Test Questions

BOTTOM LINE UPPFRONT

1. Civilian blast / ballistic injuries closely follow Vietnam era patterns
2. Fatalities with survivable injuries
   - 60+% die from arm / leg hemorrhage
   - 30+% die from tension pneumothorax
   - 2-6% die from airway compromise
   - < 1% all other survivable deaths
3. Mumbai 2008 is the modern hallmark attack
   - Small, Light, and Heavy weapons,
   - Cafes, theater, transportation system, media, university,
   - Women & Children's hospital, and religious institutions
4. Triage expectant decisions haunt hardened military providers
5. We are better-prepared for blast-ballistic mass cas than any other CBRNE (+/- burns)
6. Definitions – rate of chemical reaction
   - HE – detonation – supersonic – pressure trigger
   - LE – deflagration – sub-sonic – pressure trigger
   - Incendiary – conflagration – spark trigger
7. Mechanism (only HE)
   - over-pressure (1°)
   - penetrating (2°)
   - blunt / crush (3°)
   - all other (4°) burn, suffocation, toxicants, asthma, MI, anxiety

Test Questions
Test Questions
8. TNT-equivalence – maybe ...
   • There are 7 formulas to calculate TNT-equivalence.
   • Final step is to cube the product (10-fold difference)
   • Incomplete detonation in open space
   • Confined space = up to x 9 the yield
   • Ground burst x 2 the yield greater relevant for nukes
9. Casualty patterns are determined more by environment & proximity, than yield. Benchmarks:
   • Open space 10% killed, 20% admitted, 2/3 outpt
   • Confined space 20% DOS, 10% admit, 2/3 outpt
   • Confined w/collapse 30% DOS, 3% admit, 2/3 outpt

Test Questions
10. Use TCCC, Theater Trauma Guidelines, & damage Control Surgery for highest survivor rate
   • Stop the bleeding
   • Decontaminate
   • Re-vascularise
11. Crisis Standards Simplified
   • Patient – an individual with a health need treated independently of outside influences
   • Casualty – an individual with an injury or illness whose triage, transport, or treatment decision affect the care and outcomes of a larger group.
12. Starboard - right – Port - left

Epidemiology
• Boring
• Unless it provides insight
  • Plausible (vs. possible) targets
  • Injury patterns and prioritization
  • Treatment that makes a difference
  • Resource requirements
  • Staff utilization / pacing of staff
  • Quality Benchmarks
WHO – At-risk Populations

A. Historical Risk (case-based, E-B risk)
   - 10% < 15 y.o. // 10% > 45 years // 10-20% 30-44 years
2. U.S. Experience – Gov workers / buildings
   - Postal workers, Fire, Police, EMS, military, judges
   - Congressional staffers, visitors to gov buildings
   - Murrah Building (OKC), WTC, Pentagon, Post Offices, Hart Senate Building

B. Proximity Risk (hazard-based risk)
3. Live or work near major targets (urban dwellers)

C. Theoretical Risk (vulnerability-based risk)
4. Limited only by imagination

WHO – At-risk Populations

A. Evolution (case-based, E-B risk)
1. Mil / Law Enforcement – > Civ gov targets
   - Buildings
   - Personnel
2. Non-gov targets as gov targets harden
   - Transportation systems
   - Areas of density
3. Revered social institutions
   - Hospitals
   - National / international events

Where? 2001 Total U.S. Worldwide Terror Casualties

- 0.3% business
- 17% Gov.
- 2% military

81% other
(contain public access or leisure targets)

Pre-9-11 Majority of casualties occurred at non-Gov sites

<table>
<thead>
<tr>
<th>Category</th>
<th>Pre-9-11</th>
<th>9/11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Military</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Government</td>
<td>377</td>
<td>77</td>
</tr>
<tr>
<td>Other</td>
<td>1348</td>
<td>925</td>
</tr>
</tbody>
</table>

Excludes 9/11 deaths and injuries

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CDC 1
**WHAT?  2001 Worldwide Terror Against U.S. Concerns**

Bombs were used in 74% of the 348 terror attacks in 2001. 98% of terror attacks used conventional weapons.

Almost one terror attack per day in 2001.

