NON-COMPLEX BURN MANAGEMENT PROTOCOL

This protocol is aimed at Emergency Departments, Minor Injury units, Walk in Centres, Tissue Viability Nurses, Community Nurses and all other staff who may encounter burn wounds outside of Burn Services

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1. Introduction

The Northern Burn Care Network (NBCN) was created in 2008, in response to the National Burn Care Review, published in 2001. The review identified clinical networks as the organisational model, or way of working, to drive change and improve burn care services for the populations in specific areas. As a result of the development of the Northern Burn Care Network, a number of initiatives have been developed. This document forms part of a larger set of guidelines devised to ensure consistent management of complex and non complex burn injuries across the North of England, North Wales and the Isle of Man.

The protocol should be read in conjunction with the non complex referral form, guidelines and flow chart, and is aimed at all clinicians outside of the Burn Services who manage patients with burn wound injuries. This could include Emergency Departments, Walk in Centres, Urgent Treatment Centres, Community Nurses, Practice nurses, Tissue Viability Nurses etc. This list is not exhaustive.

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2. Burn Wounds

Burn wounds are traumatic thermal, chemical or electrical injuries that are defined in terms of severity and complexity by mechanism of injury, size, depth and involved anatomical structures. Appropriate management of any burn injury is dependant upon accurate assessment of the above variables. Assessment can be somewhat complicated by the ‘burn wound conversion’ phenomenon, in that the depth of tissue damage may either improve or extend quite significantly within the first few days. Health care professionals can positively influence this outcome by adhering to principles of wound debridement, moist wound healing and infection control, plus by arranging for follow-up review within 48-72 hours. This will aid management goals which are to restore optimum physical, functional, psychological and sensory potential (National Burn Care Review 2001) A crucial component of this process is to facilitate timely wound healing. Timely wound healing will lessen the possibility of complications such as infection, contracture and abnormal scarring and will require the consideration of excision and grafting for deep dermal and full thickness burns, and consideration of the ‘Burn Wound Conversion’ phenomenon.

2.1. Burn Wound Conversion

The pathophysiology of burn injury is dynamic and changing. Burns have the potential to convert to deeper injuries depending upon how badly the vasculature within the injury is compromised. Dead tissue/vessels in full thickness injury cannot be salvaged however compromised tissue/vessels in superficial dermal, and some deep dermal injuries are potentially salvageable with appropriate management. This includes use of the most appropriate dressings that will provide a clean, moist environment to allow adequate tissue perfusion and preventing the potential for infection. Burn wounds are divided into zones which denote the level of tissue/vessel damage, these are:

Figure 1: Burn Wound Zones

<table>
<thead>
<tr>
<th>Zone:</th>
<th>Pathophysiology:</th>
<th>Potential for salvage:</th>
</tr>
</thead>
</table>
| Zone of Hyperaemia           | • Tissue/vessels furthest away from the heat source and/or with least exposure to the heat source.  
                               | • Capillary vasodilatation but minimal cell/vessel damage                         | • Spontaneous recovery expected               |
| Zone of Stasis               | • Tissue/vessels intermediate to the heat source  
                               | • Hypo-perfusion of tissues  
                               | • Some degree of damage to tissue and vessels                                      | • Potentially salvageable with appropriate treatment |
| Zone of Coagulative Necrosis | • Tissue/vessels nearest to the highest heat source and/or with most exposure to the heat source.  
                               | • Complete cell and vessel destruction                                           | • Not salvageable                            |

All acute burn wounds should be reviewed 48-72 hours post injury in consideration of this phenomenon.
2.2. Mechanism of Injury

(Refer to section 5 on complexity)

An understanding of how a burn injury has been sustained can give important clues as to the potential severity/complexity of the injury. A burn injury can be from thermal, radiation, chemical or electrical sources:

2.2.1. Thermal injuries

Thermal injuries occur when skin is exposed to temperature extremes. These injuries can be Hypothermic or Hyperthermic.

Hypothermic Thermal Injuries

Examples of hypothermic injuries include frostbite and cryogenic aerosol burns.

Frostbite

Frostbite occurs by the formation of ice crystals in the intracellular and extracellular space which precludes an osmotic process that can ultimately lead to cell death. Severity of frostbite is related to duration of exposure and to the temperature gradient of the skin surface (Lee and Hansen 2007).

Cryogenic Aerosol Burns

The use of aerosols to self harm is an emerging phenomenon. Aerosol sprays contain a chemical repellent stored in a liquid form. Such substances have an evaporation point at sub-zero temperatures which can cause a hypothermal injury similar to frostbite. They are usually deep injuries due to:

- Analgesic effect of cooling allows for a longer exposure time than that of thermal agents.
• The particular cohort of patients with this injury is unlikely to administer first aid.
• Possible poor compliance to treatment
  (Stefanutti et al 2010)

**Hyperthermic Thermal Injuries**

Hyperthemic injuries comprise; contact, flame, flash and scalds.

**Contact**
- Sources include radiators, fire surrounds, irons, hair straighteners, motorbike exhaust pipes
- Depth of tissue damage is dependant upon the temperature of the injuring agent and the amount of time the individual is in contact with it.
- Can cause full thickness injury in those unable to remove themselves from the heat source i.e. those who have lost consciousness, those who are incapacitated through drugs and/or alcohol and those at either end of the age spectrum, the very young and the very old.

**Flame**
- Common form of burn injury from various sources i.e. house fire, candles.
- High association with self inflicted injury
- Have a tendency to cause deep dermal or full thickness injuries especially if clothing catches fire
- Associated with inhalation injury in enclosed spaces

**Flash (Flame)**
- Often caused by ignition of a volatile substance i.e. putting petrol onto a bonfire/BBQ
- Commonly results in superficial injury to face, neck, hands or other exposed areas.
- Common cause of ocular injury

**Scald**
- Common form of burn injury from various sources i.e. bath water, kettles, hot drinks and hot fat.
- Approx 60% of burns in children are scald injuries, (EMSB 2004)
- Commonly cause superficial to superficial dermal injuries but can deepen without appropriate first aid and treatment
- Hot fat scalds are becoming more prevalent and typically cause injury at the deeper end of the tissue spectrum.

**2.2.2. Radiation Injuries**

**Sunburn/ Sun beds**
- Injury to the skin from over exposure to ultraviolet rays
- Erythema and inflammation are typical responses to overexposure however deeper burns can result from prolonged exposure. (Driscoll and Wagner 2000)
- Characterised by erythema, pain, tenderness, swelling, itching and blisters

**2.2.3. Chemical Injuries**

Chemical injuries are those which can be acidic or alkaline in origin. The extent of tissue damage caused by these injuries is dependant on the strength/concentration of the agent, the quantity, length of contact with the skin and the agent’s mechanism of action, (EMSB 2004).

These are complex injuries and should be referred directly to the burn service.
While there is residual chemical on the skin, burning continues. Therefore contaminated clothing should be removed and the burn washed with water for a long time. Chemical burns to the eye require continuous flushing with water. Swelling of the eyelids and eyelid muscle spasm due to pain may make adequate washing difficult. Careful retraction of the eyelids will facilitate correct irrigation. An early ophthalmological opinion is necessary in these cases.

2.2.4. Electrical injuries

Electrical injuries can be low voltage, high voltage or flash. Any electrical injury results from heat generation which leads to a thermal burn. Tissue damage is dependant on the resistance of the tissue, the type and duration of contact and the concentration of the current, (EMSB 2004). Again these are complex injuries and should be referred directly to the burn service.

2.2.5. Flash (Electrical)

- Can occur with high tension discharge
- The current does not pass through the individual
- Results in cutaneous tissue damage. Not usually deep unless clothing catches fire

3. Classification of Burn Injury

Burns are classified in a number of ways. They are classified by size, depth and complexity, all of which dictate their most appropriate management. Accurate classification is dependant upon accurate assessment.

3.1. Size classification

Burn size is classified in terms of the percentage of Total Body Surface Area (TBSA) burned. It is essential to establish an accurate TBSA percentage which can be measured using the following methods;

Lund and Browder chart
(See appendix 1)

- Body chart broken down in percentages according to age and TBSA
- Suitable for both adults and children as the chart allows for the differing body surface area proportions of children
- Produces the most accurate measurement of TBSA in children

Note: children have proportionally larger heads and smaller legs than adults

Rule of Nines
(See appendix 2)

- This chart breaks the body down into percentages of nine.
- It is taught on the Emergency Management of Severe Burns (EMSB) course and can be used as an assessment method for adults, usually pre hospital

Palmar Surface Method
(See appendix 2)

- Palmer surface of patients own hand, (closed fingers and palm)
- Suitable for small and/or patchy burns and accurate up to approximately 7%.
- Equates to 1% of TBSA.
- Burns of less than 1% TBSA, can be measured in cm²
3.2. Depth classification

Burns may be classified as either superficial or deep. Classification is dependant, on depth of tissue damage. The depth of a burn is proportional to the amount of heat applied and the duration of application (EMSB 2004). Influencing factors include mechanism of injury, age and existing co-morbidities. The depth of injured tissue is classified as follows:

- Erythema
- Epidermal/Superficial
- Superficial Dermal
- Deep Dermal
- Full Thickness.

Note: The terms 1\textsuperscript{st}, 2\textsuperscript{nd} and 3\textsuperscript{rd} degree are often used in the media and some other countries to describe burn depth. However, these terms offer no description of tissue injury and therefore can be misleading. They are therefore not accepted by the Northern Burn Care Network and should not used within the United Kingdom.

Figure 3 - Diagram of Burn Depth

<table>
<thead>
<tr>
<th>Indicator of Tissue Depth</th>
<th>Indication</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>Patency of blood vessels within the injury site</td>
<td>An even pink colour indicates good vessel patency and thus a less deep burn, while a fixed red/mottled staining or pale white colour can indicate vessel destruction and thus a deeper burn</td>
</tr>
<tr>
<td>Capillary Refill Time</td>
<td>Testing Capillary refill time can indicate the efficiency of blood flow through the skin</td>
<td>The spectrum of brisk refill to no refill indicates superficial to full thickness tissue damage respectively</td>
</tr>
<tr>
<td>Pain level at burn site</td>
<td>Depth of tissue damage</td>
<td>Pain receptors lie in the epidermal to mid dermal layers of the skin. The deeper the burn, the greater the extent of damage to</td>
</tr>
</tbody>
</table>
these receptors with a corresponding reduction of pain at the burn site.

<table>
<thead>
<tr>
<th>Sensation level at burn site</th>
<th>Depth of tissue damage</th>
<th>Nerve endings lie in the epidermal and mid dermal layers of the skin. The deeper the burn the less feeling at the burn site.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence/absence of hair/hair follicles at burn site</td>
<td>Depth of tissue damage</td>
<td>Hair follicles lie in the mid to deep dermis. The absence of hair (or if they pull out easily) denotes deeper tissue injury damage</td>
</tr>
<tr>
<td>Presence/absence of blisters at burn site</td>
<td>Depth of tissue damage</td>
<td>Blisters can be present in all depths apart from erythema</td>
</tr>
</tbody>
</table>

Incorporating these indicators into your clinical assessment of the wound, (as well as taking a full medical history and mechanism of injury), will aid depth assessment. Performing a holistic assessment is the key to establishing an accurate depth of tissue injury.

