

Key aspects of burn wound management

KEY WORDS

- ▶ Assessment
- ▶ Burn
- ▶ Management

Burns are injuries that most people suffer at some point in their lives, these injuries however can range from a simple burn from an iron to major life threatening injury. Some of these patients will be treated at regional burn services, but many will be managed locally. Therefore, an understanding of the management of burns is needed by local clinicians.

It is important that clinicians have an understanding of the nature of burn wounds to be able to undertake effective clinical management.

BACKGROUND

Burns comprise of three zones (*Figure 1*; Jackson, 1953). The central zone – the most severely damaged – is called the zone of coagulation, the tissue within which is nonviable.

Around this is the zone of stasis, containing both viable and nonviable tissues experiencing capillary vasoconstriction and ischemia. This area is at risk of tissue loss and can, with hypoperfusion, oedema, or infection become necrotic. Systemic factors, such as chronic illness, diabetes, and advanced age, may also influence the survival of the zone of stasis.

The outer zone of injury experiences hyperaemia, characterised by vasodilation from the release of inflammatory mediators. The tissue in the zone is viable and will recover, unless severe hypoperfusion or infection occurs. In view of this, the need for correct management is essential to ensure that as much of the tissue in this zone as possible remains

viable. Thus, allowing for a reduction in the inflammatory response, burns injuries are ideally reviewed at 48 hours after the event, rather than 24 hours.

REFERRAL CRITERIA

The decision to refer a patient with a burn or not can be ambiguous. For this reason, the Northern Burn Care Network (NBCN) has devised referral guidelines and criteria to ensure consistent care across the Network.

The adult noncomplex referral criteria recommends that any epidermal /superficial dermal burn >5% of total body surface area (TBSA), or deep-dermal to full thickness burn >1%–2% TBSA should be referred to a burn service and any injuries over 15% TBSA need to be referred as a complex burn. Children 1–16 years of age need to be referred for non-complex burns of 2%–10% TBSA; all burns >10% of TBSA in children <1 year of age should be referred as a complex burn.

Patients who do not fall within the usual referral criteria may still require input from a burns service at any point in their management. Patients may require referral for pain management, or physiotherapy or psychology input, or who are failing to cope with their wounds at home. It is also advised that any burn in adults not healed within 14 days, or with suspected infection, should be referred, as should children with burns not healed in <7 days.

IMMEDIATE, NON-COMPLEX BURN MANAGEMENT

The NBCN has developed a management protocol to support staff who encounter non-complex burns.

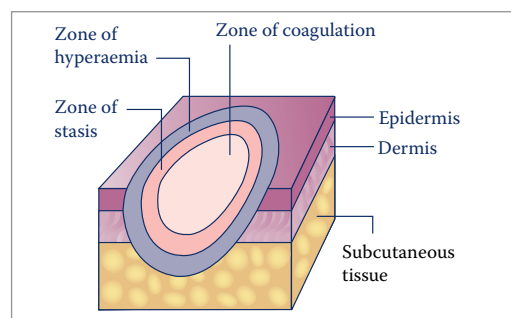


Figure 1. An illustration of the three zones of a burned, as suggested by Jackson (1953).

When managing burns, the first objective is to dissipate the heat, firstly by simply removing the heat source. First aid in burn injuries should be initiated immediately, Cuttle et al, (2008), report that cold water, for up to 20 minutes, is effective for treating all burn injuries, regardless of depth. However studies have suggested that even delayed first aid, up to 3 hours can still be beneficial (Cuttle et al, 2010). Ice should never be used, as it may deepen the wound due to vasoconstriction (Cleland 2012). The burn should then be covered with cling film. Cling film is an ideal temporary dressing as it protects the wound, reduces heat and evaporation, reduces pain, and also allows the wound to be visualised (Hettiaratchy and Papini, 2004). This should be a single layer and not wrapped circumferentially, and should not be used on facial burns.

RECORDING BURN EXTENT

A number of methods to estimate the extent of a burn exist. Most frequently used is the palmer surface method as it one of the simplest (Williams, 2009). This method equates the palm surface including the fingers of the patient’s hand to approximately 1% of the TBSA (Durrant et al, 2008). It is ideal for quick estimation and assessing small burns. However, for large burns this method can results in an overestimation factor of 10–20% (Rossiter et al, 1996).

