26.2 Lessons Learned From Boston

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We Will Finish The Race
The stories behind those shoes begin on page 70
Where did we come from?

• Specialty plans have been developed to respond to unique situations that require pre-planning coordination:
  – Nuclear/Radiological
  – Chemical/Hazmat
  – Infectious Diseases
  – Hospital Evacuation
  – MCI protocol
  – Mass Screening Process
  – Hospital Surge

• Special Considerations:
  – *Facility “lockdown” (controlled access) procedures for MCI*
  – Special evidence handling procedures for contaminated articles
  – Building evacuation plans that differ from the “fire” plan
Boston Healthcare Preparedness Coalition
Medical Intelligence Center

- Conglomeration of Boston healthcare entities
- Members of this coalition include, but are not limited to: Hospitals, Healthcare Centers, Long-term Care, Coalition for the Homeless, Home Health Agencies
- Training and Exercise Workgroup that coordinates and guides curriculum
- Medical Intelligence Center (MIC) is staffed during an incident to give hospitals a conduit to the MEMA (Mass Emergency Management Agency) incident command desk and act as a liaison to other local, state, and federal agencies
Exercises and Trainings

• In the past 5 years MGH has conducted over 150 exercises and training sessions
  • Weekly New Employee Orientation Session
  • Administrator On-call training and continuing education
  • 10-15 tabletop, functional, or full scale exercises per year

• Participants include:
  • Materials Management, Environmental Services, Patient Care Services, Emergency Departments, Perioperative Services, Buildings and Grounds, Engineering, Information Systems, Telecom, Police & Security, Safety Department
  • External partners: Boston Police Department, Boston EMS, Boston Fire department, and other local and regional hospitals
Patient Evacuation Exercise
HAZMAT Decontamination Exercise
Lessons Imbedded in MGH Plan

- Notification interval will be very short, if it exists at all
- Early information will be inaccurate, incomplete, or both
- Patient distribution may be uneven
- Patients will arrive by mechanisms other than EMS
- The ED and hospital will likely be full
- Many response actions have to happen very, very quickly
- Triage must be brief, but must also be repeated
- Chaos and disorganization are inevitable, but must be managed as quickly as possible
- Practice is essential
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The Boston Marathon
Monday, April 15, 2013

- 117th Boston Marathon
- 26.2 miles
- 26,839 runners
- Over 500,000 spectators
- Coincides with a Red Sox home game
Initial Response

The First Ten Minutes: Notifications

- First and second explosions
- Radio Notification: Tent A to MIC
- WebEOC High Alert
- Notification to Hospital Emergency Depts. via Disaster Radio
- Boston EMS Request for Mutual Aid
- First Patient Transported
- HHAN Severe Alerts

**Notifications Legend**
- MIC: Stephen M. Lawlor Medical Intelligence Center
- WebEOC: a web-based communication tool for emergency managers and first responders
- HHAN: Massachusetts Department of Public Health Health and Homeland Alert Network
MGH Boston Marathon Bombing Notification

• 2:50 pm explosions at finish line

• 2:55 pm COBTH transmitted disaster notification of explosion to area hospitals.

• MGH CODE DISASTER activated at 3:03 pm. Disaster plan/mass casualty protocols implemented

• Hospital Emergency Operations Center (EOC) opened in administrative conference room per plan

• First patient arrived at 3:04 pm
Non-Traditional Notification and Early Situational Awareness

• Twitter and Facebook
• Text messaging
• Cell phones
  – Communication from the incident site (temporarily disabled)
  – Provided photos, video, GPS
  – Improved incident command communication
• MGH utilized homepage, Twitter, and Facebook to push HIPPA-compliant updates and status reports
Scene Response

• Finish line tents became triage areas
• EMS and other medical responders rushed to the scenes
• Some victims moved well away from the initial blast area
  – Significant bystander efforts as well
• Victims received mostly BLS interventions
  – Open airway
  – Control hemorrhage (largely with improvised tourniquets)
  – Transport
EMS Response

• Provide hospitals with situational awareness
• Sensors for chem/bio/radiological threats
• Additional EMS units mobilized
• Loading officer managed most of the transport destination decisions
  – Scene cleared of critical victims in 18 minutes
  – victims transported 2, 3, 4 per ambulance
• Some area hospitals established ambulance resupply carts in their ambulance bays
EMS Staging Area

Boston EMS would like to thank our mutual aid partners that sent support to the Boston Marathon bombing incident. The level of support we received was immediate, coordinated and responsible for saving a number of lives.

Thank you for answering the call.
Boston hospitals respond to Marathon bombing

St. Elizabeth's Medical Center received 18 patients.

Beth Israel Deaconess Medical Center received 24 patients.

Boston Children's has seen 10 patients, with three still hospitalized.

Brigham and Women's Hospital has seen 31 patients, five of whom are critical.