4. Tissue Injury

4.1. Erythema

- Injury only to the epidermis.
- Characterised by red (unbroken) skin with mild oedema.
- Brisk capillary refill
- Often very painful.
- Careful assessment of skin viability is necessary as skin may look intact but may not be viable.
- Push firmly upwards on affected area to assess whether skin is intact
- Skin may also blister at a later date thus dressing the area and review in 48 hours is advisable
4.2. Superficial/Epidermal

- Injury to the epidermis and the upper portion of the dermis
- Characterised by uniform pink colour to wound bed
- Brisk capillary refill
- Painful
- Blisters often present
- Heal spontaneously within 7 days for adults and 5 days for paediatrics by epithelialisation

4.3. Superficial Dermal

- Injury to the epidermis extending to the upper and middle portion of the dermis
- Characterised by pink colour but may have some white mottling.
- Less brisk capillary refill
- Painful
- Blisters often present
- Under suitable conditions, (keeping the injury warm, moist and free from infection, (Papini 2004), the wound will heal outwards from the adnexal structures, (hair follicles, sebaceous glands and sweat glands). (EMSB 2004)
- Should heal spontaneously within 10 - 14 days for adults and 7 – 10 days for paediatrics
4.4. Deep Dermal

- Injury to the epidermis and lower portion of the dermis
- Characterised by a fixed red capillary staining and/or pale white mottling
- Sluggish capillary refill
- Reduced pain and sensitivity
- Blisters may sometimes be present
- Ability to heal spontaneously often depends on the amount of adnexal structures remaining. In some cases a deep dermal wound will heal spontaneously if the wound environment is optimised by being kept warm, moist and infection free, (Papini 2004). This may be after a prolonged period with the possibility of significant contracture and scarring.

4.5. Full Thickness

- Injury to epidermis and all of dermis. May extend beyond dermis into subcutaneous layer, muscle and bone
- Characterised by white to charred colour.
- Do not blanch (no capillary refill)
- Dry leathery appearance
- Insensate (but may be painful around edges)
- Does not bleed on pinprick
- Absence of blisters in most cases (but may be some blistering)
- No regenerative elements remain in full thickness burn injury. Epithelialisation from the wound cannot occur. Wound can heal from the edges but prolonged length of time associated with significant contracture and scarring
It is important to note that burns are rarely uniform in depth therefore there may be a range of different depths in any particular burn.

5. Complexity Classification

Appendices 3, 4 and 5 provide a visual classification of complex, non-complex and complex non-burns. The information below provides the rationale and explanation for burn complexity.

5.1. Age

Extremities of age, <1 years old and >75 years old, should be referred to a Burn Service for assessment because:

- Elderly patients are less physiological reserve and have thinner skin, thus presenting the potential for deeper burns. These injuries are likely to become more complicated, as the elderly are more prone to pre-existing co-morbidities (EMSB 2004)

- Paediatric patients have immature immune systems thus increasing the risk of infection. Children under 5 also have thinner skin, thus presenting the potential to sustain deeper burns and have smaller airways and difficult vascular access (Rodgers et al 2000), (Thombs et al 2006)

5.2. Depth

Deeper burns may not heal spontaneously or may take longer to heal with the potential complications of infection, scarring and contracture. These burns should be referred according to appendices 3, 4 and 5.

5.3. Size

The greater the surface area of the body injured, the greater the mortality rate. These injuries should be referred as per appendices 3, 4 and 5.

5.4. Pre-existing Conditions

A number of pre-existing conditions can influence the outcome of a burn injury, for example, patients with renal or liver disease or metastatic cancer have a higher mortality and morbidity risk (Tombs et al 2007), patients with diabetes generally sustain deeper wounds and are more at risk of infection (Campbell et al 2002) and pregnancy can inhibit a woman's ability to respond to the injury and the safety to the woman and foetus can be compromised (Guo et al 2001). A list of pre-existing conditions which can make a burn more complex can be found in appendices 3, 4 and 5.

5.5. Site

The following significant sites must be referred to a Burn Service because;

Facial/Neck
Facial/neck burns are often associated with significant swelling which can compromise the patient’s airway. Post acute facial burns also have the potential for aesthetic and functional complications.

Hands
Burns to the hands have the potential to lead to functional complications and impairments depending on the depth of the injury (Kawalski and Greenhalch 2007).
Perineum/genitalia
Perineum/genitalia burns are more prone to infection and are difficult to manage in the community.

Feet
Burns to the feet have a high complication rate of delayed healing, infection and hypertrophic scarring and therefore require more aggressive acute management (Hemmington-Gorse et al 2007)

Flexure Creases
Flexure creases have increased potential for functional complications. Areas such as the axillae, groins, antecubital fossa and behind the knee are more at risk of developing scar contractures.

Circumferential Burns
Circumferential burns have the potential for respiratory or circulatory compromise depending on the site of the burn (Kavanagh and De Jong 2004).

5.6. Mechanism of Injury
Burns sustained from the following mechanisms of injury should be referred to the Burn Service.

Chemical
Chemical burns are predominantly deep injuries due to the progressively destructive nature of the chemicals penetration into tissues. Chemicals with systemic effects comprise;

Hydrofluoric Acid
Hydrofluoric acid causes the systemic effect of hypocalcaemia as a result of fluoride ions depleting the body’s calcium reserves. Burns >2% body surface area can be fatal (EMSB 2004).

Phenol
Phenol burns lead to rapid systemic absorption which is directly proportional to the surface area of exposure which can cause liver and kidney damage, (Hathaway et al 1991).

Petrol (Immersion)
The complex hydrocarbon properties of petrol cause injury to the lungs, liver, spleen and kidneys. There is also the possibility of increased fluid loss due to an increase in cell membrane permeability.

Electrical
Low voltage injuries from domestic electrical supply, often cause small full thickness injuries to hands and underlying damage to structures e.g. nerves, tendons is no always visible. High tension electrical injury can cause extensive tissue and muscle damage

Inhalation
Inhalation injuries can cause injury to various parts of the respiratory tract and can increase the likelihood of mortality in all burns (EMSB 2004)

Steam
High pressure steam injury has the potential to cause pulmonary injury (Still et al 2001) as steam has a heat carrying capacity 4000 times higher than hot dry air (Moritz et al 1994).
Non Accidental Injury
Detecting and managing non-accidental injury is crucial as repeated abuse is associated with significant morbidity and mortality (Hettiaratchy and Dziewulski 2004).

6. Non-Complex Wound Management Process

6.1. First Aid
(See appendix 10 for care plan)

There is much discussion around cooling of the burn wound. Yuan et al (2007) advocate cooling the burn with running cool/tepid water for at least 20 minutes. This is said to decrease pain from damaged nerve endings, decrease immediate cell death due to hot temperatures, decrease the inflammatory response, Prevent vasoconstriction and decrease or prevent oedema formation. The suggested temperature is 15°C to prevent possible hypothermia and ice should never be used as this will promote vasoconstriction and potentially deepen the burn. Chemical burns should always be irrigated with copious amounts of water. Some recent work has also demonstrated that even if there is a delay in applying appropriate first aid, then application of water even up to 3 hours post injury will have a beneficial effect on re-epithelialisation and scar tissue production, this may have implications for community staff when assessing patients.

Once the wound is cooled then it should be wrapped in a clean covering. Cling film (Plasticised Polyvinyl Chloride) is the covering of choice as it excludes air and bacteria and will help alleviate pain. It also allows the wound to be viewed for assessment without having to remove it does not shed fibres into the wound and is easily removed without causing further trauma. It is important to lay the film on the patient not wrap the area as swelling may lead to constriction, in addition to not use for facial burns. Hand burns can be covered with a clear plastic bag so not to restrict mobility.

6.2. Pain management
Burn wounds can be extremely painful. Initially this may be dependant on depth of injury as progressive damage to tissues affects the nerve endings. Thus the deeper the injury the less pain/sensation is generally felt at the wound site (Richardson and Mustard 2009). However burn injured patients can have pain from all depths of burn injury and during all stages, from the acute injury itself through to healing and rehabilitation. It is therefore important to consider that burn pain can be protracted and also that a burn injured individual can experience different types of pain. These are:

Immediate Pain
Initial exposure of nerve endings during acute injury coupled with inflammatory stimulation of said fibres can cause intense pain (Richardson and Mustard 2009)

Procedural Pain
Procedural pain is generated by therapeutic interventions such as dressing changes and physiotherapy, this type of pain is intense but short in duration. (Patterson et al 2004)

Anticipatory Pain
Anticipatory pain is described as incurring or intensifying pain through expectation, (Woo 2010). It is often related to previous unpleasant experiences or the perception of an impending unpleasant experience, for example, increased pre-dressing change anxiety has been significantly correlated with an increase in pain, (Woo 2010)
Background Pain
Background pain is present while the patient is at rest. This type of pain is usually less intense but protracted. (Patterson et al 2004)

Breakthrough Pain
Unpredictable surges of pain at various time intervals (Richardson and Mustard 2009)

Neuropathic Pain
Neuropathic pain can originate from disordered re-growth of nerves or neuroma (growth or tumour of nerve tissue), (Richardson and Mustard 2009)

6.3. Pain Assessment
(See appendix 11 for Care Plan)

Frequent and continued pain assessment is needed to ascertain pain type/severity and to guide pain management. Simple, patient friendly scales can be used to form a structured pain assessment. While numerical scales are useful to gauge pain severity in adults pictorial representations of pain scales are more suitable for use with children, (Wong and Baker 1988).

There are a wide range of pharmacological and non-pharmacological interventions used to treat burn pain. These can be used separately, or as a combined approach to pain management. The decision of which pain relief to use will be dependent on pain type, intensity and the individual characteristics of the person requiring the pain relief. All pharmacological methods of pain control must be prescribed and their effects monitored and documented.

6.4. Pruritus (Itch)
Pruritus often replaces pain as a source of discomfort, anxiety and distress (depending on its intensity) when burn wounds have healed. Affected individuals may attempt to relieve itch by rubbing or scratching the affected area and this may cause trauma/blistering/breakdown to newly healed and fragile skin, (Summer et al 2007). Prevalence of itch post burn injury is high with reported intermittent to persistent itch at 60% to 87%, (Vitale et al 1991, Willebrand et al 2004). For this reason antihistamines should be considered first line management and be administered alongside analgesia.

