

Towards a national burns disaster plan

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Summary

The International Society for Burns Injuries (ISBI) has published guidelines for the management of multiple or mass burns casualties, and recommends that 'each country has or should have a disaster planning system that addresses its own particular needs.' The need for a national burns disaster plan integrated with national and provincial disaster planning was discussed at the South African Burns Society Congress in 2009, but there was no real involvement in the disaster planning prior to the 2010 World Cup; the country would have been poorly prepared had there been a burns disaster during the event. This article identifies some of the lessons learnt and strategies derived from major burns disasters and burns disaster planning from other regions. Members of the South African Burns Society are undertaking an audit of burns care in South Africa to investigate the feasibility of a national burns disaster plan. This audit (which is still under way) also aims to identify weaknesses of burns care in South Africa and implement improvements where necessary.

'An emergency anticipated and prepared for ceases to be an emergency'.¹

Severe burn injuries are among the most catastrophic forms of trauma. For the afflicted individual, the injuries can have long-standing physical consequences, and the psychosocial and economic sequelae are invariably as debilitating. For the community, the costs of caring for such individuals are enormous.²

Hospital resources in South Africa are presently stretched to capacity, and reductions in bed numbers continue unabated. One result is that ongoing and unreasonable expectations are placed on doctors to triage patients to unacceptable standards of care.^{3,4}

A general disaster plan is a prerequisite for hosting an event of the magnitude of the 2010 FIFA World Cup.^{5,6} The need for a national burn response plan integrated into this plan was recognised at the 2009 South African Burns Society meeting in Pretoria, and a task team was established.

The Football World Cup is the world's largest sporting event. Vast numbers of fans congregate in confined areas, some adapted for a temporary period for the purpose. Major funding is channeled into constructing football stadia, which took place in South Africa in the context of a legal system battling to cope with the world's worst violent crime rate, and education and health systems in crisis. Significant challenges faced those attempting to host this sporting event, with limited emphasis placed on potential complications; a fire at one of the venues, for instance, could have been catastrophic. Table I lists some of the characteristics of burns disasters.

TABLE I. CHARACTERISTICS OF A BURN DISASTER

Large number of patients with extensive injuries

A high incidence of associated serious injuries

Site of the disaster not readily accessible

Immediate care and assistance may not be adequate

Response time may be prolonged

Local infrastructure may be affected by the fire

Research indicates that the likelihood of a burns disaster increases when large numbers gather in an environment where powerful sources of energy are harnessed in industry or where there has been a significant growth in transportation and technology.⁵⁻¹¹ Acts of civil disturbance and terrorism have been of recent importance and have highlighted the need for national disaster plans in all countries. The Australian Burns Disaster Plan (Ausburnplan), for instance, was drawn up in the aftermath of the Bali catastrophe.¹²

Analysis of major terrorist attacks has revealed that up to 15% of the total live casualties sustained severe burn injuries. Using a worst-case scenario of 2 000 live casualties, we would have to manage 300 major burns, which would overwhelm existing services.^{6,10-14}

While international experience of burns disasters is being utilised to formulate such a plan, it needs to be adapted to our unique setting.¹⁵ The South African Burns Society is therefore undertaking a major audit of burns practitioners and burns units.

A burns disaster plan for South Africa

The International Society for Burns Injuries (ISBI) has published guidelines for the management of large numbers of burns casualties, and recommend that 'each country has or should have a disaster planning system that addresses its own particular needs.'¹⁵ The essential elements of any disaster plan, the ISBI maintains, are descriptions of how medical facilities should be set up to provide appropriate treatment, and how to ensure access to such facilities.¹⁵

Table II is a list of benefits of a planned response.¹⁶ The ISBI divides burn treatment facilities into 4 categories:

- facilities that offer only resuscitation
- facilities that offer comprehensive care (burn centres)
- facilities that offer rehabilitation
- facilities that offer a reconstructive service.¹⁵

The ISBI maintains that the national burns society (in our case, the South African Burns Society) must play an integral role in evaluating these facilities and maintaining standards, as well as formulating and implementing burns disaster plans.¹⁵ In addition, it is felt that members of the South African Burns Society (SABS) should:¹⁵

- maintain a list of units and individuals accredited with the SABS
- collaborate with other agencies
- provide courses and training (e.g. Emergency Management of Severe Burns course¹⁷)
- be represented at disaster management headquarters
- maintain contact with burns units and liaise with bed managers during normal functioning.

