Hurricane Rita

University Of Texas M. D. Anderson

“Standing Our Ground - Lessons Learned from Hurricane Rita”

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Objectives

• Hurricane Information
• Hurricane Rita Data
• Hurricane Rita Preparedness
• M.D. Anderson Plan Activation
• M.D. Anderson Lessons Learned
• Estimated Cost to M.D. Anderson
• Texas Medical Center Lessons Learned
• 2006 Projections
• Conclusion
• Questions
What are Hurricanes?
Hurricane KATRINA has hit land and is moving north at 15mph. It has max sustained winds of 145 mph and gusts of 165mph.
Hurricane – Defined

• A hurricane is a cyclonic storm, which, as a unit, normally travels at about 8 to 12 miles per hour and has a small center area of relative calm with an area of high wind velocity revolving counterclockwise about this central area. Hurricane winds are defined as those having a force greater than 75 MPH; however, they have been recorded well over 180 MPH.
SAFFIR/SIMPSON HURRICANE SCALE

• The Saffir-Simpson Hurricane Scale is a 1-5 rating based on the hurricane's present intensity
• Used to give an estimate of the potential property damage and flooding expected along the coast from a hurricane landfall
• Wind speed is the determining factor in the scale
• Category I is a minimum hurricane, category 5 is the worst case scenario
<table>
<thead>
<tr>
<th>Category</th>
<th>Central Pressure</th>
<th>Winds</th>
<th>Coast Surge</th>
<th>Bay Surge</th>
<th>Damage</th>
<th>Storm Name</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>980+ (mb)</td>
<td>74-95 mph</td>
<td>4-5</td>
<td>4-7</td>
<td>Minimal</td>
<td>Stan</td>
<td>2005, 2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gaston</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>965-979</td>
<td>96-110 mph</td>
<td>6-8</td>
<td>8-12</td>
<td>Moderate</td>
<td>Juan</td>
<td>2003</td>
</tr>
<tr>
<td>3</td>
<td>945-964</td>
<td>111-130 mph</td>
<td>9-12</td>
<td>13-18</td>
<td>Extensive</td>
<td>Jeanne</td>
<td>2003, 2005</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Rita</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Charley, Katrina</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>&lt;920-(mb)</td>
<td>&gt; 155 mph</td>
<td>18+</td>
<td>24+</td>
<td>Catastrophic</td>
<td>Camille</td>
<td>1969, 1992</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Andrew</td>
<td></td>
</tr>
</tbody>
</table>
Hurricane Rita

- Hurricane Rita was the 17th named tropical storm, 9th hurricane, 5th major hurricane, and 2nd Category 5 hurricane of the 2005 Atlantic hurricane season.
Houston/Galveston
Evacuation of Houston

Evacuation of Galveston
Area within COH at 35ft Elevation or Below
RISK AREAS / EVACUATION MAP

Saffir-Simpson Scale

<table>
<thead>
<tr>
<th>Hurricane Category</th>
<th>Windspeed (MPH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>74 - 95</td>
</tr>
<tr>
<td>2</td>
<td>96 - 110</td>
</tr>
<tr>
<td>3</td>
<td>111 - 130</td>
</tr>
<tr>
<td>4</td>
<td>131 - 155</td>
</tr>
<tr>
<td>5</td>
<td>&gt;155 mph</td>
</tr>
</tbody>
</table>

Evacuation Routes
Secondary Routes
Freeway
Proposed Freeway
City Of Houston

Risk Area 1
Risk Area 2
Risk Area 3
Risk Area 4
Risk Area 5

Risk area numbers correspond to hurricane categories. For example, in the event of a category 3 hurricane, risk areas 1, 2, and 3 would be threatened.

