Lessons From the Fertilizer Plant Explosion in West, Texas

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Texas Department of State Health Services

www.nwcphp.org/hot-topics
2008 - 2013 Major Responses in Texas

• Hurricanes & Tropical Storms
  • Dolly, Gustav, Ike, Alex & Eduard

• Epi Investigations
  • Raw vegetables, TB, Mercury
  • Salmonella, Measles, Mumps, Cyclospora, Pertussis

• H1N1 Pandemic
• Bastrop Wildfire
• West Nile Virus
• West Fertilizer Plant
West, Texas

- Established as a railroad and farming town
- Settled by Czech and German farmers
- 20 miles north of Waco
- Population 2,800
- A popular stop along Interstate 35...famous for Kolaches
West Fertilizer Company

- Established in 1958
- 10 full time staff
- Approximately 150 tons (300,000 lbs) ammonium nitrate (AN) on site. About 30 tons detonated.

1947
- Texas City Disaster
  - 4,600,000 lbs AN

1995
- Oklahoma City Bombing
  - 5,000 lbs AN

2013
- West Fertilizer Plant
  - 60,000 lbs AN
Plant Explosion

- Wednesday, April 17th, 2013
- West Fertilizer plant fire
- 7:29 pm, Local volunteer firefighters respond
  - Volunteer firefighters from West and Abbott
  - An experienced Dallas Fire Department Captain
- 7:51 pm, Explosion
• EMT students evacuated nearby residents
• Nursing home patients relocated to west wing of the building
• Firefighting efforts concentrate on cooling Ammonium Nitrate and Anhydrous Ammonia storage
Suspected Causes of the Fire

Three possible causes

1. Arson
2. Electrical system malfunction
3. Faulty golf cart parked next to building
   - Designated as a crime scene
   - Months of analysis and hearings
The Impact

7:53 PM: “There has been an explosion.....many people down...”
Source: Google earth
The Impact

- Explosion is felt more than 30 miles away and registers as a 2.1 magnitude earthquake
- Blast crater is 10 feet deep and 100 feet wide
- Flaming debris causes fires over a half mile
- Furthest piece of debris found 2.5 miles away
Nursing Home Debris Impact
Nursing Home Debris Impact
The Impact

- 350 out of 700 homes impacted
- **142 destroyed**
- **51 major damage**
- **27 minor damage**
- 130 otherwise affected
- West Rest Haven Nursing Home destroyed
  - 128 residents evacuated to local and regional care facilities
Immediate response led by Dr. George Smith who had been supervising evacuation of nursing home patients
Immediate Response

7:59 PM: “All Call” issued by 911 dispatchers
Immediate Response

• Mutual aid arrived at approximately 8:15 PM
• Limited radio and cell phone capability at the scene
• 2 different staging areas established without coordination
  • Football field (1/4 mile from blast site)
  • Community Center (1 mile)

Source: Rod Aydelotte, Waco Tribune Herald
## Patient Surge

### Receiving Hospitals

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Patients Treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hillcrest Baptist Medical Center</td>
<td>123 patients treated (28 admitted, 5 ICU)</td>
</tr>
<tr>
<td>Providence Health Center</td>
<td>87 patients treated (21 admitted)</td>
</tr>
<tr>
<td>Hill Regional Hospital</td>
<td>42 patients treated</td>
</tr>
<tr>
<td>Scott &amp; White Memorial Hospital</td>
<td>3 patients treated (2 ICU)</td>
</tr>
<tr>
<td>John Peter Smith (JPS)</td>
<td>3 patients treated</td>
</tr>
<tr>
<td>Parkland</td>
<td>2 patients treated</td>
</tr>
<tr>
<td>McLane Children's</td>
<td>2 patients treated (1 PICU)</td>
</tr>
</tbody>
</table>

Every patient that made it to a staging/triage area at the scene survived.
Patient Surge

“Both Hillcrest and Providence Hospitals kicked into gear with a response I didn’t think possible. Patients were treated in a timely manner, and medical staff did a great job of getting people into the system fast.”