**Bombings in the U.S.**

CDC, FBI, State - Bomb-related data, 1988-1997

17,579 criminal bombings in U.S., 1988-1997 (FBI)
- Average of 5 bombings per day
- Bombings doubled over the 10-year period

214 U.S. Embassy Bombings, 1988-1997 (State)
- Average ~ 2 per month

830 bomb-related deaths, 1988-1997 (CDC/NCHS)

US bombing death counts exceed deaths for most US disasters - floods, hurricanes, lightening. (NOAA)

4,063 bomb-related injuries (FBI)

**FBI Reported Bombings, 1988-1997**

CDC 1

4
Selected Causes of Deaths, United States, 1988-1997

<table>
<thead>
<tr>
<th>Cause</th>
<th>Count</th>
<th>Data source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floods</td>
<td>903</td>
<td>NOAA</td>
</tr>
<tr>
<td><strong>Bombs</strong></td>
<td>830</td>
<td>NCHS</td>
</tr>
<tr>
<td>Lightning</td>
<td>712</td>
<td>NCHS</td>
</tr>
<tr>
<td>Tornadoes</td>
<td>437</td>
<td>NOAA</td>
</tr>
<tr>
<td>Earthquakes</td>
<td>276</td>
<td>NCHS</td>
</tr>
<tr>
<td>Hurricanes</td>
<td>224</td>
<td>NOAA</td>
</tr>
</tbody>
</table>

When — any pattern?
- Murrah Federal Building – 9 AM
- Atlanta Olympic Park – midnight
- ATL Buckhead nightclub – 10 PM
- ATL Woman's Clinic – 7 AM
- Birmingham Clinic – 7 AM
- Nairobi Embassy bombing – 11 AM
- 9-11 – 9-10 AM
- Chechen tourist train – 8 AM
- Moscow Commuter Train – 7 AM
- Madrid Commuter Train – 7:30 AM
- London Commuter Train and bus – 8 AM
- Boston Marathon – 9 AM

Where is Terror Used?
- Terrorism targets free-press countries
  - Representative governments
- Russia
  - Chechens use suicide tactics against free-press
  - Russia – not against totalitarian USSR
- Kurds – "Kurdistan" – parts of Iran, Iraq, and Turkey
  - Terror tactics only against Turkey
  - Not used against Iran or Iraq
Why Is Terror Growing?
Because it works

- 6 of 11 suicide campaigns successful (55%)
  - terrorists achieved at least partial victory
- airpower or economic sanctions < 15% success

- Targeted states
  - Fully or partially withdraw from territory
  - Began negotiations
  - Released a terrorist leader

- Suicide campaigns - successful against even hawkish governments
  - Succeeded despite military raids to kill or arrest terrorist leaders

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Why? Success Breeds Escalating Trends

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Three Distinct Evolving Tactics

The 1980s - The “IRA era”
- Large placement bombs
- “Gentlemen’s agreement” - limits casualties
  - advanced warning - evac, & staging of medical assets

The 1990s - The Suicide bomber era
- Small, but deadly, human “smart bomb”
- Maximum casualties, against “soft” civilian targets

The 2000+ - Complex tactics era
- Couples mega-bombs with multiple synchronized attacks
- Often suicide - pioneered in 1983 Beirut
  - Large or multiple suicide “smart” bombs vs. “soft” targets
  - Herds masses to kill zone or targets staging areas

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Why?
Because it works

- Democratic leaders publicly confirmed terror attacks forced concessions
- Examples
  - U.S. left Lebanon after 1983 - Marine barracks bombing
  - Israel followed in 1985 after > 900 IDF deaths / 18 mos
  - Spain left Iraq after March 2004 Madrid bombings

"We couldn't stay there and run the risk of another suicide attack on the Marines."
-- Ronald Reagan, An American Life

How? – circa 2002 Threat Analysis

1. Single 1-5 kg confined space bomb
2. Single 100 kg TNT-equivalent car bomb
3. "Complex-Synchronized" – multiple coordinated sequential explosions
   - Herd crowd to a "killing zone"
   - 2nd hit at hospital or staging area
   - Single explosions at multiple US cities
4. Ambulance truck bomb collapses a hospital
5. Tanker ship explosion consumes a port city

CY Lee Ordun - TE Davis

How? – only a click away.