City Of Houston
Planning And Development Department
Data Systems Division

5 Miles
### Hospital Locations Within Evacuation Zones

<table>
<thead>
<tr>
<th>ID</th>
<th>Hospital Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Memorial Hospital - Southeast</td>
</tr>
<tr>
<td>2</td>
<td>East Houston Regional Medical Center</td>
</tr>
<tr>
<td>3</td>
<td>Brilea McGreary Women's Place</td>
</tr>
<tr>
<td>4</td>
<td>Doctor's Hospital - East Loop</td>
</tr>
<tr>
<td>5</td>
<td>Memorial Hermann - Pasadena</td>
</tr>
<tr>
<td>6</td>
<td>Kindred Bay Area Hospital</td>
</tr>
<tr>
<td>7</td>
<td>Deaton Hospital</td>
</tr>
<tr>
<td>8</td>
<td>Triumph Hospital Baytown</td>
</tr>
<tr>
<td>9</td>
<td>Gulf Coast Hospital</td>
</tr>
<tr>
<td>10</td>
<td>San Jacinto Methodist Hospital</td>
</tr>
<tr>
<td>11</td>
<td>San Jacinto Methodist Hospital</td>
</tr>
<tr>
<td>12</td>
<td>Triumph Hospital East Houston</td>
</tr>
<tr>
<td>13</td>
<td>Heights Park Hospital</td>
</tr>
<tr>
<td>14</td>
<td>Tri City Regional Hospital</td>
</tr>
<tr>
<td>15</td>
<td>Clear Lake Rehab Hospital</td>
</tr>
<tr>
<td>16</td>
<td>Clear Lake Regional Medical Center</td>
</tr>
<tr>
<td>17</td>
<td>Speciality Hospital of Houston - Clear Lake</td>
</tr>
<tr>
<td>18</td>
<td>Christus St. John Hospital</td>
</tr>
</tbody>
</table>

**Area Hospitals Within Evacuation Zones**
TMC Figure 2
Hurricane Rita roared through the Gulf as one of the most powerful hurricanes on record, sending more than 25 million people fleeing in anticipation of its wrath. Choosing Sabine Pass over Galveston Bay for landfall, Rita proved to be more imminent than imagined. A look at how the area fared:

- **Lake Livingston**: Damage to the dam forced a water release, causing flooding along the Trinity River.
- **Bellaire**: Fallen tree limbs left 1,171 homes without power Saturday morning.
- **Houston**: Power loss in some parts of the city, and some windows were knocked out downtown, but the city escaped relatively unscathed.
- **Galveston**: A fire raged in three historic buildings in the Strand District during the storm, but the island was spared Rita’s full fury, suffering only moderate damage.
- **Port Arthur**: The city’s seawall held, but substantial flooding still occurred, and power was lost.
- **Sabine Pass**: The center came ashore at 2:30 a.m. Saturday with winds in the 120-mph range as a Category 3 hurricane.

**Rita’s wrath**

**Hurricane Rita**

**Texas: 150 Years**

**Hurricanes**

Information provided by “Policy Council Update” presentation entitled “Hurricane Rita: Lessons Learned” April 20, 2006, Texas Medical Center by William Wheeler
Galveston

Port Arthur
M. D. Anderson
Emergency Plan Activation

• Incident Command System

• Primary Command Center & seven sub-command centers
Key Players

• Triage Officers
• Incident Command Officers
• Emergency Plan Officers
• Hurricane Ride-Out Team Members
• Recovery Team Members
Institutional Response

- September 20, 2005 – Emergency Level 1
- September 21, 2005 – Emergency Level 2
- September 22 - 25, 2005 - Emergency Level 3
- September 28, 2005 – Normal Operations
Facilities Issues

• M. D. Anderson Main Campus flood barriers under construction
  – Flood Wall
  – Flood Gate

• FEMA project to install flood gates & new flood wall not complete
Flood Wall

Flood Gate
Flood Gate for Research Building
Flood Gate Testing at Main Hospital Entrance
The Learning Process

• Opportunities for improvement documented during the emergency.

• As the events unfolded, areas of improvement/opportunities for improvement were categorized into the following:
  • Facilities
  • Logistics
  • Training
  • Communications and
  • Department-specific issues
Logistical Issues

• OK, I’m on the Ride-Out Team, Now What?
  – Lack of preparedness by Ride Out Team members
  – Lack of sleeping bags, cots, air mattresses
  – Stretchers and furniture were stripped of their pads and cushions
  – Groups expected VIP treatment during emergency
Lessons Learned

Solutions

• Provide
  – Annual Hurricane Ride-Out Team training
  – Personal Preparedness Plan for Ride-Out Team members
  – Sleeping areas inventoried annually by EH&S
  – Increased number of sleeping cots
  – Designated shower locations identified
  – Small amenity kits provided
Logistical Issues Continued

