Pediatric Mass Casualty Management

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Perhaps catastrophe is the natural human environment and…. we are programmed for survival amid catastrophe.

I think that testosterone is a rare poison.

Germaine Greer
International Red Cross - Disasters 2010

- 304,476 people were killed
- Affected 304,000,000 people (~4% of the earth population)
- 42% of Disasters in Asia Pacific Region
- China- 22, India-16, Philippines- 14
- Floods- 47%, Transport/Industrial- 37%
Why Continue to Prepare?

- Los Angeles - a suburb of San Diego that may have an $>8$ earthquake along the San Andreas Fault
- Reality Check - 99.7% chance quake will occur in the next 30 years
California’s San Andreas Fault

Pediatric Population
10,000,000
Yellowstone Supervolcano

- Eruptions every 600,000 years
- Yellowstone Park is rising 3 inches a year from magma underneath
Some Issues of Mass Casualties

- 25% of the US population are children
- < 25% of USA Local Emergency Medical Services have a plan for a pediatric mass casualty event
- USA policy states Hospitals should accommodate a surge of 500 injured children per 1,000,000 population
The Birth of Pediatric Surgery?

- Halifax Harbor, Canada Dec 6, 1917
- SS Mont Blanc crashed with SS Imo
- Wartime Ammo=2.9 kilotons TNT force
- 2000 killed 9000 injured
- Flattened the city
- Tsunami wiped out a native village
OKLAHOMA CITY, OK, USA
Terrorist Bombing

APRIL 19
1995
9:02 am
1. Blast wave breaks windows
   Exterior walls blown in
   Columns may be damaged

Figure 4-4: Blast Pressure Effects on a Structure, page 4-7
Blast Pressure Effects

2. Blast wave forces floors upward
Blast Pressure Effects

3. Blast wave surrounds structure
   Downward pressure on roof
   Inward pressure on all sides
BLAST INJURY-OKC

- > 700 Injured
- 168 Killed
- Pediatric deaths largely secondary and tertiary blast injuries
- 17 Open brain injuries in children
OBSERVATIONS

- Most died of building collapse
- Most survivors out in < 30 minutes
- 2 Triage areas
- Volunteer rescue workers
- CHAOS
OBSERVATIONS

- Helicopter-NO NO
- Ground Transport-YES
- Traffic Control
- Media- Problem?
- Motives of “volunteer rescue workers”!
OBSERVATIONS

- Hypothermia
- Late CNS Effects
- Response to resuscitation
- Entrapment
- Family reunification was an issue
May 3, 1999

- F5 Tornado (old version)
- Wind Speeds 319 mph
- 5000 homes damaged
- 26 hospitals treated patients
CHANGING THE F SCALE

- Jarrell, TX tornado of May 27, 1997 and the Oklahoma City/Moore, OK tornado of May 3, 1999

- *The Enhanced F-scale still is a set of wind estimates (not measurements) based on damage*

- Jarrell, TX is 39 minutes from DCMC
# Old Fujita Tornado Intensity Scale

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Wind Speed</th>
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<tbody>
<tr>
<td>F-0</td>
<td>Gale tornado</td>
<td>40 – 72 mph</td>
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<tr>
<td>F-1</td>
<td>Moderate tornado</td>
<td>73 – 112 mph</td>
</tr>
<tr>
<td>F-2</td>
<td>Significant tornado</td>
<td>113 – 157 mph</td>
</tr>
<tr>
<td>F-3</td>
<td>Severe tornado</td>
<td>158 – 206 mph</td>
</tr>
<tr>
<td>F-4</td>
<td>Devastating tornado</td>
<td>207 – 260 mph</td>
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<tr>
<td>F-5</td>
<td>Incredible tornado</td>
<td>261 – 318 mph</td>
</tr>
<tr>
<td>EF Number</td>
<td>3 Second Gust (mph)</td>
<td></td>
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<tr>
<td>-----------</td>
<td>--------------------</td>
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<tr>
<td>0</td>
<td>65-85</td>
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<td>1</td>
<td>86-110</td>
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<td>3</td>
<td>136-165</td>
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<tr>
<td>4</td>
<td>166-200</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Over 200</td>
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</table>
Tornado Injuries

- 682 Victims
- 45 deaths
- early warnings
- 23 Doppler radars
- Still no Level I TC
Pediatric Events

- ED and hospital record review
- 9 hospitals
- Age < 19 years
Injuries-Pediatric

- 68 pediatric patients seen in EDs
- 22 admitted
- 7 transferred to CHO
- 3 deaths
Injuries-Overall

- 682 injured or killed
- 140 patients hospitalized
- females > males 6:5
- most injured in the 35 to 54 age range
Pediatric Transports

- Ambulance 32
- Air 2
- Private vehicle 34
Pediatric Injuries

- Head - 24%
- Torso - 11%
- Lung - 7%
- Extremity 16%
- Natural gas inhalation 8 %
Pediatric Procedures

