Building Back Better After Superstorm Sandy

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Presentation Objectives

• To demonstrate an understanding of the planning required for current and future complex disasters.
• To develop strategic tools for enhancing organizational readiness for leadership and management.
• To design a resilient hospital culture through protective infrastructure measures, people, plans and preparation.
About NYULMC

- Academic Medical Center
- Biomedical Research
- School of Medicine
- Four Hospitals
  - Tisch
  - Rusk Rehabilitation
  - Hospital for Joint Diseases
  - Hassenfeld Children’s Hospital
- Article 28s
- Faculty Group Practices
- Across 250 locations
- Approx. 20,000 staff, faculty and students

Then Along Came Sandy...
Superstorm Sandy Video

https://www.youtube.com/watch?v=3z078ak7_sc
A Call from the President

EOC Coordination
Seminar Room
What is e-FINDS

Evacuation of Facilities in Disasters System

A patient tracking system developed after Sandy

e-FINDS Lower Manhattan Exercise
May 2015

NYU Hospitals Center – Tisch

NYU Hospital for Joint Diseases

Mount Sinai Beth Israel

Bellevue

NYP – Lower Manhattan

Gouverneur Health
e-FINDS: Areas for Improvement

- Coordination with New York State Department of Health
- Access for Networks
- Integration of e-FINDS and EMR
- Unable to track some patients

Post-Sandy Flood Mitigation Strategy

- Created a protective barrier around campus
- Secured all points of entry
- Provided containment for vital hospital systems
NYU Langone Medical Center
December 2013

Facilities Changes Post-Sandy

- Infrastructure relocations to higher elevation
- Flood protection at critical areas within and between buildings
- Hardening of the building perimeters
- Deployable systems at campus perimeter to the Sandy flood level
- New Tisch elevators without cellar level stop
Facilities Mitigation Measures

- Infrastructure relocations to higher elevation
- New emergency generators
- New fuel oil system
- All automatic transfer switches elevated

New automatic transfer switch in Tisch Hospital, 7th floor

New energy building with 7,500 kW generator capacity on 3rd floor

Facilities Mitigation Measures (cont.)

New permanent flood doors protecting Skirball Ground Floor
Facilities Mitigation Measures (cont.)

Hardening of the Building Perimeter
- Pipe penetrations sealed
- Area ways closed
- Walls structurally reinforced
- Barriers between interconnected buildings

Tiger Dam along FDR Service Road
Facilities Mitigation Measures (cont.)

- Elevator Service
  - Operational plan to lock-out lower level access
  - New elevator tower that serves the Tisch Hospital
  - Temporary protection plan for pits and equipment
Facilities Mitigation Measures (cont.)

- Increase on-site power generation, electrical distribution and fuel oil storage
- Enhance system redundancy

Typical Installation:
- Normal power fed by ConEdison and CoGen in parallel (Primary)
- Standby power backed up by generator (Emergency)

Campus Perimeter Protection Flood Wall
Energy Building Loading Dock—
New Permanent Flood Barrier

Elevate and Protect Key Infrastructure

Emergency generators and ConEd normal power switchgear in the energy building
Developed 2014 Hurricane Season Emergency Plan

- Identified NYULMC facilities within evacuation zones
- Planning assumptions
- Strategic decision support matrix
- Five-day hurricane countdown matrix
- Inter-agency coordination
- Damage assessments

NYULMC Properties & Hurricane Evacuation Zones
Redesigned NICS Organizational Structure

