presence of **any** circumferential burn, advice should be sought from the Burns Unit or Burns Registrar on (08) 7074 5076. If the circumferential burn is **deep** or **full thickness** please contact the Burns Consultant (contact through RAH switchboard (08) 7074 0000).

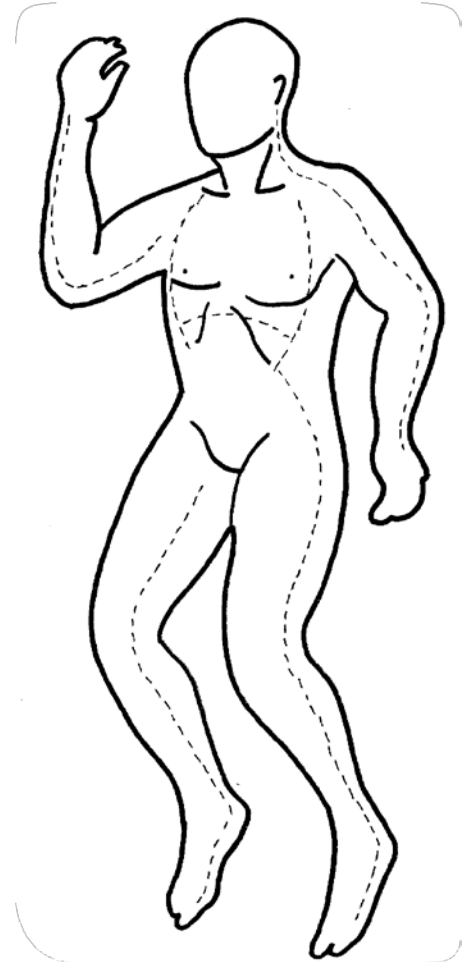
An escharotomy should be considered when there is a circumferential deep dermal or full thickness burn injury (dry wound) and where:

- > Delay in transfer to the tertiary Burns Unit is expected
- > There is evidence of circulatory compromise indicated by an extended capillary refill time compared to non-burned or non-circumferential burned limb.

Escharotomy is designed to divide inelastic burned skin and the incision does **not** need to be extended deeply into the underlying fat.

This procedure is essential, but has the potential for considerable damage to underlying structures. These include:

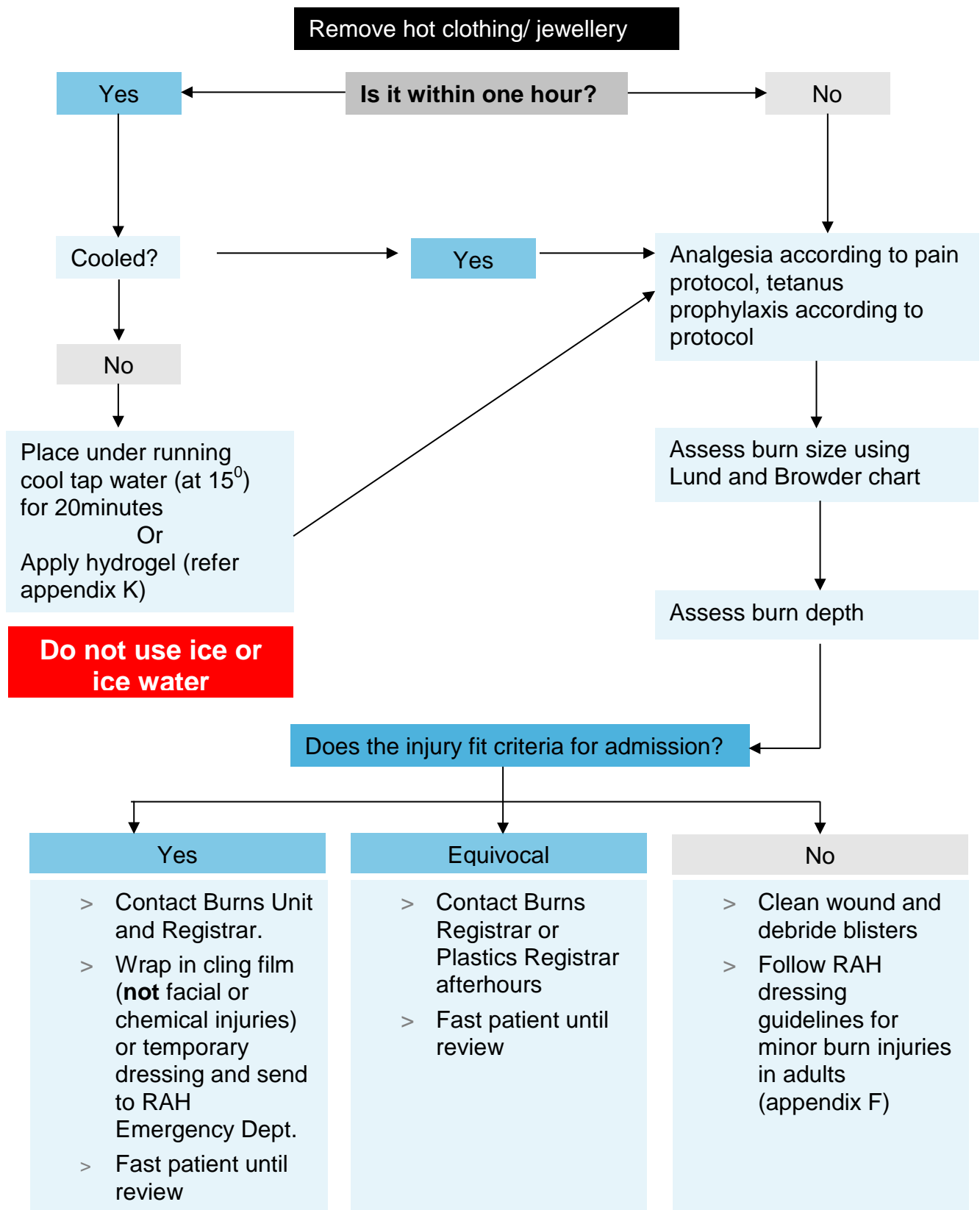
- > common peroneal nerve at the outside of the knee (over neck of Fibula)
- > radial nerve at the wrist (superficial branch)
- > ulnar nerve at the elbow
- > cephalic vein at the wrist
- > great saphenous vein and nerve at ankle.



