Disaster Preparedness, Business Continuity, and Recovery: Lessons Learned from Sandy

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A world-class, patient-centered, integrated academic medical center
Mission: To Serve, To Teach, To Discover

• Projected FY16 revenue = $5.52B
• Grant revenue = $284M: 603 NIH and 1452 total awards – among fastest growing medical schools nationally
• 1,200+ FT faculty (400 dedicate significant effort to research). Ambulatory network of 2300+ physicians
• 1000+ medical and graduate students, 1125 residents and fellows
• 1500+ total beds: 844 at Tisch, 225 at HJD and Rusk, 450 at NYU Lutheran
Hurricane Irene: What Happened?

- August 25, 2011 - Ordered to evacuate 500 patients in advance of Hurricane Irene
- August 27, 2011 - Hurricane Irene impacted the medical center
- August 29 - Several buildings were put on emergency generator power due to water infiltration
- August 30 - All patients returned to the medical center

Lesson Learned

- Valuable learning experience testing our disaster preparedness and working with our Insurance Company and FEMA
By Monday, October 29, 575 patient census was reduced to 322 patients (discharges and hold admissions)

Evacuation order for Tisch Hospital issued when Con Edison power plant explosion caused widespread damage and power loss to lower Manhattan

Remaining patients were transferred to 14 hospitals within 13 hours
A world-class, patient-centered, integrated academic medical center
Mission: To Serve, To Teach, To Discover
The Impact Was Well-Publicized

Images: print screens of Nature.com, NYTimes.com and ScientificAmerican.com
Sandy – Unexpected Storm Surge & Power Loss

- **Three major research facilities** on our main campus disrupted by water intrusion and power outage
- **Bellevue (HHC) and our VA Hospital affiliates** also closed for extended periods
- **Rodent losses:** 700+ lines to be rederived
- **Lost equipment:** Lab-based and shared resources
- **Lab materials and labor:** Cell lines, tissue samples, antibodies, etc.
- **Human research interruptions:** Spoilage of study drugs, data losses, study enrollment disruptions
Our Response Benefited from NYULMC’s Integrated Structure

- Hospitals
- Education
- Research
- Command Center
- Practice Plan

Corporate Services
- HR
- Finance
- IT
- Facilities
- Security
Save/rescue critical research items
- Precious samples (dry ice, liquid Nitrogen, freezers)
- Clinical research materials & Investigational pharmacy
- Initiate loss documentation appropriately & safely

Communication & Empathy for the Research Community
- Understand – Inform – Respond
- On-site help desk/help line, fliers, town halls, twitter
- Peer outreach
- Counseling, other aid available

Immediate assurances
- Back to labs ASAP – start planning research relocations
- Extra time for grad students
- Extension of the tenure clock
- Financial support

Proactive outreach to external stakeholders
- NIH and other sponsors
- Government officials
- Media
Restoring Research Operations after Sandy

- Consistent message: “We understand and you will have support to rebuild”
- Loss of loading docks required alternate supply delivery locations
- Loss of power required prioritized external generators, boilers, dryers
- Temporary space required for cold storage, lecture halls/classrooms, wet and dry labs, vivaria

Delivering supplies through the main lobby
Dry ice was carried to labs upstairs, freezers
Planning Began Immediately for Research Laboratories

A number of crucial questions had to be answered:

- Who needs to be relocated?
- What do they need?
  - Equipment
  - BSL3
  - Confocal
- Where can they go?
  - Back to their lab?
  - Washington Square
  - Other NYULMC space
  - Other NYC locations
- How can we make sure researchers are comfortable in their new locations?
Many of relocations had distinct challenges:

- Research labs
- Vivarium
- Sample & freezer storage
- Clinical research sites
- Records for active studies
- Investigational pharmacies

Laboratory door damaged by the storm
### Sandy Exerted Significant Impact on Research Mission

<table>
<thead>
<tr>
<th>Building</th>
<th>Research Net SF</th>
<th>Scope</th>
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<tbody>
<tr>
<td><strong>Back in Service within 30 days</strong></td>
<td></td>
<td></td>
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<tr>
<td>Skirball</td>
<td>80,000</td>
<td>30 PIs</td>
</tr>
<tr>
<td><strong>Back in Service by end of 2012</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smilow</td>
<td>98,000</td>
<td>40 PIs</td>
</tr>
<tr>
<td><strong>Back in service Q2/Q3 2013</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bellevue</td>
<td>45,000</td>
<td>30 PIs</td>
</tr>
<tr>
<td>VA</td>
<td>20,000</td>
<td>12 PIs</td>
</tr>
<tr>
<td><strong>Out of Service through 2013 and Beyond</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical Science</td>
<td>110,000</td>
<td>50 PIs</td>
</tr>
<tr>
<td>Smilow Vivarium</td>
<td>14,000</td>
<td>10,000 rodent cages</td>
</tr>
<tr>
<td>Berg Vivarium</td>
<td>13,000</td>
<td>• 3,000 rodent cages</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Large animal facilities</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>380,000</td>
<td>162 PIs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 of 3 animal facilities</td>
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**Required long term relocation:**
- ~ 90 PIs
- 13,000 cages
Research Mission was on an upward trajectory before Sandy

