

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

**November 2012 v1.3
Review Date: June 2013**

Produced By

Jacky Edwards, Northern Burn Care Network, Lead Nurse

North West Link Nurse Coordinators:

Donna Souter, Wythenshawe Hospital, Manchester

Adele Hull, Royal Preston Hospital, Preston

Louise Campbell, Alder Hey Children's Hospital, Liverpool

Kevin Ryan, Royal Manchester Children's Hospital, Manchester

Karen Edwards, Whiston Hospital, Liverpool

Acknowledgements

Northern Burn Care Network Lead Nurses Forum

Northern Burn Care Network Clinical Leads Forum

Northern Burn Care Network Clinical Advisory Group

Jenna Cotton, Service Improvement Manager, NBCN

Contents Page

1. Introduction	5
2. Burn Wounds	6
2.1. Burn Wound Conversion	6
2.2. Mechanism of Injury	7
2.2.1. Thermal injuries	7
2.2.2. Radiation Injuries	8
2.2.3. Chemical Injuries	8
2.2.4. Electrical injuries	9
2.2.5. Flash (Electrical)	9
3. Classification of Burn Injury.....	9
3.1. Size classification	9
3.2. Depth classification.....	10
4. Tissue Injury.....	10
4.1. Erythema	10
4.2. Superficial/Epidermal.....	12
4.3. Superficial Dermal	12
4.4. Deep Dermal	13
4.5. Full Thickness.....	13
5. Complexity Classification	14
5.1. Age	14
5.2. Depth.....	14
5.3. Size	14
5.4. Pre-existing Conditions.....	14
5.5. Site	14
5.6. Mechanism of Injury	15
6. Non-Complex Wound Management Process	16
6.1. First Aid	16
6.2. Pain management	16
6.3. Pain Assessment.....	17
6.4. Pruritus (Itch).....	17
6.5. Burn wound cleansing	17
6.6. Debridement.....	18
6.7. Blister Management.....	18
7. Dressings for Non-Complex Burns.....	19
7.1. Dressing Principles.....	19
7.2. Types of Dressings.....	20
7.2.1. Antimicrobials.....	20
7.2.2. Foam Dressings.....	21
7.2.3. Low Adherent Products.....	21
7.2.4. Hydrogels.....	21
7.2.5. Hydrocolloids	21
7.2.6. Secondary Dressings.....	21

8.	Infection	21
8.1.	Colonisation.....	22
8.1.1.	Management of colonised/infected burn wounds	22
8.2.	Toxic Shock Syndrome.....	23
8.3.	Tetanus	23
9.	Rehabilitation and Aftercare	23
10.	Importance of Accurate Medical Documentation	24
10.1.	Documentation of Burn Wounds:	24
10.2.	History Taking	24
11.	Referral Guidelines.....	25
12.	Treatment factors	25
13.	Post Acute Complications.....	26
14.	References	27
15.	Acronyms	31
16.	Glossary	32
17.	Appendices.....	37
17.1.	Appendix 1: Lund and Browder.....	37
17.2.	Appendix 2 Rule of Nines and Palmar Method	38
17.3.	Appendix 3: Adult Referral Criteria and Guidelines	39
17.4.	Appendix 4: Paediatric Referral Criteria and Guidelines	40
17.5.	Appendix 5: Adult and Paediatric Referral Flowchart.....	41
17.6.	Appendix 6: Adult Complex Referral Form.....	42
17.7.	Appendix 7: Paediatric Complex Referral Form	44
17.8.	Appendix 8: Adult Non-Complex Referral Form	46
17.9.	Appendix 9: Paediatric Non-Complex Referral Form	47
17.10.	Appendix 10 First Aid Care Plan	48
17.11.	Appendix 11: Pain Management Care Plan	49
17.12.	Appendix 12: Burn Wound Cleansing Care Plan	50
17.13.	Appendix 13: Burn Wound Care Formulary	51

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.

Jacky Edwards
Lead Nurse, Northern Burn Care Network

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 some what 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

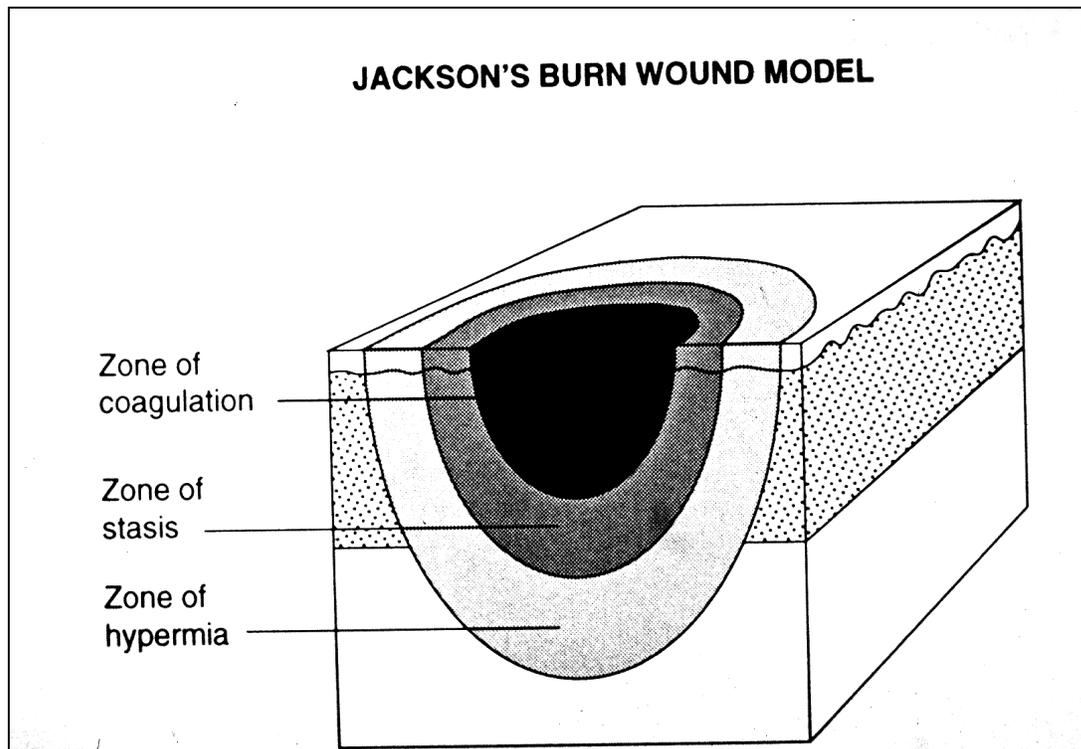
The pathophysiology of burn injury is dynamic and changing. Burns have the potential to convert to deeper injuries depending upon how badly the vasculature within the injury is compromised. Dead tissue/vessels in full thickness injury cannot be salvaged however compromised tissue/vessels in superficial 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

Zone:	Pathophysiology:	Potential for salvage:
Zone of Hyperaemia	<ul style="list-style-type: none"> • Tissue/vessels furthest away from the heat source and/or with least exposure to the heat source. • Capillary vasodilatation but minimal cell/vessel damage 	<ul style="list-style-type: none"> • Spontaneous recovery expected
Zone of Stasis	<ul style="list-style-type: none"> • Tissue/vessels intermediate to the heat source • Hypo-perfusion of tissues • Some degree of damage to tissue and vessels 	<ul style="list-style-type: none"> • Potentially salvageable with appropriate treatment
Zone of Coagulative Necrosis	<ul style="list-style-type: none"> • Tissue/vessels nearest to the highest heat source and/or with most exposure to the heat source. • Complete cell and vessel destruction 	<ul style="list-style-type: none"> • Not salvageable

