

## PREHOSPITAL CARE

# Pre-hospital management of burns by the UK fire service

A Walker, R Baumber, B Robson



*Emerg Med J* 2005;22:205–208. doi: 10.1136/emj.2004.015784

See end of article for authors' affiliations

Correspondence to:  
Dr A Walker, Mid  
Yorkshire Trust, Pontefract  
General Infirmary,  
Friarwood Lane,  
Pontefract, WF8 1PL, UK;  
alison.walker2@  
midyorks.nhs.uk

Accepted 16 August 2004

**Objective:** To determine the current policies and practice of UK fire services for the management of burns patients.

**Methods:** Structured telephone questionnaire covering formal policies including patient assessment, oxygen and entonox use, burn assessment and treatment, and paediatric patients and training.

**Results:** The questionnaire was completed by 74% of the UK Fire Services (n = 46); only 14 had a specific written policy for the management of burns. Most services use "ABC" or "First Aid at Work" principles, although five have no formal guidelines for patient assessment. Oxygen is given by 44 services, all services cool burns with water and/or dressings, and 31 assess burn size. The same protocols are used for both adults and children by 29 brigades, while two brigades use lower oxygen concentrations for children. Only three brigades receive joint training from the fire and ambulance services.

**Conclusions:** UK firefighters are in an ideal position to provide early assessment and treatment of burns, but there is currently a wide variation in the fire services' management of these patients. There is a need for clear evidence based national guidelines for all pre-hospital providers to standardise patient care for burns. A suggested protocol is included in this report.

An estimated 175 000 people with burn injuries attend emergency departments (ED) in the UK each year, 13 000 of whom are subsequently admitted.<sup>1</sup> In many cases, the UK fire service has played a vital part in the rescue of these casualties, and in some cases commenced treatment. Given the importance of prompt treatment in these patients, firefighters are ideally placed to play a crucial part in the management of casualties with burns injuries.

The UK fire service is organised into 62 regional brigades, each under the command of a Chief Fire Officer. Historically, there has been variation between brigades in terms of equipment, training, and treatment. This study investigates the first aid treatment provided for burns patients.

Firefighters may be first on the scene; they are expected to attend 95% of emergency calls within 5 minutes' response time in metropolitan areas,<sup>2</sup> and provide first aid treatment to the public. They may play an important role in the care of patients with burn injuries, and yet have been overlooked by those authors evaluating the quality of pre-hospital care for these patients.<sup>3–6</sup>

## METHODS

The 62 UK fire and rescue services were identified from the National Directory of Fire Brigades.<sup>7</sup> Each brigade was sent a structured questionnaire, comprising 18 questions relating to the provision of burn care by UK fire services (Appendix 1). The questionnaire was developed by a medical student (RB) following a literature review, in conjunction with an emergency department consultant (AW), and a senior fire service officer (BR). Approximately 1 week after the questionnaire was despatched, the answers were collected by telephone (by RB) from the officer in charge of first aid training (two attempts were made at data collection for each service).

## RESULTS

Responses were obtained from 46 of the 62 fire brigades (74%).

## Written policy on the fire service management of burns

Of the 46 brigades, 14 had a specific written policy for burns care, 1 had a specific first aid manual for all their firefighters, and 3 had written information on water gel dressings. Nine brigades use recommendations from local medical personnel and one uses a policy based on the percentage of the burn.

## Protocols for primary and secondary survey

Fire and rescue services use a variety of protocols in their primary and secondary surveys: 25 use ABCDE-type protocols, 11 use First Aid at Work (FAW) protocols, 2 follow Basic Trauma Life Support guidelines, 1 uses Advanced Trauma Life Support guidelines, and 2 use protocols in conjunction with the local ambulance service, which are based on the Joint Royal Colleges Ambulance Liaison Committee guidelines<sup>8</sup> and First Responder training.<sup>9</sup> The remaining five brigades had no stated policy for primary and secondary survey.