- 13 patients operated on
- 24 patients had ED procedures (37%)
- Chest tubes, ICP, closed reductions
Joplin, May 22, 2011

- 162 deaths as of Sept 14
- 13 children died
- 8000 homes destroyed/damaged
- St. Johns Medical Center
Moore/El Reno OK 2013

- May 20, 2013 EF5
- May 31, 2013 EF5 downgrade to EF3
- Finally, there is a Level I adult and pediatric TC
- Condition Black announced, not a drill
May 20, 2013

- 2 elementary schools, 1 high school
- 1 hospital
- 1.3 miles wide
- 25 dead, 350 injured
- 70 children treated at hospitals
May 31, 2013

- Wind speeds 296 mph (2\textsuperscript{nd} highest)
- 2.6 miles wide (widest recorded)
- Mostly over less populated ground
- 8 deaths, 151 injuries
- 4 experienced storm chasers killed
Bombs and Tornados

- Terrorism vs natural disasters
- Children are likely to be protected with warnings
- Natural Disaster- similarities with NBC
- 30-80 % of victims will be children
- In the first 12 hours, all response is local
Bombs and Tornados-2

- Regional hospital involvement in natural disaster response
- Private vehicle transports ignore disaster planning
- Involve the media early, including drills
- Remember—Chaos always happens
Crunch the Numbers

- Pediatric population USA is ~ 23%
- Roughly potential 72 million kids
- 67 million in school on weekdays
Now Do the Math

- Federal guidelines recommend 500 surge beds per 1 million pediatric population
- There aren't that many beds!
- Estimated that 6% of DMATs have members with pediatric training
An elementary school gets exposed to a chemical agent and it's your job to organize the Forty 6 year old children who must go through the decontamination showers.
What do we need for a local response?

- Pediatric critical care, pediatric trauma, and pediatric burn capabilities
- Pediatric triage planning
- Displaced children management (5000 in Katrina)
- Pediatric specific drills with live volunteers
- Enable a surge response
Pediatric Specific Disaster Management Issues

- Family Separation
- Inappropriate deployment of medical professionals
- Perceived lack of training by providers
- EMTALA/Legal concerns
- PTSD
Supervision

- Providing appropriate medical care
- Coordinating the family reunification process
Kid Problems After Disasters

- Children are dependent on adults for care, shelter, transportation, and protection from predators.
- Children are often away from parents, in the care of schools, child care providers.
- Children must be expeditiously reunified with their legal guardians.
School Evacuations

- Duck and Cover 1950s and 60s
- Fire drills
- Only 15 states have requirements for children/family reunification planning
**Parens Patriae**

- Power of states to protect and act in the best interest of individuals who are unable to care for or protect themselves.
- Typically invoked to make decisions on behalf of individuals who are incapable of doing so for themselves.
- Assert the state’s general interest and standing in communal health and welfare.
In General

- Informed consent is not generally necessary to treat imminently life threatening or serious conditions of unaccompanied children in the emergency setting.
- This is not the same thing as a Good Samaritan Law.
- “Best Interest of the child”
Kid Problems After Disasters

- The State has a duty to protect and act in the best interest of individuals who are unable to care for or protect themselves.
- Depending on where you live, this might be you as an agent for the State.
EMTALA- Mass Casualties

- Generally EMTALA is not waived
- Hurricane Katrina (2005)
- 56th Presidential Inauguration (2009)
- Hurricanes Ike and Gustav (2008)
- North Dakota flooding (2009)
EMTALA 1135 Waivers

- The President - Stafford Act or NEA
- HHS Secretary - Public Health Emergency
- Regional Office Advisories are not waivers
- A Governor cannot issue a waiver
- A Governor can ask for disaster declaration and a 1135 waiver
In Disasters

- Event trauma (one time event - we hope)
- Yields a “traumatic moment”
- “I am vulnerable to death/injury”
- Compared to process trauma - ongoing child abuse
Post Traumatic Stress Disorder

- PTSD is fairly common in children
- Poor availability for long term help
- PTSD can occur at great distances (Children in Tulsa affected by the OKC bombing)
- Lack of funding for treatment
PTSD

- Girls > Boys, take longer to recover
- Egocentric (I caused it!)
- Preschool-sleep & appetite disturbances, separation anxiety, nightmares, hypervigilance, behavioral reenactments
- School age- Typically classic sx$s$
- Teenagers- Hedonism, phobias
PTSD

- Proximity
- Degree of exposure
- Physical threat
- Response by family members
- Gender
- Prior developmental issues
National Commission on Children and Disasters- 2010

- Bring Government Agencies Together
- Mental Health Support
- Evacuation Specific for Children
- Improve Disaster Preparedness for Children
- Include pandemics as a national disaster- i.e. H1N1 Influenza
Summary

- Be Aware of MCI threats that might involve children
- Drill/Practice a variety of MCI possibilities
- Have a family reunification plan
- Be aware of PTSD in the involved children
Consider the Children