6.5. Burn wound cleansing
(See appendix 12 for care plan)

The aim of burn wound cleansing is to help create the optimum local conditions for wound healing by removal of debris, exudates, foreign and/or necrotic material and other micro-organisms (Dougherty & Lister 2007). This will also assist in assessment of burn size and depth. These solutions are currently used:

NaCl 0.9%
Physiologically balanced solution that has a similar osmotic pressure to that already present in living cells and thus compatible to human tissue (Herndon 2007)

Tap water and Soap
Evidence from various research studies suggests that there is no increased risk of infection in acute wounds when using tap water. (Angerras 1992, Fernandes et al 2003)
Soap and water is used by most Burns Units and is cited by the European Working Party of Burns Specialists as a solution of choice for burn wound cleansing, (Alsbjorn et al 2007). Soap should be non-perfumed to avoid potential skin/tissue irritation.

6.6. Debridement

Burn injuries are subject to certain degrees of dead and devitalised tissue, slough and other debris. This is dependant on age and depth of the wound. Acute burn wounds commonly have dead tissue and blisters present which need to be removed. The removal of devitalised tissue or foreign material from and around a wound is essential to optimise healing (Leaper 2002). If not removed, it can increase the risk of wound infection, (Ayello et al 2004) and prevent epithelial tissue from migrating across the wound bed which will inhibit timely wound healing. Debridement is also necessary to assist in assessment of burn size and depth.

6.7. Blister Management

There is conflicting evidence within international burns literature concerning best practice for the management of blisters. However consensus leans towards the conclusion that blisters should be debrided as their presence will impede wound depth assessment, limit function and increase the potential for infection.

Guidelines for Blister Management: adapted from Sargent (2006)

**Blister size**

< 1cm: can be left intact as unlikely to rupture spontaneously or impede healing.

> 1cm: should be debrided as more likely to rupture spontaneously

**Blister type:**

- *Thin walled blisters:* should be debrided because a) they are prone to rupture and b) they occur on hair lined skin surfaces which are of increased infection risk.
- *Thick walled blisters:* Thicker skin occurs on hands and feet. If 1cm or below and not limiting function and/or mobility they can be left intact. If larger they are more likely to limit these actions and thus should be debrided.

**Infection Prevention**

A blister is non-viable tissue that is a potential source of wound infection if not removed

**Wound assessment**

Blisters should be debrided to facilitate proper inspection of the wound bed which will aid depth assessment.

**Functional outcome**

Blisters should be debrided when their presence impedes the function and/or mobility of the burn injured individual.

**Aesthetic outcome**

Blisters should be debrided to facilitate timelier wound healing which will limit the potential for abnormal scarring.

To debride you need: a) adequate pain relief b) sterile forceps and scissors c) a competent practitioner to carry out the procedure. If these are not available please refer to your local burn service.
7. Dressings for Non-Complex Burns

Wound dressings can have a profound influence on healing, thus making them an essential part of wound management (Atiyeh et al 2002). The outcome of the burn can be significantly influenced by the choice of dressing.

When selecting the most appropriate dressing many factors should be taken into account:

- Burn depth
- Burn site
- Burn TBSA
- Type of first aid (use of unclean water may increase infection risk)
- Cause of burn
- Any co-morbidities that may influence dressing choice
- Patients ability to manage/tolerate dressing
- Health professionals ability to manage dressings
- Functional impact of dressing
- Associated pain (and control of pain)
- Cost

(Kavanagh and De Jong 2004)

7.1. Dressing Principles

(See appendix 13 for Burn Wound Care Formulary)

Provision of a moist wound environment

This has been shown to accelerate healing by as much as 50% as opposed to a dry environment caused by air exposure, (Geronemus et al 1982). A moist environment not only promotes autolytic debridement of devitalised tissue but also provides a surface over which migration of epithelial cells can move more easily, Fallabella (1998).

Note: Burn wounds are initially wet in the first 24-48 hours of injury. This is the normal ‘hyperaemic’ phase of injury. After this point (excluding the incidence of infection) they will generally be quite dry wounds that require moisture to assist with timely healing.

Absorbency

Dressings should have the right level of absorbency for status of the burn wound/ stage of healing. A dressing that does not have the correct capacity for absorbency for any particular burn wound will engender ‘strike through’ of exudates which will increase the potential for infection.

The provision of a moist environment does not remove the need to prevent the build up of excessive moisture/exudates that can lead to skin maceration, delayed wound healing and infection. (Alsbjorn et al 2007). Balancing the need for moisture with the level of exudates of any given burn wound is crucial to aid timely healing and prevent complications.

Protect the wound from micro-organisms

Dressings should be impermeable to micro-organisms. Strike through of exudates allows passage of bacteria in and out of its field (Hallet and Hampton 1999) Consider dressing absorbency in this context.

Antimicrobial properties

Burns have the potential to become colonised or infected. Potential increases with:

- Method of first aid – (using unclean water to extinguish flame/rolling on unclean surfaces)
- depth of wound – (deeper burns will have more necrotic tissue)
Site of wound – (feet, axilla, groin, perineum)
Co-morbidities – (i.e. Diabetes)

Non-adherence
Dressings need to be applied and removed without causing trauma. Any dressing that adheres to the wound (and that is not its intended mechanism of action) may damage any healthy tissue on removal.

Conformable to wound surface
Dressings/topical creams and ointments should be in contact with the burn wound surface in order for them to be effective. (Alsbjorn et al 2007)

Keep the burn patient warm and avoid any unnecessary exposure
A drop in wound temperature below 37 degrees Celsius delays mitotic activity for up to 4 hours (Myers 2004).

Allow adequate movement
Joints should always be dressed in a range that maximises movement. Concerning the hands, fingers should be dressed individually, or if there is no alternative the thumb should be dressed separately from the other digits, with the dressing in contact with the wound in between each digit.

Be comfortable for the patient
Dressings should be comfortable and manageable for the patient otherwise they are less likely to comply/cope with treatment which in turn may be detrimental to the healing process.

Cost effectiveness
Choosing the most appropriate dressing for the characteristics of any particular wound/patient will reduce waste, facilitate timely wound healing and promote cost effectiveness

Note: Inclusion of categories of products does in any way endorse specific products; users should select products that meet the principles of managing burn wounds outlined above.

7.2. Types of Dressings

7.2.1. Antimicrobials
Topical antimicrobial dressings are impregnated or coated with various agents which provide sustained antimicrobial effects. Their aim is to manage wound bio burden and reduce the risk of invasive infection through minimisation of bacterial colonisation (Wasiak 2010). Current antimicrobials include dressings containing; iodine, Polyhexamethylene Biguanide (PHMB), Dialkyl Carbamoyl Chloride, (DACC), honey and silver, in relation to burns the latter two are most commonly utilised.

Silver Containing Products
Silver sulphadiazine (SSD) cream, is the primary form of silver, which has an established use in the topical management of burns (Klasen 2000). SSD cream is effective against a wide array of gram positive and gram negative organisms. There is also evidence to suggest antifungal and antiviral benefits (White and Cooper 2005).

Honey Products
The use of honey within dressing products has been found to provide a multitude of antimicrobial and anti inflammatory benefits. These include promoting wound debridement, stimulating healing, maintaining a wound moist environment and assists in deodorising
wounds (Cutting and Davis 2005). It has proven to be effective against a wide range of wound pathogens (Davis 2005). Discomfort has been reported occasionally with the use of Honey Products (Cutting and Davis 2005), particularly in more superficial burns or when deeper burns are granulating.

7.2.2. Foam Dressings
The majority of foam dressings are made out of polyurethane foam. They provide patient comfort, are extremely conformable and highly effective for the absorption of exudate, whilst providing a bacterial barrier to prevent contamination (Leonard et al 2009). Their primary use is for light to moderate exuding, clean, granulating wounds, and care needs to be taken when using them with burn wounds unless a suitable moisture agent has been added.

7.2.3. Low Adherent Products
These dressings usually consist of polyamide net coated with soft silicone and their meshed composition allows exudate to drain away from the wound bed (Wasiak et al 2010). Their primary benefit lies with their ability to reduce tissue trauma and pain, during dressing procedures. They are very useful in painful areas like hands or newly debrided burn wounds.

7.2.4. Hydrogels
Hydrogel dressings have high water content and contain insoluble polymers. These products are usually used to donate fluid to dry and/or sloughy wounds and aid wound autolytic debridement, but some have the capacity to manage low levels of exudate (Edwards 2010). They are suitable for use throughout all stages of the wound healing process. They are used to debride full thickness burn wounds or to manage pain in superficial wounds in their sheet versions.

7.2.5. Hydrocolloids
Hydrocolloid dressings form a gel once in contact with wound exudate; this promotes autolytic debridement (Wasiak et al 2010). These dressing products are suitable for use throughout the wound healing process and may provide pain relief by ensuring the nerve ending remain moist (Morgan 2000). They are able to absorb low to medium levels of exudate and do not require secondary dressings. However, care should be taken when using these in burns that there is no contamination of the wound prior to application as they create an anaerobic environment in which bacteria can thrive.

7.2.6. Secondary Dressings
A dressing consists of two parts; the primary wound contact layer and the secondary dressing. The key purpose of a secondary dressing is to keep the primary dressing in contact with the wound and absorb exudate. Although some dressings contain both layers in a single unit, others require the selection of an appropriate, separate secondary layer. In either instance it is essential that the amount of exudate is considered prior to selecting a suitable dressing product.

8. Infection
Burns wounds by nature are prone to infection from a variety of different micro-organisms. Skin usually provides a barrier to prevent bodily invasion of microorganisms however when this barrier is breached by a burn injury microbes gain access into the tissues and increase the potential for infection. The presence of any necrotic tissue will compound this potential. Infection can occur at any stage of the wound healing process. It is important to be proactive in the prevention of infection and assess the wound at every dressing change for signs of clinical infection. Clinical infection follows a cellulitic profile of:
Heat
Local to and surrounding the wound site

Redness
Most wound bed tissue and even newly healed tissue has a red/pink appearance. This is normal. Redness originating from infection will track outside the margins of the wound/healed areas and often be accompanied by one or all of the other signs of infection

Swelling
Local to and surrounding the wound site

Pain
Local to and surrounding the wound site

Where a burn has the above characteristics and is on a functional area e.g. hand then the patient may protect this area, leading to loss of function

8.1. Colonisation
Colonisation occurs when bacteria are present on the wound surface yet there are no clinical signs of infection, (Church et al 2006). The circumstances surrounding the burn injury, extent and depth of injury, health status and lifestyle if the injured individual, along with the type and amount of microorganisms colonizing the wound can all influence the potential future risk of clinical infection, (Erol et al 2004)

*For these reasons all burn wounds should be swabbed on initial presentation to ascertain a baseline status and check with your local burn service for information about protocols for the use of antibiotics

8.1.1. Management of colonised/infected burn wounds
An infected or colonised burn wound can lead to further tissue damage, delay healing and increase the potential for complication such as scarring and contracture. It is important that we use the appropriate measures to prevent and treat infections

Dress wound with anti microbial dressings such as silver
Antimicrobial dressings alone may be sufficient to control/ limit/ eradicate microorganisms on colonised wounds without the need for antibiotics. This will be dependant on the individual circumstances of the injured individual, the level of colonisation present and whether the colonisation is inhibiting normal wound healing. Clinically infected wounds should be treated with both antibiotics and antimicrobial dressings.

