

Burn Care in Disaster and Other Austere Settings



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KEYWORDS

• Disasters • Mass-casualty planning • Triage • Low-income countries

KEY POINTS

- Each burn center needs both an external and internal plan for mass-casualty disaster preparedness; these plans should outline standard operating procedures for airway management, resuscitation, and wound care, including pain management strategies.
- Collaborating with local, state, regional, and national stakeholders is essential to devise successful disaster plans, which should involve a regional strategy for patient transport.
- Improvised recipes for fluid resuscitation of burns greater than 40% total body surface area can be lifesaving when customary supplies for burn shock resuscitation are unavailable.
- Beyond the urgency of securing the airway and initiating treatment of circulatory collapse from burn shock, the risk of limb loss requires careful vetting before performing escharotomy and/or fasciotomy.
- Combined burn-trauma injuries are exponentially dangerous and, faced with this dilemma, trauma management must precede burn management.
- Focusing on preventing the progression of burn depth from partial to full thickness is likely to save the maximal number of lives.
- Ideal disaster preparation is repeated training that drills to fail, pushing care teams out of their comfort zones and past their present capacities.
- Although clean water and other sterile supplies and equipment may be absent or limited, strive to effect sterile, antiseptic technique and to do the most good for the most people.

INTRODUCTION

Most readers of this article will need to care for patients with burn injuries in an austere environment without the advantage of consulting references, so the recommendations provided here center on those actions that can be taken with a dearth of resources and can translate into saving life and limb in a highly leveraged fashion.

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The term austere conditions, as it is used here, refers to impoverished communities, care on the battlefield, and the landscape in the aftermath of a mass-casualty situation. These three very different scenarios are the basis for the recommendations that follow.

AIRWAY AND BREATHING

The single most proximal cause of death for a burn victim, including during austere conditions, is loss of the airway. The most sensible approach to airway preservation varies widely, with the root cause likely to be limiting medical resources. In modern warfare there are often extensive medical resources available within 6, 12, or 24 hours, and endotracheal intubation or securing an airway surgically makes the best sense. Preventable airway deaths seem to be uncommon in this setting, although in lower-intensity conflicts this may not be true.¹

Practitioners in the environment of low-income countries are the best judges of what airway and ventilator management is available. When these professionals deem that no management is possible, their wisdom cannot be second-guessed by clinicians not facing the same limitations. These clinical decisions determine which patients are in either the potentially survivable group or those to receive expectant care only. Clinical decisions in these environments also shape every aspect of burn care to effectively minimize those occasions when the only option is mechanical ventilation. Mass burn casualties with 200, 2000, or 20,000 living injured quickly consume the available number of endotracheal tubes and ventilators. The limited supply of medical-grade oxygen also becomes a rate-limiting step for care. Triage and burn resuscitation guidelines must, as always, be strategically optimized to minimize the number of patients requiring airway and breathing resources.²

In addition, if the burn injury has occurred in a closed space with a likelihood of carbon monoxide inhalation, 100% oxygen, if available, for several hours might be life-saving; it hastens the elution of carbon monoxide and frees hemoglobin for its intended role of oxygen transport to cells.

BURN SHOCK RESUSCITATION

Under austere conditions, intravenous cannulation and sterile intravenous salt solutions, which are the foundation of modern burn shock resuscitation, become luxuries. The following recipes for fluid resuscitation in the aftermath of burns (orally, and less commonly by enema) are the primary message of this article. Burns of 20% total body surface area (TBSA) can be successfully resuscitated in this manner. Burns of up to 40% TBSA can most likely be resuscitated.³⁻⁵ In austere conditions without access to intravenous therapy, fluid resuscitation for burns larger than 40% TBSA must suffice by using the techniques described later. The current published global experience is not large, and the magnitude of burn injuries that successfully respond to World Health Organization oral rehydration solution (ORS) when put to the challenge is surprising:

- ORS can be made with 1 L of clean water, 1 teaspoon of table salt (3 g), and 3 tablespoons of sugar (18 g or 9 sugar cubes); it can also be purchased as packets.
 - Clean water can be obtained by boiling the water, or by adding potassium alum, chlorine drops, or iodine tablets.
 - As an alternative to table salt, sodium bicarbonate (baking soda) can be used as a source of sodium.

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