Poor Man’s James Bond: Homemade Poisons, Explosives, Improvised Firearms
Price: $600.00
"All items ship FREE with Super Saver Shipping"
99 bombs were recovered at Columbine High School delayed access to casualties by Paramedics

Propane bomb in the wrecked cafeteria Blue duffel bag bomb in the background just two of the 99 bombs found at Columbine Car bomb timer mis-set – detonated 12 hours after event

How?
Terrors’ Perfect Storm

1. Available - 5 billion pounds legally made in U.S.
2. Low tech - Literacy helpful
3. Scalable - 1 kilogram to 1 kiloton TNT-equivalents
4. Simple delivery - hand-carried, truck, plane, train, ship
5. Simple Guidance - placed, thrown, or suicide
6. Human factors - available financing and volunteers
Understanding Terrorism

1. **Induce fear** in someone other than its casualties – goal to change an entity’s political behavior.
2. **Independent** of the cause that motivates it – unjust or righteous – the end justifies the means.
3. **NOT spontaneous or random** – staged psychological act conducted for an audience.
4. **No DIRECT personal gain** – targets may be $$$ – political, religious, or ideological objectives.
5. Requires escalating “shock and awe” to maintain sense of helplessness.

Traditional Public Health Applied to Asymmetric War

1. **Assess needs**
   a. **acute** - immediate post-even needs
   b. **long-term** - Gap analyses – information and management needs
2. **Assure access** to health care & vital services
   a. at-risk and special needs populations
   b. Resources – e.g., SNS, training, surge capacity
3. **Collect, analyze, and report** information
   a. Decision-makers and managers
   b. Providers and the Public

Bomb-Injury Threat Model

- **Agent**
- **Host**
- **Environment**
- **Human**
  - Age, sex, & weight
  - Fitness, TPE
  - Nutrition, health
  - Access to care

CDC 1
History must be Interpreted

<table>
<thead>
<tr>
<th></th>
<th>Military Combatant</th>
<th>Civilian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat</td>
<td>Mostly male, healthy, athletic, 18-35 years</td>
<td>More young, older, female, poor health</td>
</tr>
<tr>
<td>Personal Protective</td>
<td>Helmet, armored vest, armored vehicles</td>
<td>No PPE or armor</td>
</tr>
<tr>
<td>Equipment (PPE)</td>
<td>Manufactured high-order (HE) military ordnance</td>
<td>Makeshift low- and high-order bombs</td>
</tr>
<tr>
<td>Agent (weapon type)</td>
<td>Well-studied High-tech shrapnel</td>
<td>Poorly studied Nails, bolts, glass</td>
</tr>
<tr>
<td>Injury Patterns</td>
<td>Organized trauma care - long-term rehab, comp. lifelong ass.; Pres.-Cabinet adv.</td>
<td>Variable access to care, rehabilitation,</td>
</tr>
<tr>
<td>Access (Environment)</td>
<td></td>
<td>and assistance Ad hoc advocacy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TE Donn, CY J. Ordun</td>
</tr>
</tbody>
</table>

From the Israeli Trauma Registry

• Higher ISS scores than other trauma
  - ISS ≥16 in 30% vs. 10%, and
  - blast ISS grossly under-estimates resources
• Higher death in-hospital (mil DOW)
  - Terror 6.2% DIH vs. non-terror 3% DIH
  - Terror peak DIH day 4-5 vs. < 24 hours non-terror
• ↑ surgical interventions
  - Multiple surgeries, multiple days, multi-specialties
  - Terror peak DIH day 4-5 vs. non-terror < 24 hrs
• ↑ ICU requirements, Length of stay (LOS), & rehab

Other Observations

1. 80% of immediate casualties self- or buddy transport to the 3 closest hospitals.
2. Half of all casualties arrive over a 60 minute period
3. Israeli 20-20-60 rule
   • 20% killed, 20% admitted, 60% treat and release
4. Davis-Ordun-Hopmeier rule – 1/3rd, 2/3rd outpt
   • 1/3rd critical – mixed DOS, DIH, and admitted
   • Access to care is a determinant
   • 2/3rd non-critical – creat and release

Martinez Phenomenon – tendency for the insecure to apply their name to some disease or rule in a vacile attempt to gain immortality – Ric Martinez
Other Observations
5. Bottleneck for immediate admitted care is number of Operating Rooms
   • Number of major cases for 20 surgeons in 5 ORs?
6. Bottleneck for outpatient care is Radiology capacity – 5 plan films per X-ray per hour?
7. ED is cleared out in 4-6 hours
8. Economic loss is not due to uncompensated care – but rather cancelled, no-shows, and discretionary care going elsewhere.

Other Observations
9. Immediate needs
   • Standard practice “decon”, screening for perps
   • Trauma providers – Triage Czar, Surgeons, EM, nurses, RTs, paramedics, mental health
   • Inter-hospital transport teams & monitors
   • ORs, radiology capacity
   • Casualty / family locators
10. Less needed – neurosurgeons, vascular surgeons, administrators in the clinical areas

Questions?

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