Dress and assess wound regularly 48hrs after initial injury then every 72 hours
Colonised or infected wounds should be reviewed on a regular basis to assess the effectiveness of treatment and prevent any wound/systemic deterioration.

Antibiotic treatment according to assessment and wound swab results
Note: individuals with burn wounds should not be given antibiotics for prophylaxis. Only when clinical signs of infection are apparent and/or confirmed by swab results, or delayed wound healing is apparent due to heavy colonisation, should antibiotics be considered.

Always adhere to good hygiene and aseptic techniques
This rule should apply to all wound management whether colonisation/infection is indicated or not.
Burn wounds that are healing in a timely manner for injury depth, and show no clinical signs of infection only need to be swabbed if any changes in the status of the wound i.e.

- Wound develops clinical signs of infection
- No clinical signs of infection but wound shows signs of delayed healing which may indicate colonisation

8.2. Toxic Shock Syndrome
This is a life threatening infection that can happen in any percentage burn. It is usually more common in minor burns and originates from toxins released by the Staphylococcus aureus pathogen which can colonise in the wound (Young & Thornton 2007). Toxic Shock Syndrome (TSS) is more prevalent in children as they generally have a weaker immune system. The onset of this syndrome happens very rapidly and accurate assessment and treatment is vital. It is imperative to commence treatment from the first signs of:

- Rash
- Diarrhoea
- Vomiting
- Circulatory shutdown

Treatment
This is a medical emergency and rapid transfer to the nearest emergency department is vital. It may also be appropriate to initiate discussions with your local Burn Service as the affected individual will most likely continue their care at a burn facility once the acute episode has been stabilised.

8.3. Tetanus
Patients have the potential to develop Tetanus as a complication of burn injury (Cassell 2002). This is a disease caused by the pathogen Clostridium Tetani. The condition presents as a pattern of muscle stiffness starting in the jaw, (lockjaw), followed by neck stiffness, swallowing difficulties and rigidity of the abdominal muscles. Laryngospasm can also occur. Therefore a Tetanus protocol should be followed when managing a burn injury (Alsbjorn et al 2007).

9. Rehabilitation and Aftercare
Rehabilitation from burn injury should begin on the date of injury itself. This will optimise the potential to restore the patient to an optimum form, function, sensory and psychological post burn state. Rehabilitation begins with appropriate assessment and management of the burn injury to facilitate timely healing and thus reduce the risk of abnormal scarring, contracture and function.

Promotion of movement and function:
- Encourage patient to move injured area
- Balance any need for elevation due to swelling with the need for movement
- Ensure adequate pain relief to help patient undertake functional exercises

Note:
Burns over flexure surfaces may have increased risk of functional problems and would benefit from referral to your local burn facility

Acute or recovering full thickness injuries may also have the complication of tendon damage and should not be mobilised without proper assessment of the injury. Referral to your local burn service is then necessary
First line scar management techniques for healed burns:
Once healed, all burns should commence a scar management regime of moisturising, massage and UV protection. This is aimed at reducing the potential for abnormal scarring, contracture and altered pigmentation of newly formed tissue:

Moisturising
Moisturising with non-perfumed creams helps to return moisture to skin that has lost varying degrees of secretory function due to burn injury. It helps to stop newly healed skin from drying out, cracking and/or contracting. For best effects this is performed in combination with massage.

Massage
Massage provides pressure which helps to prevent/minimise restrictive bands of scar tissue and/or raised hypertrophic scarring. It can also make scar tissue more pliable and reduce risk of contracture. (Edgar and Brereton 2004)

UV (sun) protection
Healed skin generally has some degree of hyper-pigmentation and this should fade with time, However exposure to UV light (daylight) can render this hyper pigmentation permanent and can give the healed tissue a 'stained' appearance. This phenomenon can be avoided/limited by daily use of sun screen. Factor 50 is recommended.

Patient education
Patients must be made aware of the need to comply and continue with these skin care techniques for up to two years post injury as scar tissue can continue to be active within this time period

10. Importance of Accurate Medical Documentation
The importance of effective documentation cannot be stressed enough especially in our current world of litigation and questionable motives behind actions. Accurate documentation is required to record pertinent facts, findings, and observations about an individual's health history including the past and present illnesses, examinations, tests, treatments, and outcome. The medical record chronologically documents the care of the patient and is an important element contributing to high quality care. Documentation is extremely important as without it facts can be forgotten, misinterpreted or even omitted entirely.

10.1. Documentation of Burn Wounds:
The documentation of burn wound status and progress should inform action:

- Use burn wound assessment/evaluation chart to document wound status and progress
- This should be available to all health care professionals involved in the management of any particular patient so that they are fully informed as to treatment plans and histories
- Treatment objectives should be evident on the plan of care and evidence of ongoing reassessment documented.
- Changes to planned wound care should be documented including rationale for any change.

10.2. History Taking
The history of a burn injury can give valuable information about the nature and extent of the burn, the likelihood of any complications/complexities, and probability of other injuries. The exact mechanism of injury and any initial treatment must be established, along with a medical history which outlines any previous medical problems, medications, allergies, vaccinations and social circumstances.
Note: taking a medical history should not be subject to any delay as these variables are crucial to any subsequent diagnosis and treatment.

Factors to be considered
- Cause of the injury (Consider Non-Accidental Injury (NAI))
- Type
- Depth
- Location
- Any first aid carried out at the time of injury, with what and for how long
- Patients general condition
- Medical/mental health issues
- Social considerations
- If hands are involved, ascertain which is the patient's dominant hand and whether this will mean the patient is unable to carry out Activities of Daily Living (ADL) for themselves

11. Referral Guidelines
(Refer to appendices 3, 4 and 5)

12. Treatment factors

Many non-complex burn injuries can be safely managed outside of specialist burn services. However some may need support for specific treatment factors or post acute complications.

Dressings
Even on minor burn injuries dressings can be complex if on difficult to dress areas. Dressings may be large and/or time consuming. Patients can be referred if these factors inhibit their burn management.

Physiotherapy
Individuals with minor burns over joints should be referred for physiotherapy for assessment. Patients with any other restrictions to normal movement can also be referred to Physiotherapy.

Occupational Therapy
Patients unable to achieve a good functional position or with significant oedema should be referred for assessment regarding splinting.

Psychology
Psychological distress can be experienced regardless of burn size, site and mechanism of injury. Patients can be referred for psychological support.

Pain Management
Pain experience is highly subjective and not exclusive to complex injuries alone. Minor burns have the potential to be extremely painful. Therefore patients with minor injuries can be referred for pain management.

Social factors
Ability to carry out basic needs (washing, cooking, and toileting) may be compromised due to burn injury. For example; minor burns affecting both hands and feet can limit self care and/or mobility. Inability to self-care may indicate need for referral.
13. Post Acute Complications

Infection
Infection can occur at any stage post burn injury. This can delay healing and increase potential for additional complications such as scarring and contracture. Clinically infected burn wounds indicate the need for referral to your local burn service for management.

Unhealed after 7 days (Paediatrics) 14 days (adult) post injury
Delayed wound healing indicates that there has been a complication with the normal wound healing process. This increases the potential for infection, contracture and scarring and referral for wound management is indicated.

Scarring
As a general rule, wounds that heal in a timely manner without complication are less likely to scar. However this may not always be the case. Individuals who develop abnormal scarring and/or altered pigmentation post healing can be referred for specialist support.

Delayed psychological trauma
Psychological distress is not always immediate or apparent post injury. Individuals who develop psychological problems post injury can be referred for psycho/social support.
14. References


15. Acronyms

**ADL:** Activities of Daily Living

**DACC:** Dialkyl Carbamoyl Chloride

**EMSB:** Emergency Management of Severe Burns

**NAI:** Non Accidental Injury

**NBCN:** Northern Burn Care Network

**PHMB:** Polyhexamethylene Biguanide

**SSD:** Silver Sulphadiazine

**TBSA:** Total Body Surface Area

**TSS:** Toxic Shock Syndrome
16. Glossary

Adnexal
Adnexa refers to the appendages of an organ.

Anticipatory Pain
Pain that is expected by the patient.

Background Pain
Background pain is pain which is present while the patient is at rest. This type of pain is usually less intense but is protracted.

Breakthrough Pain
Breakthrough pain is unpredictable surges of pain at various time intervals.

Coagulative Necrosis
Necrotic tissue which is firm retains its architectural pattern and is dense in comparison to surrounding tissue.

Colonisation
Development of bacterial infection in an individual, as demonstrated by a positive culture. The infected person may have no signs or symptoms of infection while still having the potential to infect others.

Co-morbidities
Co-morbidities are other co-existing illness(es) in addition to the particular illness which is currently most significant.

Contracture
Contracture refers to the tightening of the skin after a deep dermal or full thickness burn. When skin is burned, the surrounding skin begins to pull together, resulting in a contracture. It needs to be treated as soon as possible because the scar can result in restriction of movement around the injured area.

Cutaneous
Pertaining to the skin.

Debridement
Debridement is the process of removing non-living tissue from burns and wounds.

Deep Dermal
Deep dermal burns are injuries to the epidermis and lower portion of the dermis. These burns are characterised by a fixed red capillary staining and/or a pale white mottling.

Dermis
The dermis is a layer of skin between the epidermis (with which it makes up the cutis) and subcutaneous tissues, that consists of connective tissue and cushions the body from stress and strain.

Devitalised Tissue
Devitalised tissue is tissue that has been starved of oxygen and nutrients over a period of time. It can have a range of presentations from hard black and fixed dead tissue to soft, stringy yellow or green slough or loose tissue/blistering as a result of thermal or chemical injury.
**Epidermis**
The epidermis is composed of the outermost layers of cells in the skin. It is composed of 4 or 5 layers depending on the region of skin.

**Epithelialisation**
Epithelialisation is the re-growth of skin over a wound.

**Erythema**
Erythema is redness of the skin caused by hyperaemia of the capillaries of the lower layers of the skin.

**Eschar**
A piece of dead tissue that is cast off from the surface of the skin, particularly after a burn injury. Eschar may be allowed to slough off naturally or it may require surgical removal.

**Exudates**
Exudate is any fluid that filters from the circulatory system into wounds or areas of inflammation.

**Flexure**
Bend or fold.

**Full Thickness**
Full thickness burns are injuries to the epidermis and all of the dermis. Injury may extend beyond the dermis into subcutaneous layer, muscle and bone. These burns are often characterised by white to charred colour.

**Hyperaemic**
Describes the increase of blood flow to different tissues in the body. Clinically, hyperaemia in tissues manifests as erythema.

**Hyperthermic**
Elevated body temperature due to failed thermoregulation.

**Hypothermic**
Decrease in body temperature below that required for normal metabolism and body function – 35.0 C

**Hypertrophic Scar**
Hypertrophic scar is a protruding scar resembling a fibroma or collagen nevus.

**Immediate Pain**
Immediate pain is the initial exposure of nerve endings during acute injury coupled with inflammatory stimulation of fibres that can cause intense pain.