• Who is Onsite and How Do You Know?
  – Too many visitors and unauthorized personnel onsite
  – Unauthorized shelter set up by staff families in research areas and administrative buildings
  – Food and Sleeping Arrangements for Patient families
Lessons Learned
Solutions

• Hurricane Specific Identification
  – Embossed Color Coded Wristbands to
    identify Ride-Out Teams, visitors, and
    patients.
• Ride-Out Team protocols in place
• Kronos Time Clocks to maintain
  accurate account of personnel on
  campus
• Emphasis on communicating that
  M.D.A. will not shelter families
Wristbands and ID Card
Logistical Issues Continued

- Parking
  - Parking garage closest to MDA controlled by TMC
  - Access issues to parking garages
  - Garage full with unauthorized visitors and people camping out to shelter
  - Garage used as shelter for unauthorized vehicles
  - Parking not available for Ride Out Team members
Lessons Learned

Solutions

• Access Control Plan for Campus
• Parking Plan
• Emphasis in training that M.D. Anderson employees are only allowed to bring one car to campus
Logistical Issues Continued

• Food and Dining Services
  – Meals for approximately 3,000 individuals each day
  – Actual Ride Out Team contingencies for 1,800 individuals
Lessons Learned
Solutions

• Identification card also serves as meal ticket
• Meal ticket is a simple and effective way to track the number of meals a person has received each day
Communication Issues

- Challenges:
  - Communications to patient families
  - Communications to TMC hotels
  - Communications to areas utilized for sleeping
  - Getting information out to hearing impaired staff via the information line
Lessons Learned Solutions

• Pages
• Mass email notifications
• Information phone line (RING line)
• Updates on MDA website
• Townhall meetings by Incident Officer
Lessons Learned Solutions

• Daily update fliers handed out at meal times
• Postings outside Command Center and Subcommand Centers
• Running updates on internal channel 20 (TV)
Recovery Issues

- Insufficient staff available to activate hospital operations
- Many staff members had evacuated the city
- Fuel shortage
- Timekeeping
Lessons Learned

Solutions

- Hurricane Ride-Out Team members have been informed that they will begin the recovery process if recovery teams are unable to return.
- Use of Kronos time clocks to maintain time for emergency pay purposes.
- MDACC will align recovery expectations with the city plan for reentry.
Unresolved Logistical Issues

• Issues at Rotary House Hotel
  – Patient families in the hotel that could not go home
  – Patients in hotel that could not travel
  – Evacuation of the hotel
  – Alternate arrangements for hotel guests
  – International Patients
Unresolved Logistical Issues

• Housekeeping Issues
  – Inpatient areas still operational
  – Lack of adequate housekeeping staff to pick up trash
  – Trash pile-up in hallways and on inpatient units
Cost to the Institution

• Estimated cost of Hurricane Rita (True cost still being worked out)
  – Facilities and Infrastructure - $ 96,000
  – Additional labor cost i.e. overtime, emergency pay, compensatory time – $ 2,405,630
  – Compensatory Time - $ 3,400,000
  – Loss of Revenue - $ 14,082,529
  – Other expenses - $ 92,967
  – Total expenditure - $ 20,077,126
Hurricane Rita — LESSONS LEARNED - OBSERVATIONS

Logistics

- Medical supply deliveries stopped 72-96 hours prior to landfall
- Food commodities were in short supply and demand quickly overwhelmed supply at each institution
- Emergency drinking water was in short supply
- Staffing and shelter populations overwhelmed commodity delivery systems
- Pharmacy supplies were diminished due to lack of replenishment delivery
- Retail pharmacies were closed applying increased demand on hospital pharmacy supplies
- Dialysis patient demand increased due to neighborhood dialysis clinics being closed because of evacuation
- Emergency generator power fuel supplies greater than 5 days needed

Information provided by “Policy Council Update” presentation entitled “Hurricane Rita: Lessons Learned” April 20, 2006, Texas Medical Center by William Wheeler
Hurricane Rita — LESSONS LEARNED
– OBSERVATIONS (cont.)