Lessons from major burns disasters

Barilo *et al.* noted 73 major burns disasters in the United States in the 20th century.⁶ A number of studies have been published evaluating the response to major disasters in other countries. Lessons can be learnt from these events.

It is evident that the number of fatalities per incident has declined steadily over this period, a statistic that is accounted for by the successful implementation of basic safety standards in domestic and industrial settings. Important advances have been made in fire prevention in response to these disasters and the critical analysis of the response plans so initiated.⁶

Table III charts the outcomes of victims of burns disasters of last century.⁵

Most disaster plans have not made adequate provision for burn casualties, a group that demands greater access to resources than other categories of major trauma.^{6-11,13,14} Essential to its success is a burn disaster plan's integration into overall regional, national and international disaster plans.^{6,11,18}

During many major burn disasters, most patients either died within 24 hours of the incident or had relatively minor injuries that could be managed as outpatients. The smallest cohort required hospitalisation and intensive care.⁶ It appears reasonable that centres should prepare for this cohort to number between 25 and 50 patients. Even 10 new patients, however, are likely to overwhelm most burns units in South Africa.^{6,10,11,13}

It is well established that the optimal management of burns casualties occurs in a burns unit.^{2,5,10,14} Table IV lists the 10 principles of disaster management.¹⁶ Triage patients to the appropriate category is paramount to the success of a plan's implementation.^{6,7} An experienced burns practitioner may be required to co-ordinate with the senior emergency medicine practitioner on the scene. Circumstances may dictate that he be on the scene. Emergency medicine staff and paramedics, however, are the best equipped to

TABLE II. BENEFITS OF A PLANNED RESPONSE

- Improved notification**
- Consistent initial and follow-up information**
- Timeliness of responses**
- Better management**
- Accurate collection of information**
- Appropriate analysis of information, improved triage etc.**
- Improved use of transport**
- Improved outcomes for victims**

TABLE III. SELECTED MAJOR BURNS DISASTERS IN RECENT TIMES, AND OUTCOME OF VICTIMS

Date	Location	Deaths at scene	Admissions	Deaths in hospital
1942	Coconut Grove Night Club, Boston	400	200	91
1944	Circus, Hartford, Connecticut	125	150	
1961	Circus, Niteroi, Brazil	400	160	
1978	Camp site, Los Alfaques, Spain	102	148	108
1981	Circus, Bangalore	92	77	17
1973	Summerland Leisure Complex, Isle of Man	48	32	2
1984	Abbeystead Pumping Station	9	35	7
1985	Football Ground, Bradford	53	83	5

TABLE IV. TEN PRINCIPLES OF DISASTER MANAGEMENT

- Prevention**
- Preparedness**
- Disaster profiles**
- Disease patterns**
- Effective multidisciplinary response**
- Mobilisation of multisectorial manpower**
- Risk assessment**
- Post-emergency phase**
- Reconstructive phase**
- Community involvement**

manage patients at the scene; the skills of the other burns staff are best utilised in the burns unit.^{5,6} Fig. 1 illustrates the triage process.

