Current Gaps in Tactical Response to Active Violent Incident Mass Casualty Incidents

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Conflicts of Interest

Learning Objectives

- C-TECC Overview
- US Terror response operational landscape
- Response Gaps
- What keeps me up at night

Committee for Tactical Emergency Casualty Care (C-TECC)

Overview

Best practice develop group convened in 2010 to speed the translation and evolution trauma lessons learned from combat to the high threat civilian environment

Mission

In a multi-stakeholder, disseminated command and control environment, eliminate potentially preventable trauma deaths from high threat, Active Violent Incidents

Medical Response: Tiered RDCR+

Threat–Driven and Applied in 3 Dynamic Phases

- **Direct Threat Care (Hot Zone/Care Under Fire)**
  - Access casualties
  - Mitigate the Threat
  - Rapid Control of Life Threatening Hemorrhage (TQ)
  - Rapid extraction
- **Indirect Threat Care (Warm Zone/Tactical Field Care)**
  - Tactical Primary Survey + Rapid LSI
  - Establish CCP and triage
  - Initiate RDCR as appropriate
- **Evacuation Care**
  - Tactical Evacuation: alternate transport platforms
  - Conventional Protocols with focus on DCR

Download the guidelines at www.c-tecc.org

US Terror response operational landscape

US Historical Preparation

- Static MCI
- Traditional WMD
- Active Shooter Incidents

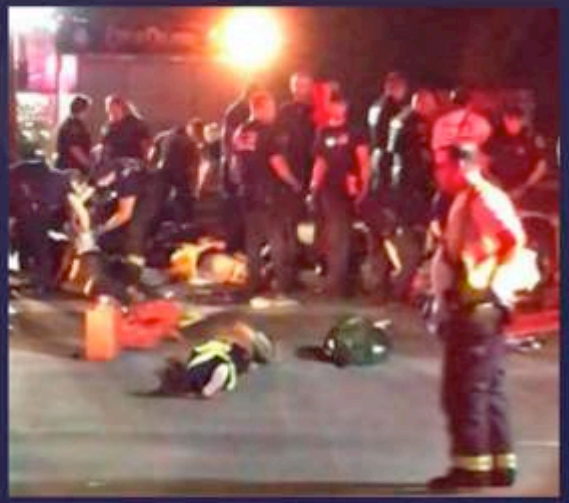

POLICE

Orlando (2016)

Bloodied victims arrived at firehouse before firefighters were aware of the attack

Firefighters faced with mass casualty incident with no warning or dispatch information

- Firehouse was down the street from attack
- Disoriented, bloody victims came to the door
- Gunshots could be still be heard



Triage was set up across the street from firehouse

Critical decision:

Danger to responders vs. Life threatening injuries to victims

- Consider all available information
- How much action should be taken when faced with uncertain danger?

Decision made to wait inside firehouse until armed police could be seen outside
Once assured of safety, firefighters opened doors and provided care

2017 Mass Casualty Reality

- New tactics
  - IED & multi- modality attacks
  - High velocity ballistics
  - Lone wolf active shooters
  - Dynamic coordinated small unit attacks
  - Perpetrators willing to die
  - Military style tactics
  - Multi-capacity high velocity weapons
  - Potential for toxic hazards


BREAKING NEWS
POLICE IN STANDOFF WITH POSSIBLE SUSPECTS
OF DEADLY MASS SHOOTING IN SAN BERNARDINO
4


JOHN TLUMACKI/THE BOSTON GLOBE VIA GETTY IMAGES

The 2017 Mass Casualty Reality

- New Response Paradigm
  - **New Operational Strategies Required:**
    - ALL first responders must be able to transition from routine to high threat operations
  - **New Treatment Strategies: TECC**
    - Threat mitigation
    - Hemorrhage control
    - Rescue and Extraction
    - Common language across all responders
    - Accounting for special populations

