



Patient Safety
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In Hurricane's Wake, Decisions Not to Evacuate Hospitals Raise Questions



Patients are taken to ambulances outside of Bellevue Hospital during an evacuation on Oct. 31, in New York. Bellevue Hospital continued to evacuate its patients on Wednesday after flooding inundated the basement and knocked out electricity. (Stan Honda/AFP/Getty Images)

by Sheri Fink, Special to ProPublica, Nov. 1, 2012, 3:36 p.m.

At 9:30 p.m. Monday, Eugene Tangney burst into a meeting of doctors at the command center for Long Island's North Shore-LIJ hospital system. Ceiling tiles creaked in the wind and television screens showed images of Hurricane Sandy slamming into New York City.

"NYU called," Tangney said. "They want to evacuate. I don't know how to help them right now. They're in a panic mode."

Tangney, a senior vice president, already had plenty to worry about -- 16 North Shore-LIJ hospitals spread across New York and Long Island. Minutes later, a member of the team delivered an alarming report about a community hospital in Bay Shore, N.Y.

"Water is still rising at Southside," corporate safety officer Robert Gallagher said. "We have a good hour before high tide."

Hours earlier, corporate leaders had called Southside and Staten Island University Hospitals to go over how they would handle the worst-case scenarios: Had they thought about what they would do if backup systems failed and part or all of their facilities suddenly lost power?

Officials huddled around a speakerphone. "There's a good possibility it will occur," warned a Staten Island University hospital official. Part of the power system, he said, was below ground. "It cannot be used if it floods."

Everyone on the call understood what this meant. Modern medicine depends on electricity, from the ventilators that keep seriously ill patients breathing to the monitors that detect life-threatening changes in vital signs.

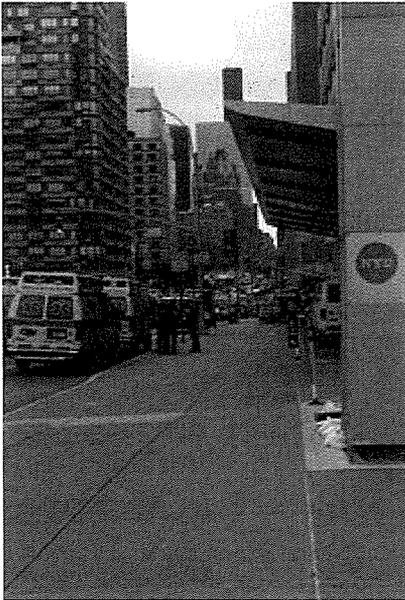
Now, in the late evening hours, the worst-case scenario was unfolding at the main campus of NYU's Langone Medical Center in Manhattan, which had lost much of its backup power at the height of the storm. Could North Shore-LIJ dispatch ambulances from its Lenox Hill Hospital in New York City to pick up four critically ill babies from the neo-natal intensive care unit?

New York City hospital and nursing home patients and their loved ones might reasonably have believed they were safe as Hurricane Sandy approached. Mayor Michael Bloomberg had exempted hospitals and nursing homes in low-lying "Zone A" areas of the city from his pre-storm evacuation order. Much thought and planning had gone into the decision to "shelter in place."

But anyone following the recent history of how hospitals and nursing homes have fared [1] in American disasters had ample reason for concern.

In many New Orleans hospitals after Hurricane Katrina in 2005, floodwaters knocked out vulnerable backup power systems. A day later, still awaiting rescue in intense summer heat, doctors at Memorial Medical Center were so desperate [2], they intentionally hastened the deaths of some patients by injecting them with morphine and sedatives, and ultimately 45 bodies were found at the hospital.

Over the past five years, I've reported on the impact of disasters on hospitals and medical systems [3], from Hurricanes Katrina, Gustav and Isaac in New Orleans to Hurricane Irene in New York. I'm also writing a book about this subject. So when Hurricane Sandy approached, I interviewed city and state health and emergency commissioners about their plans and the reasons for their decision this time not to mandate hospital and nursing home evacuations in the city's most vulnerable areas.