First explosion
The first explosion occurred near the finish line of the race, around 2:50 p.m.

Second explosion
The second explosion occurred about 300 feet away and 12 seconds after the first.

Copley Square
Staging area for casualties.

Tufts Medical Center saw 17 patients, none of whom had life-threatening injuries.

Mass General Hospital received 29 patients, eight of whom are critical.

Boston Medical Center received 23 patients. Ten of them are critical.

Mount Auburn Hospital treated and released five patients.

Brigham and Women's Faulkner Hospital received 13 patients.

Not shown on map:
Carney Hospital saw seven patients, all of whom have been treated and released.

Learn more at: advisory.com/daily-briefing or follow @daily_briefing on Twitter
PATIENT Transports*

41% of critical transports in 30 minutes

75% of critical transports in 45 minutes

100% of critical transports in 60 minutes

*16 non-critical patients were transported after 60 minutes, with the final transport occurring at 8:50pm.

EMS Agency Legend

- Action: Action Ambulance Service
- American: American Ambulance Service
- AMR: American Medical Response
- Armstrong: Armstrong Ambulance
- EasCare: EasCare Ambulance
- Fallon: Fallon Ambulance Service
- LifeLine: LifeLine Ambulance Service
- McCall: McCall Ambulance Service
- Pro: Professional Ambulance Service
- Brewster Ambulance Service also responded to the incident, but did not transport patients.
Patient Arrivals at the Hospital

- Hospitals along the marathon route had been receiving some usual Marathon-related patients throughout the day (dehydration, dizziness, sprains/strains)
- First bombing related patients arrived at affected hospitals shortly after 3:00 pm
- Patients with limited minor injuries continued to arrive into the evening and for several days after the incident
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Immediate Hospital Response

• The Acute area of the Emergency Department was cleared
• Existing ED boarders: bring in the psychiatrists!
• Two-tiered triage system
  – External triage on ambulance ramp
  – Internal triage area created in ED waiting room
• Perioperative services cleared and prepared ORs
  – 6 ORs immediately available
• Security controlled all access points
• ED volume decreased 97 to 39 patients within 1.5 hours
@ MGH: 43 patients
9 emergent operations
6 amputations
2 laparotomies
1 thoracotomy
1 traumatic arrests

Number of in-hospital deaths MGH: 0
Number of in-hospital deaths Boston: 0
**Blood Products**

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<td>ALL Marathon victims at MGH (first 12 hrs)</td>
<td>46</td>
<td>25</td>
<td>60</td>
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The Longest Day
19 April 2013

Sean Collier
26 Y/O

Richard Donohue Jr.
33 Y/O
5 killed, 275 injured
Over 100 leg injuries
17 amputations
When things go well…
Lessons: How did we do it?

• it was race day
How did we do it?

• it was race day
• it was a city holiday
How did we do it?

- it was race day
- it was a city holiday
- it was 3pm
How did we do it?

• it was race day
• it was a city holiday
• it was 3pm
• low yield devices
How did we do it?

- it was race day
- it was a city holiday
- it was 3pm
- low yield devices
- it’s Boston
How did we do it?

- it was race day
- it was a city holiday
- it was 3pm
- low yield devices
- it’s Boston
- military lessons well-disseminated
But Paul Harvey would say

The Rest of the Story...
3 killed, 275 injured
Over 100 leg injuries
17 amputations

Number of severe limb injuries: 66
Number of major bleeding limbs: 35
Number of pre-hospital tourniquets: 27
Number improvised tourniquets: 27
The REAL Lessons
The REAL Lessons

Failure to translate

1. No tourniquets or advanced topical hemostatic agents available
The REAL Lessons

Failure to translate

2. Improvised tourniquets do not work
The REAL Lessons

*Failure to translate*

3. No formal protocol or training
The REAL Lessons

Failure to evacuate

4. Stay and play in the medical tent
The REAL Lessons

**Failure of technology and translation**

5. Electronic medical record system slow
6. Sequential MR#s dangerous
Failure to review

7. Tertiary trauma survey critically important in identifying missed injuries
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• ‘moving’ longitudinal artifact suggestion intra-cardiac location of FB
ECG-gated Cardiac CT

Systole

Diastole
Trans-esophageal ECHO
4/16/13 and 4/19/13

- Metallic object is located in right atrial free wall
- Atrial side of tricuspid valve
- Location near mouth of RA appendage
- 1.5 cm from RCA in AV groove
The REAL Lessons

1. No tourniquets or advanced topical hemostatic agents available
2. Improvised tourniquets do not work
3. No formal TQ protocol or training
4. Stay and play in the medical tent
5. Electronic medical record system slow
6. Sequential MR#s dangerous
7. Tertiary trauma survey very important
YANKEE FANS ❤️ BOSTON!
118th Boston Marathon
36,000 runners
Over 1,500,000 spectators
Red Sox home game
Boston Museum of Science