Equipment required

- > Local anaesthetic infiltration with Adrenaline (if patient awake)
- > Povidone Iodine (Betadine) skin preparation
- > Cutting monopolar diathermy with either needle or spatula (set equally to cutting/coagulation). A normal scalpel may be used in the absence of this but more bleeding should be expected
- > Bipolar diathermy for haemostasis
- > Kaltostat™ for dressing escharotomy wound. Cover with antibacterial dressing and bandage then elevate limb.

Management of Small Thermal Burns (<15% TBSA)



Dressing guidelines for minor burn injuries in adults

Please refer to RAH Criteria for Burn Unit referral (including telephone consultations and patient transfers)

Aims of burn wound dressings

- > Promote healing
- > Prevent desiccation of the wound
- > Prevent or treat infection
- > Patient comfort – pain, exudate, odour management
- > Ease of management for patient and staff
- > Allow normal movement

Initial burn wound care

- > Remove restrictive jewellery (ie rings) as soon as possible
- > Administer pain relief – superficial and partial thickness burns are very painful
- > Complete burns first aid if patient has not had appropriate/ complete first aid
- > Wash affected area with antiseptic sponge e.g. Medisponge
- > Shave any body hair from burn wound and allow for at least a 2.5cm margin surrounding burn site (do not shave eyebrows)
- > Debride blisters and remove all loose burned tissue
- > Assess wound depth by pressing on wound bed and looking for presence of capillary refill according to the burn wound assessment chart (Appendix J)
- > Use the appropriate dressing based on the wound depth, site and likelihood of infection
- > Elevate the limbs to reduce oedema formation

Superficial burns – unblistered (erythema, sunburn or healed burns)

- > Wash with non-perfumed soap and dry well
- > Apply moisturising cream. This may need to be done several times a day
- > Advise patient regarding the use of sun-block agents
 - **physical** – hats and long sleeved shirts
 - **chemical** – SPF factor 30+

Important note

Partial thickness burns due to 'dirty/organic' liquids (petrol, chemicals, 'cooking' water, sauces, hot oil, water from a car radiator, etc.) frequently become infected, resulting in burn wound depth progression requiring surgical intervention, and even grafting.

It is prudent to treat these with a topical anti-bacterial (silver-containing) dressing. Systemic antibiotics are usually only used when there has been organisms identified in conjunction with a clinical picture of a wound infection.

Superficial burns/clean partial thickness burns

- > It is advised to use a silver based dressing such as Acticoat™
- > Alternative dressing options for a clean superficial wound, such as a hot water scald, include Meplix™ or Meplix Ag™ however these dressings cannot be wetted and procedures should be followed to allow patients to shower (such as plastic bag wrapping).
- > Wounds should be reviewed within 3 days of initial consult.

Contaminated/infected partial thickness burns and small full thickness burns (e.g. less than size of a 20 cent piece)

Three day Acticoat™

- > Apply Acticoat™ directly to wound, secure with Hypafix™.
- > Patient instructed to keep dressing activated by dampening under tap at home once a day or when dressing starts to feel too dry.
- > For some patients, it can cause a stinging or burning sensation on application. This can be minimised by resting the product after activation with water for a couple of minutes before application.

Flamazine Cream™

- > Apply a one centimetre thick layer of Flamazine cream to the wound with secondary dressing otherwise drying out will occur, making dressing removal difficult and/or painful
- > Flamazine needs to be washed off the wound (Medisponge) and redressed **daily**.
- > Flamazine can change partial thickness wound appearance, making it look as though the wound has become deeper.
- > Flamazine is **not** recommended for anyone with a sulphur allergy or previous reaction to drugs containing sulphur (such as sulphonamide antibiotics)
- > **Do not use on the face** – can cause corneal ulceration

- > For some patients it can cause a stinging or burning sensation on application. If this does not settle within 30 minutes remove Flamazine and choose alternative dressing

Facial Burns (Appendix O)

- > Ophthalmic review (within 12 hours)
- > Male patients will need to shave one or twice daily, depending on rate of beard growth.
- > Daily hair washes are required.
- > Clean facial burns with normal saline using aseptic technique every four hours. Debride the blisters and remove crusts. Pay particular attention to eye and ear care.
- > Apply sterile soft paraffin to raw areas every four hours after cleaning.
- > Apply moisturising cream to healed areas.
- > Advise patient to stay out of sunny and dusty conditions.