Ambulances line up outside of New York University Langone Medical Center on Oct. 28 for a pre-storm evacuation that never happened. (Sheri Fink)

I pressed them on this even though there was every indication they and their staffs had diligently prepared for the storm. Last year, these commissioners decided that many of the same hospitals and nursing homes should be evacuated before Hurricane Irene, many of them shutting their doors for the first time in history in part due to the lessons of Katrina.

In interviews, they told me that the decision to evacuate last year was based on fears that an eight-foot storm surge could knock out backup power. Even after Irene proved less damaging than expected in New York City, they stood by their decision to shift thousands of patients to safer locations. It was much better, they said, to move patients in a controlled, calm environment with full power than it would be to empty hospitals in the midst of an emergency.

As Irene approached, NYU Langone Medical Center transferred or discharged all but a few very critically ill patients. It kept a full complement of staff on duty to care for them and respond to storm-related emergencies. Coney Island Hospital was also fully evacuated before Irene. Many of its staff members and doctors traveled with their patients to other hospitals, including sections of Long Island College Hospital and Maimonides Medical Center in Brooklyn.

This time around, the commissioners decided not to order as many evacuations, an approach that puzzled me since the weather service was predicting as early as Sunday morning that the storm surge could reach 11 feet in lower Manhattan and, as early as Saturday morning, up to eight feet from Ocean City, Md., to the Connecticut-Rhode Island border.

What had changed in the intervening year? Were the hospitals and nursing homes better prepared to handle a hurricane? Were the lessons from other recent disasters being applied to a storm being described as the worst in a century?

I rented a car and drove to the Long Island command center in hope of finding out. The answers I came away with after reporting from crippled hospitals in Manhattan and Coney Island and darkened, sand-swept nursing homes by the ocean in the Rockaways highlight the complexities of that decision and raise some serious questions.

There was a clear payoff from recent efforts to improve preparedness. No one at a hospital had died in a storm-related incident as of Thursday morning, according to New York state health commissioner Dr. Nirav R. Shah. Shah said he had heard of only one injury, a single fractured limb he understood was due to a fall caused by slipping on a wet floor.

"Outcomes matter," Shah said. "Outcomes speak louder than anything else."

Still, even though the larger health care community averted an immediate catastrophe, the question remains: After everything we've learned about those horrific days in New Orleans, how could another hospital in a major American city find itself without power, its staff fighting to keep alive their most desperately sick patients?



Scott Strauss, North Shore LIJ's corporate director of security and emergency management, left, and Mark Solazzo, chief operating officer, who oversees the health system's Emergency Operations Center, coordinate at the health system's command center in Syosset, N.Y., on Oct. 30. (Sheri Fink)

New York's hospitals and nursing homes continue to deal with the impact of the storm. On Thursday morning, two days after the winds subsided, patients were still being moved out of Bellevue Hospital, which had 712 patients when the storm came, according to Shah. Air National Guard, Army National Guard and Marine Reserve troops carried them on brightly colored plastic litters, five troops to a patient. "Eat quick," a nurse told a patient on the sixth floor. "They're coming to get you."

On Wednesday evening at 5 p.m., there were still a few patients to transfer from Coney Island Hospital and four nursing homes in Brooklyn and the Rockaways, according to the New York State Department of Health. In several of these places, backup power systems were

inadequate for prolonged use or nonfunctioning, and city power had not been restored.

The long-term health effects on vulnerable patients like these might not be immediately calculable.

To Evacuate or Not To Evacuate

The scene at the Department of Veterans Affairs hospital in Manhattan on Sunday, Oct. 28, was strikingly different from the chaotic scramble some have described at NYU hospital after the storm hit.

The VA moved all of its 132 patients out of the building before Sandy's arrival, discharging those who could safely go home, and transferring others to hospitals less threatened by rising waters. The director of the hospital based her decision on geography, according to Jennifer Sammartino, public affairs officer for the VA New York Harbor Health Care System. The hospital sits in a flood zone, close to New York City's East River. "It's critical to evacuate before the storm hits," she said.

