

FROM CHAOS TO ORDER:
ELEMENTS OF SUCCESSFUL RESPONSE

Scene Response & Triage Considerations
ADVANCED EXPLOSIONS & BLAST INJURIES

The First Phase

- Incident command
- Securing the area
- Secondary device survey
- Bystanders as rescuers



Scene walk-through
Boston, April 15, 2013

Organizing Chaos



Scene walk-through
Boston, April 15, 2013

- Triage categorization
- Regular trauma protocols
- Radiation survey
- Survey for chemical contamination
- Agent-Host-Environment
- Communication
- Special populations (pregnant, children, elderly, and special needs)

Secondary Devices

- Secondary explosive devices are designed to explode after a primary explosion has attracted large numbers of responders to the scene to inflict additional injury, damage, and fear.
- Hidden in-out of view locations, or camouflaged
 - North Atlanta Abortion Clinic Bombing

Police Reacting the 2nd Explosion in Boston
Image Credit to Boston Globe/Getty Images



U.S. Fire Administration Guidelines

- Anticipate the presence of a secondary device at any suspicious incident.
- Search for a secondary device before moving into the incident area.
- Avoid touching or moving anything that may conceal an explosive device.

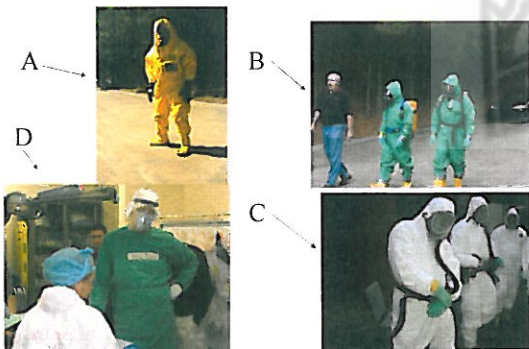
U.S. Fire Administration Guidelines

- Effectively manage the scene with boundaries, exclusion zones, triage areas, etc.
- Evacuate victims and non-essential personnel as quickly as possible.
- Preserve the scene as much as possible for evidence collection and crime investigation.

Personal Protective Equipment



Personal Protective Equipment



Kellermann A. NIJM 368.21 May 23, 2013

- Better when applied in the prehospital phase and before shock
- Low morbidity
- Decreased mortality from external exsanguination of a single limb
 - Vietnam 9%
 - Currently 2%
 - Israel 0%

Birth control: advised with progesterone to suppress endogenous

- **Judicious use of IV fluids:**
 - Overzealous fluid administration may worsen primary pulmonary injury and bleeding
 - Permissive hypotension
- **Cautious mechanical ventilation:**
 - Mechanical ventilation and positive pressure may increase the risk of alveolar rupture and air embolism

Prehospital Considerations

- Cautious air transport
- Air embolization:
 - Place patient in a prone left lateral position with the head down
 - Traps air pocket in right ventricular apex, preventing transfer to lungs

Prehospital Considerations

- Rescue of entrapped victims
 - Specialized rescue resources per Fire Dept's
- Field management of crush injuries
 - Scene amputations
 - Sodium bicarbonate
- Immobilization (splints, collars and back boards)
 - Pediatric considerations

Mass Casualty Triage

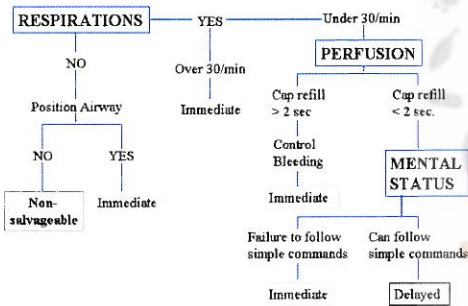
- Dynamic process
- START (Simple Triage And Rapid Treatment)
 - RPM
 - Respirations $\geq 30/\text{min}$
 - Pulse Cap refill $\geq 2 \text{ sec}$
 - Mental status
- JumpSTART for Pediatrics



Triage Categorization

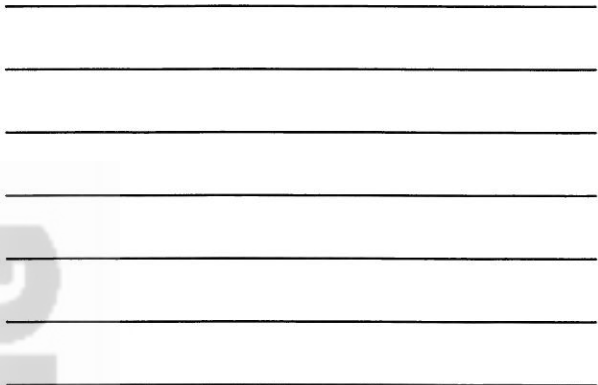
- **Red**
 - **Yellow**
 - **Black**
 - **Green**
- Immediate
 - Delayed
 - Dead or expectant
 - Minimal


START Triage

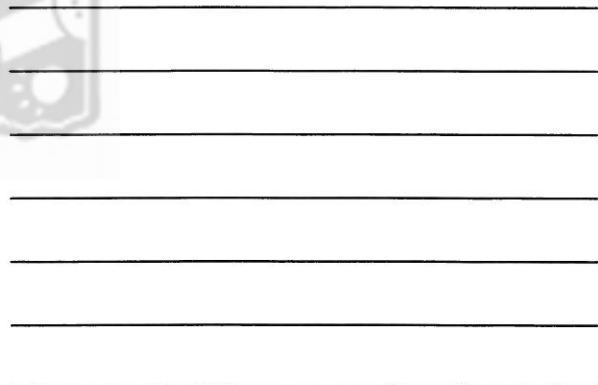


The image shows three variations of a triage tag form. The first is a standard form with fields for patient information, triage category (Immediate, Delayed, Deceased, Minimal), and a section for medical history. The second is a simplified form with a similar layout but fewer fields. The third is a form that includes a body diagram with numbered regions (1-10) for indicating the location of injuries or conditions. All forms include a 'CONTAMINATED' warning and a 'MORQUE' section for tracking patient status.