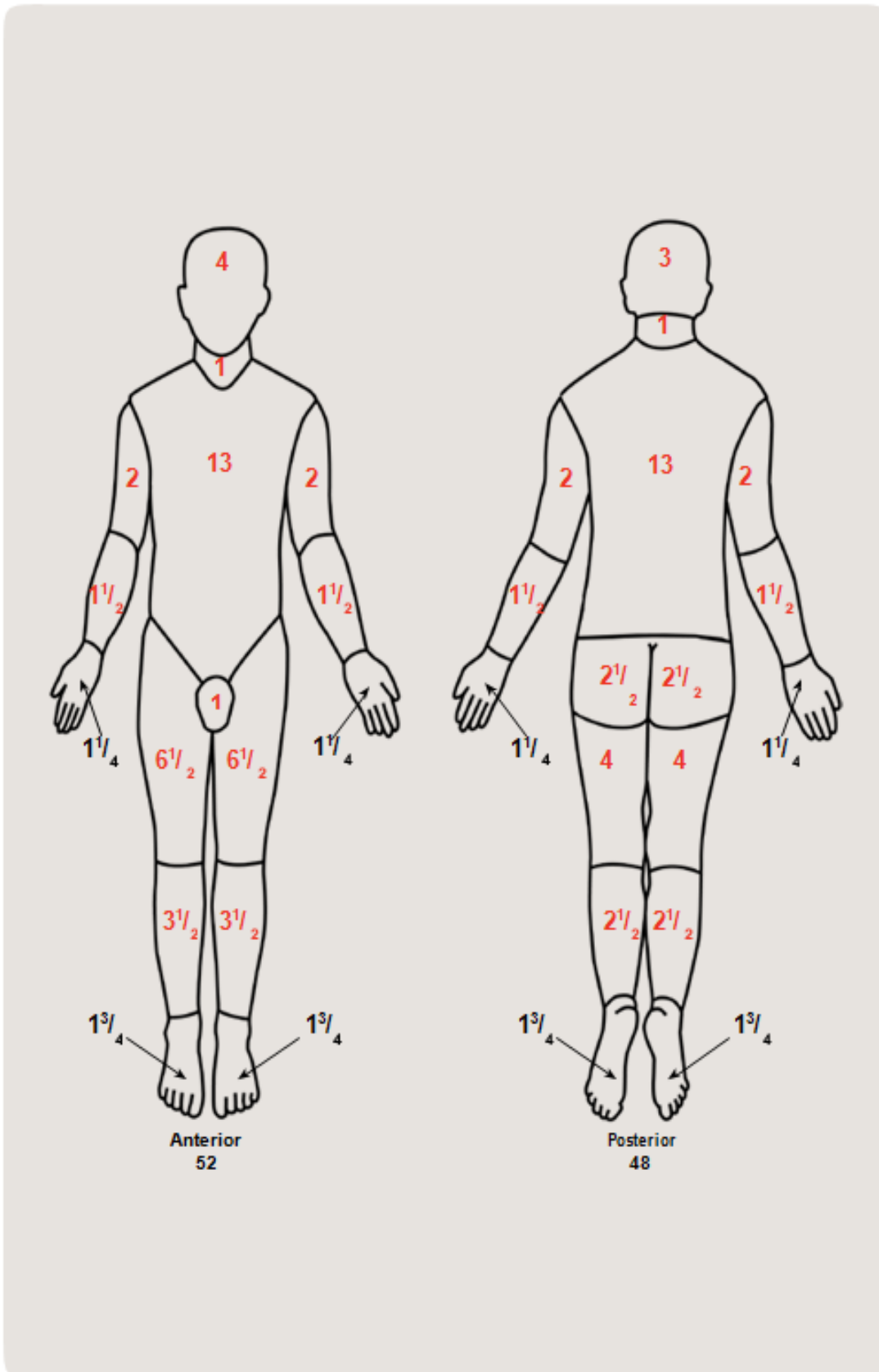
Oedema

- > Swelling to the burned area can be reduced by elevation.
- > Patients with burns to the face and neck are best nursed sitting up (~45° at the hip).

Considerations for hospital admission

- > Pain will not be adequately controlled with oral analgesia.
- > Infection – cellulitis of burn wound requiring intravenous antibiotics.
- > Bed rest with lower limb(s) elevated is required.
- > If patients live alone or have inadequate support at home.
- > Any circumstances that may result in a patient having an inability to cope with own dressing care.
- > Transport difficulties the patient may face – e.g. getting to appointments for dressing changes

Modified Lund and Browder chart (adult)



Royal Adelaide Hospital Modified Parkland resuscitation protocol for adults with >15% Total Burn Surface Area

- > Assess total burns surface area (TBSA) using the Lund and Browder chart.
- > Assess patient body weight as accurately as possible (in kilograms).