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

Figure 2: Jackson's Burn Wound Model



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

Hyperthermic 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

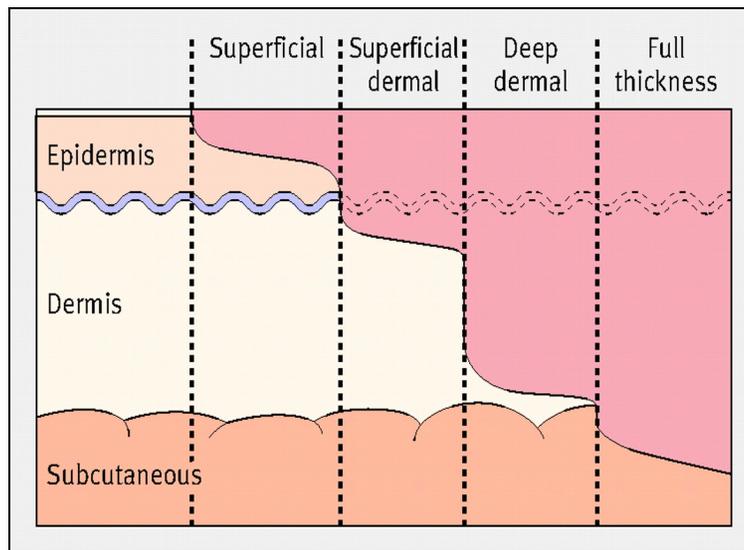
3.2. Depth classification

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 1st, 2nd and 3rd 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



There are visual and sensory indicators of tissue injury that can give clues as to depth and will aid assessment:

Indicator of Tissue Depth	Indication	Rationale
Colour	Patency of blood vessels within the injury site	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
Capillary Refill Time	Testing Capillary refill time can indicate the efficiency of blood flow through the skin	The spectrum of brisk refill to no refill indicates superficial to full thickness tissue damage respectively
Pain level at burn site	Depth of tissue damage	Pain receptors lie in the epidermal to mid dermal layers of the skin. The deeper the burn, the greater the extent of damage to

		these receptors with a corresponding reduction of pain at the burn site.
Sensation level at burn site	Depth of tissue damage	Nerve endings lie in the epidermal and mid dermal layers of the skin. The deeper the burn the less feeling at the burn site
Presence/absence of hair/hair follicles at burn site	Depth of tissue damage	Hair follicles lie in the mid to deep dermis. The absence of hair (or if they pull out easily) denotes deeper tissue injury damage
Presence/absence of blisters at burn site	Depth of tissue damage	Blisters can be present in all depths apart from erythema

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 not 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. (Angerrras 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 of 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 patients 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

Alsbjorn, B., Gilbert, P., Hartmann, B., Kazmierski, M., Monstray, S., Palao, R., Roberto, M. A, Van Trier, A. and Voinchet, V. (2007). Guidelines for the Management of Partial Thickness Burns in a General Hospital or Community Setting – Recommendations of a European Working Party. *Burns*. 33, 155-160

Angerrass MH, Brandberg A, Falk A and Seeman T, (1992) Comparison between sterile saline and tap water for the cleansing of acute traumatic soft tissue wounds. *European Journal of Surgery*. 158(6-7), 347-350

Atiyeh, B. S, Ioannovich, J., Al-Amm, C. A., and El-Musa, K. A., (2002). Management of Acute and Chronic Open Wounds: The Importance of Moist Environment in Optimal Wound Healing. *Current Pharmaceutical Biotechnology*. 3(3), 179-195

Ayello, A. E, Baranoski, S., Kerstien, M. D and Cuddington, I (2004). Wound Debridement. In: *Wound Care Essentials: Practice Principles*. Lippincott, Williams and Willkins, Springhouse, Pennsylvania.

Campbell, B., Wasif, N., Rabbitts, A., Staiano-Coico, L., Yurt, R. W and Schwartz, S. (2002). Diabetes and Burns: A Retrospective Cohort Study. *Journal of Burns Care and Rehabilitation*. 23(3), 157-166.

Cassell, O. (2002). Death from Tetanus after a Pretibial Laceration. *British Medical Journal*. 324, 1442-1443.

Church, D., Elsayed, S., Ried, O., Winston, B and Lindsay, R. (2006). Burn Wound Infections. *Clinical Microbiology Reviews*. 19(2), 403-434.

Cutting, K and Davis, P. (2005) Natural Therapeutic Agents for the Topical Management of Wounds. *Wounds UK*. 1(3). Honey Supplement, 4– 3.

Davis, P. (2005). Recent Clinical Usage of Honey in the Treatment of Wounds. *Wounds UK*. 1(3). Honey Supplement, 14-22.

Dougherty, L and Lister S. (2007) *Royal Marsden Hospital of Clinical Nursing Procedures. Seventh Edition*: London. Blackwell Science

Driscoll, M. S and Wagner, R. F. (2000). Clinical Management of Acute Sunburn Reaction. *Dermatology Nursing*. 21(3), 133-137

Edgar D, Brereton M (2004). Rehabilitation after Burn Injury. *BMJ*. 329, 343-345

Edwards, J. (2010) Hydrogels and Their Potential Uses in Burn Wound Management. *British Journal of Nursing*. 19(11) S12-S16

Emergency Management of Severe Burns (2004). *EMSB Course Manual*. (7th edition) Australian and New Zealand Burns Association. UK version for the British Burn Association.

Erol, S., Altoparlak, M. N., Akcay, F., Celebi, F and Parlak, M. (2004). Changes of Microbial Flora and Wound Colonisation in Burned Patients. *Burns*. 30, 357-361.

- Fairbairn, K., Grier, J., Hunter, C and Peace, J. (2002). A Sharp Debridement Procedure Devised by Specialist Nurses. *Journal of Wound Care*. 11(10), 371-375.
- Fallabella, A. (1998). Debridement of Wounds. *Wounds*. 10 (Supplement C: 1C- 9C)
- Fernandez, R., Griffiths, R and Ussia, T (2003). Water for Wound Cleansing. *Cochrane Review (2008). The Cochrane Collaboration*. Oxford. John Wiley and Sons.
- Frame et al (1985) - Change to: Young AE and Thornton L (2007) Toxic Shock syndrome in Burns: Diagnosis and Management.<http://group.bmj.com>
- Geronemus, R. G and Robins, P. (1982). The Effect of Two New Dressings on Epidermal Wound Healing. *Journal of Dermatological and surgical Oncology*. 8, 850-852.
- Gray. D. Acton, C., Chadwick, P., Fumarola, S., Leaper, D., Morris, C., Stang, D., Vowden, K., Vowden, P and Young, T. (2010). Consensus Guidance for the Use of Debridement Techniques in the UK. *Wounds*. 6(4)
- Guo, S. S., Greenspoon, J. S and Kahn, A. M. (2001). Management of Burn Injuries During Pregnancy. *Burns*. 27, 394-397.
- Hallett A., and Hampton, S. (1999) Wound Care Educational leaflet 6(1). The Wound Care Society, Huntingdon, UK
- Hathaway GJ, Proctor NH, Hughes JP and Fischman ML (1991). *Proctor and Hughes Chemical Hazards of the Workplace*. Third Edition. New York. Van Nostrand.
- Hemmington-Gorse, S., Pellard, S., Wilson-Jones, N and Potokar, T., (2007). Foot Burns: Epidemiology and Management. *Burns*, 33(8) 1041-1045.
- Herndon D., N (2007). *Total Burn care*. Third Edition. Philadelphia. Saunders Elsevier
- Hettiaratchy, S and Dziewulski, P. (2004). Pathophysiology and Types of Burns. *British Medical Journal*. 328, 1427-1429
- Huspith, J and Ryatt, S. (2004). First Aid and Treatment of Minor Burns. *British Medical Journal*. 328, 1487-1489.
- Kavanagh, S. and De Jong, A. (2004). Care of Burns Patients in the Hospital. *Burns*. 30, A2 A6.
- Kawalski, K. J and Greenhalch, D. G. (2007). Hand Burns. *Journal of Burn Care and Research*. 18(4), 1-4.
- Klasen, H., J (2000). Historical Review of the Use of Silver in the Treatment of Burns. I. Early uses. *Burns*. 26, 117–130
- Leaper,. D (2002) *Sharp technique for Wound debridement*. World Wide Wounds. Available online at: www.worldwidewounds.com/2002/december/Leaper/Sharp-Debridement.html
- Lee, C, and Hansen, S. (2007). Management of Acute Wounds. *Clinics in Plastic Surgery*. 34, 685-696.

