

Project: Ghana Emergency Medicine Collaborative

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Burn Mass Casualty Incidents

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Burn Mass Casualty Incidents

Lecture Outline

- **Recent mass casualty events**
- **International guidelines**
- **Regional / national planning**
- **Prehospital considerations**
- **Useful reference web sites**

Recent Burn Mass Casualty Events (cont.)

- **Bali nightclub bombing in 2002**
 - **190 killed at the scene**
 - **12 additional deaths after hospital admission**
 - **> 500 injured, most with severe burns**
 - **62 burn patients were transferred to Australia and all its burn beds were filled (Australia has 12 burn centers with 146 beds)**

Recent Burn Mass Casualty Events

- **Station Nightclub fire in Warwick, Rhode Island, February 20, 2003**
 - **96 killed at the scene**
 - **196 patients seen at 16 regional hospitals**
 - **50 % treated and released, 25 % admitted, 25 % transferred to other hospitals**
 - **Only 4 subsequent deaths**
 - **17 % (35) required intensive care and ventilatory support**

Recent Burn Mass Casualty Events (cont.)

- **Madrid, Spain train bombing, March 11, 2004**
 - **10 bombs exploded**
 - **181 dead at scene**
 - **10 died later in hospital**
 - **2051 wounded**
 - **82 in critical condition**
 - **Transported by 291 ambulances, 200 firemen and police vehicles, to 5 hospitals**
 - **City-wide disaster plan activated by the health authority**

Recent Burn Mass Casualty Events (cont.)

- **Asuncion, Paraguay supermarket explosion and fire, 2004**
 - 424 died at scene
 - 360 admitted to hospital
 - 5 % of these died
- **London Underground (subway) and bus bombings, July 7, 2005**
 - 3 Underground train bombs and one bomb on a double-decker bus
 - 52 dead at scene
 - Over 700 injured



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EMS vehicles staging near one of the Underground entrances after the London bombings

Non-flame Burns in Mass Casualty Events

- Israeli field hospital in Duzce, Turkey in 1999 treated 40 burn patients (2 % of patients seen) injured by scalding water from an earthquake (the quake occurred at dinner time)
- 2007 report from China (Burns 2007; 33:565-571) of 118 patients with alkali burns from a flooded alkali storage area

General Aspects Common to Most Burn Mass Casualty Events

- Burn patients comprise 1 to over 40 % of casualties depending on the event (usually about 25 % from bombings)
- Usually 50 % of patients who present to emergency departments can be discharged after initial evaluation and treatment
- Mortality of injured patients after hospital admission is 1 to 5 %
- Victims may have smoke inhalation in addition to other injuries

One Method for Teaching Hospital Staff Management of a Burn Mass Casualty Event

- **Senior Emergency Physician triages patients at the entrance to the Emergency Department or mass casualty facility**
- **One resident and one nurse are assigned to conduct the resuscitation of each major burn patient (emergency medicine, surgery, Obstetrics and Gynecology residents for adult patients, pediatric residents for pediatric patients)**
- **Senior Emergency Physician or surgeon supervises 5 to 15 residents**
- **Remainder of surgeons ready to perform emergent surgeries**

International Society for Burn Injuries Guidelines : Facility Classification (Burns 2006; 32:933-939)

- **Type A : facilities that provide resuscitation treatment only**
- **Type B : facilities that provide both resuscitation and post-resuscitation treatment**
- **Type C : facilities that provide rehabilitative and reconstructive treatment only**

Note that if a Burn Center suffers structural or functional damage from the disaster (such as an earthquake) it might only be able to function as a Type A ; a distant Burn Center could function as a Type B if helicopter evacuation is available.

Regional and National Planning for Burn Mass Casualty Events

- **Healthcare facilities need to be designated Type A, B, or C**
- **Ambulance transport arrangements between facilities are needed**
- **Burn unit staff (from Type B and C facilities) need to train emergency physicians, family and general practice physicians, surgeons and nurses at the Type A facilities in burn resuscitation (including escharotomy) and referral**
- **Other surgeons at non-burn unit Type B facilities need to be also trained in skin grafting and other definitive burn care**

Problems with the 2006 International Burn Mass Casualty Guidelines

- Inappropriately large numbers of the following items for each 5 patient “triage station” are recommended :
 - Central IV catheters
 - Laryngoscopes
 - Endotracheal tubes
 - Larger size airways and catheters
 - IV fluid types (only Lactated Ringers is needed)
 - Medications (only parenteral opiates and sodium bicarbonate would be useful in a mass casualty situation)

