Challenges of Nurses' Deployment to Other New York City Hospitals in the Aftermath of Hurricane Sandy

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ABSTRACT *On October 29, 2012, a 12-ft storm surge generated by Hurricane Sandy necessitated evacuation and temporary closure of three New York City hospitals including NYU Langone Medical Center (NYULMC). NYULMC nurses participated in the evacuation, and 71 % were subsequently deployed to area hospitals to address patient surge for periods from a few days up to 2 months when NYULMC reopened. This mixed methods study explored nurses' experience in the immediate disaster and the subsequent deployment. More than 50 % of deployed nurse participants reported the experience to be extremely or very stressful. Deployed nurses encountered practice challenges related to working in an unfamiliar environment, limited orientation, legal concerns about clinical assignments. They experienced psychosocial challenges associated with the intense experience of the evacuation, uncertainty about future employment, and the increased demands of managing the deployment. Findings provide data to inform national and regional policies to support nurses in future deployments.*

KEYWORDS *Hurricane Sandy nurses' deployment-related practice-based challenges, Psychological distress, Regional and national disaster response policy implications*

INTRODUCTION

On October 29, 2012, a 12-ft storm surge generated by Hurricane Sandy crossed the major highway that runs along the East River in Manhattan overwhelming three major hospitals located along First Avenue. The storm surge ultimately necessitated the evacuation and temporary closure of these hospitals. Designed to withstand the predicted 9-ft surge, the NYU Langone Medical Center (NYULMC), in consultation with relevant city and state agencies, elected to shelter in place. Prior to the storm, hundreds of medically stable patients were discharged to home or alternate facilities. However, the night of the storm after the unprecedented storm surge began, the hospital's power systems were overcome, and clinical areas experienced power outages. Around 9 p.m., the evacuation of 323 patients began, with 46 critically ill patients evacuated first including 22 babies from the neonatal intensive care unit. The evacuation efforts were well supported by the New York City Fire Department as well as nurses, physicians, physical therapists, and other hospital staff. The evacuation continued throughout the night with patients being carried down dark stairways on "Medical Sleds®" and then transported to eight area hospitals and health facilities that had not been as directly affected by the storm. The hospitals were all located within New York City but differed in ways that had implications for

NYULMC nurses deployed there. For example, they varied in size, number of beds available, staffing levels, and patient acuity. Some of the hospitals had collective bargaining agreements while others did not. Hospitals also differed in their medical record systems, types of equipment, and certain policies and procedures.

The evacuation and transfer of these hospitalized patients created a significant strain on the resources of the receiving New York City (NYC) hospitals.^{1,2} In addition, after the storm, new patients that would have been treated at the three hospitals directly affected by the storm were redirected to many of the same NYC hospitals that received the evacuated patients. To reduce the burden on area hospitals, nurses from NYULMC were temporarily deployed to work at these hospitals. Initially, they were responsible for the evacuated NYULMC patients but soon began to provide care for the host hospitals' surge of new patients as well. In some instances, NYULMC nurses remained in those other hospitals for up to 6–8 weeks after the initial evacuation.

Hurricane Sandy was the second storm to result in the evacuation of NYULMC within a 14-month period raising concerns that similar events may follow. Globally, the number of reported natural and technological disasters is increasing and the impact of these events is widening.³ Research has shown that managing disaster-related events poses a significant challenge for nursing staff and health care facilities.^{4,5} Even when forewarned, the circumstances of most disasters are unpredictable, often limiting the utility of pre-disaster planning. Some health care providers have reported that strategies to accommodate abrupt changes in their work environment are even more essential to fulfilling their assigned disaster roles than specific skills acquisition.⁶ The psychological toll on nurses working in such rapidly changing, uncontrolled and potentially dangerous circumstances has not been well studied. Often during these events, nurses must balance professional obligations along with their personal experience of trauma and the needs of their families.^{7,8} Their risk of psychological sequela is potentially high given both indirect, and in many instances, direct exposure to the disaster incident.⁸ During the acute phase of a disaster, emergency response such as hospital evacuation may be necessary. In the aftermath, as rescue and recovery efforts proceed, job descriptions and work conditions may continue to change, creating ongoing work place disruption and instability.