Leonard, S., McCluskey, P., Long, S., Butters, V., Winter, R and Smith, G (2009). An Evaluation of Allevyn Adhesive and Non-Adhesive Foam Dressings. *Wounds UK*. 5(1), 17–28.

Lundgren, R. S., Kramer, C. B., Rivara F, P., Wang, J., Heimbach, D. M., Gibran, N. S., and Klein, M. B. (2009). Influence of Co morbidities and Age on Outcome Following Burn Injury in Older Adults. *Journal of Burn Care Rehabilitation*. 30(2), 307-314.

Morgan, D (2000). *Formulary of Wound Management Products* (8th Ed) Uromed Communications Ltd.

Moritz, A., Henritues, F and McLean, R. (1994). The Effects of Inhaled Heat on the Air passages and Lungs: An Experimental Investigation. *American Journal of Pathology*. 21, 311-331

Myers B., A (2004). *Wound Management Principles and Practice*. New Jersey. Prentice Hall.

National Burn Care Committee (2001). *National Burn Care Review: Standards and Strategy for Burn Care. A Review of Burn Care in the British Isles*. UK: Committee Report.

Papini, R. (2004). Management of Burn Injuries of Various Depths. *British Medical Journal*. 329, 158-160.

Patterson, D. R., Hoflund, H., Espey, K and Sharar, S. (2004). Pain Management. *Burns*. 30, A10-A15.

Richardson, P and Mustard, L. (2009). The Management of Pain in the Burns Unit. *Burns*. 35, 921-936.

Rodgers, G. L., Mortenson, J., Fisher, M., Lo, A., Cresswell, A and Long, S. (2000). Predictors of Infectious Complications after Burn Injury in Children. *Paediatric Infectious Disease Journal*. 19(10), 990-995.

Sargent, R. (2006). Management of Blisters in Partial Thickness Burns. *Journal of Burn Care and Research*. 27(1) 66-81.

Sawadal, Y., Urushidate, S and Yotsuyanagil, T. (1997). Is Prolonged and Excessive Cooling of a Scalded Wound Effective? *Burns*. 23, 55-58.

Senarath-Yapa, K., Enoch, S. (2009). Management of Burns in the Community. *Wounds UK*. 5(2), 38-48.

Stefanutti, G., Yee, J and Sparnon, A. L. (2010). Cryogenic Burns from Intentional Use of Aerosol Spray in Children: An Emerging Phenomenon. *Burns*. 36, e65-e67.

Still, J., Friedman, B., Law, E., Orlet, H and Craft-Coffman, B. (2001). Burns due to Exposure to Steam. *Burns*. 27(4), 379-381.

Summer, G. J., Puntillo, K. A., Miaskowski, C., Greem, P and Levine, J. D. (2007). Burn Injury Pain: The Continuing Challenge. *The Journal of Pain*. 8(7), 533-548.

Thombs, B. D., Singh, V. A., Halomen, J., Diallo, A and Milner, S. M. (2007). The Effects of Pre-Existing Medical Co-morbidities on Mortality and Length of Hospital Stay in Acute Burn Injury. *Annals of Surgery*. 245(4), 629-634.

- Thombs, B. D., Singh, V. A. and Milner, S. M. (2006). Children under 4 Years are at Greater Risk of Mortality Following Acute Burn Injury: Evidence from a National Sample of 12,902 Paediatric Admissions. *Shock*. 26(4), 348-352.
- Tong, A (1999). The Identification and Treatment of Slough. *Journal of Wound Care*. 8(7), 338-339.
- Vitale, M., Fields-Blanche, C and Luterman, A. (1991). Severe Itching in the Patient with Burns. *Journal of Burn Care Rehabilitation*. 12, 330-333.
- Vowden, K and Vowden, P. (1999). Wound Debridement. Part 1: Non-Sharp Techniques. *Journal of Wound Care*. 8(5), 237-240.
- Wasiak, J., Cleland, H and Campbell, F (2010). *Dressings for Superficial and Partial Thickness Burns (Review)*. The Cochrane Collaboration.
- White, R., J and Cooper, R. (2005) Silver Sulphadiazine: A Review of the Evidence. *Wounds UK*. 1(2).
- Willebrand, M., Low, A., Dyster-As, J., Kidal, M., Anderson, G., Ekselius, L and Gerdin, B. (2004). Pruritus, Personality Traits and Coping in Long-Term Follow-Up of Burn Injured Patients. *Acta Derm Venereol*. 84, 375-380.
- Wong, D and Baker, C. (1988). Pain in Children: Comparison of Assessment Scales. *Paediatric Nursing*. 14, 9-17.
- Woo, K. Y. (2010). Wound Related Pain: Anxiety, Stress and Healing. *Wounds UK*. 6(4), 92-98.
- Young, E, and Thornton, K. L. (2007) Toxic Shock Syndrome in Burns: Diagnosis and Management. *Archives of Disease in Childhood. Education and Practice*. 92, 97–100
- Yuan, J., Wu, C., Holland, A. J. A., Harvey, J.G., Martin, H. C. O., and La Hei. E., R. (2007) Assessment of Cooling on an Acute Burn Injury in a Porcine Model. *Journal of Burn Care and Research*, 28, 514-20

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 health 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

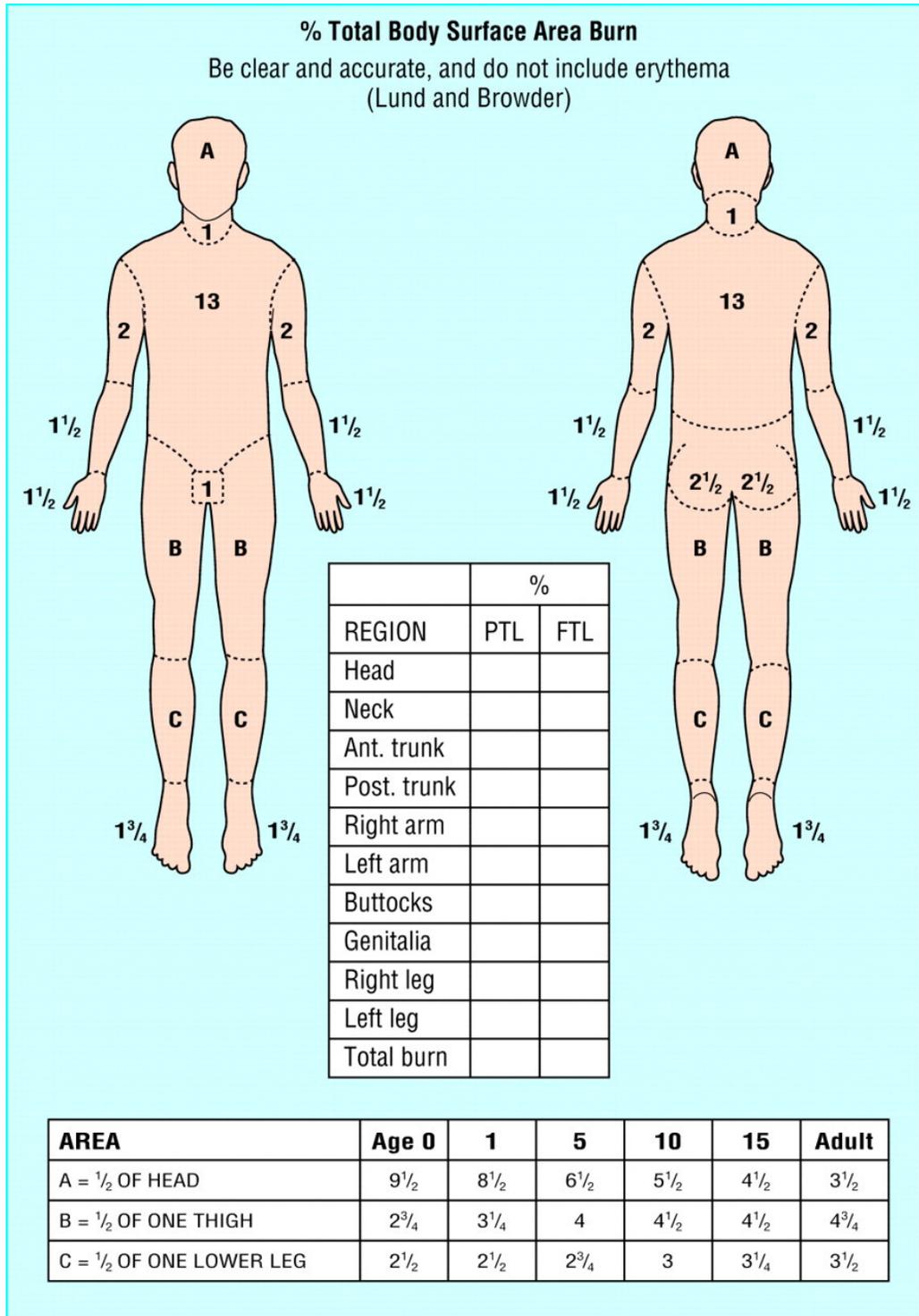
Toxic Shock Syndrome (TSS) occurs where poisonous substances produced by bacteria enter the bloodstream.