Wikimedia Commons



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Sort

- Walk
- Wave
- Can't move or wave

Assess

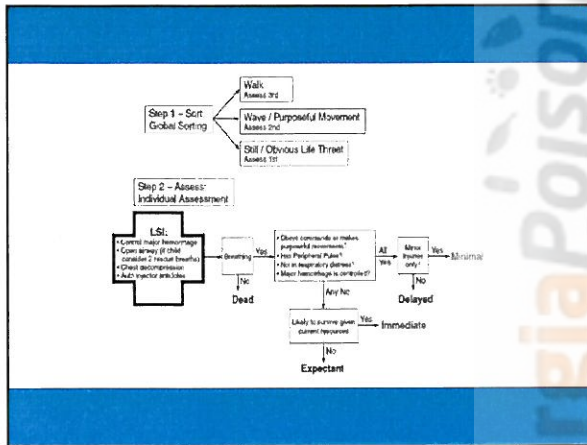
- Walk
- Wave
- Can't move or wave
- Third (green tag: minor)
- Second (yellow tag: delayed)
- First (red: immediate vs. black tag: deceased)

Life-saving Interventions

- Open airway
- Two rescue breaths for child
- Control hemorrhage: direct pressure, tourniquets
- Needle chest decompression
- Auto-injector antidotes

Triage

- Expectant or Gray/Black category
 - Resource based
 - Dynamic



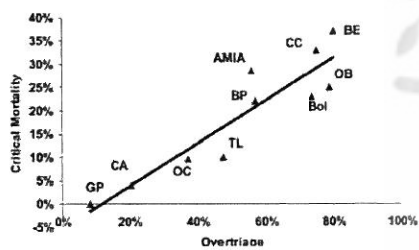
Model Uniform Core Criteria (MUCC)

- Concept of effective interoperability among multiple EMS & rescue agencies on-scene
- FICEMS recommends single system of mass casualty triage across jurisdictions
- Categories (24 criteria)
 - Gen. considerations
 - Global sorting
 - Lifesaving interventions
 - Individ. assessment of a given triage category

Transport

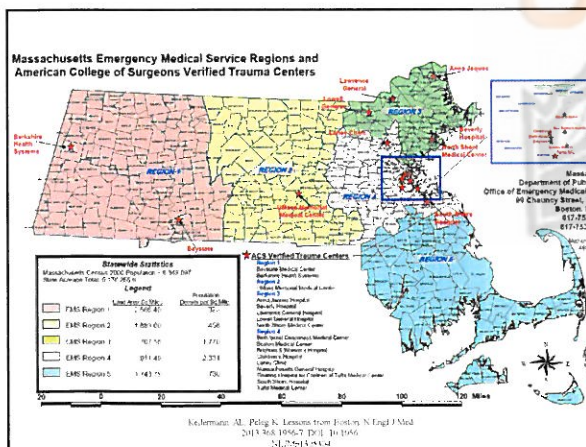
- Transport to the nearest facility of red patients
- Green patients should be directed to other hospitals that are further away and that are not necessarily level I trauma centers

Overtriage and Critical Mortality

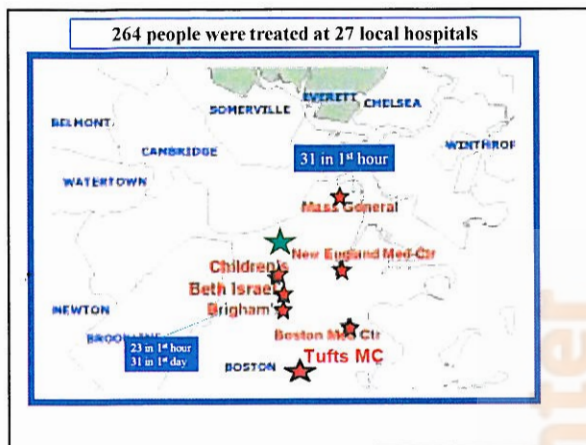


Frykberg ER. Medical Management of Disasters and Mass Casualties From Terrorist Bombings. How Can We Cope? J Trauma 2002;53:201-212

Bombings: Injury Patterns and Care—
Source: Dr. Vik Kapil



Kedemian AL, Pelly K. Lessons from Boston's N-Engl J Med
2013;368:1056-7. DOI: 10.1056/NEJMp1211111



Blast Lung Injury

- Should not rely on TM rupture to predict lung injury:
 - TM perforations are found in only 60% of patients with clinically significant injuries: leads to under-triage (miss 40%)
 - Clinically significant injuries present in < 30% of patients with TM perforations: leads to over-triage (70% w/o lg. injury)

Management of Crush Syndrome

- IVF:
 - Start in the field
- Urinary alkalization
- Relief of entrapped extremity
- Field amputation



Scene Management of Quaternary injuries

- Inhalational injuries-Intubation
- Carbon monoxide-Oxygen
- Hydrogen cyanide-Oxygen and antidote therapy
- Chemical or radiological contamination-Decontamination
- Mental health-Psychological first aid

Questions or Comments?