## Oxygen administration

Oxygen therapy is given to casualties by 44 brigades; of these, 39 would give oxygen to all patients with burns, while 5 stated they would only give oxygen in certain cases such as trauma, breathing difficulties, and hypovolaemic shock. Of those that do administer oxygen, 26 administer oxygen at a rate of 15 l/min, 1 at 10 l/min, 1 at 5 l/min, and 1 at 4 l/min. The remaining 15 either use a high concentration or did not know how much was given.

All brigades using oxygen would continue treatment until the ambulance crew took over, it was no longer required by the patient, or until the supply ran out.

Regarding the method of administration, 19 use a non-rebreather mask, 13 use a specific resuscitator, 7 brigades use a bag and mask, and the remaining 5 brigades were unsure of how the oxygen was administered.

**Abbreviations:** FAW, First Aid at Work; HSE, Health and Safety Executive

### First aid treatments and burns dressings

All 46 brigades stated they would cool the burn. Of these 29 would use cold water, with cooling times varying between 10–20 minutes, until the ambulance arrived, or until no pain was felt, while 17 would cool the burn with a water gel dressing. Some services would use a variety of techniques to cool the burn.

All brigades use dressings to cover burns; 35 use water gel or similar type of dressing, 11 use clingfilm, 11 use basic non-adherent first aid dressing, and other specific dressings were also mentioned.

### Removal of clothing and jewellery

Eight brigades would remove burnt clothing, but 19 would not removing clothing if adherent to the burn (some stated that it serves as a sterile dressing). Nineteen brigades would never remove a patient's clothing, while 30 brigades would remove jewellery if appropriate.

### Warming the patient

Regarding warming the patient, 41 brigades would keep the patient warm, 5 would move the casualty to a warm environment, 5 do not routinely keep patients warm but most would monitor the situation and consider warming in extreme weather conditions. Of the 41 that keep the patient warm, 26 use ordinary blankets, 9 use space blankets, 5 use both, and 1 uses firefighters' tunics.

### Burn assessment, time and source

An assessment of the burn is made by 31 brigades; of these, 26 use the "rule of nines", 6 use the palm of the hand as a guide, and some use both methods. Only 10 of those brigades who assess the burn make an assessment of the depth of the burn, two classifying it as first, second, or third degree, and eight as superficial, partial, or full thickness.

The length of time a casualty was in contact with a burning agent is recorded by 31 brigades, and 34 determine the source of the burn.

### Children

When treating adults and children, 29 brigades use the same protocols. The 17 brigades who use different protocols mainly view burn injuries to children as more serious. However, two brigades used a lower oxygen concentration when treating children.

Three brigades specifically mentioned the danger of excessive cooling and hypothermia in children, and one used appropriate CPR protocols if the child weighed <20 kg.

### Handover to ambulance crews

A protocol for relaying information to ambulance crews is used by 28 brigades; of these, 7 have written documentation and 21 pass on information verbally usually following a set protocol, including mechanism of injury, assessment, treatment, current condition, and oxygen therapy.

### Patient transfer

One brigade said that they would consider transferring a patient if ambulance arrival was delayed.

### Extent of training and training sources

All fire fighters in 42 brigades are trained in first; the remainder train between 60 and 80% of personnel. Three services have some firefighters trained to emergency medical technician or first responder level. Six brigades receive burn management training from their local ambulance service, 35 from their own trainers and 2 rely on outside providers. Only three are jointly trained by their own first aid trainers and the local ambulance service.

### Medical personnel involvement in policies

Nineteen brigades have no input from medical personnel for burn management protocols. Of the 27 brigades who do, many have medical input from more than one source: 16 obtain advice from the local ambulance service, 15 from doctors including ED registrars (1), ED consultants (10), British Association of Immediate Care Schemes doctors (1), advanced life support instructors (1), local intensive therapy unit director (1), employed medical director (1), nurses (1), and St John's Ambulance (1).