**Laryngospasm**
Laryngospasm is the spasmodic closure of the larynx.

**Larval Debridement**
Larval debridement is the use of Larvae of the Green Bottle Fly to remove necrotic and devitalised tissue from fixed burn eschar and slough that is not dry and hard.
**Larvae**
Is a distinct juvenile form many animals undergo before metamorphosis into adults. Often termed maggots.

**Liquefactive Necrosis**
Necrosis marked by a circumscribed lesion consisting of the fluid remains of necrotic tissue that was digested by enzymes.

**Maceration**
Softening and breaking down of skin resulting from prolonged exposure to moisture.

**Mitotic**
Process by which a cell divides.

**Non-pharmacological**
Therapy or treatment which does not involve drugs.

**Necrosis**
Premature death of cells in living tissue.

**Neuropathic Pain**
Neuropathic pain is pain that can originate from disordered re-growth of nerves or neuroma. (growth or tumour of nerve tissue)

**Ocular Injury**
Ocular injuries are those pertaining to, or affecting the eye.

**Oedema**
Excessive amount of water fluid accumulated in the intracellular spaces, most commonly present in subcutaneous tissue.

**Osmotic Pressure**
The pressure required to stop osmosis through a semi-permeable membrane between a solution and pure solvent.

**Patency**
A state of being open or exposed.

**Pathophysiology**
The functional changes associated with or resulting from injury.

**Pharmacological**
Therapy or treatment which involves drugs.

**Procedural Pain**
Procedural pain is pain that is generated by therapeutic interventions such as dressing changes and physiotherapy. This type of pain is intense but short in duration.

**Pruritus**
An itching sensation or feeling.

**Rehabilitation**
Rehabilitation is a programme of therapy designed to restore independence and reduce disability.
Rule of Nines
Assesses the percentage of burn and is used to guide treatment decisions. It works by splitting the body into anatomical regions that represent 9% (or multiples of 9%) of the total body surface area.

Safeguarding
Promoting the welfare of children and young people that reflect the needs of the children they deal with; or to protect vulnerable adults from abuse or the risk of abuse.

Scar Management
Scar management is the physical and aesthetic components as well as the emotional and psychosocial implications of scarring.

Sharp Debridement
Sharp debridement is the removal of dead and devitalised tissue from healthy tissue either using scissors and forceps or a scalpel.

Slough
A layer or mass of dead tissue separated from surrounding living tissue, as in a wound, a sore, or an inflammation.

Stasis
Stoppage or diminution of flow as of flow of blood or other body fluid.

Subcutaneous
A layer of tissue immediately below the dermis.

Superficial Dermal
Superficial Dermal burns are injuries to the epidermis which extend to the upper and middle portion of the dermis. These burns are characterised by a pink colouring, however, there may be some white mottling.

Surgical Debridement
Surgical debridement is the excision or wider resection of dead and devitalised tissue, including the removal of healthy tissue from the wound margins where the eschar needs to be removed quickly due to size/status/anatomical position of the burn injury that would otherwise present complications of infection, contracture and scarring. This process should only be undertaken by surgeons or practitioners with surgical training.

Systemic
Affecting the whole body, or at least multiple organ systems.

Tetanus
Tetanus is a rare but often fatal disease that affects the central nervous system by causing painful muscular contractions. It begins when tetanus bacteria enters the body, usually through a wound or cut exposed to contaminated soil.

Thermal Injuries
Thermal injuries are injuries that occur with skin exposure to extreme temperature.

Toxic Shock Syndrome
Toxic Shock Syndrome (TSS) occurs where poisonous substances produced by bacteria enter the bloodstream.
**Vasculature**
Arrangement of blood vessels in the body or in an organ or body part.
17. Appendices

17.1. Appendix 1: Lund and Browder

% Total Body Surface Area Burn
Be clear and accurate, and do not include erythema
(Lund and Browder)

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<td>6½</td>
<td>5½</td>
<td>4½</td>
<td>3½</td>
</tr>
<tr>
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<td>3¾</td>
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<td>4½</td>
<td>4¾</td>
<td></td>
</tr>
<tr>
<td>C = 1/6 OF ONE LOWER LEG</td>
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<td>2¾</td>
<td>3</td>
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17.2. Appendix 2 Rule of Nines and Palmar Method
17.3. Appendix 3: Adult Referral Criteria and Guidelines

**NON-COMPLEX BURN**
* Complete and Fax NBCN Non-Complex Burn Referral Form *
- Size: 1-2% deep dermal to full thickness loss
  - ≥ 5% epidermal/superficial dermal
- Wound Healing: Any wound unhealed at 14 days or suspicion of clinical infection
- Rehabilitation: Any healed wound where scarring suggests there may be a significant aesthetic/functional impact, loss of function or psychological disturbance.

**COMPLEX BURN**
* Complete and Fax NBCN Complex Burn Referral Form *
- Total Body Surface Area (TBSA)/Depth: ≥15% (above 16 years)
  - ≥10% (65 years and over)
  - ≥2% deep dermal/full thickness
- Any depth and size of the following:
  - Mechanism: All burns associated with chemical or electrical injuries, exposure to ionising radiation or high pressure steam, or suspicion of non-accidental injury
  - Site: Buttocks, perineum, facial, neck, testes, joint or flexural creases
  - All circumferential burns and deep dermal/full thickness to hands
  - Existing Conditions: Cardiac limitation, respiratory limitation, diabetes, pregnancy, renal impairment, immune suppressive disorders, hepatic impairment, carcinoma, infected burn injuries
- Associated Injuries: All burns associated with inhalation or trauma

**COMPLEX NON-BURN**
- Progressive Non-Burn Skin Loss ≥5%: Blistering skin disorders e.g. Toxic Epidermal Necrolysis, Staphylococcal Scalded Skin Syndrome, Stevens-Johnson syndrome
- Inhalation injury with no cutaneous burn should follow local ICU referral guidelines

**REFERRAL NOT NECESSARY**
*Unless indicated by complexity*
- Erythema ≤5%
- Superficial ≤2%

**FLUID GUIDELINES**
- ≥ 15% TBSA - IV fluid resuscitation according to Parkland Formula (age 16-65 years old)
- ≥ 10% TBSA if multiple comorbidities - IV fluid resuscitation according to Parkland Formula (>65 years old)
- Contact Burn Unit for advice re: NBM, sedation, analgesia and future fluids

**IV Access:** All adults with burns ≥15% should have two well secured IV cannulae

**IV Resuscitation Fluids:** All adults with burns ≥15% TBSA will receive fluid according to the Parkland Formula:
- 3 ml/kg% burn over 24 hrs from time of injury given 1/4 in the 1st 8 hrs & 1/4 in the 2nd 16 hours given as Hartmann’s solution

**Analgesia:** Ensure adequate analgesia is given prior to intervention/transfer. Consider use of IV opiates Entonox

**Catheterisation:** All adults with burns ≥15% TBSA should have an appropriate size catheter. Consider catheter if burn ≥10% TBSA in patients 65 years or older. Consider for burns to perineum/genital area

**Suspected Inhalation Injury:** If there is a suspected inhalation injury, give oxygen and seek anaesthetic review

**Infection:** Observe for signs of infection
- Temperature >38°C
- Tachycardia/Tachypnoea
- Hypotension
- Increased pain
- Offensive/increased exudate
- General malaise

For cases that do not meet the criteria for referral:
Continue local care and give advice to observe signs of infection. Refer on if wound unhealed at 14 days. Discharge when wound healed, with written advice to moisturise and protect from sun until healed skin loses pink colour

**MEETS CRITERIA FOR REFERRAL – CALL LOCAL BURN SERVICE**
- Sheffield: 0114 2714129 / 0114 2714126
- Preston: 01772 522244
- Manchester: 0161 2916314
- Wakefield: 01924 541700
- Liverpool: 0151 4301540 / 0151 4302349
- Newcastle: 0191 2825637 / 0191 2620271
17.4. Appendix 4: Paediatric Referral Criteria and Guidelines

### Paediatric Burn Referral Criteria and Guidelines – June 2012 v1.0

#### Non-Complex Burn

*Complete and Fax NBCN Non-Complex Burn Referral Form*

- **Size:** 2-10% TBSA > 1 and < 16 years old
- **Wound healing:** Any wound unhealed at 7 days
- **Rehabilitation:** Any healed wound where scarring suggests that there may be a significant aesthetic/functional impact, loss of function or psychological disturbance

#### Complex Burn

*Complete and Fax NBCN Complex Burn Referral Form*

- **Total Body Surface Area (TBSA)/Depth:**
  - ≥ 10% (≤ 16 years)
  - ≥ 15% TBSA Deep Dermal burn (all children < 1 year)
- **All Full Thickness burns > size of a patient’s finger tip**

- **Any depth and size of the following:**
  - **Mechanism:** All burns associated with chemical or electrical injuries, exposure to ionising radiation or high pressure steam, or suspicion of non-accidental injury
  - **Site:** Buttocks, nappy area, perineum, facial, neck, hands, feet, joints or flexural creases
  - **All circumferential burns**
  - **Existing Conditions:** Burn wound infection, congenital conditions or significant medical conditions
  - **Associated Injuries:** All burns associated with inhalation or trauma
  - **Progressive Non-Burn Skin Loss:** Blistering skin disorders e.g. Toxic Epidermal Necrolysis, Staphylococcal Scalded Skin Syndrome, and Stevens-Johnson syndrome

#### Fluid Guidelines

- <10% encouraged to have oral fluids unless NBM
- ≥ 10% cannula, resus fluids and maintenance

**Contact Burn Unit for advice re: NBM, sedation, analgesia and future fluids**

#### Must Give

**IV Resuscitation Fluids:**
- All children with burns ≥10% TBSA will receive fluid according to the Parkland Formula:
  - 3 ml/kg% burn over 24 hrs from time of injury given ½ in the 1st 8 hrs & ½ in the 2nd 16 hrs given as Hartmann’s solution.
- **AND IV Maintenance Fluids:**
  - 100 ml/kg over 24hrs from time of injury for 1st 10kg, plus 50 ml/kg over 24 hrs for 2nd 10kg, plus 25 ml/kg over 24 hrs for each additional kg. Give as 0.45% Sodium Chloride and 5% Glucose solution or a suitable local alternative

#### Analgesia

Ensure adequate analgesia is given prior to intervention, transfer. Discuss with burn service

#### Catheterisation

- All children with burns ≥10-15% TBSA and/or burns to genitalia should have an appropriate size catheter.