Operational Response

ACCESS

ASSESS

STABILIZE

EVACUATE

Operational Response

CARE IN HIGH THREAT ENVIRONMENTS

- Access
- Assessment
- Stabilization
- Extraction/Evacuation

BARRIERS TO CARE

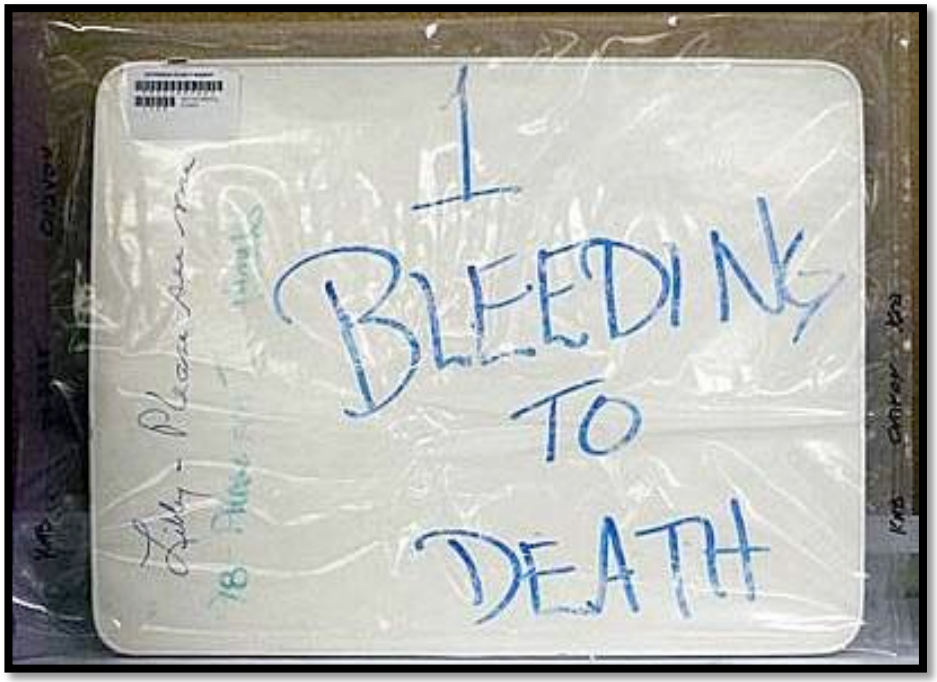
- Access
  - Active threat, chained doors, fire, gas, active shooting, etc.
- Assessment
  - Active threat, access, MCI, knowledge, communication, etc.
- Stabilization
  - Active threat, wounding pattern, manpower, equipment, SOP's, access to blood
- Extraction/Evacuation
  - Active threat, equipment, training, fire, collapse, manpower

GAP Analysis

Gap 1: Access defines response

Casualty access is a medical procedure, but the guys who do access don't do "medical"

Columbine (1999)



Virginia Tech (2007)

Aurora Century Theater (2012)

"During my drive to the Theaters I encountered hundreds of people running and screaming for help. Many people appeared wounded, others were just running" (B1).

Evacuation: APD 75% in first 30 min

Lessons

- Communities need comprehensive strategy for accessing and delivering care in the Hot/ Warm Zone
- Tactical Teams are subject matter experts and force multipliers but…
- Foundation must be non-tactical teams

LEO Paradigm Shift

STOP THE KILLING

STOP THE DYING

Interagency Paradigm Shift

ASSAULT

ASSAULT RESCUE
RESCUE TASK FORCE

Gap 2: Assessment/ Stabilization

Lack of a common trauma response lexicon in the civilian setting limits application of DCR in Direct Threat and Indirect Threat Zones

Could They Have Survived?

#976
Potentially Survivable

Over six months, a team of military officers reviewed 4,596 autopsies of troops killed in Iraq and Afghanistan between Oct. 2001 and June 2011. Of those men and women...

4,016 died before they reached a surgeon, of which...

976 had "potentially survivable" wounds, of which...

888 bled to death

590 suffered a hemorrhage within the torso

171 died of bleeding where arms or legs meet torso

119 incurred fatal wounds to the extremities

Source: Eastridge, et al. (2012) J Trauma Acute Care Surg
Illustration modified from the Wall Street Journal

Special Operations Medical Association
http://www.specialoperationsmedicine.org

Learn more at Tactical Combat Casualty Care
http://tccc.org

ORIGINAL ARTICLES

Causes of Death in U.S. Special Operations Forces in the Global War on Terrorism

2001–2004

John B. Holcomb, MD, Neil R. McMullin, MD,* Lisa Pearse, MD,† Jim Caruso, MD,† Charles E. Wade, PhD,* Lynne Oetjen-Gerdes, MA,† Howard R. Champion, FRCS,‡ Mimi Lawnick, RN,* Warner Farr, MD,§ Sam Rodriguez, BS,§ and Frank K. Butler, MD‖*