### Awareness of national policy

Only 13 services were aware of national policies for burn management; these included Health and Safety Executive (HSE) guidelines (10), Royal College of Surgeons policies (8), The British Burns Association (1), St John's Ambulance (1), policies seen in medical journals (1), or a combination of these.

## DISCUSSION

The UK fire and rescue services have the capacity to be a significant provider of pre-hospital care, administering immediate care to burns patients. However, there is a large variation in the level of knowledge, skills, and treatment available within the brigades in the UK. No national standards exist to determine the level of equipment and training required. Some brigades provide a high level of medical treatment (medical equipment carried by fire services included automated external defibrillators, oropharyngeal airways, nasopharyngeal airways, suction devices, cervical collars, splints and spinal boards), while others have no protocols for treating patients other than cooling the burn and covering with ordinary non-adherent dressings.

It has been suggested that the ideal level for care in the fire service could be provided by using first or co-responder protocols.<sup>8</sup> It is not surprising, however, given the historical background to the UK fire service, that over 30% of brigades responding to this survey in the UK are still not above the basic level of first aid training for staff. It is more positive that the majority of those interviewed use "ABC" based protocols, but few could be classified as first or co-responders. Some crews may operate with no first aid trained firefighter.

The assistance of medical personnel in the formulation of policy is important to ensure a systematic, standardised approach from immediate care to inpatient treatment. Significant numbers of burn patients require hospital treatment, and treatment given by the fire services should follow nationally recognised protocols throughout the UK, as suggested previously.<sup>4,6</sup>

The variation in burn management policy is unsurprising, given the lack of awareness of national protocols. HSE protocols are the closest the fire service currently has to a national standard. Few services have their own burn care policy; documents such as first aid manuals<sup>10</sup> and protocols for dressings were quoted. Brigades should have a policy, with all first responders implementing a standard approach.

An estimate of the surface area and depth of burn is essential for ongoing treatment but is unlikely to have implications for immediate care and is not an essential formal component of the initial assessment.

All UK fire services cool burns in some way, to limit further tissue damage and for analgesia. Cooling time is controversial; FAW guidelines followed by some fire service recommend cooling for at least 10 minutes with tap water, whereas other authors recommend total cooling times of up to 60 minutes.<sup>6,9</sup> The pain threshold temperature for skin is 42°. Cooling the burn until a persisting analgesic effect is reached will ensure that the burn has been cooled adequately and could dispense with standard cooling times, which may

be inaccurate.<sup>4 11</sup> Even among burns surgeons, there is disagreement on the duration of cooling.<sup>3</sup> A German paper has found few adverse effects from pre-hospital cooling in non-anaesthetised patients.<sup>12</sup> However, hypothermia must be avoided by confining cooling to the area of the wound, while keeping the patient warm, so fulfilling the dictum of “cool the burn but warm the patient”.<sup>3</sup>

Clingfilm is an ideal dressing, as it is transparent, non-adherent, and easy to remove. Greaves and Porter<sup>13</sup> acknowledge that many fire brigades now use water gel dressings to cool and dress at the same time. Heat retention can be minimised by the removal of clothing and jewellery as appropriate. The need for the early removal of jewellery to minimise oedema,<sup>14</sup> particularly for hand burns, seems to be generally understood, but it is of concern that some brigades would not carry out this basic procedure.

Brigades recognised that the length of time in contact with the burning agent is important. Firefighters are in an ideal position to include assessments of the risk of carbon monoxide and cyanide inhalation.

Differences in the method and rate of oxygen delivery exist and standardisation is required. Of particular concern was the suggestion by some services that a lower oxygen concentration was appropriate for children.

Effective handover has been emphasised;<sup>9</sup> when a fire crew initiates treatment, written information should be passed onto the ambulance service, preventing documentation replication and allowing a focus on patient care.

The transfer of patients is recognised as the role of the ambulance service, thus only one rural brigade may undertake this. It may be appropriate to educate fire services regarding other means of transfer such as by air ambulance.