NYU NIH Awards & Rank Among Schools of Medicine

*Federal FY08 – FY12, $M*

- Consistent funding growth
- Improved rankings: NIH, School, Hospital System
- Successful faculty recruiting: Leadership positions & junior faculty
- Faculty awards and honors on par with top 3-5 schools nationally
• Congress passed $50.5 B Superstorm Sandy aid bill in Jan 2013, delivering funds to residents along the East Coast who were battered by the storm

• NIH published Recovery RFAs in April:
  - Supplements and “with cost” extensions for funded investigators
  - Assistance for new investigators (prior to receipt of first grant) to restore preliminary data
  - Equipment and shared resources; Reconstruction and renovation

• Mobilized faculty and support resources to respond
  – Six workshops per week to provide instruction on how submit under the DRAA RFAs
  – One-on-one consulting was provided

• 400% of normal proposal volume in June/July 2013
NYULMC Received Significant Funding Assistance

<table>
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<tr>
<th>Funding Source</th>
<th>Awarded (approx.)</th>
</tr>
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<tbody>
<tr>
<td>FEMA: Emergency Clean Up, Repairs &amp; Temp Facilities</td>
<td>$300 M</td>
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<tr>
<td>FEMA: Repairs and Rebuilding</td>
<td>$540 M</td>
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<tr>
<td>FEMA: Mitigation</td>
<td>$589 M</td>
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<tr>
<td>National Institutes of Health</td>
<td>$130 M</td>
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<tr>
<td>Social Services Block Grant</td>
<td>$22 M</td>
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<tr>
<td>National Flood Insurance Program</td>
<td>$9 M</td>
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<tr>
<td>Commercial Insurance</td>
<td>(Under Negotiation)</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>$1.6 B</strong></td>
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Our Growth Trajectory Was Interrupted, but Recovered

Total NIH Awards to NYULMC, FY08 - FY15 ($M)

NYU NIH Award ($M)

<table>
<thead>
<tr>
<th>Year</th>
<th>NIH excl. Sandy/ARRA</th>
<th>Sandy research awards</th>
<th>Sandy construction grants</th>
<th>ARRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY08</td>
<td>$122</td>
<td>$31</td>
<td>$40</td>
<td>$96</td>
</tr>
<tr>
<td>FY09</td>
<td>$96</td>
<td>$31</td>
<td>$40</td>
<td>$98</td>
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<tr>
<td>FY10</td>
<td>$149</td>
<td>$31</td>
<td>$40</td>
<td>$98</td>
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<tr>
<td>FY11</td>
<td>$149</td>
<td>$31</td>
<td>$40</td>
<td>$98</td>
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<tr>
<td>FY12</td>
<td>$166</td>
<td>$31</td>
<td>$40</td>
<td>$98</td>
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<tr>
<td>FY13</td>
<td>$144</td>
<td>$31</td>
<td>$40</td>
<td>$98</td>
</tr>
<tr>
<td>FY14</td>
<td>$148</td>
<td>$37</td>
<td>$40</td>
<td>$98</td>
</tr>
<tr>
<td>FY15</td>
<td>$178</td>
<td>$37</td>
<td>$40</td>
<td>$98</td>
</tr>
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NIH Budget Appropriation ($B)
Ongoing construction projects provided contractors and resources, playing a critical role in our recovery.

**Expanded Emergency Department**
Construction was underway for a new ED, 3x the size of former facility.

**Energy Building Construction**
State-of-the-art power plant to feed power to the medical center. Unfortunately, facility was not operational during Sandy.

**Decommissioning of Rusk and Perelman Buildings**
Demolition was planned prior to Sandy, to be replaced with the new Kimmel Pavilion, an 830,000-square foot inpatient and outpatient hospital.