Annals of Surgery • Volume 245, Number 6, June 2007

ORIGINAL ARTICLE

ONLINE FIRST

Eliminating Preventable Death on the Battlefield

Russ S. Kotwal, MD, MPH; Harold R. Montgomery, NREMT; Bari M. Kotwal, MS; Howard R. Champion, FRCS; Frank K. Butler Jr, MD; Robert L. Mabry, MD; Jeffrey S. Cain, MD; Lorne H. Blackbourne, MD; Kathy K. Mechler, MS, RN; John B. Holcomb, MD

Arch Surg. 2011;146(12):1350-1358. Published online August 15, 2011. doi:10.1001/archsurg.2011.213

ORIGINAL ARTICLE

Death on the battlefield (2001–2011): Implications for the future of combat casualty care

Brian J. Eastridge, MD, Robert L. Mabry, MD, Peter Seguin, MD, Joyce Cantrell, MD, Terrill Tops, MD, Paul Uribe, MD, Olga Mallett, Tamara Zubko, Lynne Oetjen-Gerdes, Todd E. Rasmussen, MD, Frank K. Butler, MD, Russell S. Kotwal, MD, John B. Holcomb, MD, Charles Wade, PhD, Howard Champion, MD, Mimi Lawnick, Leon Moores, MD, *and* Lorne H. Blackbourne, MD

J Trauma Acute Care Surg
Volume 73, Number 6, Supplement 5

Integration of Tactical Emergency Casualty Care Into the National Tactical Emergency Medical Support Competency Domains

Andre M. Pennardt, MD, FACEP; David W. Callaway, MD, MPA, FACEP; Richard Kamin, MD, FACEP; Craig H. Llewellyn, MD, MPH, FACPM, FRSM; Geoffrey L. Shapiro, BSHS, EMTP; Richard H. Carmona, MD, MPH, FACS; Richard Schwartz, MD, FACEP

Journal of Special Operations Medicine Volume 16, Edition 2/Summer 2016

Figure 2 *Proposed Updated NTIC Core Competency Domains (2016).*

1. TECC methodology and TECC threat-based trauma interventions
a. Hemostasis
b. Airway
c. Respiration/breathing
d. Circulation
e. Vascular access
f. Medication administration
g. Casualty immobilization and packaging
2. Medical planning
3. Remote medical assessment and surrogate treatment
4. Force health protection
5. Legal aspects of TEMS
6. Hazardous materials management
7. Environmental factors
8. Mass casualty triage
9. Tactical familiarization
10. Operational rescue and casualty extraction

Tourniquet use at the Boston Marathon bombing: Lost in translation

David Richard King, MD, Andreas Larentzakis, MD, Elie P. Ramly, MD,
and **The Boston Trauma Collaborative,** *Boston, Massachusetts*

BACKGROUND: The Boston Marathon bombing was the first major, modern US terrorist event with multiple, severe lower extremity injuries. First responders, including trained professionals and civilian bystanders, rushed to aid the injured. The purpose of this review was to determine how severely bleeding extremity injuries were treated in the prehospital setting in the aftermath of the Boston Marathon bombing.

METHODS: A database was created and populated by all the Boston Level I trauma centers following the Boston Marathon bombing. Data regarding specific injuries, extremities affected, demographics, prehospital interventions (including tourniquet types), and outcomes were extracted.

RESULTS: Of 243 injured, 152 patients presented to the emergency department within 24 hours. Of these 152 patients, there were 66 (63.6% female) experiencing at least one extremity injury, with age ranging from younger than 15 years to 71 years, and with a median Injury Severity Score (ISS) of 10 (range, 1–38). Of the 66 injured patients, 4 had upper limbs affected, 56 had injuries on the lower limbs only, and 6 had combined upper and lower limbs affected. The extremity Abbreviated Injury Scale (AIS) scores had a median of 3 (range, 1–4). There were 17 lower extremity traumatic amputations in 15 patients. In addition, there were 10 patients with 12 lower extremities experiencing major vascular injuries. Of 66 injured patients, 29 patients had recognized extremity exsanguination at the scene. In total, 27 tourniquets were applied: 16 of 17 traumatic amputations, 5 of 12 lower extremities with major vascular injuries, and 6 additional limbs with major soft tissue injury. All tourniquets were improvised, and no commercial, purpose-designed tourniquets were identified. Among all 243 patients, mortality was 0%.