## CONCLUSION

UK firefighters are in an ideal position to provide early assessment and treatment for burns patients. There is a need for clear evidence based national guidelines for the management of these patients for pre-hospital providers to standardise patient care. A suggested protocol is included, which could be carried as an aide memoire by firefighters (Appendix 2).

### Authors' affiliations

**A Walker**, ED Consultant, Mid Yorkshire Trust, Leeds, UK  
**R Bamber**, Student, University of Leeds Medical School, Leeds, UK  
**A Walker, B Robson**, West Yorkshire Fire and Rescue Service

Competing interests: none declared

## REFERENCES

- 1 **British Association of Plastic Surgeons.** *National Burn Care Review, 2001. Standards and strategy for burn care—a review of burn care in the British Isles.* Available at: [www.baps.co.uk/documents/](http://www.baps.co.uk/documents/).
- 2 **Bain G.** *Independent review of the British fire service.* London: ODPM, 2002.
- 3 **Allison K.** The UK pre-hospital management of burn patients: current practice and the need for a standard approach. *Burns* 2002;**28**:135–42.
- 4 **Marichy J, Chahir N, Peres-Tassart C, et al.** Pre-hospital management of burns. *Pathol Biol (Paris)* 2002;**50**:74–81.
- 5 **Cupera J, Mannová J, Rihová H, et al.** Quality of pre-hospital management of patients with burn injuries—a retrospective study. *Acta Chir Plast* 2002;**44**:59–62.
- 6 **Allison K, Porter K.** Consensus on the prehospital approach to burns patient management. *Emerg Med J* 2004;**21**:112–14.
- 7 **The Chief Fire Officers Association.** *National directory of fire brigades.* 2003. Available at: <http://www.fire-uk.org>.
- 8 **Joint Royal Colleges Ambulance Liaison Committee.** *Guidelines.* 2001. Available at: <http://www.jrcalc.org.uk>.
- 9 **Stoy W, Klein J.** *International first responder, UK edition.* London: Mosby, 1998.
- 10 **First-Aid Manual.** *The authorised manual of St John Ambulance, St Andrews Ambulance Association and the British Red Cross,* 7th ed. London: Dorling Kindersley, 1999.
- 11 **Crawford ME, Rask H.** Prehospital care of the burned patient. *Eur J Emerg Med* 1996;**3**:247–51.

- 12 **Lonnecker S, Schroder V.** Hypothermia after burn injury—influence of pre-hospital management. *Der Chirurg* 2001;**72**:164–7.
- 13 **Judkins KC.** Thermal injury. In: Greaves I, Porter K, eds. *Pre-hospital medicine. The principles and practice of immediate care.* London: Arnold Publishing, 1999.
- 14 **Platt AJ, Aslam S, Judkin K, et al.** Temperature profiles during resuscitation, predicted survival following burns complicated by smoke inhalation injury. *Burns* 1997;**23**:250–3.

## APPENDIX 1: QUESTIONNAIRE

- Does your brigade have a specific written policy for burn management? If so, has this policy been developed in association with other agencies?
- What protocols does your brigade have for primary and secondary surveys of patients with burns? (ABCD)
- What medical skills and equipment does your brigade provide or use, e.g. defibrillation, cannulation, fluids?
- Do you give oxygen therapy to all burns patients? When? How much? How long? How?
- Is pain killing treatment provided? What? When? How long? How?
- What first aid treatments do you use on a skin burn?
- What types of dressings do you use?
- Is burnt clothing/jewellery removed from the area?
- Is the patient kept warm? How?
- Do you assess burn size, depth or severity?
- Do you ascertain the length of time the patient is in contact with the burning agent? Do you determine the source of the burn?
- Do you use the same treatment protocols for adults and children? If not, how do they differ?
- In your crews, can burn treatment be provided by all members, or are there specifically designated crew members who provide treatment?
- Who provides the training for the management of burns?
- Do you ever transport patients with burns? If so, do you transport patients on spinal boards?
- Do you have a protocol for summarising information to ambulance crews
- Are you aware of any National Policies for the management of burns?
- Have any medical personnel been involved in the development of your policies?