Vasculature

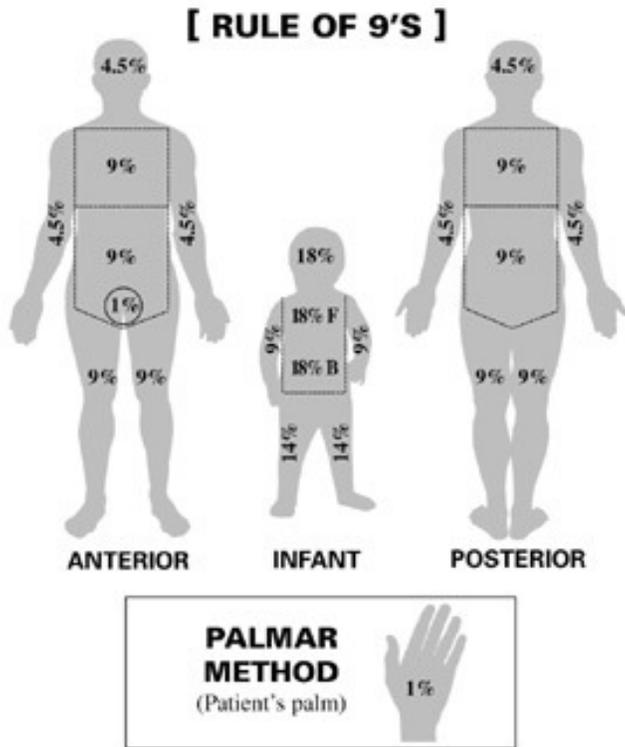
Arrangement of blood vessels in the body or in an organ or body part.

17. Appendices

17.1. Appendix 1: Lund and Browder



17.2. Appendix 2 Rule of Nines and Palmar Method



17.3. Appendix 3: Adult Referral Criteria and Guidelines

ADULT BURN REFERRAL CRITERIA AND GUIDELINES – June 2012 V1.0

<p align="center">NON-COMPLEX BURN * Complete and Fax NBCN Non-Complex Burn Referral Form *</p> <p>Size: 1-2% deep dermal to full thickness loss ≥ 5% epidermal/superficial dermal</p> <p>Wound Healing: Any wound unhealed at 14 days or suspicion of clinical infection</p> <p>Rehabilitation: Any healed wound where scarring suggests that there may be a significant aesthetic/functional impact, loss of function or psychological disturbance.</p>	<p>IV Access: All adults with burns ≥15% should have two well secured IV cannulae</p>
<p align="center">COMPLEX BURN * Complete and Fax NBCN Complex Burn Referral Form *</p> <p>Total Body Surface Area (TBSA) Depth: ≥15% (above 16 years) >10% (65 years and over) >2% deep dermal / full thickness</p> <p>Any depth and size of the following:</p> <p>Mechanism: All burns associated with chemical or electrical injuries, exposure to ionising radiation or high pressure steam, or suspicion of non-accidental injury</p> <p>Site: Buttocks, perineum, facial, neck, feet, joints or flexural creases All circumferential burns and deep dermal/full thickness to hands</p> <p>Existing Conditions: Cardiac limitation, respiratory limitation, diabetes, pregnancy, renal impairment, immuno suppressive disorders, hepatic impairment, cirrhosis, infected burn injuries</p> <p>Associated Injuries: All burns associated with inhalation or trauma</p>	<p>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 ½ in the 1st 8 hrs & ½ in the 2nd 16 hours given as Hartmann's solution</p>
<p align="center">COMPLEX NON-BURN</p> <p>Progressive Non-Burn Skin Loss >5%: Blistering skin disorders e.g. Toxic Epidermal Necrolysis, Staphylococcal Scalded Skin Syndrome, and Stevens - Johnson syndrome</p> <p>Inhalation injury with no cutaneous burn should follow local ICU referral guidelines</p>	<p>Analgesia: Ensure adequate analgesia is given prior to intervention/transfer. Consider use of IV opiate/Entonox</p>
<p align="center">REFERRAL NOT NECESSARY *Unless indicated by complexity*</p> <p>Erythema <5% Superficial <2%</p>	<p>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 perineal/genital area</p>
<p align="center">FLUID GUIDELINES</p> <p>≥ 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 (>65years old)</p> <p>Contact Burn Unit for advice re: NBM, sedation, analgesia and future fluids</p>	<p>Suspected Inhalation Injury: If there is a suspected inhalation injury, give oxygen and seek anaesthetic review</p>
<p align="center">MEETS CRITERIA FOR REFERRAL – CALL LOCAL BURN SERVICE</p> <p>Sheffield: 0114 2714129 / 0114 2714126 Preston: 01772 522244 Manchester: 0161 2916314 Wakefield: 01924 541700 Liverpool: 0151 4301540 / 0151 4302349 Newcastle: 0191 2825637 / 0191 2820271</p>	<p>Infection: Observe for signs of infection</p> <ul style="list-style-type: none"> • Temperature >38°C • Tachycardia/Tachpnoea • Hypotension • Increased pain • Offensive/increased exudate • General malaise
<p>For cases that do not meet the criteria for referral: Continue local care and give advice to observe signs for 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</p>	

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

MUST GIVE

IV Resuscitation Fluids: All children with burns $\geq 10\%$ TBSA will receive fluid according to the Parkland Formula:-
3 ml/kg/% burn over 24 hrs from time of injury given $\frac{1}{2}$ in the 1st 8 hrs & $\frac{1}{2}$ in the 2nd 16 hours given as Hartmann's solution.