Resuscitation Fluid for the First 24 Hours Post Burn

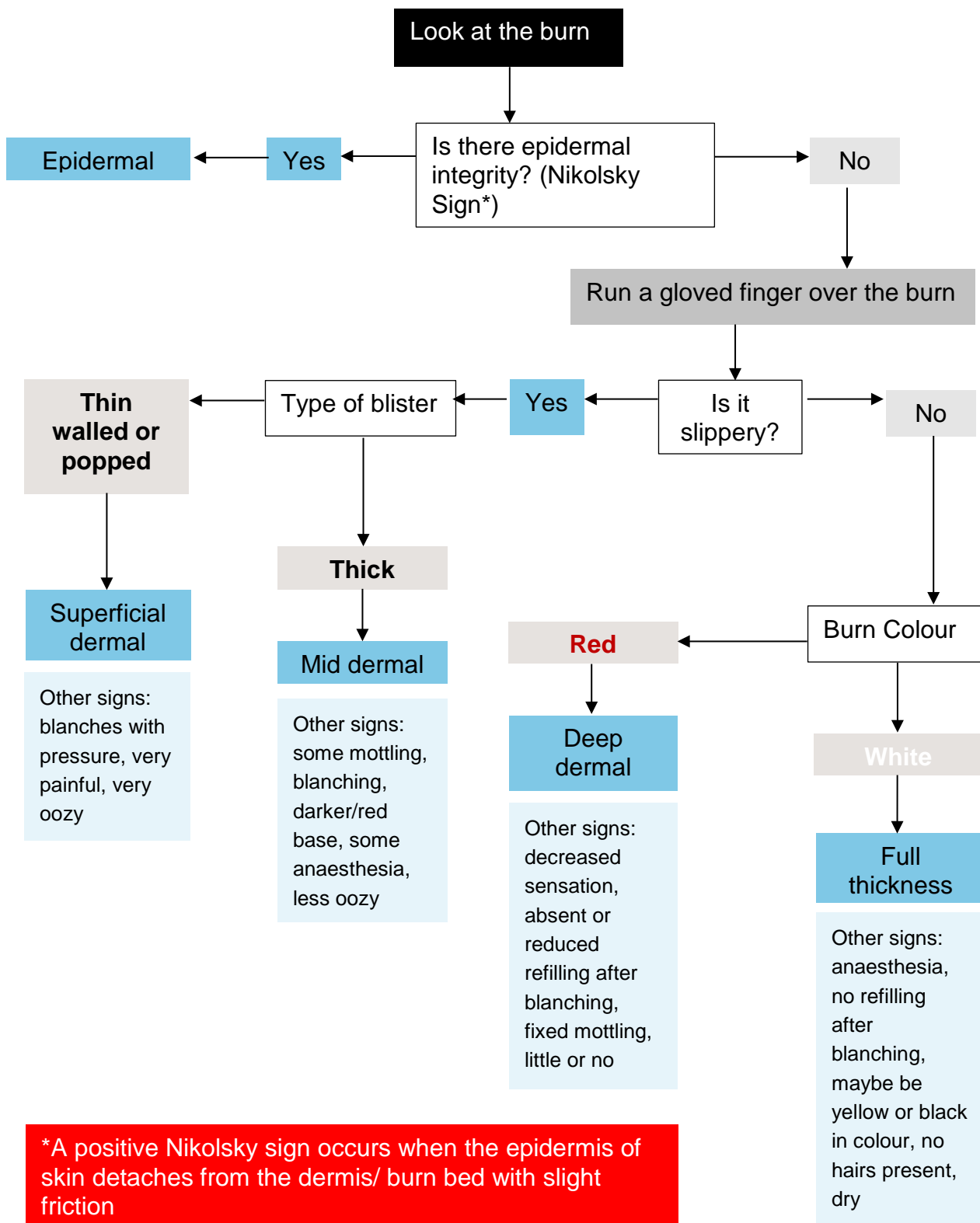
Resuscitation fluid (in mls) for the first 24 hours after the burn injury =
 $\%TBSA \times Kg \times 4$

This is given as Hartmann's (Ringer's Lactate) Solution

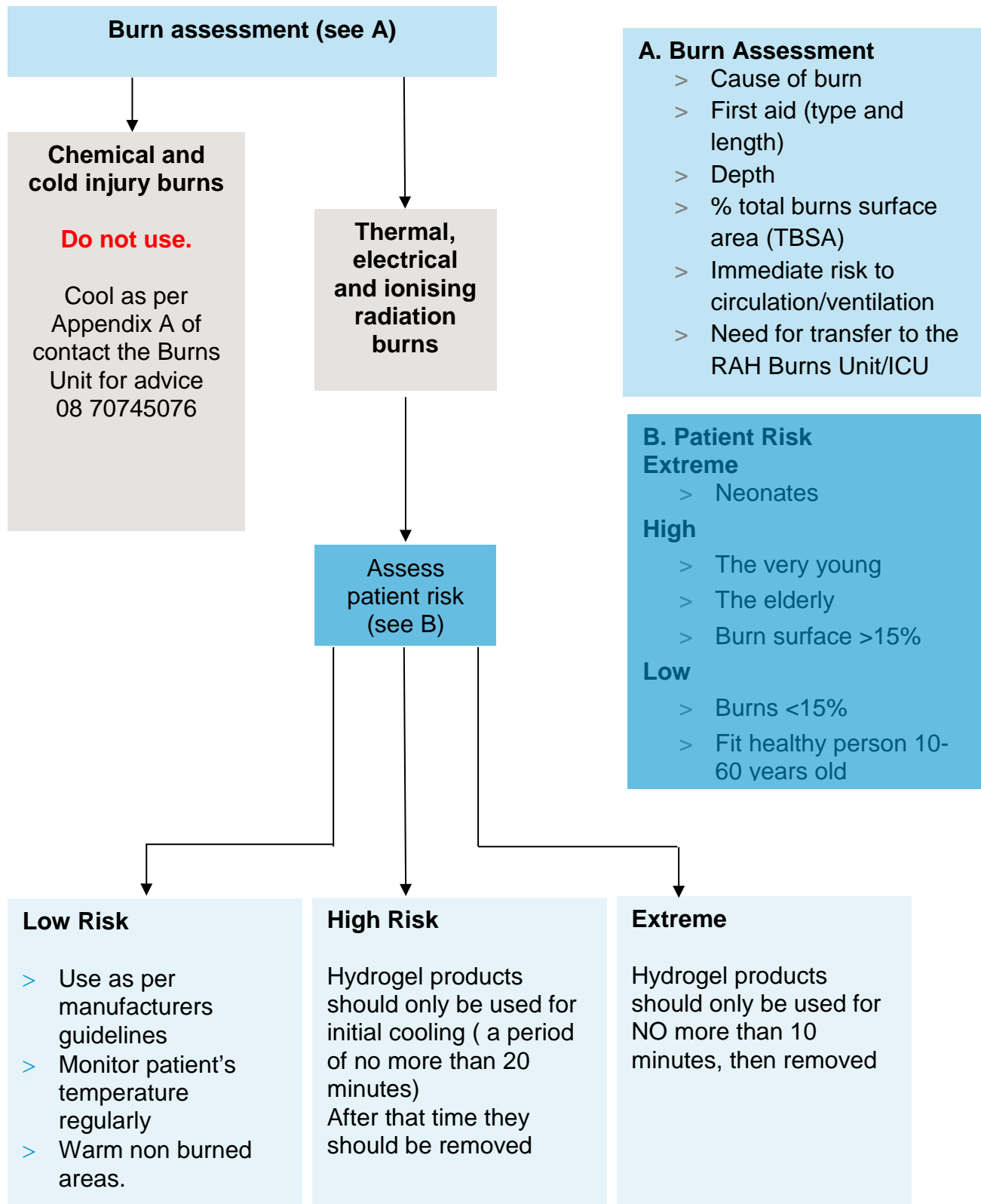
- > Give half of calculated volume in the first 8 hours after the injury
Give the second half over the next 16 hours
- > Adjust fluid input to achieve urine output of 0.5-1ml/kg/hr.
- > Normal saline can be used if Hartmann's solution isn't available (dangerous electrolyte imbalances will result if large volumes are administered!)
- > **Timing begins at the time of burn, not at the time of arrival to hospital**

