Guidelines for the management of partial-thickness burns in a general hospital or community setting—Recommendations of a European working party

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ABSTRACT

Most partial-thickness burns in Europe and the United States are managed by non-burns specialists who do not treat burns on a regular basis. To achieve better patient outcomes, partial-thickness burns should be properly managed in non-specialist centres and referred to burn units when appropriate. Although some guidelines have been published to assist non-specialists, few have attempted to provide a comprehensive step-by-step guidance emphasising wound-healing principles. A working party of European burn specialists devised a new treatment algorithm to provide clear and current guidance on the management of partial-thickness burns in the general hospital and community setting. Four areas were identified for improvement: diagnosis and referral, wound preparation, wound covering and post-wound care. The guidelines take into account the role of wound dressings, infection and general patient well-being, bearing in mind the different working environments that occur across Europe. They are aimed at improving the overall outcome for community-treated patients within the expanding European Union and reducing the number of preventable late referrals to specialists.

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1. Introduction

The vast majority of partial-thickness burns in Europe are treated by non-specialists in a general hospital or community setting. Of the 2000 people per million who suffer from burns per year, most are managed by healthcare professionals for whom burns treatment constitutes only a small proportion of the healthcare services that they provide and who may lack experience in this evolving field.

For best patient outcomes, partial-thickness burns should be properly managed in non-specialist centres, with referrals to burns units being reserved for appropriate cases. However, the identification of appropriate referrals can sometimes be problematic, and the clinical management of partial-thickness burns by non-specialists can have variable results. For example, sequelae such as hypertrophic scarring and contractures after deep partial-thickness burns are now considered unacceptable in the Western world; however, a recent review of the literature has shown that up to 20% of all burns patients have restrictions in their range of motion even 5 years after injury, whereas one in seven patients who are treated for ‘minor burns’ report long-lasting problems with their appearance [1].

A recent survey of the minor burn facility at a major teaching hospital in Australia, Royal Perth Hospital, showed that only 39% had received appropriate first aid from their primary healthcare provider [2]. Equally, a review of the management of minor burns within the emergency departments of hospitals in Ontario, Canada, showed that 70% of responding physicians would not measure the extent of the burn area when making an assessment, whereas 45% failed to discuss analgesic requirements [3]. Clearly, there is room for improvement.

These guidelines and accompanying treatment algorithm were produced out of a desire by burns specialists from European countries to provide clear and up-to-date advice on the management of partial-thickness burns in the general hospital and community setting. It is hoped that this guidance will also support the dialogue between local burns centres and colleagues in their referral area so that regionalised care plans can be produced. Their aim is to raise the standards of community-treated patients across the whole of Europe and to reduce the number of preventable late referrals to specialist units, those about whom it is said, “If only…”

2. Developing a consensus

The management of partial-thickness burns is a neglected area in the literature, with the evidence base being highest in the area of more severe burns injury or in sub-groups such as children [1]. Although a number of publications provided valuable advice in this area [4–7], none have attempted to provide comprehensive step-by-step guidance to the non-specialist, which includes applying the principles of modern burn wound healing and dressing choice.

This treatment algorithm has been developed by an expert working party of European burns specialists, who pooled their clinical judgement to provide guidance that would be applicable as widely as possible, with the aim of improving the standards of community burns care across the expanding European Union. The starting point was the development of management questionnaires detailing their preferred clinical definitions and treatment pathways and their knowledge of the clinical needs of patients and healthcare professionals involved in community burns care. At a specially convened round-table meeting, the group was able to reach consensus on the needs of patients and non-burns specialists and proceeded to draft guidelines to meet these needs.

The guidelines are specifically intended for healthcare professionals who are involved in burns management in a general hospital or community setting, including accident and emergency staff, general surgeons and physicians, dermatologists, general practitioners, paediatricians, geriatricians, pharmacists, paramedics, nurses and public-health advisors. They have been developed to provide a more consistent standard of burns management, particularly in the early stages, whilst supporting the healthcare teams in their decision-making, including the most appropriate use of specialist intervention (see Table 1).