AND

IV Maintenance Fluids: 100ml/kg over 24hrs from time of injury for 1st 10kg, plus 50ml/kg over 24hrs for 2nd 10kg, plus 20ml/kg over 24hrs 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 $\geq 10-15\%$ 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 $>38^{\circ}\text{C}$
- 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-breathe mask and bag) and seek anaesthetic review

COMPLEX BURN

* Complete and Fax NBCN Complex Burn Referral Form *

Total Body Surface Area (TBSA)/Depth:

$\geq 10\%$ (<16 years)

$>1\%$ TBSA Deep Dermal burn (all children <1 year)

All Full Thickness burns $>$ size of a patients 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

$\geq 10\%$ cannula, resus fluids and maintenance

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

For cases that do not meet the criteria for referral:

Continue local care and give advice to observe for signs of infection. Refer on if unhealed at 7 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

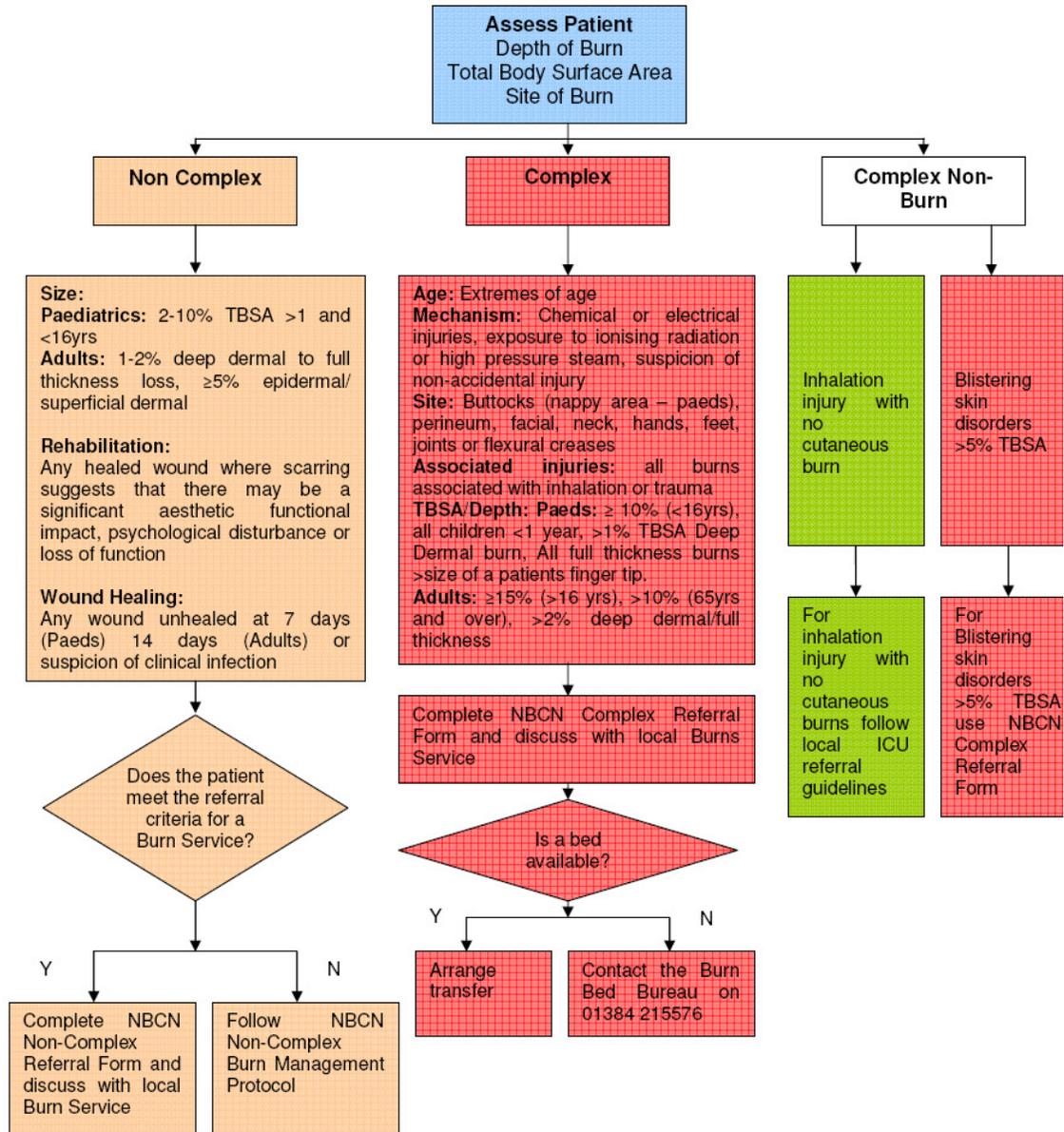
Newcastle: 0191 2826011 / 0191 2829009
Liverpool: 0151 252 5400

Manchester: 0161 701 8100
Wakefield: 01924 541931

Sheffield: 0114 2260694

17.5. Appendix 5: Adult and Paediatric Referral Flowchart

NBCN Burn Referral Flowchart – V1.0 June 2012



17.6. Appendix 6: Adult Complex Referral Form



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

<p>Patient Details NHS Number Name Date of Birth /..... /..... Gender Male <input type="checkbox"/> Female <input type="checkbox"/> Address Postcode Telephone number Is an interpreter required? Yes <input type="checkbox"/> No <input type="checkbox"/> Language</p>	<p>Referral Information (Please specify) Date: Hospital/ Community/ Other..... Department – ED / ICU / Ward/ Other Referrer Name Grade Direct Line Fax Number</p>
<p>Next Of Kin Details Patient accompanied by(relationship) Name of Next of Kin Contact Details Relationship Family/carer aware of hospital attendance? Yes <input type="checkbox"/> No <input type="checkbox"/></p>	<p>GP Details GP Name..... GP Practice/Address</p>
<p>Airway/Breathing Patent airway Yes <input type="checkbox"/> No <input type="checkbox"/> C. spine injury Yes <input type="checkbox"/> No <input type="checkbox"/> Immobilised Yes <input type="checkbox"/> No <input type="checkbox"/> Inhalation injury suspected Yes <input type="checkbox"/> No <input type="checkbox"/> Soot in nose/throat Yes <input type="checkbox"/> No <input type="checkbox"/> Hoarse voice Yes <input type="checkbox"/> No <input type="checkbox"/> Stridor/ noisy breathing Yes <input type="checkbox"/> No <input type="checkbox"/> Anaesthetic assessment Yes <input type="checkbox"/> No <input type="checkbox"/> Intubated Yes <input type="checkbox"/> No <input type="checkbox"/> Time (if applicable)</p>	<p>PMSH Smokes /day Alcohol /day Drug Abuse Yes <input type="checkbox"/> No <input type="checkbox"/> Specify Allergies Yes <input type="checkbox"/> No <input type="checkbox"/> Specify..... Tetanus Status Mobility Learning Disabilities Yes <input type="checkbox"/> No <input type="checkbox"/> Mental Health Requirements Yes <input type="checkbox"/> No <input type="checkbox"/> Co-morbidities Yes <input type="checkbox"/> No <input type="checkbox"/> Specify</p>
<p>Please use an UNCUT tube Laryngoscopy grade I II III IV Size ETT mm cuffed/uncuffed Fixed at teeth/nose cm</p>	<p>Safeguarding/Risks Safeguarding Concerns Yes <input type="checkbox"/> No <input type="checkbox"/> Risk Concerns Yes <input type="checkbox"/> No <input type="checkbox"/> Specify Action taken</p>
<p>Burn Information Date of Burn /..... /..... Time of Burn: Cause of Burn..... First Aid Given/Cooling Yes <input type="checkbox"/> No <input type="checkbox"/> Was the First Aid Delayed Yes <input type="checkbox"/> No <input type="checkbox"/> Specify By Whom: Witness/Fire Service/Paramedic/A&E/Other</p>	
<p>OBS prior to intubation FIO2 % SaO2% RR Min GCS prior to intubation/15</p>	
<p>Circulation HR bpm B/P / CRT sec Peripheral/Core Temp ° Fluid resuscitation commenced? Yes <input type="checkbox"/> No <input type="checkbox"/> (see overleaf) Urinary Catheter Yes <input type="checkbox"/> No <input type="checkbox"/> Balloon inflated..... size..... Venous Access 1 : central/peripheral size.....site Venous Access 2 : central/peripheral size.....site</p>	
<p>Environment Patient kept warm prior to and during transfer Yes <input type="checkbox"/> No <input type="checkbox"/> 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 <input type="checkbox"/> No <input type="checkbox"/> Where Escharotomies carried out prior to transfer Yes <input type="checkbox"/> No <input type="checkbox"/> Patient Weightkg actual/estimated</p>	<p>Burn % Chart - Ignore Simple Erythema</p> <p>A : ½ of head = 3½% B : ½ of one thigh = 4¾% C : ½ of lower leg = 3½%</p>