In the aftermath of Hurricane Sandy, the Institute of Medicine with the New York Academy of Medicine convened an expert panel to make recommendations on priority areas for Hurricane Sandy disaster research. One of the four priority research areas identified was *barriers and facilitators for effective short-term and long-term deployment of health workforce personnel in disasters*.⁹ Consistent with that priority, the primary aim of this study was to assess nurses' experience in the Hurricane Sandy disaster, response, and recovery and identify how nurses can best be supported to function effectively before, during, and after the event. Data presented below explores the challenges NYULMC nurses experienced during their deployment to other area hospitals after the evacuation and the temporarily closing of their hospital and the resources that supported them.

In order to develop a more complete understanding of these events and to contextualize the data,¹⁰ we implemented a mixed methods study consisting of in-depth qualitative interviews with a purposive sample of nurses followed by a quantitative online survey of all nurses employed at the hospital at the time of the evacuation and deployment. The study was approved by the NYU Medical School Institutional Review Board.

Qualitative Interviews

Sample and Recruitment. We recruited a purposive sample of 20 nurses reflecting the diversity of practice areas, nursing experience, and organizational role in the disaster. Nurses were contacted by the research team via text, email, or phone and invited to participate in a 1-h qualitative interview to explore their experiences during and after Hurricane Sandy. Among those nurses contacted, 16 out of 20 agreed to participate (response rate 80 %), 12 held staff nurse positions, and four held management positions.

Interviews were conducted from April to June 2013 in a private setting by experienced qualitative interviewers. Participants were assured that no individual identifiers would be collected, the interview would be audiotaped to insure the accuracy of the data, and immediately after the transcription of the interview, the audiotape would be destroyed. In addition, participants were given an information sheet describing the study and contact information for the Principal Investigator and the Institutional Review Board.

Measures. We drew on the extant disaster literature and information from a small group of nurses with disaster experience to inform the development of the qualitative interview guide. The guide explored prior disaster experience and training, communication and experience during the evacuation and deployment, and subsequent challenges and experiences in the recovery period.

Qualitative Data Analysis. All interviews were transcribed verbatim and read by members of the research team. Data reduction consisted of a three-level coding process: open coding followed by focused coding and finally identification of major themes. A detailed code book was developed and interviews coded and entered into ATLAS.ti 6.0 by a trained qualitative researcher. A subset of 20 % of the interviews was independently coded by a research student familiar with the study to establish inter-rater reliability. Consistencies were 84 % and were considered appropriate for inter-rater reliability.¹¹

Quantitative Survey

Data for the cross-sectional study were collected using an internet-based survey from July to September 2013. The survey was conducted after the qualitative interviews had been analyzed to inform the survey content.

Sample and Recruitment. The population of interest was all registered nurses (RNs) ($n=1,668$) who were employed by NYULMC and worked on inpatient units on October 29, 2013. We included all nurses even if they were not on site during the evacuation. Nurses were recruited via email using procedures described below.

Measures. We collected information on sociodemographic factors, disaster preparedness prior to the evacuation, perceptions of their disaster response and recovery experience, the impact of the storm on their home life, and their experience with deployment to other area hospitals.

The survey was placed on a secure web site at NYULMC using Qualtrics survey software. Prior to sending out the link to the survey, the survey was tested by several research staff members.

Data Collection. The confidential link to the email addresses of all nurses who worked at NYULMC was obtained from the Senior Vice President and Chief Nursing Officer at the hospital. At no time did the researchers have a list of the nurses' emails. We sent a total of four emails. To protect confidentiality, we did not keep a record of who responded and who did not. Therefore, all nurses received all four emails. The first email described the study purpose and alerted the nurses that they would shortly get an email with a link to the survey. No emails bounced back, but one respondent said that she no longer worked at NYULMC. Three days later, we sent another email providing a link to the online Qualtrics survey on a secure web site at New York University. Qualtrics gave each respondent an identification code. Reminder emails were sent 2 and 3 weeks after the initial email. Of the 1,668 nurses contacted, 528 returned responses for a response rate of 32 %. The protocol for this study was reviewed and approved by the NYULMC School of Medicine Institutional Review Board prior to data collection.

Quantitative Data Analysis. Survey data were downloaded into an SPSS data file. This procedure eliminated transcription errors that often occur when using paper surveys. Six cases were eliminated because they did not meet the inclusion criteria. They were not registered nurses working at the time of the storm.