3. The guidelines

A treatment algorithm describing the assessment and management of burns in a non-specialist setting is shown in Fig. 1. Four key areas for improvement were identified: diagnosis and referral, wound preparation, wound covering and post-wound care. These are reviewed in turn.

3.1. Referral

One of the principal aims of diagnosis is to determine whether or not a burn should be referred to a specialist burns unit. Burn depth is an important measure in this regard; however, assessment can be difficult even for an experienced burns surgeon. The distinction between superficial and deep burns is not always precise and burn wounds may not be homogeneous with respect to depth.

As a practical rule to distinguish between the two in a non-specialist environment, partial-thickness burns are wet, painful, blistering, red, white or pink, whereas full-thickness burns are dry, painless, grey, white or brownish and can look like normal skin but lack sensation. Although it is possible to successfully treat the majority of partial-thickness burns in the general hospital/community setting, full-thickness burns should always be referred. A detailed formal depth assessment is not necessary for partial-thickness burns, as the distinction between superficial and deep partial-thickness burns is based largely on their healing times (see below).
Management of burns in non-specialist centres

Clinical algorithm

Examine depth and assess area
- Partial-thickness burns = wet/painful/red/white/pink/white
- Full-thickness burn = dry/no pain/grey/white/brownish/looks like normal skin without sensation
- Use "rule of nines" for area
- Lund and Browder charts for children

Prepare the wound
- Apply cold water as soon as possible
- Remove clothing, keep patient warm
- Offer pain relief as soon as required
- Tetanus prophylaxis if not current (>5 years)
- Clean and debride wound
- Remove loose skin and blisters >2% BSA
- Puncture blisters <2% BSA

Cover wound with appropriate dressing
- Modern dressings, e.g. hydrocolloids, Hydrofiber®, silicone, alginate, polyurethane dressings
- Traditional dressings, e.g. paraffin gauze, silver sulfadiazine cream

Initial referrals
- All full-thickness burns
- >15% TBSA in adults
- >10% TBSA in children and elderly
- Burns to face, neck, hands, feet, armpits, popliteal region, genitals
- Electrical and chemical burns
- Circumferential burns
- Burns associated with inhalational injury, trauma or disease
- Non-accidental burns

10–14 days

Late referrals
- Not healed in 10–14 days
- Late presentation of pain, fever, exudates, redness, odour, malaise

Post-wound care
- Moisturise healed wound
- Protect from sunburn for 12 months
- Prevent itching with low-pressure garments, extra moisturisers and oral medications if necessary
- Communicate with patient regarding return to work
- Patient to return if surface changes occur, e.g. blisters, new wounds
- Offer psychological support if necessary

Very late referrals

Fig. 1 – Treatment algorithm for burns in non-specialist centers.
The total body surface area (TBSA) affected by the burn should be assessed using the ‘rule of nines’ for adult patients: the front, back and legs are each 18% of the TBSA; the head and arms are each 9% of the TBSA; the genitalia are 1% of the TBSA; and the hand (palms and fingers) constitute 1% of the TBSA. Assessment of paediatric burns is different due to differences in body proportions and should be based on Lund and Browder charts for children. Extensive partial-thickness burns should be referred to a burns unit. For this purpose, extensive burns are defined as burns that affect more than 15% of TBSA in adults and more than 10% TBSA in children and the elderly.

Specialist burns units are better equipped to manage chemical and electrical burns, circumferential burns and burns associated with inhalational injury, trauma or other diseases. Burns to the face, neck, hands, feet, armpits, popliteal regions or genitals should also be referred in order to improve functional outcomes. For medico-legal reasons, referrals should be made on suspicion of non-accidental injury.