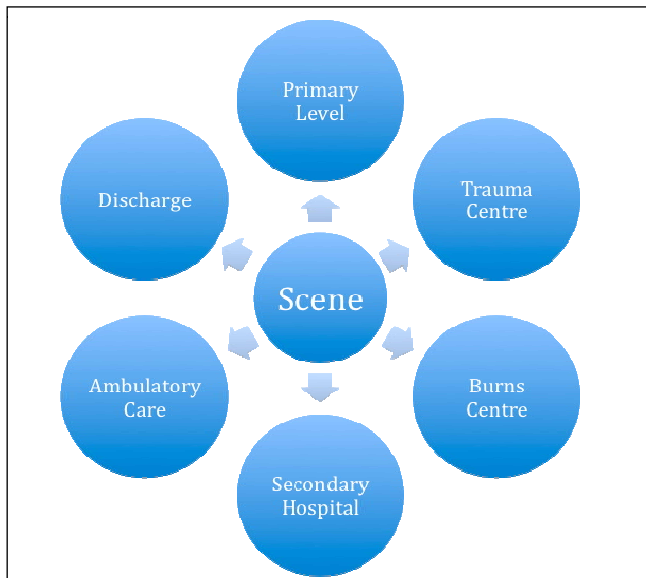


Fig. 1. The triage process, critical to optimising specialist resources.

The use of enforced written triage and treatment protocols and *pro formae* has proved effective.^{6,20,21} A clearly defined hierarchy of command enables efficient operation, both at the scene during the initial triage and at the burns units. Regular planning and debriefing sessions have also been useful.

Transportation strategies should be streamlined to optimise the care of patients, and should be adapted to the specific disaster. The role of paramedics and ambulance, fire and police services must be clearly defined in the disaster plan and adapted during the event.^{5,6,22}

Early notification of surrounding hospitals is important. A burns disaster, by definition, will overwhelm even a burns centre within a multispeciality hospital, and so-called secondary triage may be required. An experienced burns surgeon should perform secondary triage and co-ordinate with units where patients may be diverted and where adequate treatment may continue. Depending on the circumstances, it may be more appropriate for equipment, staff or supplies to be transported to the disaster scene or local receiving facilities.^{5,6,12-14}

Each department in the hospital complex should have an emergency call-out plan and implement it according to the nature of the disaster, as determined by the senior burn surgeon. Normal functioning of the hospital should continue where possible, but it may be decided that only emergencies be managed for a period, and all elective surgery be postponed. Critical medical and support personnel may include doctors from a variety of specialities (surgeons, intensivists, anaesthetists); nurses with critical care, wound care, trauma or burns experience; physiotherapists, escorts and translators, clerks, radiologists and radiographers, blood bank and laboratory technicians, social workers and psychologists, administrators, security guards and porters.¹¹

One burns surgeon should lead in-patient care and co-ordinate with other departments, e.g. intensive care, anaesthetics and allied departments (physiotherapy, etc.).

One member of the team should be identified to liaise with the media and with representatives from victims' families. These groups have important roles to play in successful implementation of the plan, but failure to manage them appropriately has hampered optimal patient care.^{5,6,11}

Staffing *per se* is unlikely to be problematic; how to optimise the skills of volunteers and burns practitioners can be the main challenge. Shortages are more likely to occur in the availability of hospital, burns unit and intensive care beds, as well as supplies such as dressings and medicines.

Adequate supply stockpiles should be available for such disasters. These include sterile dressings (tulle gras), burns gauze, bandaging, intravenous fluids and medicines. Systems should be in place to enable industry to supplement the stores where deficits exist. The laboratory will be under increased pressure, and the blood bank should have the ability to arrange major blood donation drives at short notice.^{5,6}

Cadaver skin was identified as the major single resource lacking in Singapore after the 2002 Bali attack, despite having more than 9 000 cm² in the local skin bank at the time of the disaster.²³ Legislation and local resistance has affected the availability of cadaver skin in South Africa.

During normal hospital functioning, it is important for burns units to maintain databases of burns patients managed, bed occupancy rates, and a variety of other information including staffing. This information can be used to motivate for improved resources, the allocation of resources, and the redistribution of patients should units be full. This database should be in use during non-disaster times to appropriately distribute trauma victims and specifically burns patients. Examples of such systems are used in Europe and the USA. Telemedicine systems have also proved invaluable in these settings.^{12,15}

Units able to adapt to function as a burns unit temporarily (such as secondary level hospitals with general surgery staff) may be crucial and should be identified, prepared and incorporated into the plans.