RESULTS

Quantitative Survey Data

As shown in Table 1, respondents were predominately Caucasian females who had a bachelor's degree as their first professional degree.

Table 2 presents data on nurses' deployment experience. About 69 % of respondents were deployed to work in another area hospital after the evacuation of NYULMC. The number of 12-h shifts worked in other hospitals ranged from 0–5 (14 %) to 31 or more (23 %) with 65 % reporting 16 or more shifts. More than 50 % of deployed nurse participants reported the experience to be extremely or very stressful, and another 38 % stated the experience was stressful but manageable. There were no differences in reported deployment-related stress between new nurses and those with more experience. Deployed nurses who also experienced personal storm-related loss, damage, or injury were no more likely to report deployment-related stress than nurses who did not experience a personal storm-related event. Less than one third of nurses felt they had sufficient orientation after deployment. About half felt they had support from staff at the host hospital, and 65 % reported frequent, valuable, good, or adequate communication with NYULMC nursing leadership during the deployment period.

Qualitative Interview Data

Qualitative data identified two major challenges experienced by nurses: *challenges related to practice and psychosocial challenges*. In addition, the data revealed two major resources that buffered the stress of the experience: *peer support and supervisory support*. Data regarding supervisory support is presented separately for staff nurses and nurses in management positions as the context of their positions provides important insights that have implications for those unique roles in the disaster, response, and recovery experience.

TABLE 1 Nurses deployed to other area hospitals (N=362)

		Percent	Number
Age	20–29	31 % (96)	313
	30–39	30 % (95)	
	40–49	20 % (64)	
	50–59	16 % (50)	
	60–69	3 % (8)	
Gender	Female	91 % (288)	316
	Male	9 % (28)	
Race/Ethnicity	White	69 % (213)	308
	Black/AA	9 % (28)	
	Hispanic/Latino	2 % (7)	
	Asian	8 % (24)	
	Other	12 % (36)	
Marital status	Married	51 % (161)	312
	Never married	41 % (127)	
	Widowed, divorced, separated	8 % (24)	
Children	With children	41 % (126)	309
	No children or none living at home	59 % (183)	
Job title	Staff/senior staff nurse	45 % (146)	326
	Nurse clinician/advanced NC/advanced practice	46 % (151)	
	Nurse manager/assistant NMs/directors	9 % (29)	
Nursing ed	Baccalaureate in Nursing (BSN)	87 % (276)	316

Challenges Related to Practice

The assignment of evacuated nurses to other area hospitals presented a number of stressful experiences that created concerns for them about their nursing practice. Subthemes related to challenges to practice included working in an unfamiliar environment, limited orientation, legal concerns, and issues related to assignments.

TABLE 2 Nurses' experience on reassignment to work at another area hospital post evacuation (N=362)

Nurses assigned to work in another area hospital after the evacuation of NYULMC hospital		69 % (362)
Number of shifts worked in other hospitals	0–5	14 % (50)
	6–10	9 % (31)
	11–15	12 % (42)
	16–20	18 % (63)
	21–25	15 % (53)
	26–30	9 % (33)
	31 or more	23 % (82)
Found the experience extremely or very stressful		54 % (196)
Found the experience stressful but manageable		37 % (133)
Had sufficient orientation to the host hospital		30 % (109)
Had support from the staff at the host hospital		49 % (178)
Communication with NYU nursing leadership during reassignment		
Frequent-valuable/good/adequate		64 % (232)

Working in an Unfamiliar Environment A staff nurse explained how being in an unfamiliar work environment affected her practice:

Everything was different, and as a nurse, part of the comfort you have that comes with being able to do the job well is familiarity with your surroundings, the equipment, the technology, the medications, and when you go somewhere and everything is different, it's stressful. And it slows you down....You have to relearn everything. You've got your nursing skills, your assessment skills, but as far as the pumps, the drugs, everything is different. P2

The lack of familiarity with the new environment coupled with limited orientation compounded NYULMC nurses concerns about their practice.