Bradford Holland, MD
Waco Physician
Hillcrest Hospital Response

- No official notification to hospitals
- Anecdotal phone reports from EMS and DPS personnel to RAC staff and Trauma Program Manager
  - “Code Alert” at 8:28 PM
  - “Code Green” at 8:40 PM
- First patients arrive via DPS patrol car at 8:40 PM

Source: Waco Tribune Herald, Jerry Larson
Hillcrest Hospital Response

- Hillcrest registered and treated over 100 victims in 4 hours
- 28 Admissions, 5 ICU patients, 8 Emergent Surgeries
- More than 50 nursing home patients
Hillcrest Hospital Response

- Over 250 additional employees and physicians at the hospital by 9:00 PM
- EMS ground transported
  - 13 red patients
  - 30 yellow patients
  - 47 green patients
- 94 CT scans and 129 x-rays in <4 hours
- 131 patients with explosion injuries seen in the ED over the next several days
West Injury Investigation

- Describe characteristics of:
  - Fatal injuries
  - Physical injuries of survivors
- Risk factors
  - Location at the time of the blast
  - Injury timing
  - Demographic characteristics
- Quantify the number who sought medical care
- Describe medical care received by the injured
Case Finding

1. Fatal injuries = persons who died in McLennan County due to injuries sustained in blast within one week

2. Non-fatal injuries = persons who sought medical treatment for injuries related to the explosion, identified through medical records:
   a. Injury treated at any hospital, emergency room, or urgent care facility in McLennan or Hill County within 5 days with cause and timing of injury consistent with being related to the blast
   b. Injury treated at a Texas hospital known to have received injured patients within one month and identified by that hospital as being related to the blast
176 Patient-Encounters at Medical Facilities that Night
First Patient Received at 8:10pm

NOTE: Preliminary Data
Leading Injuries

Fatal injuries
- Blunt force trauma
- Multiple fractures
- Multiple lacerations and penetrating injuries

Non-fatal injuries
- Numerous lacerations, contusions, abrasions
- Traumatic brain injuries and concussions
- Ear injuries, including hearing problems and tympanic membrane ruptures
- Eye injuries
- Inhalation injuries
### Injury Demographics

<table>
<thead>
<tr>
<th></th>
<th>Non-fatal injury</th>
<th>Fatal injury</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$N=288$</td>
<td>$N=15$</td>
</tr>
<tr>
<td>Female</td>
<td>176 (61%)</td>
<td>1 (7%)</td>
</tr>
<tr>
<td>Male</td>
<td>111 (39%)</td>
<td>14 (93%)</td>
</tr>
<tr>
<td>Under 18 years</td>
<td>28 (10%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>18 – 39 years</td>
<td>71 (25%)</td>
<td>5 (33%)</td>
</tr>
<tr>
<td>40-69 years</td>
<td>77 (27%)</td>
<td>9 (60%)</td>
</tr>
<tr>
<td>70 years and older</td>
<td>105 (36%)</td>
<td>1 (7%)</td>
</tr>
<tr>
<td>Residents of West Rest Haven</td>
<td>77 (27%)</td>
<td>1 (7%)</td>
</tr>
<tr>
<td>First responders</td>
<td>14 (5%)</td>
<td>12 (80%)</td>
</tr>
</tbody>
</table>
Media response was “immediate, intrusive, and relentless”
Regional Response

• Heart of Texas Regional Advisory Council (HOTRAC, Our HPP Contractors) were activated to coordinate regional response resources and data collection

• The Regional Medical Operations Center (RMOC) was stood up at 8:15pm

• The RMOC was staffed by HOTRAC, Waco-McLennan County Public Health District, & DSHS Region 7
State Resources

- 4 AMBUSs
  - 2 demobilized upon arrival
  - One remained on-site
- One Type 2 Mobile Medical Unit (MMU) deployed with staff
- Morgue Trailers
- Disaster Portable Morgue Unit
Texas Emergency Medical Task Forces (EMTFs)
State Response

- Two mortuary trailers deployed with a mortuary team
  - Stored and transported deceased responders to Dallas for identification
  - Demobilized two days later
- Two Medical Incident Support Team (MIST) members
  - Coordination of medical transportation with hospitals and nursing home patients
Local Public Health Response: Waco-McLennan County Public Health District