Another method is the Lund and Browder (1944) chart (see Figure 2), which is deemed to be one of the most accurate (Grunwald and Garner, 2008). This method allows for changing body proportion and can be easily adapted for children (Durrant et al, 2008). The Wallace rule of nines is another method, and is more often used in the pre-hospital setting.

CLASSIFICATION

Burns are primarily classified by depth of skin damage. There are three major determinants that effect the depth of an injury: (i) the length of contact; (ii) the temperature; and (iii) the thickness of the skin affected (e.g. the skin on the back is thicker than the skin on the forearm; Durrant et al, 2008).

Clinical assessment is the accepted method of burn depth evaluation; there are visual and sensory indications to aid this process (Table 1). Erythema

involves the epidermis only, and is best illustrated by sunburn. The skin is red and unbroken, but there may be mild oedema, blister formation can occur later (Herndon, 2007). As there is no epidermal loss, it is not included in the TBSA assessment and can settle within hours (Durrant et al, 2008). However, a dressing can be used for comfort, and reassessment is advised in 48 hours.

In superficial/epidermal burns, blisters will often be present or the skin is easily comes away from the body, and comes away easily with pushing.

A superficial dermal wound involves the epidermis down into the middle of the dermis. Such burns should heal in 10–14 days in adults, and 7–10 days in children, from the undamaged adnexal structures in the dermis (e.g. hair follicles, sebaceous glands and sweat glands). If these burns have not healed within 2 weeks, the initial depth may have been incorrectly assessed and referral to the burns service is advised (Papini, 2004).

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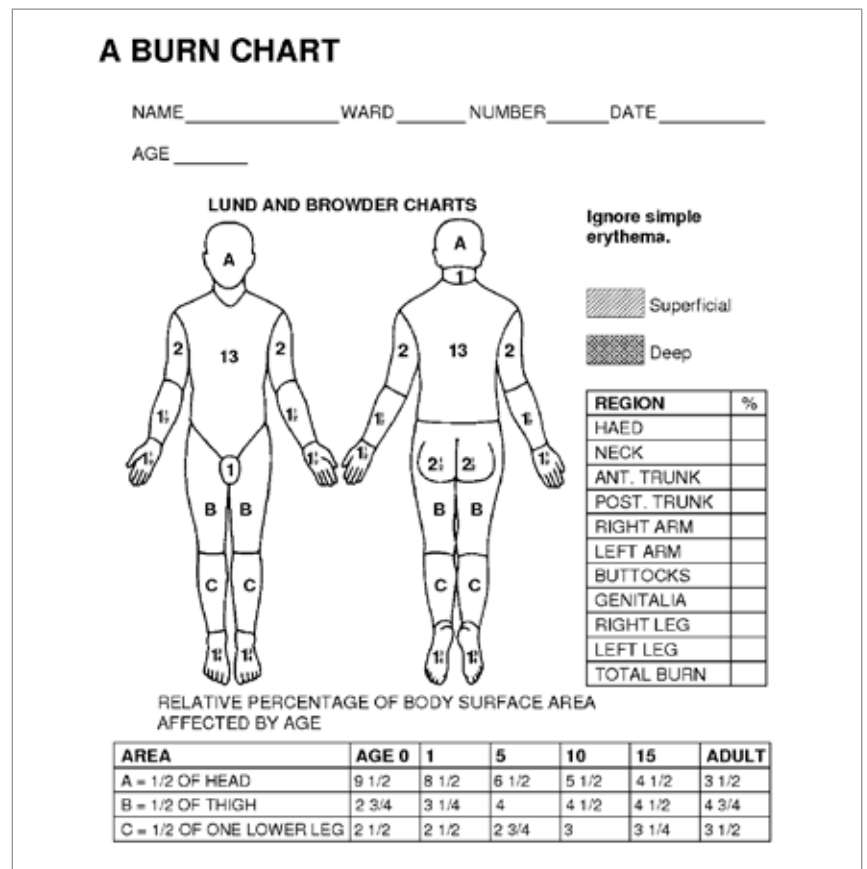


Figure 2. The Lund and Browder (1944) chart is deemed to be one of the most accurate methods of burn extent recording. It allows for changing body proportion and can be easily adapted for children.

Table 1. Burn classification guide.