Most of the hospital's essential facilities, including its elevator banks and steam systems, are at sea level or below, she said. The hospital's backup generators are on street level. Depending on how high the waters rose, Sammartino said in an interview at the hospital before the storm, "we could be in a critical situation in terms of patient care." The director's main priority was that "everybody's safe."

The transfer process at the VA appeared calm and orderly. One by one, patients rode down elevators and were wheeled into waiting vehicles. By about 2:45 p.m. on Monday, about half of the patients had been moved.

I traveled a few streets up First Avenue to NYU Langone. A double line of ambulances stretched around the block. EMTs told me they had been waiting hours to carry out what they expected would be a pre-storm evacuation of the hospital.

Just after 4 p.m., NYU Langone public relations director Lisa Greiner walked toward the hospital carrying what looked like supplies for a long stay. "I don't know what these ambulances are here for," she said, assuring me the hospital wasn't evacuating.



EMS units take patients as Coney Island Hospital evacuates on Oct 30. (Sheri Fink)

I had asked her about NYU's vulnerabilities before the storm hit. We spoke again by phone on Tuesday morning after the power outage. She said that after Irene, the hospital had invested in raising generators above ground level. "This had been tested several times," she said. "I don't think anybody anticipated the level of flooding that occurred." The National Ocean Service reported a peak tide height of 13.7 at the southern tip of New York, topping Monday morning's prediction of 6 feet to 11 feet.

Greiner said there was as of yet no official answer to why the backup systems had failed. Based on the New Orleans experience, I would speculate

that while generators had been moved up, key elements that allow electricity to flow through the system remained at flood level.

Before Hurricane Sandy's arrival, I had requested permission to report on the storm from within NYU Langone as I've reported from other hospitals in previous storms.

Greiner apologized. My request, and one from CNN, was declined because "having media present could be distracting" to staff who needed to focus on patient safety. New York City's Health and Hospitals Corp. similarly declined to open Coney Island Hospital's emergency operations to public view.

NYU Langone and Coney Island ended up, of course, being the two New York City hospitals that experienced extensive power and backup generator system failures during the storm. (Coney Island Hospital's facilities staff was able to restore backup power to some patient areas after several hours, but the hospital began evacuating on Tuesday due to persistent safety concerns.)

Lessons From the Last Battle?

The health commissioners for New York State and New York City are highly regarded, even beloved, hands-on leaders with substantial experience. City health commissioner Dr. Thomas A. Farley was working in New Orleans at Tulane University at the time of Hurricane Katrina. New York State's commissioner of health, Dr. Shah, based himself with the team at New York City's emergency operations center.

Both men speak passionately about preparedness and have worked as an effective duo dealing with recent hurricanes. Before Hurricane Irene hit last year, Farley and Shah helped oversee the transfer of roughly 10,000 patients from seven New York City acute-care hospitals and 39 nursing, psychiatric and adult-care homes in partnership with the city's fire and homeless services departments, emergency management office, the Greater New York Hospital Association, North Shore-LIJ and many others.

"We were not confident any could withstand flooding on the first floor without a loss of power and an inability for them to be rescued quickly," Farley told me last September. "Our assessment was it was safer for them to evacuate than stay in place."

State commissioner Shah's stance was similar. "It was the right decision," he told me last year. "Imagine what would have happened if there was an 8-foot surge? All those places would have been under water and would have been really on little islands right now."



A flooded hallway at Coney Island Hospital on Oct. 30. Evacuations continued into the night on Oct. 31, according to a health official. (Sheri Fink)

On Monday as Sandy was churning up the coast, I asked both men why a different decision was being made this time, with the storm surge expected to be even higher. They said they and their colleagues were making contact every four hours throughout the day with a list of 53 facilities in Zones A and B that could potentially experience flooding.

According to the storm surge graph, Farley said, "We can say with a high degree of confidence, the high degree of water should be three feet more than high tide this morning. We spoke to every facility. We said look at the water and tell us, will you have water on the first floor?" All but one said no, he said, and the other said maybe.