- > Maintenance fluid is not required in adults
- > Second 24 hours fluid requirement is Albumex 4% via the formula:
Total (mls) = 0.5ml x weight kg x % TBSA
- > The patient may need no further intravenous fluid.
- > The urine output should be measured **each hour** and the Medical Officer notified if patient is not meeting desired output.
- > Venous blood should be sent for Hb, PCV and Serum Electrolytes on admission and 6-hourly until transfer.
- > Monitoring
- > Indwelling catheter – mandatory
- > Nasogastric tube – mandatory

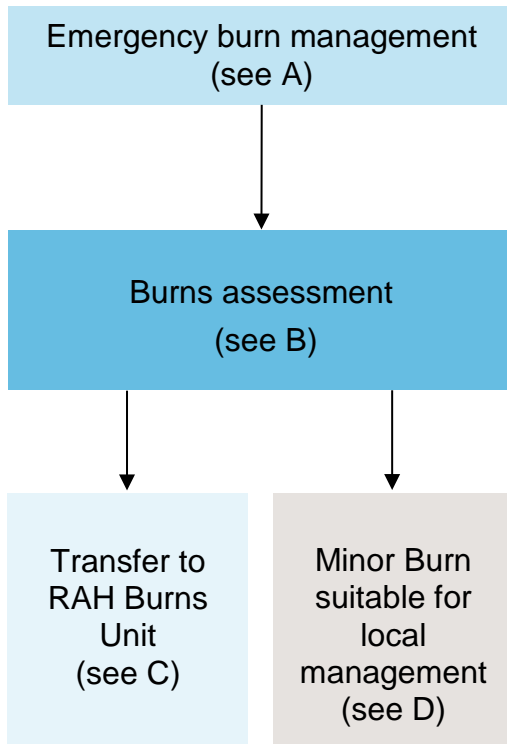
Protocol for burn depth assessment



Use of Hydrogel cooling products for burn injury first aid



Primary Burn Wound Care Guidelines- Adults



For any chemical injuries please contact the Burns Registrar through RAH switchboard (08) 7074 0000 for advice.

A. Emergency Management

Refer RAH first aid and emergency management guidelines

B. Burn Assessment

- > Cause of burn
- > First aid (type & length)
- > Depth
- > % total body surface area (TBSA)
- > Site of burn
- > Immediate risk to circulation/ventilation
- > Need for transfer/ consultation* to RAH Burns Unit

C. Transfer to RAH Burns Unit

Note; hydrogel products such as Burn Aid™ that are specifically designed for burn first aid use are those referred to below.

Anticipated time to arrival at RAH <1 hour

- > Face- wet soak or hydrogel
- > Other burn areas- cling film or hydrogel (refer to appendix K)

1-4 hours

- > Face- wet soaks or hydrogel
- > Other burn areas- cling film or hydrogel (refer to appendix K)

