BURNS ARE a common presentation in emergency departments (EDs). The World Health Organization (2012) estimates that burns account for 195,000 deaths a year globally, most of them in low- and middle-income countries. In England and Wales, patients with burns represent a significant proportion of the total serious-trauma workload and those with serious burns make up 5.4% of ED attendances (Kalson et al 2012). In the UK as a whole, 300,000 people a year sustain burn injuries, of which 80% can be classified as minor burns that are manageable without referral to specialist units (Rowley-Conwy 2012).

There is conflicting research evidence on burn blister management and clinicians have their own ideas, mainly based on professional experience, on how to manage them.

This review explores the literature on whether or not clinicians should de-roof minor burns blisters. The evidence covers all age groups, race and gender of patients and focuses on superficial and partial thickness burns in normally well people.

Using the search words 'minor burns', 'burns blisters', 'management of minor burns', 'de-roofing' and 'debridement', they searched the CINHAL, Ovid, Pubmed, Medline, ScienceDirect and Cochrane databases, before filtering out literature published before 1998 unless they were seminal works. The resulting 30 articles cover superficial and partial-thickness burns in usually well patients of both genders, and of all ages and races.

Keywords
Minor burns, blisters, de-roofing, debridement, infection, literature review

Results

Categories
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often blistered. They are usually painful because they cause nerve endings to become exposed, and generally take between seven and ten days to heal. Deep partial-thickness burns involve the epidermis and dermis, and appear mottled pink and blistered. They usually leave hairs intact although they damage follicles, and can take three or more weeks to heal. Full-thickness burns extend through the epidermis and dermis to the subcutis, appear black or white and leathery, and cause loss of hair. They are not painful because they damage the nerve endings in the dermis and they always require skin grafts.

Clinicians must be aware of ‘burn wound conversion’, whereby a superficial partial-thickness burn can deepen spontaneously into a deep partial- or full-thickness burn within 48 hours of injury (Rowley-Conwy 2012). As Enoch et al (2009) state, ‘burn wounds are dynamic and need reassessment within 24–72 hours because their depth can increase after injury as a result of inadequate treatment or superadded infection’. Jackson (1953) categorises the potential of burn injuries to heal according to which of three ‘zones’ they affect (Figure 2, page 26).

Burn injuries that affect the zone of hyperaemia, or the inflamed area of epidermis around the burn, should heal normally. Those that affect the zone of stasis, or dermis, usually impair circulation but can be repaired. However, burn injuries that affect the zone of coagulative necrosis, or subcutis, do not usually heal naturally because tissue in the area is unsalvageable. Understanding how tissue is damaged during a burn can help clinicians visualise the formation of the burn blister and the wound bed.

Thermal injuries increase capillary permeability, which leads to oedema and fluid loss from the circulatory system proportional to the size of the burn (Rawlins 2011). Burn blisters appear when the thermally damaged, permeable capillaries leak plasma, which forms fluid-containing vesicles between the layers of skin (Flanagan and Graham 2001). Plasma contains proteins that give it a high osmolarity, which causes water and more plasma to be drawn into the blisters.

**Infection** In a discussion about whether to remove blisters, Sargent (2006) suggests that six factors should be considered, namely infection, healing potential, functional and aesthetic outcomes, patient comfort, ease of dressing care and cost efficiency. An important factor for many clinicians, however, is whether the blisters prevent full assessment of burn depth (Yarrow et al 2009). Rowley-Conwy (2012) advocates the removal of all blisters larger than the patient’s little fingernail.

The Department of Health (DH) (2013) advocates that clinicians consider the tetanus status of patients with burn injuries because the tetanus bacillus can be harboured under blisters and encrustations. Fowler (1998) states that even minor burns are a source of infection and antitetanus prophylaxis should be administered to the patients concerned.

Many researchers say that blisters should be left intact because the fluid they contain protects wounds from bacterial infection, and promotes re-epithelialisation and angiogenesis, or the generation of new blood vessels (Flanagan and Graham 2001, Cribbs et al 2002, Shaw and Dibble 2006, Watkins 2011). These authors also suggest the fluid contains heparin-binding growth factors, which aid healing, while Pan (2013) states that ‘burn blisters contain many growth factors that may be responsible for the neovascularisation of burn wound healing’, adding that ‘the detrimental aspects of blister debridement include the loss of burn blister fluid and decreased circulation of the wound’.

Conversely, Rowley-Conwy (2012) claims that, if blisters are left intact, the risk of sepsis increases as skin flora in the partially damaged hair follicles and sebaceous glands that surround the burn start to recolonise the wound bed. Sargent (2006) advises de-roofing to ensure that prostaglandins and thromboxanes in the blister fluid do not impair blood flow to marginally perfused tissue, and to avoid wound necrosis caused by plasma-induced fibrinolysis. She suggests that evacuation of the blister fluid can help prevent burn wound conversion, thereby increasing the amount of tissue that remains viable and so reducing the risk of infection (Sargent 2006).