• Staffing
  – Essential functions need to be identified early
  – Sense of where people were assigned was not organized
  – Inconsistent application of emergency policy by departments
  – Did not meet expectation of emergency preparedness training
  – Leaders should be more accountable for staff performance
  – Many non-essential staff showed up to shelter self and family
  – Did not know who “ride out” team members were until the emergency was declared
  – Employee time tracking was difficult
  – Institution HR policy for “ride out” and “recovery team” needs yearly updates

Information provided by “Policy Council Update” presentation entitled “Hurricane Rita: Lessons Learned” April 20, 2006, Texas Medical Center by William Wheeler
Hurricane Rita — LESSONS LEARNED
– OBSERVATIONS (cont.)

• Sheltering
  – Identifying sleeping area capacity early
  – Establish limit for number you can shelter
  – Establish childcare facility if sheltering family members
  – Develop shelter tracking system
  – Have ability to lockdown as shelter limit is reached
  – Shelter capacity should be matched with ability to serve occupants
  – Evacuation of shelter occupants should be in the plan
  – Develop long-range shelter options

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Hurricane Rita — LESSONS LEARNED
– OBSERVATIONS (cont.)

• **Communications**
  – Improve distribution of TMC Incident Command Center’s information to all TMC institutions
  – Improve distribution of contact information for all Incident Commanders to all TMC institutions
  – Satellite phone number collection and documentation
  – Emergency “Ham” radios needed
  – Additional radio systems and radios needed
  – Activate Incident Command Centers (ICC) earlier (96 hours)
  – Create Disaster Website for tracking purposes
  – Cell phone service deteriorated due to call volume

Information provided by “Policy Council Update” presentation entitled “Hurricane Rita: Lessons Learned” April 20, 2006, Texas Medical Center by William Wheeler
Hurricane Rita — LESSONS LEARNED
– OBSERVATIONS (cont.)

• Evacuation
  – Decisions made not to evacuate “Pre-Storm”
  – Need transportation plan for “Post Storm Evacuation”
  – The Community needs to understand that TMC is not the designated shelter for “special needs” evacuees
  – Develop transportation plan to evacuate TMC sheltered occupants to public shelters
  – Should evacuation become necessary, need patient tracking system

Information provided by “Policy Council Update” presentation entitled “Hurricane Rita: Lessons Learned” April 20, 2006, Texas Medical Center by William Wheeler
What to be Looking for in 2006
Hurricane Season
From June until November
Names Not to Give Your Children This Year

<table>
<thead>
<tr>
<th>Alberto</th>
<th>Helene</th>
<th>Oscar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beryl</td>
<td>Isaac</td>
<td>Patty</td>
</tr>
<tr>
<td>Chris</td>
<td>Joyce</td>
<td>Rafael</td>
</tr>
<tr>
<td>Debby</td>
<td>Kirk</td>
<td>Sandy</td>
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<tr>
<td>Ernesto</td>
<td>Leslie</td>
<td>Tony</td>
</tr>
<tr>
<td>Florence</td>
<td>Michael</td>
<td>Valerie</td>
</tr>
<tr>
<td>Gordon</td>
<td>Nadine</td>
<td>William</td>
</tr>
</tbody>
</table>
ATLANTIC BASIN SEASONAL HURRICANE FORECAST FOR 2006

Forecast Issue Date: April 4, 2006
Source: Department of Atmospheric Science, Colorado State University and National Weather Service

- Named Storms: 17
- Named Storm Days: 85
- Hurricanes: 9
- Hurricane Days: 45
- Intense Hurricanes: 5
- Intense Hurricane Days: 13
Hurricane Probabilities

PROBABILITIES FOR AT LEAST ONE MAJOR (CATEGORY 3-4-5) HURRICANE LANDFALL ON EACH OF THE FOLLOWING COASTAL AREAS:

- Entire U.S. coastline - 81% (average for last century is 52%)
- U.S. East Coast Including the Florida Peninsula - 64% (average for last century is 31%)
- Gulf Coast from the Florida Panhandle westward to Brownsville - 47% (average for last century is 30%)
- Above-average major hurricane landfall risk in the Caribbean
Conclusion

- The M. D. Anderson Institutional Emergency Plan was successfully implemented.

Hurricane Rita was the “Perfect Storm” for M. D. Anderson

- No damage to the facility

- Allowed for full implementation of the plan

- Emergency Management Committee is monitoring the progress of action items.
Questions