He acknowledged there was always uncertainty. "I cannot guarantee there wouldn't be loss of power and loss of generators in a hospital. We're in very close contact should that happen," Farley said

"There's a chance one will go down," Shah told me of the more vulnerable facilities on the Rockaways and Coney Island. "But we can't say which of 30 will go down."

Shah pointed to the substantial risks involved in pre-storm evacuations for vulnerable patients. "It's extremely agitating," he said. "We learned there's a risk-benefit of moving people versus sheltering in place."

It's true there have been fatalities in pre-storm evacuations. A bus carrying nursing home residents away from Houston in advance of Hurricane Rita in 2005 overheated and burst into flames, igniting oxygen tanks and killing about two dozen people. When New Orleans implemented city-wide hospital and nursing home evacuations prior to Hurricane Gustav in 2008, many patients were transferred to Baton Rouge, which was harder hit by power outages from the storm, necessitating the re-transfer of a number of patients.

Though health officials do not much like to talk about this aspect of emergency preparations, it's also expensive for hospitals and nursing homes to shut their doors proactively. Dr. Shah said this played no part in the decision-making. "We never thought about money," he said. "We thought about patient safety."

Commissioner Farley said the decision not to evacuate -- "to shelter in place" -- was made because the dangers involved in moving patients were viewed as greater than the dangers of staying.

Health officials took other actions to protect patients. They instructed the vulnerable nursing homes to move residents to higher floors and to transfer roughly 100 residents who required mechanical ventilators to help them breathe. The state also ordered nursing homes to staff their facilities at more than 50 percent higher than usual.



A room inside the Seaview Manor Home for Adults in Far Rockaway in Queens, on Oct. 30, after the home evacuated its 124 residents. (Sheri Fink)

Health and emergency officials surveyed the facilities before the storm "to eyeball generators," watch them be turned on, and assess fuel and food supplies, Shah said. He said he felt confident that if anything should go wrong, the city was ready to respond quickly. He and Farley noted that New York City's Fire Department EMS units were sheltered on higher ground above nursing homes.

"It's a very different storm," Shah said. "It's a longer-duration storm, and the planning inter-year has allowed us to improve the assets and plans of these nursing homes and adult-care facilities."

The commissioner of the city's Office of Emergency Management, Joseph Bruno, told me Monday he was impressed by the smooth, well-coordinated medical preparedness for Sandy taking place in the emergency operations center, which had designated a larger space for the teams supporting health facilities after Irene. "I'm very confident in the way it's been handled," he said.

Sandy's Impact

As the high tide clock ticked down on Monday night for Staten Island University Hospital, tension spread through the North Shore-LIJ emergency command center, a vast room in a former warehouse near Syosset Hospital. Several large screens projected television coverage and a spreadsheet of status reports and action items from the health system's hospitals.

"I'm just counting minutes," said Tangney, the leader of the overnight team. Floodwaters had already wiped out power at a data center serving Staten Island University Hospital, forcing the hospital to shut down its electronic recordkeeping system.

Now all attention focused on the rising water. "We've got six minutes to high tide" at the Staten Island location, Tangney said. "If it doesn't breach by a quarter to nine, we made it."

"The switch gear room is still dry," safety officer Robert Gallagher reported at 8:15 p.m. Five minutes later came bad news from the hospital in Bay Shore. "Water has breached a creek near Southside."

More bad news arrived by phone from Staten Island. "Water is at the door of the north site," Tangney said. It had crossed Father Capodanno Boulevard and raced to the hospital along Seaview Avenue. At the south site, the waters were reportedly 65 feet from the building and continuing to rise.

"Is there anything we can do for them?" someone in the command room asked.

"No," Tangney said. The hospital's leaders had sounded calm on the phone. Workers had placed sandbags and high-powered suction pumps to protect the room with electrical switches. Many critical care patients had been transferred out before the storm. New York City Fire Department equipment had been positioned there in case help was needed. All they could do was wait.



Staff at Bellevue Hospital carry a baby down a stairwell during the hospital's evacuation on Oct. 30, in New York. (Sheri Fink)

"It's 50-50 they're going to get flooded out," Tangey said.

Safety officer Robert Gallagher received an email from Staten Island's Joseph Weiner at 8:29 p.m. "Still dry," it said. "Dry is good," Gallagher said.