...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/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

Burn Time	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	Hour 8
Hartmann's (mls)								
Other fluids (mls)								
Oral fluid (mls)								
Urine output (mls) (aim 0.5 – 1ml/kg/hr)								

Blood		Results		Medication Given			
		ABG		Time	Drug	Route	Dose
Hb		pH					
WCC		PO2 kPa/mmHg					
Platelets		PCO2 kPa/mmHg					
Sickledex		HCO3					
Na+		BE					
K+		Lactate					
Urea		CoHb %					
Creatinine		Glucose					
Albumin		CK					
ECG		X-Ray (trauma Series)					

Northern Burn Care Network Adult Burn Units Contact Details
 –If nearest service is full then contact National Burn Bed Bureau (NBBB) on 01384 215576

Newcastle	Royal Victoria Infirmary	Burn Unit	T: 0191 282 5637 / 0191 282 0271	F: 0191 2820260
South Tees	James Cook University Hospital	Burn Facility	T: 01642 854535	F: 01642 854175
Preston	Royal Preston Hospital	Burn Facility	T: 01772 522 244	F: 01772 523694
Manchester	Wythenshawe Hospital	Burn Unit	T: 0161 291 6314	F: 0161 2916315
Liverpool	Whiston Hospital	Burn Unit	T: 0151 430 1540 / 0151 430 2349	F: 0151 4301508
Wakefield	Pinderfields Hospital	Burn Unit	T: 01924 541700	F: 01924 542632
Sheffield	Northern General Hospital	Burn Unit	T: 0114 27 14129 / 0114 27 14126	F: 0114 2269097

Pre-transfer Checklist		Any Other Relevant Information
Airway - safe/secured		
NGT in situ for transit		
Tubes/lines secured		
Poisons 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		

Patient refused Yes No Reason

Transferred to:

Form Completed By

Signed

Designation

Contact Details

17.7. Appendix 7: Paediatric Complex Referral Form



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



NORTHERN BURN CARE NETWORK REFERRAL FORM PAEDIATRIC COMPLEX BURNS

Patient Details NHS Number Name Date of Birth /..... /..... Gender Male <input type="checkbox"/> Female <input type="checkbox"/> Address..... Postcode..... Telephone number..... Is an interpreter needed? Yes <input type="checkbox"/> No <input type="checkbox"/> Language		Referral Information (Please specify) Date: Hospital/Community/Other Department - ED/ICU/Ward/Other..... Referrer Name Grade Direct Line Fax Number.....																									
Next Of Kin Details Patient accompanied by(relationship) Name of Next of Kin Contact Details Parental Responsibility..... Family/carer aware of hospital attendance? Yes <input type="checkbox"/> No <input type="checkbox"/>		GP Information GP Name GP Practice/Address																									
Airway/Breathing Patent airway Yes <input type="checkbox"/> No <input type="checkbox"/> C. spine injury Yes <input type="checkbox"/> No <input type="checkbox"/> Immobilised Yes <input type="checkbox"/> No <input type="checkbox"/> Inhalation injury suspected Yes <input type="checkbox"/> No <input type="checkbox"/> Soot in nose/throat Yes <input type="checkbox"/> No <input type="checkbox"/> Hoarse voice Yes <input type="checkbox"/> No <input type="checkbox"/> Stridor/noisy breathing Yes <input type="checkbox"/> No <input type="checkbox"/> Anaesthetic assessment Yes <input type="checkbox"/> No <input type="checkbox"/> Intubated Yes <input type="checkbox"/> No <input type="checkbox"/> Time (if applicable) Please use an UNCUT tube Laryngoscopy grade I II III IV Size ETT mm cuffed/uncuffed Fixed at teeth/nose cm		PMSH Smokes /day Alcohol /day Drug Abuse Yes <input type="checkbox"/> No <input type="checkbox"/> Specify..... Allergies Yes <input type="checkbox"/> No <input type="checkbox"/> Specify..... Tetanus Status Mobility Learning Disabilities Yes <input type="checkbox"/> No <input type="checkbox"/> Mental Health Requirements Yes <input type="checkbox"/> No <input type="checkbox"/> Co-morbidities Yes <input type="checkbox"/> No <input type="checkbox"/> Specify																									
Environment Patient kept warm prior to and during transfer Yes <input type="checkbox"/> No <input type="checkbox"/> Wound Management ≥ 10% cling film and keep patient 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 <input type="checkbox"/> No <input type="checkbox"/> Where..... Escharotomies carried out prior to transfer Yes <input type="checkbox"/> No <input type="checkbox"/> Patient Weightkg actual/estimated % TBSA % TBSA Full Thickness Burns		Safeguarding/Risks Safeguarding Concerns Yes <input type="checkbox"/> No <input type="checkbox"/> Risk Concerns Yes <input type="checkbox"/> No <input type="checkbox"/> Specify Action taken																									
Burn Information Date of Burn /..... /..... Time of Burn : Cause of Burn..... First Aid Given/Cooling Yes <input type="checkbox"/> No <input type="checkbox"/> Was the First Aid Delayed Yes <input type="checkbox"/> No <input type="checkbox"/> Specify By Whom: Witness/Fire Service/Paramedic/A&E/Other		Burn % Chart - Ignore Simple Erythema 																									
OBS prior to intubation FIO2 % SaO2 % RR Min GCS prior to intubation /15		Circulation HR bpm B/P / CRT sec Peripheral/Core Temp ° Fluid resuscitation commenced? Yes <input type="checkbox"/> No <input type="checkbox"/> (see overleaf) Urinary Catheter Yes <input type="checkbox"/> No <input type="checkbox"/> Balloon inflated..... size..... Venous Access 1 : central/peripheral/IO size.....site..... Venous Access 2 : central/peripheral/IO size.....site.....																									
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Area</th> <th>Age 0</th> <th>Age 1</th> <th>Age 5</th> <th>Age 10</th> <th>Age 15</th> </tr> </thead> <tbody> <tr> <td>A : ½ of head</td> <td>9½ %</td> <td>8½ %</td> <td>6½ %</td> <td>5½ %</td> <td>4½ %</td> </tr> <tr> <td>B : ½ of one thigh</td> <td>2¾ %</td> <td>3¼ %</td> <td>4 %</td> <td>4½ %</td> <td>4½ %</td> </tr> <tr> <td>C : ½ of lower leg</td> <td>2½ %</td> <td>2½ %</td> <td>2¾ %</td> <td>3 %</td> <td>3¼ %</td> </tr> </tbody> </table>		Area	Age 0	Age 1	Age 5	Age 10	Age 15	A : ½ of head	9½ %	8½ %	6½ %	5½ %	4½ %	B : ½ of one thigh	2¾ %	3¼ %	4 %	4½ %	4½ %	C : ½ of lower leg	2½ %	2½ %	2¾ %	3 %	3¼ %	...Please Turn Over Page 1 of 2	
Area	Age 0	Age 1	Age 5	Age 10	Age 15																						
A : ½ of head	9½ %	8½ %	6½ %	5½ %	4½ %																						
B : ½ of one thigh	2¾ %	3¼ %	4 %	4½ %	4½ %																						
C : ½ of lower leg	2½ %	2½ %	2¾ %	3 %	3¼ %																						