Once compiled and published, burns disaster plans should be tested and critically evaluated^{11,14-16} as determined by the National Disaster Management Act 57 of 2002.²⁵ Note Fig. 2, which broadly illustrates the process.

The nature, impact and scale of the disaster will depend on the time and type of disaster, the location (urban or rural, and specific location) and the number of victims. The level of preparedness and the presence of a plan would also prove decisive.^{6,9,16} (Table V).

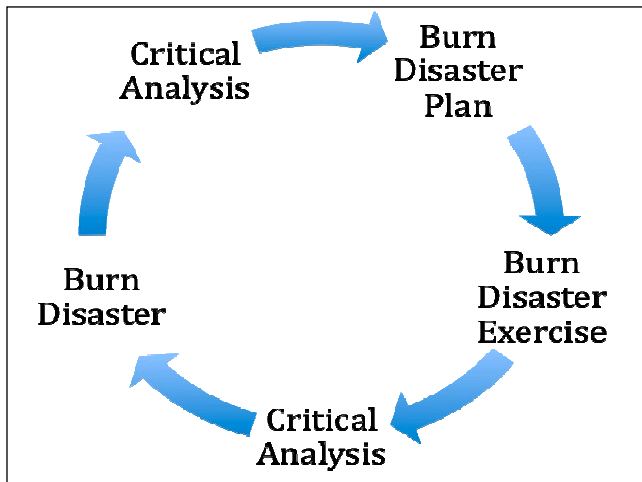


Fig. 2. Preparation for a burns disaster.

TABLE V. FACTORS THAT INFLUENCE THE EVOLUTION OF A BURNS DISASTER

Unpredictable occurrence
 Time (day, night, festival, sports event)
 Characteristics (explosion, building collapse, toxic gases, forest fire)
 Location (residential, industrial, public venue)
 Rural or urban
 Accessibility
 Number of injured
 Nature of other injuries
 Degree of preparedness

The first 2 - 3 hours require the implementation of emergency care in the field, based on advanced trauma life support (ATLS) principles.²⁵ During the ensuing 8 hours, the complex relief strategy should be implemented according to the disaster plan and, with appropriate triage and definitive burns fluid therapy, wound care and surgery if indicated in the intensive care unit, the burns unit, surgical ward or theatre, as necessary.^{6,11,15}

The concept of 'minimal acceptable care' was coined to apply to the treatment of mass burns casualties after the terrorist attacks in Indonesia. A policy of selective treatment of patients may need to be implemented to conserve hospital resources and optimise manpower.²³

Conclusion

The ISBI recommends that 'each country has or should have a disaster planning system that addresses its own particular needs.'¹⁵ The SABS is currently undertaking a major audit of burns care in South Africa so as to formulate, implement and test such a plan.

The maintenance of a central database of burns units and practitioners forms part of this strategy. Broader objectives include the improvement of burns care and resources in South Africa and the continent, and to increase the number of practitioners completing the Emergency Management of Severe Burns (EMSB) course.

We appeal to all who involve themselves in the care of burns patients to contact us in order to update the SABS database and

complete these objectives. Please join the South African Burns Society by visiting our website www.saburnsociety.org.za. Information required by the Society at this time is shown in Table VI.

TABLE VI. SABS REQUIREMENTS FOR UPDATING ITS DATABASE

1. Name of burns practitioner
2. Specific burns training received, qualifications, experience, EMSB course
3. Email and physical address, telephone numbers
4. Context of burns practice
5. Number of burns beds available
6. Number of burns patients managed monthly
7. Intensive care access
8. Affiliated surgical and allied staff contingent
9. Other information about burns care in the region
10. Suggestions for the SABS

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