Emergency Medical Services (EMS) (Prehospital) Considerations for Burn Mass Casualties

- **Scene safety for EMS personnel is the first priority**
 - **Patients may require decontamination if chemical burns**
 - **Scene needs to be treated as a crime scene**
- **Designating a “field” Incident Commander and Incident Command Post need to be done as early as possible**
 - **Next priority is determining capacity of the regional healthcare facilities and distributing the patients**
- **One interesting recent proposal is to use Oral Rehydration Solution for fluid resuscitation**

EMS Scene Safety Considerations for Burn Mass Casualties Incidents

- **Scene entry may need to await clearance by a police or military bomb squad (to make sure a secondary explosive device targeting the rescuers is not present)**
- **Vehicles and personnel should stage uphill and upwind of the site**
- **If inside (a building or subway), ventilation to remove smoke should be started, and EMS personnel may need to use oxygen or compressed air to avoid carbon monoxide or smoke inhalation**
- **Security, police, or military personnel need to secure the scene perimeter early**

EMS Stockpiling for Burn Mass Casualties

- The following items need to be considered for “stockpiling” by EMS in anticipation of a burn mass casualty event :
 - One liter bags or bottles of Lactated Ringers solution, IV lines and catheters
 - Portable oxygen tanks, oxygen tubing & masks
 - Clean sheets (do not need to be sterile)
 - Parenteral narcotics (with appropriate security and monitoring arrangements)
- Note that hospitals need to consider the same stockpile list but would need to add burn ointment (such as silver sulfadiazine) also

Burns : Disposition Criteria Based on Severity Category

- **Severe** : Transfer to burn center for burn specialist care after resuscitation
- **Moderate** : Resuscitate, then admit to local hospital for care by general, trauma, or plastic surgeons
- **Minor** : Evaluate for other injuries, treat, discharge, and followup in office or clinic as outpatient

Minor Burns

- **Second degree < 15 % in adults**
- **Second degree < 10 % in children**
- **Third degree < 2 %**
- **No involvement of face, hands, feet, genitalia (technically difficult areas to graft)**
- **No smoke inhalation**
- **No complicating factors**
- **No possible child abuse**

Moderate Burns

- **Second degree of 15 to 25 % TBSA in adults**
- **Second degree of 10 to 20 % TBSA in children**
- **Third degree of 2 to 10 % (not involving hands, feet, face, genitalia)**
- **Circumferencial limb burns**
- **Household current (110 or 220 volt) electrical injuries**
- **Smoke inhalation with minor (< 2 % TBSA) burns**
- **Possible child abuse**
- **Patient not intelligent enough to care for burns as outpatient**

Severe Burns

- **Second degree > 25 % in adults**
- **Second degree > 25 % in children**
- **Third degree > 10 %**
- **High voltage electrical burns**
- **Deep second or third degree burns of face, hands, feet, genitalia**
- **Smoke inhalation with > 2 % burn**
- **Burns with major trunk, head or orthopedic injury**
- **Burns in poor risk patients (elderly, diabetic, chronic lung or heart disease, obese, etc.)**

Simplified Severity Categorization of Burn Mass Casualties

- **Any burn $> 20\%$ body surface area would be classed as “severe” and require tertiary burn unit care (Australia)**
- **All other burns would initially be cared for in non-burn unit hospitals, but later transfer of selected burn patients (such as deep hand or face burns) to burn units as their admission capacity improves could be done**

Burn Mass Casualties : Useful Reference Web Sites

- International Society for Burn Injury
 - www.worldburn.org
- American Burn Association
 - www.ameriburn.org
- Disaster Preparedness and Emergency Response Association
 - www.disasters.org
- www.burndisaster.com
- www.bt.cdc.gov/masscasualties
- National Library of Medicine
 - f* <http://disasterinfo.nlm.nih.gov>

Burn Mass Casualties

Lecture Summary

- **Burn mass casualty events may overwhelm a single national healthcare system so an international cooperative response may be required**
- **Preplanning involves :**
 - **EMS and hospital planning coordination, with consideration of stockpiling**
 - **Training of non-burn unit personnel to include surgeons and nurses**
- **Prehospital scene management first includes scene safety and security, then distribution of casualties using the Incident Command System**