4-24 hours

- > Face- soft paraffin
- > Other burn areas- Jelonet™, Bactigras™ or Inadine™

>24 hours

- > Face- soft paraffin
- > Other burn areas- Acticoat™

D. Minor Burn for local management

Follow RAH dressing guidelines for minor burn management

Lower Airway Injury

<p>0 Hours</p> <p>Time of Injury</p>	<p>Low risk</p> <ul style="list-style-type: none"> > 'Flash' or short contact with thermal agent > No confinement in smoke filled room > Scald injury > Contact burn > Normal speech > Normal appearance on bronchoscope below the cords 	<p>High risk</p> <ul style="list-style-type: none"> > History of prolong confinement in smoke filled environment i.e. house, or car fire, including under car bonnet > Significant facial burns > History of unconsciousness or obtundation > Raised carboxyhaemoglobin > Hypoxia > Respiratory difficulty (tachypnoea, dyspnoea, increased use of accessory muscles and increased work of breathing) > Sooty or productive sputum > Confusion, obtundation, unconsciousness > Wheezing or added sounds on auscultation > Abnormal findings below the cords
	<p>Low Risk- Treatment</p> <ul style="list-style-type: none"> > Oxygen > Trauma clearance ASAP > Elevate head 45° once C-spine is clear > Chest x-ray > Notify Burns Registrar <p>Observations</p> <ul style="list-style-type: none"> > Continuous SaO₂ > Continuous visual obs > 15 min airway obs <p>Placement: Burns Unit</p>	<p>High Risk- Treatment</p> <ul style="list-style-type: none"> > Oxygen > Trauma clearance ASAP > Elevate head 45° once C-spine is clear > Chest x-ray > Intubation (long term if required) > ABGs > Nebulised adrenaline > Bronchoscopy/ review survival status <p>Observations</p> <ul style="list-style-type: none"> > Continuous SaO₂ > Continuous visual obs 15 min airway obs <p>Placement: HDU/ ICU</p>
<p>>12 hours</p>	<p>No deterioration in condition</p> <ul style="list-style-type: none"> > Oxygen > Continuous SaO₂ > 1/ 24 observations <p>Placement: Burns Unit</p>	<p>Deterioration in condition</p> <ul style="list-style-type: none"> > CODE BLUE > Contact Duty Anaesthetist > Intubate > ICU transfer
<p>>24 hours</p>	<p>No deterioration in patient</p> <ul style="list-style-type: none"> > Continuous SaO₂ > 4/24 observations <p>Placement: Burns Unit</p>	

Upper airway injury

<p>0 Hours</p> <p>Time of Injury</p>	<p>Low risk</p> <ul style="list-style-type: none"> > History of 'flash' or short contact with agent such as gas/petrol explosion characterised by superficial face burn or erythema, with some singeing of facial hair/nostril hair > Normal voice at initial examination 	<p>High risk</p> <ul style="list-style-type: none"> > Burns to mouth, nose and pharynx > Steam inhalation > Intra oral burns or blisters > Hoarse voice > Inspiratory stridor > ?hx of burn in confined space
	<p>Low Risk- Treatment</p> <ul style="list-style-type: none"> > Oxygen > Trauma clearance ASAP > Elevate head 45° once C-spine is clear > Chest x-ray > Notify Burns Registrar <p>Observations</p> <ul style="list-style-type: none"> > Continuous SaO₂ > Continuous visual obs > 15 min airway obs <p>Placement: Burns Unit</p>	<p>High Risk- Treatment</p> <ul style="list-style-type: none"> > Oxygen > Trauma clearance ASAP > Elevate head 45° once C-spine is clear > Chest x-ray > Intubation (short term if required) > ABGs > Nebulised adrenaline <p>Observations</p> <ul style="list-style-type: none"> > Continuous SaO₂ > Continuous visual obs > 15 min airway obs <p>Placement: HDU/ ICU</p>
<p>.>12 hours</p>	<p>No deterioration in condition</p> <ul style="list-style-type: none"> > Oxygen > Continuous SaO₂ > 1/ 24 observations <p>Placement: Burns Unit</p>	<p>Deterioration in condition</p> <ul style="list-style-type: none"> > CODE BLUE > Contact Duty Anaesthetist > Intubate > ICU transfer
<p>>24 hours</p>	<p>No deterioration in patient</p> <ul style="list-style-type: none"> > Continuous SaO₂ > 4/24 observations <p>Placement: Burns Unit</p>	

Management of facial burns

Initial care (may be done in theatre/technical suite)

- > All non-viable tissue should be gently removed by picking and washing with gauze. Beard, moustache and sideburn hair will have been shaved completely and scalp hair similarly shaved away from the burn edge. Soft paraffin is applied. **Do not apply Flamazine!**

Ongoing care (on ward, aseptic technique)