Limited Orientation Understandably, opportunities for comprehensive orientation of deployed nurses to the new hospital environment in the immediate crisis of the patient evacuation were limited which, in turn, contributed to the distress they experienced. As noted in the survey data, more than 60 % of NYULMC nurses felt that they did not have sufficient orientation to the new hospital. The qualitative data strongly supported this finding. The description below was similar to many others in the narratives:

So they kind of gave this quick orientation, not really much of an orientation, just check their licenses, they asked for their IDs... P3

Even a brief 2-h orientation was delayed in some hospitals for days. NYULMC nurses were not allowed to fully function as professional nurses until they received orientation at the host hospitals. During this period, deployed nurses were restricted to providing mainly "custodial care" P3. One of the nurse managers described the frustration of both the NYULMC nurses and those at the host hospitals.

They are scrambling to open up these units to accommodate our patients with the same amount of staff, because our staff are not ready to help- we tried- but legally you can't document and just start doing whatever because we hadn't had an orientation to their facility. P4

Overall orientation for NYULMC nurses deployed to other hospitals varied from one facility to another and improved over time.

Concerns About Legal Status By state law, host hospitals were required to insure that deployed NYULMC nurses' licenses were active in order to practice. In some cases, deployed nurses provided the hospital their NYULMC ID card on arrival so that they could quickly validate their licensure online. In other hospitals, the validation process took longer. For the most part, the validation of the nursing license was accomplished without issue; however, because of the lack of formal orientation, nurses' practice was restricted in some hospitals. Even after orientation, a number of nurse participants remained concerned about their professional liability should they make a mistake due to lack of familiarity with the host hospital documentation systems, equipment, policies, and procedures. One participant explained:

I was concerned about documenting on my patient, having my name written down and being liable for patients in a completely different setting... that I wasn't

comfortable with yet...I was concerned about my license...if there was an error in my documentation...you know, that's my license on the line. I really don't feel safe. I'm concerned about my patient and my license. P5

Lack of Consistency of Assignments The closing of NYULMC followed a few days later by two other NYC area hospitals affected by the storm created a large surge of patients admitted to other local area hospitals. In this environment, many local hospitals did not have sufficient staff of their own and drew on the NYULMC nurses to fill the gap wherever they were needed. For nurses unfamiliar with the environment, constant changes in patient assignments was particularly stressful.

One participant recalled the experience this way:

So every day was a different floor and a different unit. And that was hard 'cause I am not a float nurse. I know my job on my unit, know my role there, what I am expected to do. But then every day it was a different unit. 'Can I please go back to the same unit that I was on today. So I can know my patients.' P5

Schedule Uncertainty In addition to lack of consistency of patient assignments, about half the participants in the qualitative study experienced uncertainty about what days and shifts they would work. A nurse manager described the frustration of staff and managers:

"And it was frustrating because the staff didn't know which days they were gonna be working.There was just so much back and forth [regarding schedules]." P4

Assignment Load Several nurses described situations where they were assigned to more patients than they felt they could safely care for. For example:

One day I was assigned 6 or 7 patients. Without a proper orientation it was overwhelming for me, it was impossible to keep up. And they [receiving hospital nurses] would spiel out different protocols and expect us to get them. So I actually had to ask not to be assigned to [that unit] anymore. P10

This participant also described the sense of unfairness in the assignment loads other nurses in her work group felt when they realized that not all NYULMC nurses were deployed to other hospitals to work.

We ended up working 3-4 shifts a week, 12 hours....nurses on our floor weren't happy because other floors (from NYU) didn't work at all from October to January. Just didn't work. P10

Psychosocial Challenges: Impact of the Evacuation on the Deployment Experience Deployed nurses experienced significant psychosocial challenges as a result of the storm that increased their stress related to deployment. Three kinds of challenges were identified by participants: *those related to the intense experience of the evacuation, those related to uncertainty about future employment, and those related to increased demands of managing the deployment of nurses.* Although fewer participants described these personal psychosocial challenges, the reports of those

who did documented the intense distress that this experience engendered and their stoicism in coping with these challenges.