CONCLUSION: After the Boston Marathon bombings, extremity exsanguination at the point of injury was either left untreated or treated with an improvised tourniquet in the prehospital environment. An effective, prehospital extremity hemorrhage control posture should be translated to all civilian first responders in the United States and should mirror the military's posture toward extremity bleeding control. The prehospital response to extremity exsanguination after the Boston Marathon bombing demonstrates that our current practice is an approach, lost in translation, from the battlefield to the homeland. (*J Trauma Acute Care Surg.* 2015;78: 594–599.

LEVEL OF EVIDENCE: Epidemiologic study, level V.
KEY WORDS: Tourniquet; bomb; Boston; extremity; prehospital.


Boston Police
LENCO


BOSTON
EMS

Assess/Stabilize Lessons

Effective RDCR in AVI requires whole of community SOP with common language based upon TECC principles

White Paper for the Integrated Public Safety Response to the

Active Shooter/Active Assailant

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CASUALTY RESPONSE SYSTEM

THREE KEY PRINCIPLES...ONE GOAL

1. Tactical Leader Ownership of System
2. TCCC Training for All Personnel
   (Conditioning through Repetition, Become Masters of the Basics)
3. Prehospital Trauma Registry
   (Refine TCCC Protocols & Training, Force Health Protection & Procurement)

ELIMINATE POTENTIALLY SURVIVABLE CAUSES OF DEATH!

Kotwal et al. 2011 Archives of Surgery, "Eliminating Preventable Death on the Battlefield"

The Ranger First Responder Program and Tactical Emergency Casualty Care Implementation

A Whole-Community Approach to Reducing Mortality From Active Violent Incidents

Andrew D. Fisher, APA-C; David W. Callaway, MD; Josh N. Robertson, MD; Shane A. Hardwick, EMT-P; Joshua P. Bobko, MD; Russ S. Kotwal, MD, MPH

Figure 4 *Civilian TECC skill matrix.*

	Hemorrhage Control			Casualty Extraction	Airway			Chest Trauma	DCR
	Tourniquet	Hemostatic	Pressure Dressing		Positioning	NPA	Advanced		
Civilian	Proficiency	Familiarization	Familiarization	Familiarization	Familiarization	NA	NA	Familiarization	NA
Patrol	Proficiency	Proficiency	Familiarization	Familiarization	Proficiency	Familiarization	NA	Familiarization	Familiarization
SWAT	Mastery	Mastery	Proficiency	Proficiency	Proficiency	Proficiency	NA	Proficiency	Familiarization
BLS	Mastery	Mastery	Mastery	Mastery	Proficiency	Proficiency	Familiarization	Proficiency	Proficiency*
ALS	Mastery	Mastery	Mastery	Mastery	Mastery	Mastery	Mastery	Mastery	Proficiency
Leadership	Mastery	Mastery	Mastery	Mastery	Mastery	Mastery	Mastery	Mastery	Mastery

Note: *Should possess this level of knowledge for their component of the skill set (e.g., someone trained in BLS should know hypothermia prevention for DCR. ALS, Advanced Life Support; BLS, Basic Life Support; DCR, damage control resuscitation; NA, not applicable; NPA, nasopharyngeal airway; SWAT, Specialized Weapons and Tactics.

Underemphasized
Critical Early Links

First Care Providers
(Bystanders, teachers, students, public workers)

Non medical First Responders
(LEO)

STOP THE BLEED
FIRSTCARE PROVIDER

Medical First Responders
(BLS/ALS)