	Erythema	Superficial/epidermal	Superficial dermal	Deep dermal	Full thickness
Pathology / extent	Epidermis only	Epidermis and upper-dermis	Epidermis, upper- and mid-dermis	Epidermis to lower dermis	Epidermis, dermis and may involve underlying structures
Appearance	Red and unbroken skin	Uniform pink	Pink, may have white mottling	Pale, white mottled; red capillary staining	White/waxy/charred
Blisters	Absent or may occur later	Present	Present	May be present	Absent
Pain	Very painful	Painful	Painful	Reduced	Only at the edges
Sensation	Normal	Normal	Increased sensation	Reduced	Insensate
Capillary refill	Brisk	Brisk	Less brisk	Sluggish	Absent
Hair follicles	Intact	Intact	Intact	Easily removed/detached	Absent
Healing time	No skin loss	7 days adults; 5 days children	10–14 days adults; 7–10 days children	>21 days	Do not heal spontaneously; may heal by secondary intention or surgery

Deep dermal burns penetrate to the lower dermis and are pale white mottled in appearance (in some areas there can be fixed red capillary staining, often seen on the palms of the hands or soles of the feet). As deeper structures are affected, there is reduced pain and sensitivity. Depending on the depth, spontaneous healing may occur, but can take >21 days (Cleland, 2012).

Full thickness injuries, as the name implies effects both layers of the skin and may go deeper in to the subcutaneous layer, muscle, and bone. There is a classic fixed leathery appearance, which is insensate, non-blanching, and blisters are normally absent. In smaller injuries, these wounds can heal by secondary intention, but more extensive wounds will require surgical intervention (Meyer, 2004). Burns are rarely uniform and there may be different depths within the same wound.

MANAGEMENT

Debridement

For optimal healing, devitalised tissue and foreign matter in burns need to be removed (Leaper, 2002). There is debate regarding blister removal, but to ensure correct wound assessment, management, and reduce the risk of infect infection, blister removal is advocated (Cleland, 2012). Blisters that are >1 cm and/ or are thin walled should be debrided due to the risk of spontaneous rupture. Thick walled blisters <1 cm that do not impede function may be left intact (Sargent, 2006). Blister debridement should only be performed by an experienced practitioner.

Cleansing

The chosen method of cleansing in most burns units is unperfumed soap and water, with evidence showing that there is no increased risk of infection with this method (Fernandez et al, 2002). Saline is also an appropriate solution for cleansing burns (Herndon, 2007).

Pain

Burns are often painful and consideration should be given to appropriate pain relief prior to debridement and dressing changes. While deep dermal and full thickness burns are often believed to be less painful, the patient may still experience pain at the wound edges.

Dressings

The basic principles for dressing selection are summarised in *Table 2*. There is little evidence for the superiority of one dressing over another (Wasaik et al, 2008). Improved healing and reduced pain has been well-documented with moist wound healing, this environment also promotes autolytic debridement of dead tissue, and aids the migration of epithelial cell (Fallabella, 1998).

Burn wound exudate, particularly in the first 24–48 hours, can be copious, and a more absorbent dressing is needed. After the initial hyperaemic phase, the wound will become dry and require moisture and a nonadherent dressing to aid healing. However, excessive moisture / exudate can lead to maceration and subsequent delayed healing, infection, and wound breakdown.

Table 2. Dressing selection principles.

Moist wound healing	Promotes autolytic debridement and aids migration of epithelial cells and healing.
Absorbency	Manages exudate in the first 24–48 hours, and reduces maceration. The level of absorbency should be dictated by the status of the wound / stage of healing.
Protection	Impermeable to micro-organisms.
Antimicrobial	Reduces the incident of infection.
Non-adherent	To prevent trauma to healthy tissue on application and removal.
Conformable	Allows the dressing and creams and ointments to be in contact with the wound even on movement.
Temp control	Reduces patient exposure, as a drop in temperature can delay healing.
Patient movement	Dressings over joints should allow full range of movement; fingers should be dressed individually.
Comfort	Comfort will promote patient concordance treatment, and therefore timely wound healing.
Cost effectiveness	Dressing selection based on the characteristics of the wound will reduce waste and facilitate timely healing.

The reduction of bioburden and the associated risk of infection is why antimicrobial products are often used in burns management (Wasiak et al, 2008). The most commonly used is silver, which is known to be effective against Gram positive and negative bacterial, and fungal infections (Lansdown, 2010).

In today's current economical climate, cost cutting can influence dressing selection; the cheapest dressing is not always the most cost effective, taking into account patient comfort, healing time, and nursing hours.

Extremes of age, and large burn depth and extent, may require systemic management. Also the site of injury can influence the outcome; facial, hand, feet, perineum, and circumferential burns add complexity.

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