Evacuation Experience Distress Many participants who had gone through the evacuation were exhausted and traumatized from their evacuation experience thus making their adjustment to deployment more challenging; however, they were able to meet the challenge presented by the deployment, as illustrated by their words below:

We were all kind of...we were sad. We were scared, we were traumatized. We got up and we were like...'We can't do this again'. But sure enough, we got up, we made the call: 'What can I/we do? Do you need us? How can we help?' P10

Another participant's description expanded on this theme:

We slept like four hours (the night of the evacuation), we had no water, no electricity, no cell phone service, no nothing, it seemed silly but we were concerned, do we have to go back to work tonight? Do we have to go to another hospital and take care of our patients?...What is our professional responsibility?...How can I get in touch with the hospital to see if I need to go to work...because I was scheduled to work that night anyway but I didn't know where. P1

Concerns About Future Employment At the time of the decision to evacuate, NYULMC had also made the decision that all staff would continue to receive full pay and be guaranteed that they would have a job to return to whenever the hospital reopened. That information was communicated through multiple channels to hospital staff. Despite these reassurances, some nurses were or became concerned about job security over time:

It was a little nerve-wracking because we didn't know...We know what happened at St. Vincent's', how quickly they folded with money issues...I know that we are a strong organization but there was definitely concern...'How long is this going to go on?...Should I start looking for another job?' You start thinking like that. P6

Managing the Deployment of Nurses Managing the ongoing deployment of nurses took a toll on nurse managers in particular. Communication during and immediately after the evacuation was challenging because of the technical communication limitations due to storm damage. Nurse managers and deployed nurses were utilizing whatever communication technology they could access. One nurse manager described her use of multiple technologies to communicate with her staff:

It got to the point where we were all using our personal cells, we were using our Blackberries, I was using my home phone- like all three would be going off- it was insane. I mean like my house became like...it impacted my family life. Because I would literally be on this phone, this phone, and the one in the house ringing. People saying 'Where do I need to go?', 'Where should I report?' P4

Resources

In addition to the challenges they experienced, participants also identified resources that had helped them to deal with the stress of deployment.

Peer Support Almost every participant in the qualitative study remarked upon the importance of the support that their NYULMC peers provided in adjusting to the deployment experience. Being separated from coworkers was also a significant loss; thus, there were many attempts to keep in touch during the period of deployment as the following participant described:

We texted, we emailed, we even created a separate Facebook group so that we had to invite each other...We tried to keep in touch as a whole group, especially in the beginning when it was so fresh and so unstable...we were scared. We were holding on to see who knew what and was everybody ok. And as things started to stabilize, things started to settle down we started to keep in touch in smaller groups...we got closer because we needed each other more...I talked to my coworkers on the phone more in those three months than I talked to them on the phone almost 5 years that I've worked here. P10

Supervisory Support

Staff Nurses' Experience. The majority of staff nurse participants felt the support of their NYULMC supervisors sustained them through the challenges they experienced during the deployment period.

We were supported. We had staff meetings (with NYULMC supervisors) once a month while we were out that we all went to and were able to express our concerns and they were able to address the ones they could but they always heard us out...And they made sure they were there for us. P10

Other staff nurse participants described multiple strategies that their nurse managers used to support them. One staff nurse shared:

She had a binder that was her office and she would go from location to location and check on all of us throughout those weeks. P4

One participant summarized her nurse manager's efforts to support the staff:

I think she did everything she could and more. It's just, it's the little things. P14

A few staff nurse participants felt they did not have sufficient support from their nurse managers, in particular, those that experienced significant distress in the deployment; however, they felt that the support increased over time.

Nurse Managers' Experience. While direct supervision of deployed nurses was the responsibility of the host hospital, nurse managers from NYULMC facilitated communication when they could. One nurse manager described the importance of being available to her staff and the effort she took to remain in communication with them:

I did have nurses with fears...they would text me constantly. Text messaging was a big form of communication, and that would be any hour of the night. I had one nurse breakdown one particular night and you know, just couldn't even function, couldn't even work but I was right there with her. Getting in touch with her. Making sure she was ok...P15

Because they had no formal role once their nurses were deployed, nurse managers developed creative advocacy and communication strategies to provide needed support for staff.

But then it came to a point where we needed to be...somebody need to be there (at the host hospital) to act a go between, so we established a schedule among ourselves; how were we going to do this to be there to support staff. And so we would make rounds on the floors where all the staff was. Checking in on them, like I said communicating with those (host hospital) Nurse Managers and those Assistant Nurse Managers, reporting concerns to them to try to get some help... and it was hard for our nurses because they were displaced. 'We want to help. Our patients are there...' So as a manager, it was a lot of offering emotional support to them, because I don't have authority there. What am I going to say? I can only act as a go between. P4

Another nurse manager utilized creative technological strategies to communicate with her staff.