- West, TX = in their jurisdiction
- Regional and State Public Health Support
- Key Local Partnerships
Local Public Health Responsibilities

- Family Assistance Center
- Tetanus Shots
- Sanitarians
- Re-Entry & Neighborhood Resource Center
Family Assistance Center (FAC)

- Waco-McLennan County Health District
- Mental Health Professionals
  - MHMR (Local Mental Health Authority)
  - Victim Relief Services
  - Local MRC
- Texas Funeral Directors Association
- Line of Duty Death Task Force
- The Justice of Peace
- Regional and State Public Health
Re-Entry

• Divided the city into three zones
• Re-Entry completed in phases
# Disaster Behavioral Health Services

Local Mental Health Authority (LMHA)  
Mental Health and Mental Retardation (MHMR) Centers

<table>
<thead>
<tr>
<th>Populations Served</th>
<th>Service Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survivors</td>
<td>Family Assistance Center</td>
</tr>
<tr>
<td>Homeowners</td>
<td>Shelters</td>
</tr>
<tr>
<td>Business Owners</td>
<td>Incident Command</td>
</tr>
<tr>
<td>School Staff</td>
<td>Re-Entry</td>
</tr>
<tr>
<td>Children</td>
<td></td>
</tr>
<tr>
<td>Elderly</td>
<td></td>
</tr>
<tr>
<td>Non-English Speakers</td>
<td></td>
</tr>
<tr>
<td>First Responders</td>
<td></td>
</tr>
<tr>
<td>Law Enforcement</td>
<td>Bereaved</td>
</tr>
<tr>
<td>Fire/EMS</td>
<td>Affected Populations</td>
</tr>
<tr>
<td>Public Health</td>
<td>Shelter Workers</td>
</tr>
<tr>
<td>Professionals</td>
<td>First Responders</td>
</tr>
<tr>
<td>Volunteers</td>
<td>Local Officials</td>
</tr>
<tr>
<td></td>
<td>Incident Command</td>
</tr>
<tr>
<td></td>
<td>Leadership / Liaisons</td>
</tr>
<tr>
<td>LMHA Clients</td>
<td></td>
</tr>
</tbody>
</table>

|                     |                   |
| Law Enforcement     |                   |
| Fire/EMS            |                   |
| Public Health       |                   |
| Professionals       |                   |
| Volunteers          |                   |

*Formal Services*
Disaster Behavioral Health Services

- Mobile Crisis Outreach Team
- Crisis Respite
- Triage Services
- Psychiatric Hospitalization
- Safety Planning
- Crisis Hotline
- 24/7 Availability
# Disaster Behavioral Health

<table>
<thead>
<tr>
<th>Heart of Texas Region MHMR Encounters</th>
<th>Reactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• June = 50+</td>
<td>• Depression and anxiety primary concerns</td>
</tr>
<tr>
<td>• July = 150</td>
<td>• Influx of clients at the three month anniversary mark</td>
</tr>
<tr>
<td>• August = 120</td>
<td>• Numbers dropped off dramatically when school started however there has been a recent increase in numbers</td>
</tr>
<tr>
<td>• September = 65-70</td>
<td></td>
</tr>
<tr>
<td>• Types = groups, individual, children’s camp</td>
<td></td>
</tr>
</tbody>
</table>
Community Resilience

Source: Rod Aydelotte, Waco Tribune Herald

Source: Jerry Larson, Waco Tribune Herald
Suspected Causes of the Fire

Three possible causes
1. Arson
2. Electrical system malfunction
3. Faulty golf cart parked next to building
   - *Designated as a crime scene*
   - *Months of analysis and hearings*
Overarching Lessons

• PHEP and HPP Resources are vital!
• Communication, Command & Control #1
• Relationships: Planning & exercising with the right stakeholders
• Resources: Understanding agencies, key staff, and essential resources
• Preparedness planning is essential
• Responder training and exercise is necessary
Overarching Lessons

- Residents near sites with explosion hazards should be informed and make plans
- Managing influx of “help” is challenging
- Designate someone to manage Social Media
- Stress will take a toll on everyone
- Debrief opportunities needed for responders
- Leaders managing response need a scribe
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Thank you