Fluid Management (This formula is based on the Parkland Formula)

For 1st 8 hours: 0.1875mls x % burn x weight (kg) = 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

Burn Time	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	Hour 8
Hartmann's (mls)								
Other fluids (mls)								
Oral fluid (mls)								
Urine output (mls) (aim 0.5 – 1ml/kg/hr)								

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		Medication Given			
Blood	ABG	Time	Drug	Route	Dose
Hb	pH				
WCC	PO2 kPa/mmHg				
Platelets	PCO2 kPa/mmHg				
Sickledelex	HCO3				
Na+	BE				
K+	Lactate				
Urea	CoHb %				
Creatinine	Glucose				
Albumin	CK				
ECG	X-Ray (trauma Series)				

Northern Burn Care Network Paediatric Burn Units Contact Details
 –If nearest service is full then contact National Burn Bed Bureau (NBBB) on 01384 215576

Newcastle	Royal Victoria Infirmary	Burn Unit	T: 0191 282 6011 / 0191 282 9009	F: 0191 2820543
Manchester	Manchester Children's Hospital	Burn Unit	T: 0161 701 8100	F: 0161 7018199
Liverpool	Alder Hey Children's Hospital	Burn Unit	T: 0151 252 5400	F: 0151 2933627
Wakefield	Pinderfields Hospital	Burn Unit	T: 01924 541931	
Sheffield	Sheffield Children's Hospital	Burn Unit	T: 0114 2260694	F: 0114 2717167

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

Pre-transfer Checklist	Any Other Relevant Information
Airway - safe/secured	
NGT in situ for transit	
Tubes/lines secured	
Poisons 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	Form Completed By
Copy of Ambulance PRF	Signed
Relatives aware of transfer	Designation
Burn Unit contacted with time of departure	Contact Details

17.8. Appendix 8: Adult Non-Complex Referral Form

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



NORTHERN BURN CARE NETWORK REFERRAL FORM ADULT NON-COMPLEX BURNS

Patient Details NHS Number..... Name..... Date of Birth/...../..... Gender: Male <input type="checkbox"/> Female <input type="checkbox"/> Address..... Postcode Tel number..... Is an interpreter needed? Yes <input type="checkbox"/> No <input type="checkbox"/> Language	Referral Information (Please specify) Date: Hospital/Community/Other..... Department - ED / Ward / Other..... Referrer Name..... Grade..... Direct Line..... Fax Number.....																
Next Of Kin Details Patient accompanied by Relationship..... Is the Next of Kin aware? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	GP Details GP Name..... Telephone No GP Practice/Address																
Burn Information Date of Burn/...../..... Time of Burn Cause of Burn First Aid Given/Cooling Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, how long for What type Was the first aid delayed? Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, how long for	PMSH Smokes /day Alcohol units/day Drug Abuse Yes <input type="checkbox"/> No <input type="checkbox"/> Allergies Yes <input type="checkbox"/> No <input type="checkbox"/> Tetanus Status Mobility Learning Disabilities Yes <input type="checkbox"/> No <input type="checkbox"/> Mental Health Requirements Yes <input type="checkbox"/> No <input type="checkbox"/> Co-morbidities Yes <input type="checkbox"/> No <input type="checkbox"/> Specify.....																
Wound Assessment Location..... Is it over a joint? Yes <input type="checkbox"/> No <input type="checkbox"/> Size of burn % TBSA / cm Burn Depth Epidermal Superficial Dermal Deep Dermal Full Thickness	Safeguarding/Risk Safeguarding concerns Yes <input type="checkbox"/> No <input type="checkbox"/> Risks Yes <input type="checkbox"/> No <input type="checkbox"/> Specify Action taken																
Wound Management: Wash with soap and water and apply cling film (not to faces) for immediate transfer only, otherwise apply appropriate dressing	Burn % Chart – Ignore Simple Erythema 																
Circulation Core temperature ° HR bmp B/P /																	
Medication Given <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Time</th> <th>Drug</th> <th>Route</th> <th>Dose</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	Time	Drug	Route	Dose													
Time	Drug	Route	Dose														
Northern Burn Care Network Adult Burn Units Contact Details																	
Newcastle	Royal Victoria Infirmary	Burn Unit	T: 0191 282 5637/ 0191 282 0271 F: 0191 2820260														
South Tees	James Cook University Hospital	Burn Facility	T: 01642 854535 F: 01642 854175														
Preston	Royal Preston Hospital	Burn Facility	T: 01772 522 244 F: 01772 523694														
Manchester	Wythenshawe Hospital	Burn Unit	T: 0161 291 6314 F: 0161 2916315														
Liverpool	Whiston Hospital	Burn Unit	T: 0151 430 1540 / 0151 430 2349 F: 0151 4301508														
Wakefield	Pinderfields Hospital	Burn Unit	T: 01924 541700 F: 01924 542632														
Sheffield	Northern General Hospital	Burn Unit	T: 0114 2714129 / 0114 2714126 F: 0114 2269097														
Pre-transfer Checklist		Any Other Relevant Information															
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 v1.1 November 2012