Unverified reports arrived of widespread flooding on Staten Island, of drownings and rescues and people swimming to the hospital for help. Someone suggested that the National Guard might bring displaced residents of the island to the hospital.

As the hours passed, backup power kept functioning at all of North Shore-LIJ's hospitals. And even as it became clear that a decision to shelter in place had come out very differently at NYU, Tangney was convinced his most vulnerable hospitals, now serving their devastated communities, had made the right decision to remain open.

"These assets wouldn't have been there if we'd closed," he said.

The system's hospitals began accepting transfers from NYU Langone, and later Coney Island and Bellevue hospitals, 158 by Wednesday night, including the critically ill infants.

At 2:58 a.m. on Tuesday, at the city's Emergency Operations Center, Dr. Shah's cell phone received a text.

"This is Michael Kraus at Lawrence Nursing Care Center. My cell service has become spotty, and I am not able to receive or make any calls. My residents and staff are all fine. We assessed the damage to the first floor. Everything [is] ruined. We are in need of supplies. We may be able to last another day. But once more, everything is fine. Michael Kraus."

Dr. Shah nearly cried. He knew everything was not fine, but Kraus was telling him he could focus on supporting others who might be more in need. Other nursing home directors sent similar messages, some of whom Shah called "geniuses" for the resourcefulness and care they had shown through the disaster so far.

At Dr. Shah's request, a team of North Shore-LIJ safety officers drove out at first light to the Rockaways to assess the conditions at Lawrence and several nursing and adult-care homes that had lost cell and land line phone contact with the city's command center overnight.

At Horizon Care Center in Arverne, near the Atlantic Ocean, elderly residents sat in chairs in darkened, foul-smelling hallways. It had been hard to change patient diapers all night in the dark. It was chilly.

"If I'm freezing, the residents gotta be, too," administrator Nicole Markowitz said. She was worried about one resident who required oxygen and had only about a five-hour supply left.



Water gushes out of a pump at Bellevue Hospital in New York as

The facility needed easy-to-prepare foods and to recharge administrators' phones. There was no easy way, even by car batteries. Cars parked on the Care Center's grounds had been flooded.

Within five minutes on Monday night, Markowitz said, the water rose to knee height on the first floor. The 269 residents and medical supplies had already been moved to the third floor. Those with more serious medical needs had been transferred before the storm.

The backup generator had worked for only about 10 minutes after the power failed. Markowitz had barely slept in two nights, and commended her large and hard-working complement of staff members, 70 of whom had answered the call to work through the storm.

ambulances idle and wait for patients during the evacuation on Nov. 1. (Sheri Fink)

I asked why she had decided not to evacuate from the potential flood zone. The nursing home, she said, "wasn't mandated to leave. It's much harder to leave than to stay. I leave it up to OEM [the city's Emergency Operations Center] to decide whether to leave or not."

The Storm Ends And The Crisis Continues

NYU Langone Hospital completed its evacuation on Tuesday afternoon, with some patients having spent more than 12 hours in a facility with little power.

That same day, National Guard troops and staff members began ferrying patients out of Bellevue Hospital just blocks away. The 25-story hospital was on partial backup power without working elevators, its basement flooded along with many hospital supplies. Its remaining working generators were being fed with fuel carried up the staircases to the 13th floor by hand. Even patient corridors smelled like diesel. According to a sign posted in the hospital, Bellevue's largest generator, its sixth, was in the basement.

Bright orange extension cords connected to the backup generator system snaked along patient corridors in part of the intensive care unit and labor and delivery floor.

Evacuations were still occurring Thursday morning. "It's because they're being ultra careful," Shah said. "There's no need to rush."

According to doctors I spoke with, it was initially difficult to find appropriate beds for the many patients who needed to be moved from disabled hospitals and nursing homes. However, Shah said on Thursday morning that staffing at area hospitals was now back up to normal levels and there was again a cushion of extra space in the system. Critically ill patients had been moved early in the process for their safety, he said. Some psychiatric patients remain at Bellevue.