Payne and Cole (2012) suggest that burn blister fluid suppresses fibrinolysis and keratinocyte replication, thus reducing the wound’s healing
abilities, while Ortega et al (2000) claim that the fluid weakens the skin’s antimicrobial shield. DuKamp (2001) advocates the aspiration of blisters so that, in each case, the flattened roof becomes a biological dressing. However, Payne and Cole (2012) say that, because dead tissue is a source of nutrients for bacteria (Osborn 2003), this approach can leave the blister open to bacterial colonisation leading to local and systemic infection.

Healing When choosing how to manage burn blisters, clinicians should refer to evidence on whether burns with debrided blisters take longer to heal than those with blisters left intact, and should consider what types of dressing to use.

If blisters are debrided, care must be taken to ensure wound beds are moist because dryness leads to dermal cracks and deep cavities that allow bacteria into the dermis (Hettiaratchy et al 2005, Dealey 2012). Silicone dressings are generally used for debrided blisters (Enoch et al 2009), although there is some evidence that keratin-based dressings can improve wound healing rates in older people and in those with comorbidities or nutritional deficiencies (Davidson et al 2013).

In a comparison of healing rates in 14 volunteers with partial-thickness burns, Gimbel et al (1957) found that blisters left intact healed faster than those that were debrided. However, these findings do not take into account the evidence-based need for wound beds to remain moist (Lloyd et al 2012) or the recent development of ‘skin-substitute’ type dressings (Sargent 2006).

Prolonged healing times are associated with more extensive scarring, and patients should be referred to specialist units if their wounds appear unlikely to heal within 14 days of injury (Cleland 2012).

Practitioners should also assess the likely functional outcomes of the treatments they choose.

Most researchers agree that a blister that feels tense, for example, or that is located over a joint, should be removed (duKamp 2001, Pankhurst and Pochikhanawala 2003, Hettiaratchy et al 2005).

Practitioners should also assess the potential for scarring and contracture (Sterling et al 2010). There is no evidence that the de-roofing of superficial burn blisters leads to more extensive scarring than the burns themselves. Sargent (2006) says that ‘the use of extracellular wound matrix, such as is found in temporary skin substitutes, may reduce hypertrophic scarring by providing a scaffolding for cellular migration and new tissue formation’.

Dressings The decision to de-roof should take into account patient choice. Immediate de-roofing increases the pain associated with superficial burns because it exposes nerve endings (Butcher and Swales 2012) but reduces the pain associated with tense burn blisters because it relieves pressure (Richard and Johnson 2002). Patients should therefore be given analgesia to manage the pain associated with the initial injuries and subsequent dressings to ensure their choices are not influenced by the pain they experience (Connor-Ballard 2009). It is also important that patients are given all the information required to make informed decisions about their treatment.

Sargent (2006) claims that blister debridement and infrequent application of dressings are less painful than leaving blisters intact and frequent application of dressings. The frequency and duration of dressing changes must be taken into account because they affect patients’ comfort, convenience and finances.

In general, patients whose dressings must be applied daily have to take time off work or school, and nurses in ED or GP clinics must spend more of their time dressing their wounds than patients whose blisters have been debrided (Gotschall et al 1998). As well as being painful, frequent changes of dressing also increase risk of infection.

When choosing which dressings to use, practitioners must take into account the length of time that dressings can stay in place, how much nursing time their application takes and how much they cost. Blunt (2001) suggests that burn dressings should be antimicrobial because there is a high risk of infection, but Fowler (2003) claims that such dressings can hinder later assessment of wounds and should not be used in the first 48 hours after injury. The British Burns Association (2004) states that burns interfere with the functions of the skin and that burn dressing should minimise or correct the lack of these functions.
Gotschall et al (1998) show that the costs of using silicone dressings are less than those associated with use of non-adhesive dressings due to faster healing, fewer dressing changes, greater patient comfort and less use of medications for pain relief.

Gee Kee et al (2013) state that silver-depositing fabric and foam dressings are the gold standard in the management of wounds, and Sibbald et al (2005) agree that silver-based dressings are especially effective for critically colonised wounds.

Dearden et al (2001) state that silicone mesh dressings, such as Mepitel, allow moisture exchange without adhering to the wound surface. Silicone dressings can be applied repeatedly to the same burn for up to 14 days as long as the burn does not become too contaminated by exudates (Mönlycke Health Care 2013). Improved healing times are also associated with reduced costs (NHS Institute for Innovation and Improvement 2014).

Conclusion
The author’s literature search has confirmed that most burn blisters should be debrided rather than left intact because debridement enables better recovery for patients, and involves fewer staff and resources. Debridement also enables full assessment of burn wounds from first patient contact, and of burn wound conversions at first review or in dressing clinics.

Guidance on the management of minor burns should therefore state that burn blisters smaller than the patient’s little fingernail are left intact while larger blisters should be de-roofed fully.

Practitioners should make full assessments of the size and depth before choosing dressings to reduce the risks of scarring or decreased joint functionality, which can lead to compensation claims against trusts and clinicians. Practitioners should also take into account patients’ pain and anxiety levels before undertaking treatments.

The DH (2012) advises that burn injuries can be limited in number and severity if patients are educated in accident prevention and first aid measures at home and work, and clinicians should attempt to provide this education, if necessary, during consultations. This guidance should be reviewed every three years to take into account new research, specifically into healing times of debrided blisters and whether the constituents of burn-blister fluid promotes or impairs healing.

References


Conflict of interest
None declared