**Migration of Student Dorms**
Rubin hall was planned for demolition, to be replaced by the Science Building. Fortunately, students had already moved to off-campus dormitories.
As a Result of Sandy, New Space Development Was Accelerated

**New Science Building**
- Scheduled for completion - 2017
- 10 lab floors
- Vivarium

**Kimmel Pavilion**
- Building to open in 2018
- 22 stories tall
- 374 patient beds on 11 floors

**Alexandria Towers**
- 2 buildings completed in 2015
- NYU signed shell space lease
- Plans for lab floors and vivarium
Post Sandy – Massive Investment in Emergency Management and Enterprise Resilience

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 Data
- Cyber Attack against Physical
- Dam Failure
- Earthquake
- Explosives/Terrorism Attack
- Flood
- Human Pandemic
- Hurricane
- Nuclear Terrorism Attack
- Radiological Substance Release
- Radiological Terrorism Attack
- Space Weather
- Tsunami
- Volcanic Eruption
- Wildfire

NY State Hazards
- Active Shooter
- Animal Protection Plan
- Avalanche
- Bridge Collapse
- Climate Change
- Communication System Failures
- Critical Infrastructure Failure
- Cyber Attacks
- Dam Failure
- Drought
- Earthquake
- Emerging Communicable Diseases
- Extreme Temperatures
- Fire
- Arson
- Flood
- Hailstorm
- HazMat and Chemical Releases
- High Wind Events
- Homegrown Violent Extremists
- Hurricane
- IED/VBIED
- Landslides
- Land Subsidence/Expansive Soils
- Nuclear Attack
- Nuclear Plant Accidents
- Radiological Attacks
- Rail Accidents
- Severe Winter Storms
- Tsunami
- Vehicular Homicide
- Wildfire

NYC Hazards
- Coastal Erosion
- Coastal Storms
- CBRN: Chemical, Biological, Radiological, and Nuclear
- Cyber Threats
- Disease Outbreaks
- Drought
- Earthquakes
- Extreme Temperatures
- Flooding
- Infrastructure Failures
- Severe Weather Wildfires
- Winter Storms

NYULMC Hazards
- Biological Incidents & Disease Outbreaks
- Chemical Incidents
- Civil Disturbances
- Coastal
- Surge & Flooding
- Cyber Attacks
- Earthquakes
- Explosions
- Extreme Heat
- Fires
- High Wind Events
- Labor Actions & Strikes
- Radiological & Nuclear Incidents
- Small-Scale Acts of Violence
- Space Weather
- Transportation Disruptions
- Utility Disruptions
- Winter Weather
Individualized Laboratory Resilience Plans in Development

The initiative is headed by our Director of Business Continuity and Resiliency. They are customized, posted in a visible place in the lab and updated regularly.

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<td>What Would You Do In An Emergency With Several Days Notice? 5</td>
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<td>How To Plan Before And During An Emergency? .................... 5</td>
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<td>Important Contacts ...................................................... 6</td>
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<td>Lab Photos ................................................................. 6</td>
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Lessons Learned

Preparation
✓ Always be ready: Financial reserves, communication plans, lab plans etc.
✓ Important for finance to work closely with research to understand the value of materials
✓ Some things cannot be anticipated: Remediation requires good team work with best information

Immediate decisions matter
✓ Providing disaster recovery accounts, not interrupting payroll, etc., helped secure faculty and staff retention
✓ Establishment of interdisciplinary command center

Priority on people
✓ Several peer institutions warned of the threat of losing faculty and staff: without your people, there will not be a business to rebuild
✓ Accomodations, two-way communications really matter; redeployment and engagement

Engaging external parties
✓ Our peers and government officials were extremely generous with time, information, and support

Seeing opportunities (and appreciating the lucky breaks)
✓ Dollar density improvement, acceleration of facilities projects
✓ Nothing critical below ground, new buildings have exterior flood walls and tiger dams for pre-existing buidlings
✓ Investment in emergency management and enterprise resilience – part of the culture and extend beyond natural disasters to tabletop exercises, active shooter workshops, etc.
Sandy’s Impact on Our Financials Amounted to $61 M

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<tr>
<th></th>
<th>Fiscal Year Ended August 31 In $000</th>
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<tr>
<td></td>
<td>2011</td>
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<tr>
<td>Disaster Revenue</td>
<td></td>
</tr>
<tr>
<td>Other Operating Revenue</td>
<td>2,844,436</td>
</tr>
<tr>
<td>Total Operating Revenue</td>
<td>2,844,436</td>
</tr>
<tr>
<td>Disaster Expenses</td>
<td></td>
</tr>
<tr>
<td>Other Operating Expenses</td>
<td>2,705,812</td>
</tr>
<tr>
<td>Total Expenses</td>
<td>2,705,812</td>
</tr>
<tr>
<td>Gain / (Loss) from Operations</td>
<td>138,624</td>
</tr>
</tbody>
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Disaster Related Impairment of Property, Plant, and Equipment: (61,134) 2,039
Disaster Recovery: Sandy Impact: 94,548
Reimbursement for Capital: 24