Specialist referrals can also occur following the initial presentation, especially for burns that do not show signs of healing within the first 2 weeks after injury. An important indication for referral is to prevent hypertrophic scarring. Under normal circumstances, superficial partial-thickness burns heal within 10–14 days without scarring. Deep partial- and full-thickness burns take longer to heal and are likely to scar. In order to achieve good aesthetic outcomes, all partial-thickness burns that have not healed by days 10–14 should be referred to a specialist burns unit. Presentation of pain, redness, exudate formation, fever, odour or malaise days or weeks after the initial injury may be a sign of infection and can also be an indication for referral.

Although these referral criteria can be applied in the majority of cases, it is appreciated that difficulties may arise with any aspect of burns management. In particular, patients with certain pre-existing medical conditions – such as diabetes [8] – or with any psychosocial difficulties that could complicate treatment or prolong recovery, should be referred. As a general rule, in cases of uncertainty, consult a burns specialist.

### 3.2. Wound preparation

Wound preparation should be considered holistically with a view to ensuring that the patient is stable and comfortable so that the wound can be assessed safely. The aim is to achieve a clean and visible wound that is ready for dressing.

One major factor in reducing burn wound severity is the early application of cool water, which has been shown to reduce wound damage and to increase wound healing [9]. This should be done as close to the time of injury as possible – at the accident site, if appropriate – but without further endangering the patient’s life. Water temperature should be cool (around 8°C) but not cold [10]; ice is not recommended. Although suggestions for duration of cooling vary between 10 and 30 min [11,12], there are no widely agreed guidelines regarding the duration of cooling that will have the best effect. These should be adjusted for each patient to achieve maximum pain relief, as the continuing release of histamine and cytokines in a painful wound will cause that wound to further progress. Where possible, the patient’s clothing should be removed, but the patient should always be kept warm.

The wound should be cleaned and disinfected with a water-based disinfectant. Prophylactic antibiotics are not necessary to protect from infection, but tetanus prophylaxis should be provided to all patients whose vaccinations are not up to date (vaccinated within the past 5 years) [13]. Pain relief, if required, should be offered to all patients as early as possible.

Loose skin, including open blisters, should be removed prior to dressing. The clinical evidence regarding the management of blisters is poor [14], but it should be remembered that they could be very painful for the patient. To reduce pain, closed blisters of less than 2% TBSA can be punctured and re-evaluated in 5 days; removing a small area of skin will stop them reforming. Blisters larger than 2% TBSA should be removed as they may hinder burn wound assessment.

### 3.3. Wound covering

All burns should be covered in a primary care or general hospital setting. Patients to be referred to a burns unit should have their wounds covered before they are transferred. However, ointments should not be used at this stage to keep the wound clear for further assessment.

Wound dressings have changed considerably over the past 4–5 years and many different wound dressings and dressing systems are now available across Europe. The final choice of dressing will depend on local availability and personal preference of the physician. A broad knowledge of the characteristics, strengths and weaknesses of both modern and traditional dressings can greatly aid clinical decision-making. Healthcare professionals are encouraged to examine the characteristics of each wound dressing to select those that will achieve the best outcomes for each patient. A summary of characteristics that are considered to be important in wound dressings is shown in Table 2.

The following principles apply to burns wound dressings:

- As a rule, wound dressings should maintain a moist wound environment to aid healing. The principle of moist wound healing is well established and has been shown to accelerate the healing process with less pain and inflammation [15,16].
- Wound dressings should have sufficient capacity to absorb excess exudate. The provision of a moist environment does not remove the need to prevent the accumulation of

<table>
<thead>
<tr>
<th>Table 2 – Characteristics of a good wound dressing</th>
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<tr>
<td>Considered essential</td>
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<tr>
<td>Maintains moist wound environment</td>
</tr>
<tr>
<td>Contours easily</td>
</tr>
<tr>
<td>Non-adherent but retains close contact with the wound</td>
</tr>
<tr>
<td>Easy to apply and remove</td>
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<tr>
<td>Painless on application and removal</td>
</tr>
<tr>
<td>Cost-effective</td>
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<tr>
<td>Protects against infection</td>
</tr>
<tr>
<td>Considered desirable</td>
</tr>
<tr>
<td>Lasts for 10 days (one application)</td>
</tr>
<tr>
<td>Minimal dressing changes</td>
</tr>
<tr>
<td>Waterproof to allow for washing and bathing</td>
</tr>
</tbody>
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excessive moisture that can lead to skin maceration, delayed wound healing and infection.