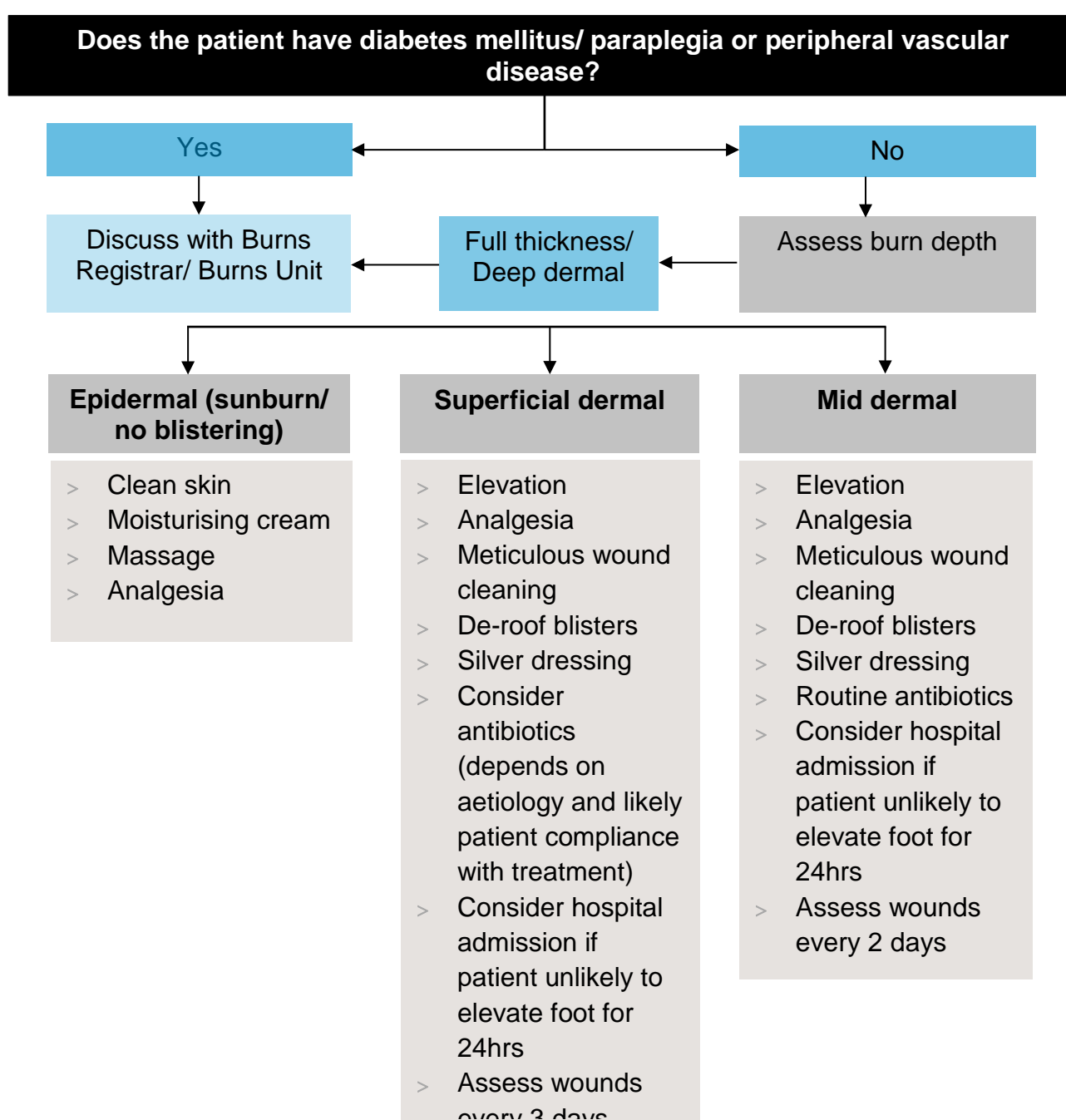
- > Performed **4-hourly** (with eye care). Gentle cleaning and removal of existing paraffin and any newly-declaring non-viable tissue. Forceps are to be avoided on the face. Application of a **thin** layer of white soft paraffin.
- > **Performed 12-hourly** (with mouth and ear care) – male patients will undergo shaving of facial hair.
- > **Performed daily** – hair washing.
- > **Viral Swabbing** – in patients with facial burns (particularly those with a history of cold sores), virology swabs must be performed for Herpes Simplex Virus on days two and five **post-burn**. A positive result requires Famcyclovir administration (herpes face burn infection if very painful, delays healing and leads to poorer healing and scarring).

Management of burns to the foot

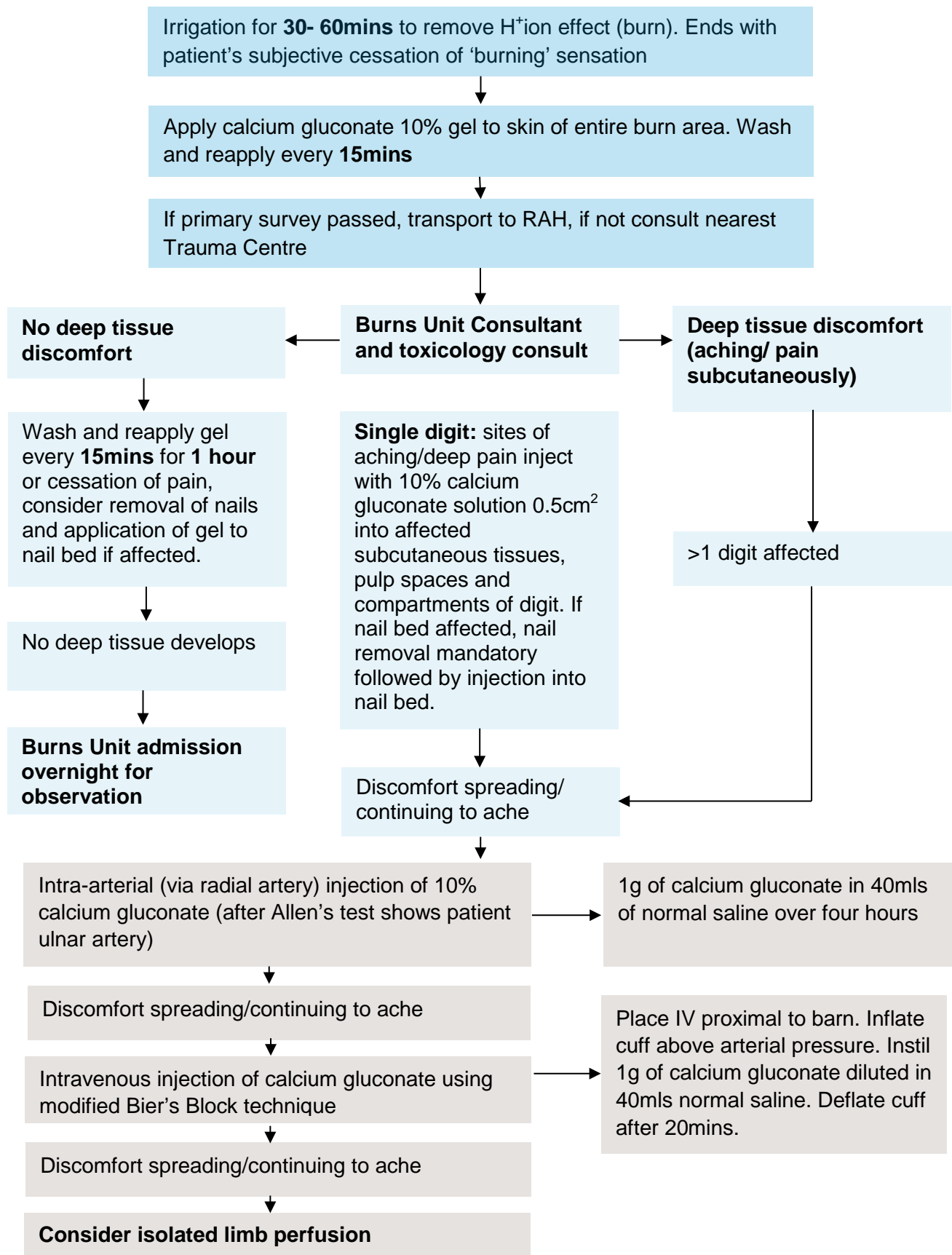
Each foot is colonised by 1,000,000,000,000 bacteria. Inadequate management of foot burns **frequently** results in serious infection. This can lead to a need for skin grafting (where spontaneous healing was expected) and even digital/other amputation.