#### Infection

- **Toxic Shock Syndrome / Burn Sepsis Syndrome**
- Observe for 2 of the following:
  - Temperature > 38°C
  - General malaise
  - Rash
  - Hypotension
  - Diarrhoea and vomiting
  - Not eating or drinking
  - Tachycardia / tachypnoea

#### Suspected Inhalation Injury

- If there is a suspected Inhalation injury, give oxygen (15 litres via non-re-breath mask and bag) and seek anaesthetic review

#### MEETS CRITERIA FOR REFERRAL – CALL LOCAL BURN SERVICE

- **Newcastle:** 0191 2826011 / 0191 2829009
- **Liverpool:** 0151 2525400
- **Manchester:** 0161 7018100
- **Wakefield:** 01924 541931
- **Sheffield:** 0114 2260654
17.5. Appendix 5: Adult and Paediatric Referral Flowchart

Northern Burn Care Network
North of England, North Wales & Isle of Man

NBCN Burn Referral Flowchart – V1.0 June 2012

Assess Patient
Depth of Burn
Total Body Surface Area
Site of Burn

Non Complex

Complex

Complex Non-Burn

Size:
Paediatrics: 2-10% TBSA >1 and <16yrs
Adults: 1-2% deep dermal to full thickness loss, >5% epidermal/superficial dermal

Rehabilitation:
Any healed wound where scarring suggests that there may be a significant aesthetic/functional impact, psychological disturbance or loss of function

Wound Healing:
Any wound unhealed at 7 days (Paeds) 14 days (Adults) or suspicion of clinical infection

Does the patient meet the referral criteria for a Burn Service?

Y

N

Complete NBCN Non-Complex Referral Form and discuss with local Burn Service

Follow NBCN Non-Complex Burn Management Protocol

Is a bed available?

Y

N

Arrange transfer

Contact the Burn Bed Bureau on 01384 215576

Complete NBCN Complex Referral Form and discuss with local Burn Service

Is a bed available?

Y

N

Inhalation injury with no cutaneous burn

For inhalation injury with no cutaneous burn follow local ICU referral guidelines

For Blistering skin disorders >5% TBSA

For Blistering skin disorders >5% TBSA use NBCN Complex Referral Form

Age: Extremes of age
Mechanism: Chemical or electrical injuries, exposure to ionising radiation or high pressure steam, suspicion of non-accidental injury
Site: Buttocks (nappy area – paeds), perineum, facial, neck, hands, feet, joints or flexural creases
Associated injuries: all burns associated with inhalation or trauma
TBSA Depth: Paeds: ≥10% (<16yrs), all children ≤1 year, ≥1% TBSA. Deep Dermal burn. All full thickness burns ≥size of a patient’s finger tip.
Adults: ≥15% (>16 yrs), >10% (65yrs and over), ≥2% deep dermal full thickness
## Appendix 6: Adult Complex Referral Form

### Patient Details
- **Name:**
- **Date of Birth:**
- **Gender:** Male / Female
- **Address:**
- **Postcode:**
- **Telephone number:**
- **Is an interpreter required? Yes / No**
- **Language:**

### Next Of Kin Details
- **Patient accompanied by:** (relationship)
- **Name of Next of Kin:**
- **Contact Details:**
- **Family/carer aware of hospital attendance? Yes / No**

### Airway/Breathing
- **Patient airway:** Yes / No
- **C. spine injury:** Yes / No
- **Immobilised:** Yes / No
- **Inhalation injury suspected:** Yes / No
- **Soot in nose/throat:** Yes / No
- **Hoarse/voice:** Yes / No
- **Stridor/noisy breathing:** Yes / No
- **Anaesthetic assessment:** Yes / No
- **Intubated:** Yes / No

### Invasive Interventions
- **Use an uncut tube**
  - **Laryngoscopy grade:** I / II / III / IV
  - **Size ETT:** mm, cuffed/uncuffed
  - **Fixed at teeth/nose:** cm

### OBS prior to intubation
- **FiO2:** %
- **SaO2:** %
- **HR:** b/min
- **RR:** b/min
- **GCS prior to intubation:** 7

### Circulation
- **HR:** b/min
- **B/P:** mm Hg
- **CRT:** sec
- **Peripheral/Central Temp:** °
- **Fluid resuscitation commenced:** Yes / No
  - **(see overleaf)**
- **Urinary Catheter:** Yes / No
- **Balloon inflated:** Yes / No
  - **Size:**

### Environment
- **Patient kept warm prior to and during transfer:** Yes / No
- **Wound Management**
  - ±15% apply cling film and keep warm
  - Irrigate chemical (except Phosphorus) burns copiously
  - Wash small complex burns to facilitate assessment if appropriate
- **Circumferential Burns:** Discuss with burn service prior to transfer
- **Escharotomies Needed:** Yes / No
- **Where:**
- **Escharotomies carried out prior to transfer:** Yes / No
- **Patient Weight:** kg, actual/estimated

### % TBSA
- **% TBSA:**
- **% TBSA Full Thickness Burns:**
  - A. % of head = 3%, B. % of one thigh = 4%, C. % of lower leg = 3%

---

**...Please Turn Over**
Fluid Resuscitation (This formula is based on the Parkland Formula)

For 1st 8 hours:  0.1875mls x % burn x weight (kg) = mls/h Hartmann’s solution

(please check calculations and discuss ‘CATCH UP’ fluid with accepting Burn Unit)
We expect the patient to be transferred to the Burn Unit within 8 hours

Fluid Balance Chart – Please complete with ACTUAL volumes given for each hour

<table>
<thead>
<tr>
<th>Burn Time</th>
<th>Hour 1</th>
<th>Hour 2</th>
<th>Hour 3</th>
<th>Hour 4</th>
<th>Hour 5</th>
<th>Hour 6</th>
<th>Hour 7</th>
<th>Hour 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hartmann’s (mls)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other fluids (mls)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral fluid (mls)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urine output (mls) (aim 0.5 – 1ml/kg/hr)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Results

<table>
<thead>
<tr>
<th>Blood</th>
<th>ABG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb</td>
<td>pH</td>
</tr>
<tr>
<td>WCC</td>
<td>PO2 kPa/mmHg</td>
</tr>
<tr>
<td>Platelets</td>
<td>PCO2 kPa/mmHg</td>
</tr>
<tr>
<td>Sickle cell</td>
<td>HCO3</td>
</tr>
<tr>
<td>Na+</td>
<td>BE</td>
</tr>
<tr>
<td>K+</td>
<td>Lactate</td>
</tr>
<tr>
<td>Urea</td>
<td>CO2Hb %</td>
</tr>
<tr>
<td>Creatinine</td>
<td>Glucose</td>
</tr>
<tr>
<td>Albumin</td>
<td>CK</td>
</tr>
<tr>
<td>ECG</td>
<td>X-Ray (trauma series)</td>
</tr>
</tbody>
</table>

Northern Burn Care Network Adult Burn Units Contact Details

- If nearest service is full then contact National Burn Bed Bureau (NBBB) on 01384 215578

<table>
<thead>
<tr>
<th>Newcastle</th>
<th>Royal Victoria Infirmary</th>
<th>Burn Unit</th>
<th>T: 0191 282 5637 / 0191 282 0271</th>
<th>F: 0191 2820260</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Tees</td>
<td>James Cook University Hospital</td>
<td>Burn Facility</td>
<td>T: 01642 854535</td>
<td>F: 01642 854175</td>
</tr>
<tr>
<td>Preston</td>
<td>Royal Preston Hospital</td>
<td>Burn Facility</td>
<td>T: 01772 522 244</td>
<td>F: 01772 523694</td>
</tr>
<tr>
<td>Manchester</td>
<td>Wythenshawe Hospital</td>
<td>Burn Unit</td>
<td>T: 0161 291 6314</td>
<td>F: 0161 2916315</td>
</tr>
<tr>
<td>Liverpool</td>
<td>Wiston Hospital</td>
<td>Burn Unit</td>
<td>T: 0151 430 1540 / 0151 430 2349</td>
<td>F: 0151 4301506</td>
</tr>
<tr>
<td>Wakefield</td>
<td>Pinderfields Hospital</td>
<td>Burn Unit</td>
<td>T: 01924 541700</td>
<td>F: 01924 542632</td>
</tr>
<tr>
<td>Sheffield</td>
<td>Northern General Hospital</td>
<td>Burn Unit</td>
<td>T: 0114 27 14129 / 0114 27 14126</td>
<td>F: 0114 2228097</td>
</tr>
</tbody>
</table>

Pre-transfer Checklist

- Airway - safe/secured
- NST in situ for transfer
- Tubes/lines secured
- PIPs centre contacted and details attached
- Analgesia adequate
- Infusions for transit
- Appropriate staff
- Jewellery/watch off

Notes/X-rays/Investigations

- Patient refused Yes ☐ No ☐ Reason ……………………………………………………………
- Transferred to: ………………………………………………………………………………
- Form Completed By ………………………………………………………………………
- Signed ………………………………………………………………………………………
- Designation ………………………………………………………………………………..
- Contact Details …………………………………………………………………………..
- Burn Unit contacted with time of departure

NBCN Adult Complex Referral Form v1.1 November 2012 Page 2 of 2
### 17.7. Appendix 7: Paediatric Complex Referral Form

**NORTHERN BURN CARE NETWORK REFERRAL FORM**
**PAEDIATRIC COMPLEX BURNS**

#### Patient Details
- **NHS Number**: 
- **Name**: 
- **Date of Birth**: 
- **Gender**: Male/Female
- **Address**: 
- **Postcode**: 
- **Telephone number**: 
- **Is an Interpreter needed?**: Yes/No
- **Language**:

#### Referral Information (Please specify)
- **Hospital/Community/Other**: 
- **Department**: ED/ICU/Other
- **Referer Name**: 
- **Grade**: 
- **Direct Line**: 
- **Fax Number**:

#### GP Information
- **GP Name**: 
- **GP Practice/Address**:

#### Next Of Kin Details
- **Patient accompanied by** (relationship)
- **Name of Next of Kin**: 
- **Contact Details**: 
- **Parental Responsibility**: 
- **Family/carer aware of hospital attendance?**: Yes/No

#### Airway/Breathing
- **Patient airway**: Yes/No
- **C, spine injury**: Yes/No
- **Immobilised**: Yes/No
- **Inhalation injury suspected**: Yes/No
- **Soot in nose/throat**: Yes/No
- **Hoarse voice**: Yes/No
- **Stridor/noisy breathing**: Yes/No
- **Anaesthetic assessment**: Yes/No
- **Intubated**: Yes/No

#### PMSH
- **Smokes**: /day
- **Alcohol**: /day
- **Drug Abuse**: Yes/No
- **Specify**: 
- **Allergies**: Yes/No
- **Specify**: 
- **Mental Health Requirements**: Yes/No
- **Specify**: 
- **Mobility**: 

#### Safeguarding/Risks
- **Safeguarding Concerns**: Yes/No
- **Risk Concerns**: Yes/No
- **Specify**: 
- **Action taken**: 

#### Burn Information
- **Date of Burn**: 
- **Time of Burn**: 
- **Causa of Burn**: 
- **First Aid Given/Waiting**: Yes/No
- **Specify**: 
- **Was the First Aid Delayed**: Yes/No