Making Sense of the Decisions

"It's worth looking at what would be the costs and advantages of making hospitals a little more capable of withstanding a flood of a certain height," Commissioner Farley told me last year after Hurricane Irene.

That sounds like an understatement now. And it is certainly worth it for everyone who might rely on a hospital in a flood zone across the country to look at whether their facility has similar vulnerabilities.

The question is: Who pays to improve the systems? Many hospitals were built years ago to different building codes and then expanded with additions, North Shore-LIJ

President and CEO Michael J. Dowling pointed out to me last year. Hospital wiring diagrams I've reviewed in Katrina hospital liability cases look like masses of spaghetti.



National Guard soldiers carry a patient down a stairwell at Bellevue Hospital on Nov. 1, in New York. (Sheri Fink)

"Whenever we build new, we make sure everything's up high," including at the new Long Island Jewish hospital, Dowling said Sunday afternoon when he visited the command center.

He said hospital leaders had "talked about" moving mechanical systems higher at the Staten Island locations and he was committed to doing it to reduce susceptibility to flooding. "These are not easy things to do," he said. "These are very complicated, expensive endeavors." But, he added, they were necessary and would get done.

Raising generators above flood level is just the first step in protecting a hospital's backup power. Often, transfer switches and other elements of the electrical systems and fuel and water pumps need to be moved or made submersible as well.

There are already suggestions that this was a factor in the failure of Langone's power systems.

Some say flood-proofing these systems should be considered public investments. Others argue it is unreasonable to expect hospitals to gird against all foreseeable, but unlikely, catastrophes.

Perhaps hospital accreditation standards and electrical codes [4] should also be tightened. Currently, hospital backup generator system codes and standards are more oriented to short-term power losses like those that might occur when a tree branch falls and cuts off city power for a few hours. Generators must be tested under load for only short periods. There is no dress rehearsal for the days-long outages that are likely to follow a severe disaster like a hurricane. Often it takes a real crisis for hospital engineers to discover pre-existing problems -- for example problems switching back from generator load to city electricity.

Even if backup power systems ran for longer periods, at many hospitals, they are not designed to power critical hospital functions, particularly heat, air conditioning and ventilation. Current hospital standards do not require this and are "not always sufficient" in major catastrophes, according to a post-Katrina warning issued by the largest hospital accreditation body, the Joint Commission. National Fire Protection Association standards call only for "careful consideration" to be given to protecting

electrical components from "natural forces common to the area" such as storms, floods and earthquakes.

Nor is there a standard for how the flow of information is to be handled. As of Wednesday evening, there was no central place for relatives of hospital patients and nursing home residents to find out where their loved ones were or whether they were safe. (North Shore-LIJ, however, offered a Hurricane Sandy Patient Information Hotline for their system at 1-855-473-6399, and important safety information can be found on the state health department website [5].)

The health care officials I've interviewed over the past several years are clearly trying to learn from the past. The threat from extreme weather events highlights the importance of investing in preparedness.

The city's and state's attention to health care evacuation planning since Irene appears to have improved communication and smoothed the response. Officials paid attention to the emergency needs and vulnerabilities of individual health facilities, working with nursing and care homes in the months after Irene to address their vulnerabilities, personally visiting and placing multiple calls offering assistance both before and after the storm struck, opening emergency shelters and sending tens of thousands of automated messages to advise health care providers.

"You can never say what's going to go wrong," Dr. Shah reflected in an interview this morning, "but if you have planning in place, have structures in place, you can be much more resilient in ways you can't anticipate.

"Even though there was more than what planning anticipated, we were able to get everyone out successfully and safely, and it was because of the heroism of front line workers.

"Planning worked," he said several times. "Planning worked."

1. <http://www.propublica.org/article/why-do-hospitals-generators-keep-failing>
2. <http://www.propublica.org/article/the-deadly-choices-at-memorial-826>
3. <http://www.propublica.org/topic/disaster-medicine>
4. <http://www.propublica.org/article/the-new-katrina-flood-hospital-liability-10102>
5. <http://www.health.ny.gov/environmental/emergency/weather/hurricane/>

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