Avoid any constrictive/abrasive footwear - loose footwear should be worn. Initial elevation for at least 24 hours is of utmost importance in preventing burn depth progression.

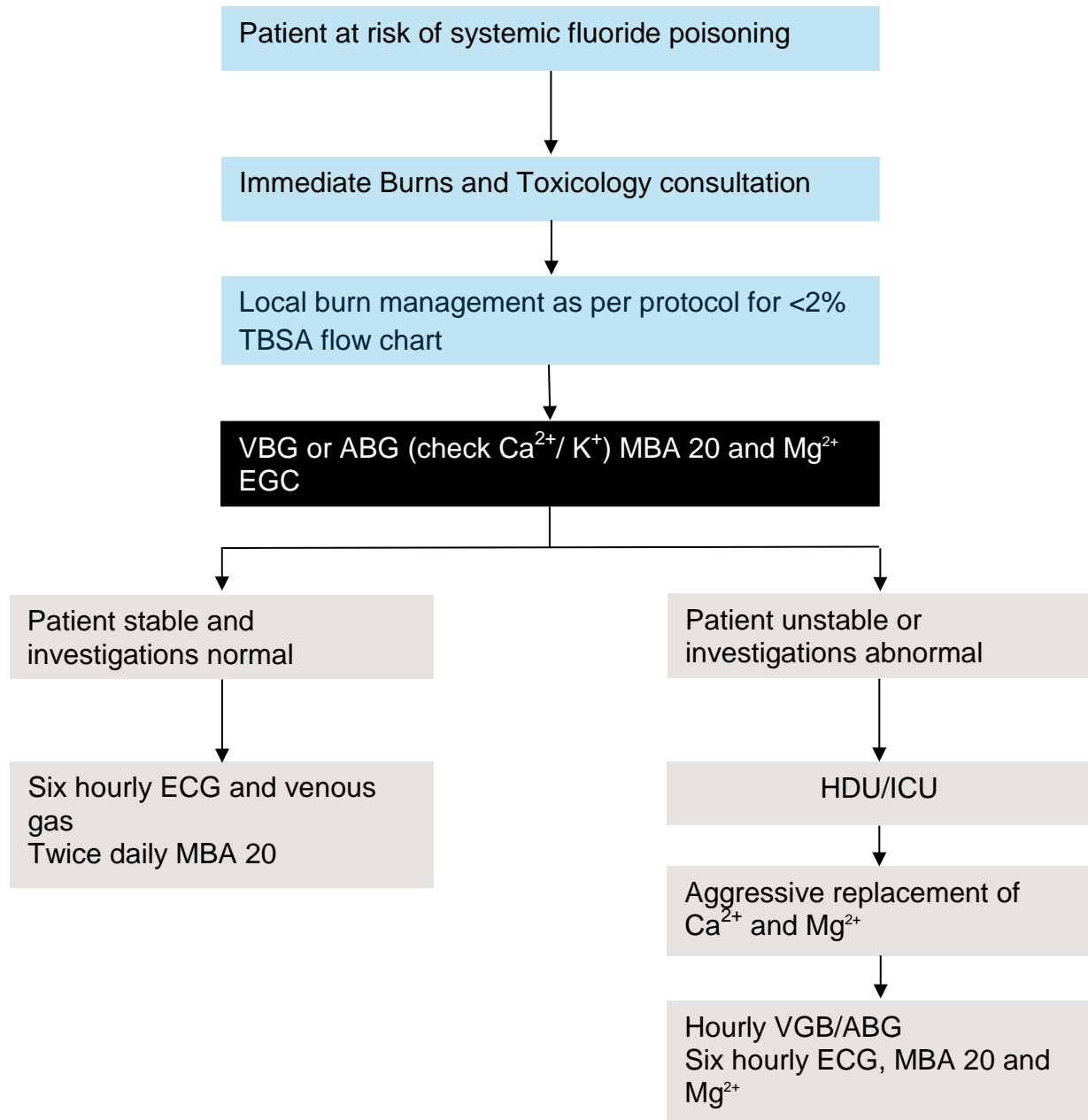
Time off work should be considered especially for those whose jobs entail standing or a hot, dusty dirty environment. As burns to the feet meet ANZBA referral criteria, consider contacting the Burns Unit/Burns Registrar for advice and how to best manage foot wounds.



Hydrofluoric acid burn treatment protocol (burns <2% TBSA and HF concentration <10%)



Hydrofluoric acid burn treatment protocol (burns >2% TBSA and HF concentration >10%)



For more information

Adult Burns Centre

Royal Adelaide Hospital
Port Road
Adelaide, South Australia 5000
Telephone: 08 707 45076
Fax: 08 707 46223
rah.burns@sa.gov.au

Confidentiality (caveat if required)-I#-A#



www.ausgoal.gov.au/creative-commons