#### Oxygen Saturation (FIO2, %, SaO2, %)

#### Circulation
- **HR (bpm)**: 
- **B/P**: 
- **CRT (sec)**: 
- **Peripheral/Core Temp**: °
- **Venous Access 1**: central/peripheral/IO size
- **Venous Access 2**: central/peripheral/IO size

#### Environment
- **Patient kept warm prior to and during transfer**: Yes/No

#### Wound Management
- **% TBSA Burns**
- **% TBSA Full Thickness Burns**

#### Please Turn Over
Fluid Management (This formula is based on the Parkland Formula)

For 1st 8 hours: \[ 0.1875 \text{mls x } \%\text{ burn x weight (kg)} = \text{mls/hour Hartmann's solution} \]

(please check calculations and discuss ‘CATCH UP’ fluid with accepting Burn Unit)

We expect the patient to be transferred to the Burn Unit within 8 hours

Fluid Balance Chart – Please complete with ACTUAL volumes given for each hour

<table>
<thead>
<tr>
<th>Burn Time</th>
<th>Hour 1</th>
<th>Hour 2</th>
<th>Hour 3</th>
<th>Hour 4</th>
<th>Hour 5</th>
<th>Hour 6</th>
<th>Hour 7</th>
<th>Hour 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hartmann's (mls)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other fluids (mls)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral fluid (mls)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urine output (mls) (aim 0.5 – 1ml/kg/hr)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Maintenance Calculation (from commencement of fluids)

- 100mls per kg x first 10kg body weight
- 50mls per kg x second 10kg body weight
- 20mls per kg x remaining body weight

Total = + = mls/hr

Results

<table>
<thead>
<tr>
<th>Blood</th>
<th>ABG</th>
<th>Medication Given</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb</td>
<td>pH</td>
<td>Time</td>
</tr>
<tr>
<td>WCC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Platelets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sgot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Na+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creatinine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albumin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECG</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Paediatric Retrieval Teams

- North East: 0191 282 3017
- Embrace (Y&H): 0845 147 2472
- NWTs (NW): 08000 84 83 82

Pre-transfer Checklist

- Airway - safe/secure
- NGT in situ for transit
- Tubes/lines secured
- Poison centre contacted and details attached
- Analgesia adequate
- Infusions for transit
- Appropriate staff
- Jewellery/watch off
- Notes/X-rays Investigations
- Photographs of wounds
- Copy of ED assessment details
- Copy of Ambulance PRF
- Relatives aware of transfer
- Burn Unit contacted with time of departure

Any Other Relevant Information

Patient refused: Yes [ ] No [ ] Reason: 

Transferred to: 

Designation: 

Contact Details: 

NBCN Paediatric Complex Referral Form v1.3 November 2012

Page 2 of 2
### Appendix 8: Adult Non-Complex Referral Form

#### NORTHERN BURN CARE NETWORK REFERRAL FORM

**ADULT NON-COMPLEX BURNS**

<table>
<thead>
<tr>
<th><strong>Patient Details</strong></th>
<th><strong>Referral Information</strong> (Please specify)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Date: ........................................</td>
</tr>
<tr>
<td>Date of Birth</td>
<td>Hospital/Community/Other ..................</td>
</tr>
<tr>
<td>Gender: Male ☐ Female ☐</td>
<td>Department - ED / Ward / Other ...........</td>
</tr>
<tr>
<td>Address</td>
<td>Referrer Name ................................</td>
</tr>
<tr>
<td>Postcode</td>
<td>Grade ...........................................</td>
</tr>
<tr>
<td>Telephone number</td>
<td>Direct Line .................. Fax Number ..................................</td>
</tr>
<tr>
<td>Is an interpreter needed? Yes ☐ No ☐</td>
<td>GP Details</td>
</tr>
<tr>
<td>Language</td>
<td>GP Name ........................................</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Next Of Kin Details</strong></th>
<th><strong>GP Practice/Address</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient accompanied by</td>
<td>GP Name ..................</td>
</tr>
<tr>
<td>Relationship</td>
<td>Telephone No ..................</td>
</tr>
<tr>
<td>Is the Next of Kin aware? Yes ☐ No ☐</td>
<td>GP Practice/Address ...........</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Burn Information</strong></th>
<th><strong>PMHS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of Burn ..........</td>
<td>Smokes /day</td>
</tr>
<tr>
<td>Time of Burn ..........</td>
<td>Alcohol units /day</td>
</tr>
<tr>
<td>Cause of Burn .........</td>
<td>Drug Abuse Yes ☐ No ☐</td>
</tr>
<tr>
<td>First Aid Given/Cooling Yes ☐ No ☐</td>
<td>Allergies Yes ☐ No ☐</td>
</tr>
<tr>
<td>If yes, how long for ...</td>
<td>Tetanus Status ...........</td>
</tr>
<tr>
<td>What type ..................</td>
<td>Mobility ..................</td>
</tr>
<tr>
<td>Was the first aid delayed? Yes ☐ No ☐</td>
<td>Learning Disabilities Yes ☐ No ☐</td>
</tr>
<tr>
<td>If yes, how long for ...</td>
<td>Mental Health Requirements Yes ☐ No ☐</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Wound Assessment</strong></th>
<th><strong>Specify</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Location ..................</td>
<td>Safeguarding/Risk</td>
</tr>
<tr>
<td>If it over a joint? Yes ☐ No ☐</td>
<td>Safeguarding concerns Yes ☐ No ☐</td>
</tr>
<tr>
<td>Size of burn % TBSA / cm</td>
<td>Risks Yes ☐ No ☐</td>
</tr>
<tr>
<td>Burn Depth ..................</td>
<td>Specify ..................</td>
</tr>
<tr>
<td>Epidermal ..................</td>
<td>Action taken ...........</td>
</tr>
<tr>
<td>Superficial Dermal .........</td>
<td>Burn % Chart – Ignore Simple Erythema</td>
</tr>
<tr>
<td>Deep Dermal ..................</td>
<td></td>
</tr>
<tr>
<td>Full Thickness ..................</td>
<td></td>
</tr>
</tbody>
</table>

**Wound management:** Wash with soap and water and apply cling film (not to face) for immediate transfer only, otherwise apply appropriate dressing

<table>
<thead>
<tr>
<th><strong>Circulation</strong></th>
<th><strong>Medication Given</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Core temperature</td>
<td>Time Drug Route Dose</td>
</tr>
<tr>
<td>HR ............. bmp</td>
<td></td>
</tr>
</tbody>
</table>

**Northern Burn Care Network Adult Burn Units Contact Details**

<table>
<thead>
<tr>
<th>Location</th>
<th>Hospital/Organization</th>
<th>Burn Unit</th>
<th>Burn Facility</th>
<th>Mobile Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newcastle</td>
<td>Royal Victoria Infirmary</td>
<td>T: 0191 282 5337 / 0191 282 0271</td>
<td>F: 0191 2820260</td>
<td></td>
</tr>
<tr>
<td>South Tees</td>
<td>James Cook University Hospital</td>
<td>T: 01642 854535</td>
<td>F: 01642 854175</td>
<td></td>
</tr>
<tr>
<td>Preston</td>
<td>Royal Preston Hospital</td>
<td>T: 01772 522 244</td>
<td>F: 01772 523804</td>
<td></td>
</tr>
<tr>
<td>Manchester</td>
<td>Wythenshawe Hospital</td>
<td>T: 0161 281 6314</td>
<td>F: 0161 2816318</td>
<td></td>
</tr>
<tr>
<td>Liverpool</td>
<td>Whiston Hospital</td>
<td>T: 0151 430 1530 / 0151 430 2369 / 0151 4301536</td>
<td>F: 0151 4301536</td>
<td></td>
</tr>
<tr>
<td>Waterfield</td>
<td>Pinderfields Hospital</td>
<td>T: 01924 541700</td>
<td>F: 01924 542632</td>
<td></td>
</tr>
<tr>
<td>Sheffield</td>
<td>Northern General Hospital</td>
<td>T: 0114 2714129 / 0114 2714126</td>
<td>F: 0114 2265079</td>
<td></td>
</tr>
</tbody>
</table>

**Pre-transfer Checklist**

- Poisons centre contacted and details attached
- Analgesia adequate
- Consider cannula
- Jewellery/watch off
- Notes/X-rays/Investigations
- Copy of ED assessment details
- Copy of ambulance PRF

**Form Completed By ........................................ Signed ..................................**

**Designation ........................................ Contact Details ..................................**

---

NBCN Adult Non-Complex Referral Form V1.3 November 2012
17.9. Appendix 9: Paediatric Non-Complex Referral Form

NORTHERN BURN CARE NETWORK REFERRAL FORM

<table>
<thead>
<tr>
<th>Patient Details</th>
<th>Referral Information (Please specify)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHS Number</td>
<td>Date: ..................................</td>
</tr>
<tr>
<td>Name</td>
<td>Hospital/Community/Other: ............</td>
</tr>
<tr>
<td>Date of Birth</td>
<td>Department - ED / Ward / Other: ......</td>
</tr>
<tr>
<td>Gender: Male □</td>
<td>Referrer Name: ........................</td>
</tr>
<tr>
<td>Female □</td>
<td></td>
</tr>
<tr>
<td>Address ..................................</td>
<td></td>
</tr>
<tr>
<td>Postcode</td>
<td>Gender: ..................................</td>
</tr>
<tr>
<td>Tel number</td>
<td>Direct Line: ..........................</td>
</tr>
</tbody>
</table>
| Is an interpreter needed? Yes □ No □ | Fax Number: ...........................
| Language ................. | GP Details: ............................|
| Next Of Kin Details | GP Name .................. Telephone No ..|
| Patient accompanied by | GP Practice Address ..................|
| Relationship: ..................................|
| Is the Next of Kin aware? Yes □ No □ N/A □ | PMHS: ..............................|
| Burn Information:  | Smokes: .............................|
| Date of Burn ...... | day Alcohol units/day .................|
| Time of Burn ...... | Drug Abuse: Yes □ No □ Specify: ......|
| Cause of Burn: ..................................|
| First Aid Given/Cooling: Yes □ No □ | Allergies Yes □ No □ Specify: ............|
| If yes, how long for ..................................|
| What type: ..................................|
| Was the first aid delayed? Yes □ No □ | Tetanus Status: ..........................|
| If yes, how long for ..................................
| Wound Assessment:  | Mobility: .............................|
| Location: ..................................|
| Is it over a joint? Yes □ No □ | Learning Disabilities: Yes □ No □ |
| Size of burn % TSBA / cm | Mental Health Requirements: Yes □ No □ |
| Burn Depth:  | Co-morbidities: Yes □ No □ Specify: ............|
| Epidermal | | |
| Superficial Dermal | | |
| Deep Dermal | | |
| Full Thickness | | |
| Wound Management: Wash with soap and water and apply cling film (not to faces) for immediate transfer only, otherwise apply appropriate dressing | |
| Circulation: Core temperature ................|
| HR: .................................. B/P: ............. /
| Medication Given | |
| Time | Drug | Route | Dose |
| Pre-transfer Checklist | Any Other Relevant Information |
| Poison centre contacted and details attached | | |
| Analgesia adequate | | |
| Consent cannula | | |
| Jewellery/watch off | | |
| Notes/X-rays/Investigations | | |
| Copy of ED assessment details | | |
| Copy of Ambulance PPR | | |
| Form Completed By: .......................... Signed: .......................... |
| Designation: .......................... Contact Details: ..........................