Strategic Decision Support Tool Matrix

<table>
<thead>
<tr>
<th>DECISION</th>
<th>EARLY (MORE THAN 48 HOURS)</th>
<th>OPTIMAL (84 THROUGH 60 HOURS)</th>
<th>LATE (LESS THAN 60 HOURS)</th>
<th>TIME TO COMPLETE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEPLOY INFRA-STRUCTURE PROTECTION MEASURES</td>
<td>Considerations: • Balance the time necessary to implement with the costs to be incurred. • Since these measures have never been fully implemented and rely heavily on contractor support, an early start may be worthwhile.</td>
<td>Considerations: • Likely to coincide with a Mayoral Evacuation Order. • Enables enough time to complete implementation with some time in case of unforeseen events • Allows normal operations to continue for as long as possible.</td>
<td>Considerations: • Projected storm impacts are not likely to warrant a full deployment, but some selected measures may be advisable • Storm unexpectedly changes in direction or intensity and may threaten the NYC area.</td>
<td>Up to 48 hours</td>
</tr>
<tr>
<td>Risks: • More likely that time, money and resources will be expended unnecessarily.</td>
<td>Risks: • Less likely, but still possible, that time, money and resources will be expended unnecessarily.</td>
<td>Risks: • Insufficient time for fully deployment and to deal with contingencies.</td>
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</tr>
<tr>
<td>IMPACTS: • Substantial costs to fully deploy measures. • Loss of access to primary loading dock and O2 farms. • New construction activities may be interrupted.</td>
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</tbody>
</table>
## Five-Day Countdown

### NOAA/NWS

**Announce that a damaging storm is predicted to impact the NYC Area.**

### Action Plan Notification Period

- **72-Hour**
  - Tiger Dams
  - Fill Port Plumbing

- **48-Hour**
  - Elevators
  - Plywood
  - Bituthene
  - Sandbags
  - Temporary structural
  - Barricades

- **24-Hour**
  - Exterior pumps within Tiger Dam perimeter
  - Interior Pumps

- **0-Hour**
  - All mitigation measures to be in place
  - Final Field Verification

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**Table: Hospital Operations**

<table>
<thead>
<tr>
<th>Hospital Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Evacuation complete (except for # of SIP patients)</td>
</tr>
<tr>
<td>- Staff reduced except for those caring for SIP patients inclusive of Support Services</td>
</tr>
<tr>
<td>- Staff all positions throughout the hurricane and ensure that lodging and feeding needs are met for stay-team staff</td>
</tr>
</tbody>
</table>

**Table: SOM Operations**

<table>
<thead>
<tr>
<th>SOM Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Review communication plan and safety precautions with the students. (i.e., stay indoors, have drinking water, stock up on food and supplies, fill your bathtub with water to flush the toilet)</td>
</tr>
<tr>
<td>- Advise students not to leave NYC right before the storm. At this point, students should not evacuate, and they should ride out the storm in NYC</td>
</tr>
<tr>
<td>- Advise students that they should not be outside DURING the storm</td>
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</tbody>
</table>

**Table: Research Operations**

<table>
<thead>
<tr>
<th>Research Operations</th>
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</thead>
<tbody>
<tr>
<td>- Restricted access, pre-identified stay team staff only</td>
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</tbody>
</table>

**Table: Clinical Sciences**

<table>
<thead>
<tr>
<th>Clinical Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Restricted access, pre-identified stay team staff only</td>
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</tbody>
</table>

**Table: DLAR**

<table>
<thead>
<tr>
<th>DLAR</th>
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<tbody>
<tr>
<td>- Only stay team DLAR staff remains</td>
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</tbody>
</table>
• Pre-storm strategic decision-making scenario
• Validated the Hurricane Plan and functional annexes
Exercise Improvement Plan Tracker

<table>
<thead>
<tr>
<th>Exercise Area</th>
<th>Actions for Improvement</th>
<th>Target Completion Date</th>
<th>Initial Considerations</th>
<th>Status</th>
<th>Primary Impactor’s Name</th>
<th>Departmental Impacts</th>
<th>Supporting Impactors</th>
<th>Supporting Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration Plan</td>
<td>Develop a non-academic Pharmacy Residency Program to enhance the residency program's ability to offer diverse training experiences.</td>
<td>2019-06</td>
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<tr>
<td>Human Capital (including trained staff)</td>
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<tr>
<td>Building a Resilient Health Care Center</td>
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<tr>
<td>Physical Protection of Assets</td>
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<tr>
<td>Emergency and Business Continuity Plans</td>
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<tr>
<td>Processes and Sub Systems</td>
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</tbody>
</table>
Departmental Goals for Achieving Organizational Resilience