That whole period of time was really about my staff. You know and being there for them because all of my staff were deployed. All of them were working...each day I sent out a blog...just basically thanking them for everything that they were doing...reminding them how special they are together...and just kept reminding them the unit is going to reopen. The hospital is going to reopen. We're all going to be back together again. P15

DISCUSSION

We explored the challenges NYULMC nurses experienced and the resources that supported them during their deployment to other area hospitals. The study has great significance regionally and nationally for complex hospital environments that are vulnerable to disaster-related events such as these. Findings provide data to inform policies to facilitate effective disaster response in the future that would support skilled nurses to participate in deployment in a meaningful way.

The vast majority of nurses that completed the survey reported significant stress related to their deployment to other area hospitals following the evacuation. Qualitative data provided critical contextual information about that experience. Many of the challenges nurses identified related to their practice. Among them were working in an unfamiliar environment with limited orientation and their legal status to practice uncertain to them and to the host hospital. Lack of consistency in patient assignments, work schedules, and patient assignment load were additional challenges identified. These issues sometimes resulted in underutilization of skilled nurses during the Hurricane Sandy patient surge in New York City. These challenges could be greatly reduced by the development of regional hospital agreements

facilitated by state and local health authorities in collaboration with local hospitals and legal policies for disasters. For example, a standardized fast track licensure assessment procedure authorized by the state for all hospitals in disaster events could reduce concerns about legal status for nurses and hospital management. A recent study of the Hurricane Sandy patient surge in New York City also identified the need to streamline credentialing in addition to recommending training on information technology systems to support deployed staff.² Regional policies and procedures for orientation and clinical assignment within the disaster context should be developed in order to reduce stress and perceived inequity on deployed nurses.

In the patient care environment, a clear chain of command is essential. In this disaster, nurses deployed to other area hospitals were supervised by nurse managers in those new environments. NYULMC nurse managers, who had extensive knowledge about the skills of their nursing workforce and were frequently the recipients of information from those nurses about the deployment experience, had no formal role in communication with the nursing leadership of the host hospitals. Qualitative data revealed the importance of the support NYULMC nurse managers provided to their deployed nursing staff and the lengths the nurse managers went to continue this support during the deployment. Formalizing a deployment liaison role for those nurse managers could increase effective communication with the host hospital, facilitate efficient allocation of staff resources, and provide critical support for deployment nurses. Qualitative data documented that the lack of a defined liaison role for NYULMC nurses managers created significant stress for them as well. Indeed, in the absence of a formal mechanism, informal opportunities for interaction between deployed nurses and the nurse managers at their home institution emerged which provided important psychosocial support for the deployed nurses.

Deployed nurses also derived strong support from their NYULMC peers in addition to their NYULMC nurse managers. Developing formal structures for enhancing opportunities for interaction of deployed nurses with their peers as well as opportunities for nurses to work with their peers during deployment, when it is not possible to deploy intact hospital work teams to host hospitals, could reduce the stress of the deployment experience.

During the initial deployment period, it is important to recognize the stress of the evacuation experience on deployed nurses' ability to adapt to the new environment. The immediate post evacuation period is also stressful because of the potential threat to employment. Almost immediately after the evacuation, NYULMC communicated their commitment to full salary and future employment for all staff; however, in the stress of the unexpected evacuation and temporary closure of the hospital, over time, some nurses felt uncertain about their future employment.

There are several important limitations to this study. First, the study was conducted 6 to 10 months after the evacuation event; thus, nurses' ability to accurately recall certain events may have been affected. Although qualitative data provides important contextual information, it may be subject to bias and may not be generalizable to other settings. However, the consistency of narrative reports with the findings in the quantitative survey strengthens our confidence in the qualitative findings. Further research is needed, however, to identify challenges experienced by nurses from the host hospitals and from the other hospitals that were evacuated as a result of Hurricane Sandy and other similar disasters to inform regional and national planning and policy development to facilitate deployment and address patient surge in future disasters.

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