3rd Annual EMS Medical Directors’ Conference
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Keynote Speaker
Civilian and EMS
Response to Active Shooter Events
Dr. Babak Sarani

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Profile of wounding in civilian public mass shooting fatalities: Current State and Next Steps

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Disclosures

• None
• This is NOT a talk about the 2\textsuperscript{nd} Amendment
• This is NOT a talk that will end with “Tourniquets are Bad”
Acknowledgments

• E. Reed Smith, MD
   – Assistant Professor of Emergency Medicine
   – Arlington Co EMS Medical Director, Virginia

• Geoff Shapiro, EMT-P
   – Director, EMS and Operational Medicine Training, George Washington University
Objectives

• Review history of TCCC
• Discuss data on causes of death in civilian active shooter events
• Discuss evolving role of TECC
Background

- Incidence of mass shootings is increasing
- Current response paradigms still rely nearly entirely on highly trained, public agencies for rescue
- Most Police and EMS SOP result in delays in patient transport and care
Background

• Hemorrhage = most common cause of preventable death after injury
  – Hartford Consensus views hemorrhage as the “critical step” in eliminating preventable death in the prehospital setting

• Tactical Combat Casualty Care (TCCC) guidelines stress use of tourniquets
  – Extrapolated to “Stop the bleed” campaign
TCCC

- First developed in 1993
  - 25% of military fatalities were preventable
  - 10% of preventable deaths were due to extremity hemorrhage
- ATLS concepts applied in Somalia were inadequate
Military ATLS Concepts Before TCCC

- Airway before bleeding
- Did not take into account tactical situation
- No tourniquets – direct pressure only
- 2 IVs in all pts, no I/Os
- 2 liters saline and then more saline
- Generous use of ETT
- Antibiotics not mentioned
- Generous use of spinal precautions
TCCC now

• 3 phases: Care under fire, tactical field care, TACEVAC

• Bleeding before airway
  – Tourniquets, hemostatic dressings, plasma, TXA

• NPA in place of ETT
  – Sit out or place in “recovery position”

• Needle thoracostomy

• Heplock IV (or don’t place one at all)

• Hypotensive resuscitation
Our Premise

• Just as the tenets of civilian ATLS did not work in the battlefield, the concepts of TCCC do not translate fully to the civilian environment.
Hypothesis

• Civilian patterns of wounding and causes of fatality differ significantly from military-associated woundings

• Strategies developed to rescue wounded following military combat-associated woundings may not be as effective in the civilian setting
The Only Study on CMSE*

• Civilian Mass Shooting Event**
  – 1. Occurs in public place
  – 2. Involves 4 or more deaths, not including shooter
  – 3. Gunmen who select victims indiscriminately
  – 4. Shooting is not a means to an end (e.g. robbery)

**FBI and Congressional Research Office Definition
Data Collection

22 without easily identifiable ME/Coroner

78 events meeting criteria for public mass shooting

56 events meeting study criteria

Convenience sample of 25 events sent requests

10 requests unanswered

3 requests denied

Received data on 12 events n=139

10 events with full autopsy data n=93

2 events with limited data n=46

14 excluded from analysis for potentially survivable injury

24 excluded from analysis of anatomic region of fatal wound
Number of Persons Killed/Injured by Event

- 1984: 57% Injured, 43% Killed
- 1986: 71% Injured, 29% Killed
- 1999: 38% Injured, 62% Killed
- 2005: 64% Injured, 36% Killed
- 2006: 100% Injured, 0% Killed
- 2007: 56% Injured, 44% Killed
- 2007: 65% Injured, 35% Killed
- 2008: 19% Injured, 81% Killed
- 2011: 28% Injured, 72% Killed
- 2012: 64% Injured, 36% Killed
- 2012: 17% Injured, 83% Killed
- 2013: 65% Injured, 35% Killed
Distribution of all wounds by anatomic location (n=297)

56% of victims (78/139) had wounds in multiple anatomic regions.
Military v Civilian Fatal Wounds

Figure 1: Site of Fatal Injury in Combat Personnel
- Head: 38%
- Chest: 24%
- Back: 38%
- Abdomen: 9%
- Face: 3%
- Neck: 6%
- Extremity: 3%
- Multiple: 17%

Figure 4: Distribution of Fatal Wounds by Anatomic Location (n=115)
- Head: 39%
- Chest/Upper Back: 38%
- Face/Neck: 6%
- Abdomen: 7%
- Multiple Regions: 10%
Questions

• Could the dead have survived if:
  – 1. EMS arrived within 10 minutes
  – 2. Arrival to trauma center within 1 hour
Preventable Deaths

Preventable death rate = 7%, majority due to isolated chest without PTX or cardiac injury

<table>
<thead>
<tr>
<th>Anatomic Region</th>
<th>Number of Wounds</th>
<th>Weapon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face/Neck/Chest</td>
<td>2</td>
<td>Shotgun</td>
</tr>
<tr>
<td>Neck/Chest</td>
<td>3</td>
<td>Shotgun</td>
</tr>
<tr>
<td>Face/Neck/Chest</td>
<td>2</td>
<td>Shotgun</td>
</tr>
<tr>
<td>Chest/Upper back</td>
<td>2</td>
<td>Handgun</td>
</tr>
<tr>
<td>Face/Chest</td>
<td>5</td>
<td>Shotgun</td>
</tr>
<tr>
<td>Chest/Back/Abdomen</td>
<td>5</td>
<td>Handgun</td>
</tr>
<tr>
<td>Chest</td>
<td>3</td>
<td>Handgun</td>
</tr>
<tr>
<td>Chest</td>
<td>1</td>
<td>Handgun</td>
</tr>
<tr>
<td>Face</td>
<td>1</td>
<td>Handgun</td>
</tr>
</tbody>
</table>
Case Fatality Rate