Emergency Medicine

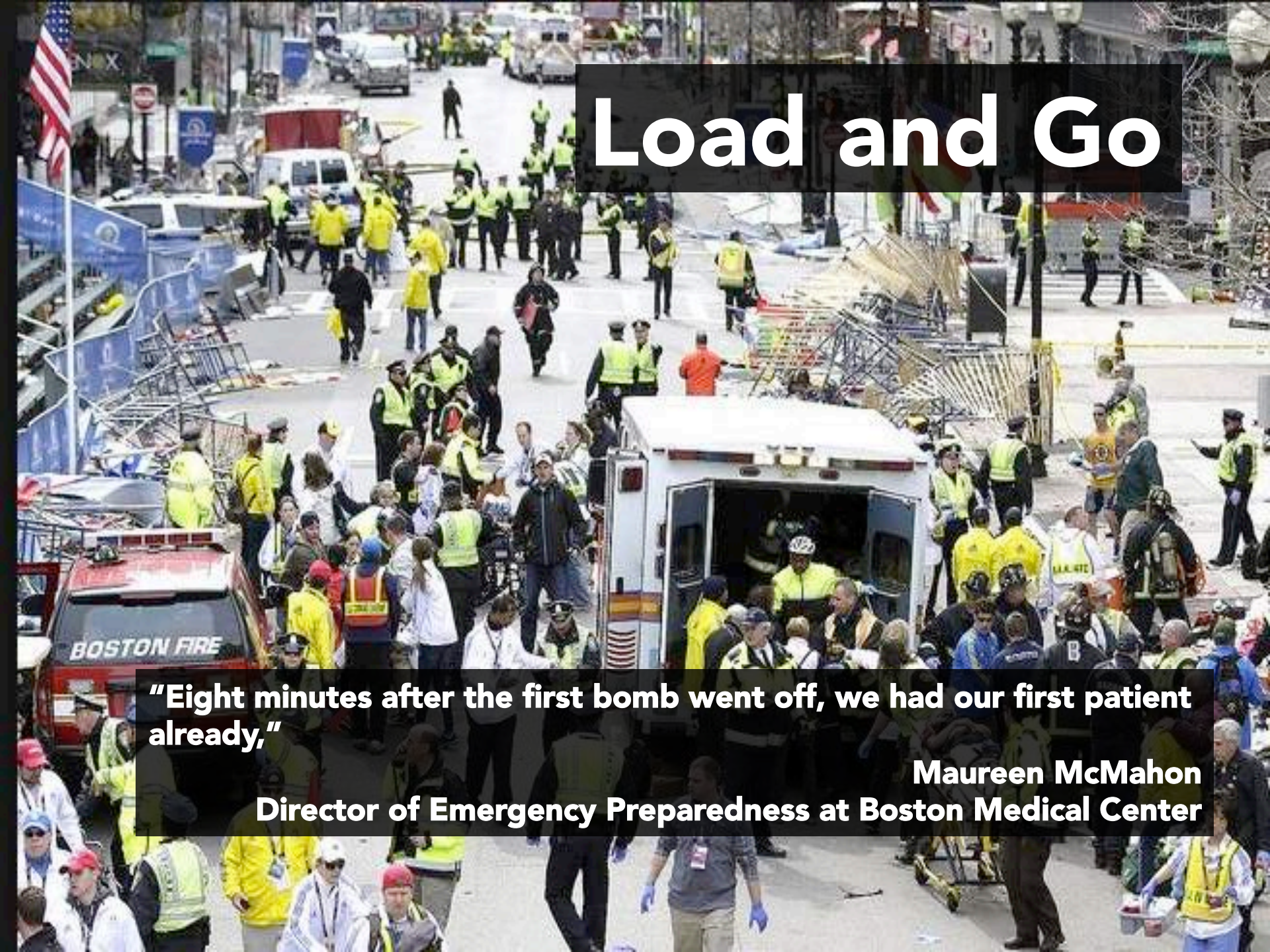
Trauma Surgery & Critical Care

Conventional Responders

Gap 3: Evacuation

There is a lack nuanced, multi-modal evacuation strategies that align resources with goals of DCR

Stay and Play


Load and Go
BOSTON FIRE
"Eight minutes after the first bomb went off, we had our first patient already,"
Maureen McMahon
Director of Emergency Preparedness at Boston Medical Center