## APPENDIX 2: FIRE FIGHTER FIRST RESPONDER PROTOCOL

- Scene safety
  - Recognition of the hazards associated with the incident and prevention of further harm to you or the casualty.
- Check ABCDE
  - Airway—An inspection of the airway to ensure that the patient can get breathe normally and immobilise the cervical spine if appropriate.
  - Breathing—Is the patient breathing or do they require assistance? Consider oxygen.
  - Circulation—Are normal pulses present, is there any serious bleeding or fluid loss?
  - Dysfunction—Is the casualty conscious, can they give a history and symptoms?
  - Extremities with environmental control and secondary survey—check the casualty to identify any further injuries.

- Cool and cover the burn  
Cool the burn with sterile water, tap water, or water gel dressings. As soon as possible, use clingfilm as initial dressing, use water gel-type dressings to continue cooling process or for head and face burns.
- Clothing and jewellery  
If possible, remove any burnt clothing and jewellery near burns, particularly on fingers.
- Briefly assess the extent and depth of the burn  
A brief survey of the size and depth of the burn. This process should not delay any urgent treatment.
- Keep the patient warm and reassured  
Cool the burn and keep the patient warm.
- Record mechanism of injury and treatment.  
Include:  
The patient's name, sex and age  
ABCDE injuries and treatment  
Any other information which might be relevant
- Handover  
Ensure all relevant information is handed over effectively.

### Clinical Evidence—Call for contributors

*Clinical Evidence* is a regularly updated evidence-based journal available worldwide both as a paper version and on the internet. *Clinical Evidence* needs to recruit a number of new contributors. Contributors are healthcare professionals or epidemiologists with experience in evidence-based medicine and the ability to write in a concise and structured way.

#### Areas for which we are currently seeking authors:

- Child health: nocturnal enuresis
- Eye disorders: bacterial conjunctivitis
- Male health: prostate cancer (metastatic)
- Women's health: pre-menstrual syndrome; pyelonephritis in non-pregnant women

However, we are always looking for others, so do not let this list discourage you.

#### Being a contributor involves:

- Selecting from a validated, screened search (performed by in-house Information Specialists) epidemiologically sound studies for inclusion.
- Documenting your decisions about which studies to include on an inclusion and exclusion form, which we keep on file.
- Writing the text to a highly structured template (about 1500–3000 words), using evidence from the final studies chosen, within 8–10 weeks of receiving the literature search.
- Working with *Clinical Evidence* editors to ensure that the final text meets epidemiological and style standards.
- Updating the text every six months using any new, sound evidence that becomes available. The *Clinical Evidence* in-house team will conduct the searches for contributors; your task is simply to filter out high quality studies and incorporate them in the existing text.
- To expand the topic to include a new question about once every 12–18 months.

If you would like to become a contributor for *Clinical Evidence* or require more information about what this involves please send your contact details and a copy of your CV, clearly stating the clinical area you are interested in, to Klara Brunnhuber (kbrunnhuber@bmjgroup.com).

### Call for peer reviewers

*Clinical Evidence* also needs to recruit a number of new peer reviewers specifically with an interest in the clinical areas stated above, and also others related to general practice. Peer reviewers are healthcare professionals or epidemiologists with experience in evidence-based medicine. As a peer reviewer you would be asked for your views on the clinical relevance, validity, and accessibility of specific topics within the journal, and their usefulness to the intended audience (international generalists and healthcare professionals, possibly with limited statistical knowledge). Topics are usually 1500–3000 words in length and we would ask you to review between 2–5 topics per year. The peer review process takes place throughout the year, and our turnaround time for each review is ideally 10–14 days.

If you are interested in becoming a peer reviewer for *Clinical Evidence*, please complete the peer review questionnaire at [www.clinicalevidence.com](http://www.clinicalevidence.com) or contact Klara Brunnhuber (kbrunnhuber@bmjgroup.com).