- Wound dressings should provide an effective barrier to the exterior to reduce the risk of infection.
- Wound dressings should be able to fit well to the contours of the skin to maintain maximum contact with the wound so as to support pain relief. They should not adhere to the wound as this could cause pain during dressing removal.
- Wound dressings should be easy to apply and remove and should cause minimal pain. Ideally, a wound dressing should stay on the burn wound for 10 days, unless there are specific reasons (e.g. recurring blisters) that might require dressing changes. Leaving a wound dressing on the wound reduces pain that is associated with dressing changes. It can also lead to a reduction in the total cost of management as reduced nursing time is required. There is little benefit to be derived from frequently checking the progress of a partial-thickness burn before the day 10.

Modern wound dressings utilising hydrocolloids, Hydrofiber®, silicones, alginates and polyurethane fulfill many of the essential and desirable criteria discussed above—the most important being the maintenance of a moist wound environment to facilitate healing. Traditional dressings, such as paraffin gauze and silver sulfadiazine, are now used less often as they can cause wounds to dry up [17] and do not effectively support optimal healing. They may also allow microorganisms to access the wound, leading to increased risk of infection [18]. Silver-impregnated modern wound dressings are also now becoming available in some burns units.

It may not be practical to make detailed analyses of available products each time a burns patient is seen. It is, therefore, advisable to make a list of wound dressings in order of preference, highlighting their strong and weak points. Such a list would be subject to availability and cost-effectiveness, and should be updated periodically.

3.4. Post-wound care

Post-wound care is an essential part of total burns management. Healthcare professionals involved in burns care should ensure adequate follow-up subsequent to wound healing. It is also important to be aware of the potential need for psychological support (for example, counselling), although good burns care that helps to alleviate physical discomfort, pain and scarring, and that promotes good wound healing will also provide psychological benefits for the patient.

Although frequent visits may be unnecessary, patients should be fully advised on the next steps to take:

- Healed wounds should be moisturised on a regular basis. There are many suitable lotions, creams and ointments available.
- Itching can be a major problem after burn injury and should be taken seriously [19]. To reduce symptoms, extra moisturisers can be applied and oral medications may also be required.
- Patients should be advised to protect themselves from the sun to prevent further thermal damage or pigmentation changes to the affected area [20]. The precautions to be taken vary according to geographical location and patient lifestyle. However, in general, patients should avoid the sun following a burns injury where possible, and use adequate sun-screening creams if exposed to excessive amounts of sunlight. A cream with a sun protection factor (SPF) of at least 25 is recommended.

If surface changes occur (e.g. skin becomes hypertrophic, blisters or new wounds appear), the patient should be advised to return to the hospital or clinic for evaluation and eventual late referral to a burns unit.

- Health professionals have a responsibility to discuss with patients the best time to return to work. The impact of burns on work is significant and depends on many factors [21]. Patients should be encouraged to return to work as soon as possible. Medical notes for long absences should not be given without proper cause.

4. Conclusions

These guidelines on the management of partial-thickness burns are intended to provide non-burns specialists with comprehensive guidance on improving patient outcomes. We recognise the pivotal role of non-specialists who continue to treat the vast majority of burn injuries and believe it is the responsibility of burns specialists to ensure that they receive adequate guidance in this evolving field.

For any such guidance to be effective, there must be adequate communication between specialists and non-specialists. We encourage national burns associations and professional bodies involved with wound care across Europe to put forward these recommendations to their members, and to develop strategies for communicating the guidelines to relevant healthcare workers.

These guidelines will need to be revised on a regular basis to ensure that patients continue to benefit as the development of new products and approaches extend out to community management.

Acknowledgements

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References