- Established NYULMC as national/international leader
- Built a comprehensive EM and Resilience Program
- Developed EM and Resilience strategies, plans, tools & resources
- Fully integrated EM and Resilience policies across the enterprise
- Promoted an enterprise-wide culture of resilience and a highly prepared workforce

Launched Enterprise-Wide Business Continuity Management

- Obtained executive-level support
- Determined how and where to initiate Program
### Rating System Description by Department Classification

<table>
<thead>
<tr>
<th>RATING</th>
<th>STANDARD</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Needs Basic Resilience</td>
<td>Has a general awareness of resilience and participates in some emergency preparedness activities.</td>
<td></td>
</tr>
<tr>
<td>Meets Minimum Resilience Requirements</td>
<td>Has at least some informal procedures in place to deal with emergencies and/or business interruptions or has emergency plans that need significant update or revision.</td>
<td></td>
</tr>
<tr>
<td>Maintains Appropriate Baseline Resilience</td>
<td>Has optimized resilience for the types of services provided. No outstanding critical resilience recommendations related to core business processes.</td>
<td></td>
</tr>
<tr>
<td>Exceeds Baseline Resilience Requirements</td>
<td>Has a formal written business continuity or resilience strategy or similar document(s), has implemented all high priority resilience recommendations, and conducts periodic contingency training and drills.</td>
<td></td>
</tr>
<tr>
<td>Achieves Maximum Resilience</td>
<td>Has implemented exceptional resilience measures necessary to avoid business interruptions for all types and magnitudes of potential hazards.</td>
<td></td>
</tr>
</tbody>
</table>

### NYULMC HVA Funnel

- **National Hazards**
  - Animal Disease Outbreak
  - Armed Assault
  - Aircraft as Weapon
  - Biological Food Contamination
  - Biological Terrorism Attack
  - Chemical/Biological Food
  - Chemical Substance Spill or Release
  - Chemical Terrorism Attack
  - Cyber Attack against Finance
  - Climatic Events
  - Earthquake
  - Explosive Terrorism Attack
  - Flood
  - Fire
  - Flood, Fire, and Chemical Pollution
  - High Wind Events
  - Homogenized Nuclear Events
  - Hurricane
  - Hydroelectric
  - Land Subsidence/Expansive Soil
  - Nuclear Attack
  - Nuclear Plant Accidents
  - Radiological Attack
  - Severe Winter Storms
  - Wildfires

- **NY State Hazards**
  - Bridge Collapse
  - Building Collapse & Explosions
  - CBRD
  - Carbon Monoxide
  - Climate Change
  - Coastal Storms
  - Dam Failure
  - Disease Outbreak
  - Domestic Terrorism
  - Drought
  - Earthquakes
  - Extreme Temperatures
  - Flooding
  - Flood, Fire, and Pollution
  - Hydroelectric
  - Nuclear Attack
  - Severe Storms — Thunder, Tornadoes, Winds
  - Transportation System Failure
  - Utility Disruption
  - Violence Explosive Device
  - Wildfires
  - Winter Storms

- **NYC Hazards**
  - Armed Assault & Criminal Activities
  - Biological Incidents & Disease Outbreaks
  - Chemical Incidents
  - Civil Disturbances
  - Cyber-Attacks
  - Earthquakes
  - Explosions
  - Extreme Heat
  - Fires
  - Flooding
  - High Wind Events
  - IT Disruptions
  - Labor Actions & Strikes
  - Radiological & Nuclear Incidents
  - Space Weather
  - Transportation Disruptions
  - Utility Disruptions
  - Winter Weather

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*Images and diagrams are not included in the text representation.*
Emergency Operations Plan

April 2012
- Scope is hospital/inpatient & ambulatory care facilities centric
- NICS is a hierarchical structure
- NICS is only activated during emergencies
- EOP does not have a strategic component
- EOP was updated post-Hurricane Sandy but not submitted for approval – many lessons learned were not integrated
- Annexes A-Z

July 2015
- Enterprise-wide scope
- NICS is a network structure which mirrors how the Medical Center operates
- NICS is always activated and used for incidents of all types and sizes
- Established CENTCOM and executive-level strategic decision-making
- Redesigned the relationship between the EOP, Appendices, Annexes
Questions?
Thank you

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