Northern Burn Care Network Paediatric Burn Units Contact Details

<table>
<thead>
<tr>
<th>City</th>
<th>Hospital/Center</th>
<th>Burn Unit</th>
<th>T:</th>
<th>F:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newcastle</td>
<td>Royal Victoria Infirmary</td>
<td>Burn Unit</td>
<td>0191 262 3500</td>
<td>0191 262 3501</td>
</tr>
<tr>
<td>Manchester</td>
<td>Manchester Children's Hospital</td>
<td>Burn Unit</td>
<td>0161 701 8100</td>
<td>0161 701 8198</td>
</tr>
<tr>
<td>Wakefield</td>
<td>Pinderfields Hospital</td>
<td>Burn Unit</td>
<td>01924 543193</td>
<td></td>
</tr>
<tr>
<td>Liverpool</td>
<td>Alder Hey Children's Hospital</td>
<td>Burn Unit</td>
<td>0151 252 5400</td>
<td>0151 259 3627</td>
</tr>
<tr>
<td>Sheffield</td>
<td>Sheffield Children's Hospital</td>
<td>Burn Unit</td>
<td>0114 226 0694</td>
<td>0114 2717187</td>
</tr>
</tbody>
</table>

Burn % Chart - Ignore Simple Erythema
17.10. Appendix 10 First Aid Care Plan

<table>
<thead>
<tr>
<th>Goal</th>
<th>Action</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STOP the burning process</strong></td>
<td>Flame Extinguish Scald/flame Remove clothing Chemical * While there is residual chemical on the skin it will continue to burn (EMSB 2004) Remove contaminated clothing Prompt and copious irrigation with water Ocular chemical injuries require continuous flushing with water Hydrofluoric acid burns require the application of Topical Calcium Gluconate Gel (10%)</td>
<td>Removes heat source Removes residual heat source Dilutes solution</td>
</tr>
<tr>
<td><strong>COOL the burn wound</strong></td>
<td>• Cool with running water up to 3 hours post injury • Water application for 20 minutes if possible Note: water temperature should be about 15 degrees Celsius. Very cold or icy water can cause vasoconstriction which can contribute to tissue ischemia and thus deepen the burn (Sawadal et al 1997)</td>
<td>Reduces inflammatory reaction which can stop wound progression Clinical and experimental evidence shows beneficial effect from immediate and active cooling: • Stabilises skin mast cells • Decreases oedema in wound • Helps to control pain (Herndon 2007)</td>
</tr>
<tr>
<td><strong>PROTECT the burn wound</strong></td>
<td>• Cover the burn wound with cling film (polyvinyl chloride film), except faces.</td>
<td>Prevents (further) contamination of the wound Provides pain relief by covering the exposed nerve endings. (Huspith and Ryatt 2004) Note: do not use constrictive circumferential material as may compromise circulation (Huspith and Ryatt 2004). Only one layer of cling film is necessary.</td>
</tr>
</tbody>
</table>
## 17.11. Appendix 11: Pain Management Care Plan

<table>
<thead>
<tr>
<th>Goal</th>
<th>Action</th>
<th>Rationale</th>
</tr>
</thead>
</table>
| To alleviate/minimise all types of pain at all stages of burn recovery | • Use a structured pain assessment tool to ascertain the type and severity of pain the patient is experiencing  
• Question the patient about the immediate, background, breakthrough and neuropathic pain as appropriate for stage of healing/recovery and any burn management procedures that are occurring  
• Use numerical scores/pictorial representation to assess pain severity  
• Ask where and when the pain is felt and what makes it better or worse  
• Ask the patient to describe the pain they are feeling and the duration of which it is felt  
• Document all pain assessment scores/information (Richardson and Mustard 2009) | Knowing what type and severity of pain the patient is experiencing will assist in appropriate pain management |

### Immediate pain
- Cool and cover the injury

### Procedural pain
- Refrain from any unnecessary procedures that can cause pain and give prescribed procedural pain medication 30 minutes prior to starting any procedure. Re-assess pain experience at intervals throughout the procedure.

Note: Entonox (Nitrous Oxide) is a self administered medication which is sometimes used as it provides rapid pain relief and is effective in relieving short-term pain. Because of its immediate action administration can occur at the time of the procedure instead of prior to the procedure.

### Background Pain
- Give modified release medication as prescribed. Reassess effectiveness at regular intervals.

### Breakthrough Pain
- Give ‘as required’ medication as needed and monitor and evaluate the frequency and dosage.

Cooling and covering the exposed nerve endings will help to reduce the pain (Hudspith and Ryatt 2005)

Limit unnecessary occurrence of pain and allow pain killers the time to act before a procedure has begun

Provide constant background analgesia and allow for dose adjustments to be made if necessary

Alleviate breakthrough pain
### 17.12. Appendix 12: Burn Wound Cleansing Care Plan

<table>
<thead>
<tr>
<th>Goal</th>
<th>Action</th>
<th>Rationale</th>
</tr>
</thead>
</table>
| To remove any debris/foreign material (that can’t be removed by cleansing alone) which may otherwise hinder wound assessment and prevent timely wound healing | • Use most appropriate method of debridement in accordance with burn wound status, type of dead and devitalised tissue and required speed of removal  
  • Use of sterile forceps and scissors to debride loose skin and blisters  
  • Perform any debridement procedure in an environment that is equipped to deal with any complications that may arise and by a practitioner that is competent to deal with them. (Gray et al 2010) | To facilitate timely wound healing with minimal complication of infection, scarring and contracture  
To prevent infection  
To prepare the wound bed for timely healing  
To aid assessment of burn wound depth and TBSA  
To maintain patient safety |
## 17.13. Appendix 13: Burn Wound Care Formulary

<table>
<thead>
<tr>
<th>Classification of Wound</th>
<th>Appearance</th>
<th>Management Aims</th>
<th>Other Considerations</th>
<th>Infection Potential</th>
<th>Treatment Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Erythema</strong></td>
<td>Skin Intact No blistering Red or pink Painful Capillary refill normal (&lt;2 seconds)</td>
<td>Alleviate pain / promote comfort Protect against any potential delayed blistering / skin loss Should spontaneously resolve within 48 hours</td>
<td>Analgesia Un-perfumed moisturising cream Erythema must be assessed for potential to develop blisters which can occur up to 48 hours post injury. If in doubt dress the area</td>
<td>None</td>
<td>Low adherents Hydrocolloids Thin Foam Dressings Hydrogels</td>
</tr>
<tr>
<td><strong>Superficial/Epidermal</strong></td>
<td>Blistering present Wet Pink Very painful Capillary refill normal (&lt;2 seconds)</td>
<td>Alleviate pain / promote comfort Be fully healed within 7 days (Adults), 5 days (Paediatrics) Prevent infection Maintain function</td>
<td>A moist wound healing environment and protecting against infection will limit the possibility of burn wound conversion – reassess in 48 hours for adults</td>
<td>Low</td>
<td>Low adherents Silicone dressings Hydrogels Foam Dressings Hydrocolloids</td>
</tr>
<tr>
<td><strong>Superficial Dermal</strong></td>
<td>Pink / red with infrequent patchy white areas Painful Capillary refill normal</td>
<td>Alleviate pain / promote comfort Prevent deterioration of burn depth Prevent infection Promote function Promote wound healing (10-14 days for adults/ 7–10 for paediatrics) and minimise scarring</td>
<td>Reassess for burn wound conversion in 48 hours for adults The deeper the burn the greater the amount of devitalised tissue and the increased risk of infection. If using a dressing product with no antimicrobial properties more frequent inspection is required</td>
<td>Low / Medium</td>
<td>Low adherents Silicone dressings Hydrogels Foam Dressings Antimicrobials Silver Dressings</td>
</tr>
</tbody>
</table>
| **Deep Dermal** | Mottled red with abundant fixed white areas  
May be painful but diminished  
Capillary refill slow or absent | Prevent infection  
Prevent deterioration of burn depth  
Promote function  
Promote wound healing and minimise scarring | Reassess for burn wound conversion in 48 hours for adults  
Deep dermal burns may require excision and grafting depending on size and site of injury and patient history. Refer to local burns service for assessment | High | Silicone dressings  
Low adherents  
Foam Dressings  
Honey based dressings  
Silver Dressings  
Antimicrobials |
|---|---|---|---|---|---|
| **Full Thickness** | Dry leathery white  
Charred black / brown  
Insensate  
Capillary refill absent | Prevent infection  
Prepare wound for surgical closure  
Promote function | Generally all but the smallest of full thickness burns require excision and grafting. Decisions are made in accordance with burn size, site and patient history. Refer to burns service for assessment. | High | Silver dressings  
Foams  
Hydrogels  
Hydrocolloids  
Honey based dressings |
| **Donor Site** | Painful  
Readily bleeds | Promote comfort  
Be fully healed within 10–14 days  
Prevent infection  
Manage leakage  
Prevent slippage of dressing | For non acute donor site - seek advice from Burn Unit. Leave intact for at least 14 days | Low | Silver dressings  
Silicone dressings  
Low adherents |
| **Face** | Varies depending on mechanism of injury and depth | Alleviate pain / promote comfort  
Prevent infection  
Limit oedema/swelling  
Maintain flexibility which allows essential functionality  
Control exudate  
Promote timely healing | Refer new burn injuries to local burns service as per referral guidelines. Dressings as per Burn Unit discharge guidelines for admitted patients | Low | Antimicrobial Ointment  
Arachois oil/Olive oil  
Silver Dressings |
| Hands and Feet | Varies depending on mechanism of injury and depth | Alleviate pain / promote comfort<br>Maintain function<br>Manage exudate<br>Promote timely healing<br>Limit oedema/swelling<br>Prevent infection | Refer new burn injuries to local burns services as per referral guidelines<br>Dressings as per burn unit discharge guidelines for admitted patients<br>Dressing choice geared towards preventing infection, and promoting function. Aim to reduce bulk of dressings as soon as exudate levels will allow | High | Low adherents<br>Silicone dressings<br>Bags<br>Hydrocolloids<br>Antimicrobials |

| Hypertrophic Scars | Scar is raised above level of surrounding skin. Reddening is present as well as itching, and sometimes pain | Prevent formation<br>Treat symptoms<br>Reduce scar | All patients must be taught to massage and cream at the point of healing<br>Review patients in 4 weeks for assessment of scars and commencement of treatment | None | Emollients<br>Silicone Gels<br>Silicone Sheets |