• Military = 10% (OIF/OEF)
  – Farther distance
  – Body armor
  – More ready access to health care
  – 24% of wounds are potentially survivable*

• Civilian = 45%
  – Closer range
  – Exposed/unprotected
  – EMS delay to transport
  – 7% of wounds are potentially survivable

Weaknesses

• We only collected 21% of all events
  – Need much better research ability
• We did not include people who lived
  – Maybe tourniquets kept these people alive but tourniquets were not in vogue until 2012
So The Point Is.....

1. Tourniquets have less of a role than anticipated in preventing fatality
   - Still important, just not the only thing!!

2. All causes of preventable death should be addressed, not just bleeding
   - Bleeding, Airway, Chest injury

3. Rapid extrication of victims may represent a better strategy overall and needs to be studied
Key Tenets of TECC (Tactical Emergency Casualty Care)

• Based on TCCC and adapted to civilian environment

• Engage First Care Providers are members of the health care team
  – Akin to bystander CPR

• Hot (Direct) v Warm (Indirect) Threat Zones and early penetration/extraction
TECC

• Direct Threat (Hot Zone)
  – Ongoing threat to life for rescuers and wounded
  – Active shooter, fire, building collapse

• Indirect Threat (Warm Zone)
  – Possibility of harm is less than the acuity of injury but not zero
  – Active shooter not present but not neutralized, cover obtained in area of collapse
### Tactical Emergency Casualty Care Provider Knowledge and Skills Matrix

*Current as of June 2016*

<table>
<thead>
<tr>
<th>Provider Level</th>
<th>911 Interface</th>
<th>Basic Bleeding Control</th>
<th>Tourniquets</th>
<th>Lifts, Moves, and Carries</th>
<th>Pressure Bandages w/ Packing</th>
<th>Hemostatic Agents</th>
<th>Basic Airway Maneuvers</th>
<th>Nasal Airway</th>
<th>Supraglottic Airway</th>
<th>Surgical Airway</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Care Provider</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X*</td>
<td>X</td>
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<tr>
<td>First Responder with a duty to act</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>EMR/EMT</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X*</td>
<td>***</td>
<td>***</td>
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<tr>
<td>Advanced EMT</td>
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<td>X*</td>
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<td>X</td>
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<td>X*</td>
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<td>***</td>
<td>***</td>
<td>X**</td>
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<tr>
<td>First Receivers</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>***</td>
<td>***</td>
<td>**</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

+ Manufactured preferred; improvised only if manufactured unavailable

* Only if available and, if applicable, approved for use by local/state medical regulations and/or agency medical director

** Only with proper training, appropriate scope of practice and protocol, and medical director approval

*** Considered standard knowledge for this level of provider
# Tactical Emergency Casualty Care Provider Knowledge and Skills Matrix

Current as of June 2016

<table>
<thead>
<tr>
<th>Provider Level</th>
<th>Basic Management of Torso Wounds</th>
<th>Needle Thoracentesis</th>
<th>Hypothermia Prevention</th>
<th>Body Positioning</th>
<th>Multimodal Pain Management</th>
<th>Damage Control Resuscitation</th>
<th>Other TECC Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Care Provider</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>First Responder with a duty to act</td>
<td>X</td>
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<td>X**</td>
<td>***</td>
<td>X**</td>
<td>X**</td>
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*** Considered standard knowledge for this level of provider
We Need More Data and Much Less Emotion.....
<table>
<thead>
<tr>
<th>Location</th>
<th>Year</th>
<th>Number of Persons Killed/ Wounded</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Ysidro McDonalds, San Diego, CA</td>
<td>1984</td>
<td>19/21</td>
</tr>
<tr>
<td>Edmond Post Office, Edmond, OK</td>
<td>1986</td>
<td>15/6</td>
</tr>
<tr>
<td>Columbine High School, CO</td>
<td>1999</td>
<td>13/21</td>
</tr>
<tr>
<td>Living Church of God, Brookfield, WI</td>
<td>2005</td>
<td>7/4</td>
</tr>
<tr>
<td>Post Office, Goleta, CA</td>
<td>2006</td>
<td>6/0</td>
</tr>
<tr>
<td>Trolley Square Mall, Omaha, NE</td>
<td>2007</td>
<td>5/4</td>
</tr>
<tr>
<td>Virginia Tech University, Blacksburg, VA</td>
<td>2007</td>
<td>32/17</td>
</tr>
<tr>
<td>Northern Illinois University</td>
<td>2008</td>
<td>5/21</td>
</tr>
<tr>
<td>Safeway Parking Lot, Tucson, AZ</td>
<td>2011</td>
<td>5/13</td>
</tr>
<tr>
<td>Sikh Temple, Oak Creek, WI</td>
<td>2012</td>
<td>7/4</td>
</tr>
<tr>
<td>Century 16 Theater, Aurora, CO</td>
<td>2012</td>
<td>12/58</td>
</tr>
<tr>
<td>Washington Navy Yard, DC</td>
<td>2013</td>
<td>13/7</td>
</tr>
</tbody>
</table>
Questions?

Contact Us:
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