TACEVAC: Access and Speed

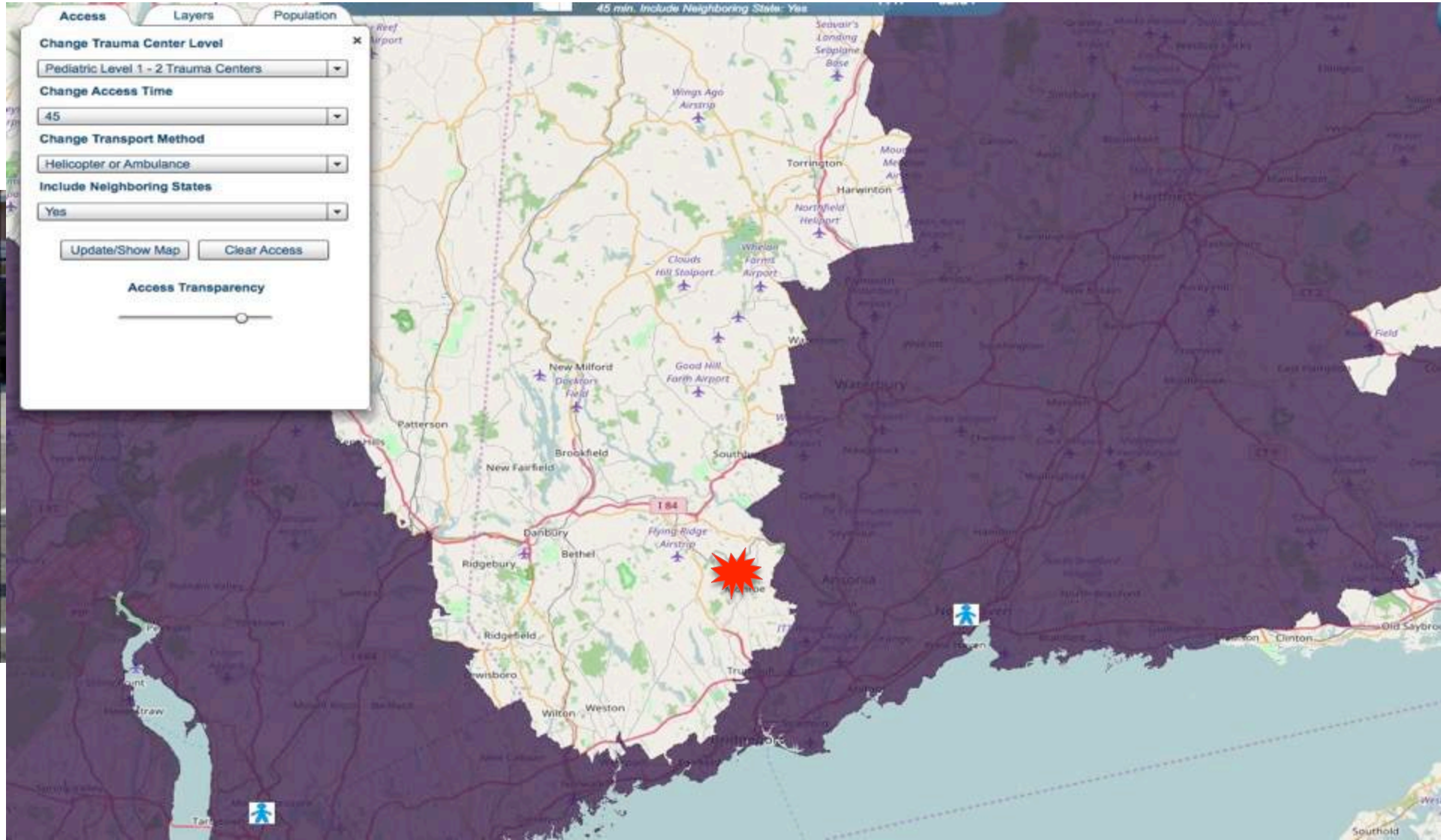
AURORA

Critical role of law enforcement
(APD evacuated 75% of victims in first 30 min)

ORLANDO

Law enforcement and self evacuation requires coordination

CASEVAC: RDCR + DCR/DCS



Pre-Trauma Center Blood Products

- RCDR in rotary wings is feasible

  Jenkins et al. Shock 2014

- Multi-center trial (PROHS) unable to demonstrate benefits of HEMS blood

  Holcomb et al. JTACS 2017

- 25% (59/235) U.S. HEMS Programs independently carry blood

  Karl et al. PEC 2016

Evacuation Recommendations

1. Know what problem you are trying to solve
2. Incorporate alternate evac platforms (e.g. LEO) into AVI response plan
3. Train to be interoperable

Gap 4:
What keeps me up at night


USA

Pediatrics & DCR

- Hemorrhage control
  - What TQ validated in peds?
  - Pelvic binders?
- Hypotensive resuscitation
  - Familiarity w/ peds values
  - IV/IO access kits
- Hemostatic Resuscitation
  - Hemostatic agents
  - Hypothermia risk
  - Blood product availability
  - Blood product protocols

Conclusions


60
MINUTES

Conclusions

1. Reducing time from POI to LSI to definitive care is a TACTICAL and MEDICAL issue
2. Tactical Teams are conductors of the orchestra not just jazz soloists
3. RDCD in high threat environments requires a whole of community approach
4. We have to figure out what to do with Pediatrics victims

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