17.9. Appendix 9: Paediatric Non-Complex Referral Form



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



NORTHERN BURN CARE NETWORK REFERRAL FORM PAEDIATRIC NON-COMPLEX BURNS

Patient Details NHS Number..... Name..... Date of Birth/...../..... Gender: Male <input type="checkbox"/> Female <input type="checkbox"/> Address..... Postcode Tel number..... Is an interpreter needed? Yes <input type="checkbox"/> No <input type="checkbox"/> Language		Referral Information (Please specify) Date: Hospital/Community/Other..... Department - ED / Ward / Other..... Referrer Name..... Grade..... Direct Line..... Fax Number																															
Next Of Kin Details Patient accompanied by Relationship..... Is the Next of Kin aware? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>		GP Details GP Name Telephone No GP Practice/Address																															
Burn Information Date of Burn/...../..... Time of Burn:..... Cause of Burn First Aid Given/Cooling: Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, how long for What type: Was the first aid delayed? Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, how long for		PMSH Smokes /day Alcohol units /day Drug Abuse Yes <input type="checkbox"/> No <input type="checkbox"/> Specify..... Allergies Yes <input type="checkbox"/> No <input type="checkbox"/> Specify..... Tetanus Status Mobility Learning Disabilities Yes <input type="checkbox"/> No <input type="checkbox"/> Mental Health Requirements Yes <input type="checkbox"/> No <input type="checkbox"/> Co-morbidities Yes <input type="checkbox"/> No <input type="checkbox"/> Specify.....																															
Wound Assessment Location..... Is it over a joint? Yes <input type="checkbox"/> No <input type="checkbox"/> Size of burn % TSBA / cm Burn Depth: Epidermal Superficial Dermal Deep Dermal Full Thickness		Safeguarding/Risk Safeguarding concerns Yes <input type="checkbox"/> No <input type="checkbox"/> Risks Yes <input type="checkbox"/> No <input type="checkbox"/> Specify Action taken																															
Wound Management: Wash with soap and water and apply cling film (not to faces) for immediate transfer only, otherwise apply appropriate dressing		Burn % Chart – Ignore Simple Erythema 																															
Circulation Core temperature ° HR Bmp B/P /																																	
Medication Given <table border="1"> <thead> <tr> <th>Time</th> <th>Drug</th> <th>Route</th> <th>Dose</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>				Time	Drug	Route	Dose																										
Time	Drug	Route	Dose																														
Northern Burn Care Network Paediatric Burn Units Contact Details <table border="1"> <thead> <tr> <th>Location</th> <th>Hospital</th> <th>Burn Unit</th> <th>Tel</th> <th>Fax</th> </tr> </thead> <tbody> <tr> <td>Newcastle</td> <td>Royal Victoria Infirmary</td> <td>Burn Unit</td> <td>T: 0191 282 6011 / 0191 282 9009</td> <td>F: 0191 2820543</td> </tr> <tr> <td>Manchester</td> <td>Manchester Children's Hospital</td> <td>Burn Unit</td> <td>T: 0161 701 8100</td> <td>F: 0161 701 8199</td> </tr> <tr> <td>Wakefield</td> <td>Pinderfields Hospital</td> <td>Burn Unit</td> <td>T: 01924 541931</td> <td></td> </tr> <tr> <td>Liverpool</td> <td>Alder Hey Children's Hospital</td> <td>Burn Unit</td> <td>T: 0151 252 5400</td> <td>F: 0151 293 3627</td> </tr> <tr> <td>Sheffield</td> <td>Sheffield Children's Hospital</td> <td>Burn Unit</td> <td>T: 0114 226 0694</td> <td>F: 0114 2717167</td> </tr> </tbody> </table>				Location	Hospital	Burn Unit	Tel	Fax	Newcastle	Royal Victoria Infirmary	Burn Unit	T: 0191 282 6011 / 0191 282 9009	F: 0191 2820543	Manchester	Manchester Children's Hospital	Burn Unit	T: 0161 701 8100	F: 0161 701 8199	Wakefield	Pinderfields Hospital	Burn Unit	T: 01924 541931		Liverpool	Alder Hey Children's Hospital	Burn Unit	T: 0151 252 5400	F: 0151 293 3627	Sheffield	Sheffield Children's Hospital	Burn Unit	T: 0114 226 0694	F: 0114 2717167
Location	Hospital	Burn Unit	Tel	Fax																													
Newcastle	Royal Victoria Infirmary	Burn Unit	T: 0191 282 6011 / 0191 282 9009	F: 0191 2820543																													
Manchester	Manchester Children's Hospital	Burn Unit	T: 0161 701 8100	F: 0161 701 8199																													
Wakefield	Pinderfields Hospital	Burn Unit	T: 01924 541931																														
Liverpool	Alder Hey Children's Hospital	Burn Unit	T: 0151 252 5400	F: 0151 293 3627																													
Sheffield	Sheffield Children's Hospital	Burn Unit	T: 0114 226 0694	F: 0114 2717167																													
Pre-transfer Checklist <table border="1"> <tbody> <tr><td>Poisons centre contacted and details attached</td><td></td></tr> <tr><td>Analgesia adequate</td><td></td></tr> <tr><td>Consider cannula</td><td></td></tr> <tr><td>Jewellery/watch off</td><td></td></tr> <tr><td>Notes/X-rays/ Investigations</td><td></td></tr> <tr><td>Copy of ED assessment details</td><td></td></tr> <tr><td>Copy of Ambulance PRF</td><td></td></tr> </tbody> </table>		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		Any Other Relevant Information																	
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																															

17.10. Appendix 10 First Aid Care Plan

Goal	Action	Rationale
<p>STOP the burning process</p>	<p>Flame</p> <ul style="list-style-type: none"> • Extinguish <p>Scald/flame</p> <ul style="list-style-type: none"> • Remove clothing <p>Chemical</p> <p>* While there is residual chemical on the skin it will continue to burn (EMSB 2004)</p> <ul style="list-style-type: none"> • 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%) 	<p>Removes heat source</p> <p>Removes residual heat source</p> <p>Dilutes solution</p>
<p>COOL the burn wound</p>	<ul style="list-style-type: none"> • Cool with running water up to 3 hours post injury • Water application for 20 minutes if possible <p>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)</p>	<p>Reduces inflammatory reaction which can stop wound progression</p> <p>Clinical and experimental evidence shows beneficial effect from immediate and active cooling:</p> <ul style="list-style-type: none"> • Stabilises skin mast cells • Decreases oedema in wound • Helps to control pain <p>(Herndon 2007)</p>
<p>PROTECT the burn wound</p>	<ul style="list-style-type: none"> • Cover the burn wound with cling film (polyvinyl chloride film), except faces. 	<p>Prevents (further) contamination of the wound</p> <p>Provides pain relief by covering the exposed nerve endings. (Huspath and Ryatt 2004)</p> <p>Note: do not use constrictive circumferential material as may compromise circulation (Huspath and Ryatt 2004). Only one layer of cling film is necessary.</p>

17.11. Appendix 11: Pain Management Care Plan

Goal	Action	Rationale
<p>To alleviate/minimise all types of pain at all stages of burn recovery</p>	<ul style="list-style-type: none"> • 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) 	<p>Knowing what type and severity of pain the patient is experiencing will assist in appropriate pain management</p>
	<p>Immediate pain Cool and cover the injury</p> <p>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</p> <p>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 it's immediate action administration can occur at the time of the procedure instead of prior to the procedure</p> <p>Background Pain Give modified release medication as prescribed. Reassess effectiveness at regular intervals.</p> <p>Breakthrough Pain Give 'as required' medication as needed and monitor and evaluate the frequency and dosage.</p>	<p>Cooling and covering the exposed nerve endings will help to reduce the pain (Hudspith and Ryatt 2005)</p> <p>Limit unnecessary occurrence of pain and allow pain killers the time to act before a procedure has begun</p> <p>Provide constant background analgesia and allow for dose adjustments to be made if necessary</p> <p>Alleviate breakthrough pain</p>

17.12. Appendix 12: Burn Wound Cleansing Care Plan

Goal	Action	Rationale
<p>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</p>	<ul style="list-style-type: none"> • 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) 	<p>To facilitate timely wound healing with minimal complication of infection, scarring and contracture</p> <p>To prevent infection To prepare the wound bed for timely healing To aid assessment of burn wound depth and TBSA</p> <p>To maintain patient safety</p>

17.13. Appendix 13: Burn Wound Care Formulary

Classification of Wound	Appearance	Management Aims	Other Considerations	Infection Potential	Treatment Options
Erythema	Skin Intact No blistering Red or pink Painful Capillary refill normal (<2 seconds)	Alleviate pain / promote comfort Protect against any potential delayed blistering / skin loss Should spontaneously resolve within 48 hours	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	None	Low adherents Hydrocolloids Thin Foam Dressings Hydrogels
Superficial/ Epidermal	Blistering present Wet Pink Very painful Capillary refill normal (<2 seconds)	Alleviate pain / promote comfort Be fully healed within 7 days (Adults), 5 days (Paediatrics) Prevent infection Maintain function	A moist wound healing environment and protecting against infection will limit the possibility of burn wound conversion – reassess in 48 hours for adults	Low	Low adherents Silicone dressings Hydrogels Foam Dressings Hydrocolloids
Superficial Dermal	Pink / red with infrequent patchy white areas Painful Capillary refill normal	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	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	Low / Medium	Low adherents Silicone dressings Hydrogels Foam Dressings Antimicrobials Silver Dressings

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 Arachis oil/Olive oil Silver Dressings

<p>Hands and Feet</p>	<p>Varies depending on mechanism of injury and depth</p>	<p>Alleviate pain / promote comfort Maintain function Manage exudate Promote timely healing Limit oedema/swelling Prevent infection</p>	<p>Refer new burn injuries to local burns services as per referral guidelines Dressings as per burn unit discharge guidelines for admitted patients Dressing choice geared towards preventing infection, and promoting function. Aim to reduce bulk of dressings as soon as exudate levels will allow</p>	<p>High</p>	<p>Low adherents Silicone dressings Bags Hydrocolloids Antimicrobials</p>
<p>Hypertrophic Scars</p>	<p>Scar is raised above level of surrounding skin. Reddening is present as well as itching, and sometimes pain</p>	<p>Prevent formation Treat symptoms Reduce scar</p>	<p>All patients must be taught to massage and cream at the point of healing Review patients in 4 weeks for assessment of scars and commencement of treatment</p>	<p>None</p>	<p>Emollients Silicone Gels Silicone Sheets</p>