

# Surviving a 500-Year Flood

*Holly Fadness McFarland*

## The Beginning

September 16, 1999 dawned to the dark, rolling clouds and cool, windy air of a hurricane just leaving. For several days, the Disaster Command Center at the hospital had been getting ready for the worst, and as Hurricane Floyd drew near, these efforts were stepped up. A Special Needs Shelter was set up in the physical therapy area for patients at home requiring any type of extra care. All the usual preparation for a disaster had been taken. But that morning everyone breathed a sigh of relief – a lot of rain had fallen, a few trees were down, some lights went out, but the storm had moved on without causing severe problems for those in the hospital. Soon the “business as usual”

announcement came over e-mail, and staff returned to doing just that. As the morning wore on the sun came out and the sky was particularly clear and blue. It was a gorgeous fall day.

Sometime that afternoon, additional news began to spread through-

by the rising water. Flooding cut off most of the roads in and out of Greenville and nearby towns, and the Pitt-Greenville airport was under water. Helicopters were the only means of transporting food, water, supplies, staff, and patients in and out

*In spite of what were thought to be adequate preparations, eastern North Carolina was devastated by the enormity of an unexpected and catastrophic flood, which followed on the heels of two hurricanes. The stories describing what happened during that time provide the information necessary to be ready for future disasters. Included is a quality improvement plan developed by one outpatient dialysis center after the flood.*

out the institutional grapevine. The river was rising, and flood warnings had been put into effect. In spite of this, work went on as usual. That night the worst happened. The 20 inches of rain that had fallen here and to the north began rushing down river, breaking dams and flooding homes. It is a time that the people in eastern North Carolina will never forget, as public safety officers in one community after another woke people up telling them to get out of their homes. Many waded through the rising waters to boats that carried them to safety. Others were rescued over the next few days from the rooftops and trees, while hundreds of animals drowned and began washing downstream. As the disaster progressed, electricity was lost and then water. Many thousands of people displaced by the flood were brought to shelters set up at schools in the various communities.

Throughout Pitt County and about 5 adjoining counties, the 730-bed tertiary care center in Greenville, NC, provided communication, transportation, medical supplies, staff, and much more to communities isolated

of town. The Air National Guard supplied several of these aircraft, which supplemented the hospital’s air ambulance service. There were often six or more “choppers” visible in the skies at any one time, and the sounds of their engines will always be associated with the disaster.

## The Hospital Perspective

Soon after the floodwaters began rising, hospital administration realized that methods would have to be established to transport staff and patients to and from the hospital. Due to the extraordinary nature of the situation, a more comprehensive plan had to be formulated on very short notice. All efforts were centralized in a new area called the Transport Command Center. A communications person from the emergency transport department, a social worker, a nurse, and additional help as needed staffed the center. Banks of phones were installed. A central number was given out to nursing coordinators, the main Disaster Command Center, outpatient dialysis centers, and others. Staff, patients, and physicians began calling to obtain rides via

*Holly Fadness McFarland, MSN, RN, CNN, was the Renal Clinical Nurse Specialist at University Health Systems of Eastern Carolina in Greenville, NC, at the time this article was written. She is currently starting her own consulting business and has 23 years of experience in peritoneal dialysis, hemodialysis, and management.*

**Acknowledgments:** *I would like to acknowledge the following for their help with this article. Ann Christenberry, RN, CNN, Home Training Supervisor, Rocky Mount Kidney Center, Rocky Mount NC; Sandra Daugherty, RN, CNN, Nurse Manager, Acute Hemodialysis and Apheresis Unit, Pitt County Memorial Hospital, Greenville, NC; Lois Rohrer, BSN, RN, MPH, Nurse Manager, East Carolina Department of Nephrology, East Carolina University, Greenville, NC; Sharon Smith, RN, CNN, Home Training Supervisor, Greenville Dialysis Center, Greenville, NC; Sherry Warren, RN, CNN, Director of Nursing, East Carolina Dialysis Center, Greenville, NC; and Joan Wynn, MSN, RN, Director of Care Management, University Health Systems of Eastern Carolina, Greenville, NC.*

helicopter to and from the hospital. Patients were triaged and needs met in dialysis, radiation therapy, discharge transport, and many other areas.

Command Center staff coordinated efforts to get medical personnel north of the river to shelters to assist with the health care needs there, and non-staff nurses from the hospital along with county health department nurses were flown to the shelters to give tetanus shots. Staff were brought to work at the hospital, and those who had been on site for several days were taken home. The coordination and teamwork needed was tremendous, and the people in the Transport Center put in numerous days of very long hours. Everyone felt very good about meeting the needs of so many and providing a vital service during the disaster.

### **The Outpatient Hemodialysis Story**

On Friday morning, when word of potential flooding was released, everyone who could came to the dialysis unit and began making plans to obtain water and electricity. The medical director, administrator, nurse manager for the nephrology office, directors of nursing from both local units, and the chief technician coordinated the planning. Various jobs were assigned as needed.

A contractor was called to provide a well pump to draw water from the milk tanker truck into the unit. However, this step turned out to be unnecessary, as the hemodialysis machines were able to pull water in without difficulty. While there was adequate water to supply the machines, there was not enough for toilets or sinks. Water had to be brought in to pour into toilets periodically, however this was only done when absolutely necessary. As little water as possible was used for hand-washing and staff relied on waterless hand cleaners most of the time. Some of these were on hand, and some were borrowed from the hospital.

In order to have electric power, the medical director (who was also the hospital chief of staff) quickly made arrangements with the hospital for an emergency generator to be brought over and hooked up. This

worked well to keep machines running, but lighting was minimal and the air conditioning could not be supported. Since it is usually still very warm in eastern NC in mid-September, working conditions were somewhat uncomfortable, and the heat was only partially relieved by using fans.

The next problem was getting patients and staff to the dialysis center. For this, the hospital Transport Command Center was used, and people were airlifted in and then out after working several days at a time. The facility administrator arranged for motel rooms for some personnel, and the remainder stayed with friends or co-workers in town. Several staff had lost homes themselves but continued to work. Some lost contact with family members, and others had family airlifted into Greenville to stay in motels. Motel space, needless to say, was difficult to find during the height of the flooding.

The administrator, managers, and secretaries spent much time on the telephones arranging for transportation and needed supplies. There was excellent collaboration between outpatient dialysis facilities. Many patients were dialyzed at units outside of Greenville and in facilities owned by other corporations. Some were done in the hospital inpatient unit as well. The general spirit was one of trying to get through this together and to get all of the patients some amount of treatment time.

### **The Home Training Units**

As the hurricane approached, the home-training nurses in all of the area units forewarned patients to make sure they had extra back-up supplies. People were also told that in case of an evacuation, they should have supplies ready to take with them. All of those using cyclers were routinely trained to do manual exchanges. After the flood began, trucks were unable to get into the various areas to deliver supplies and, in some cases, helicopters were used for this purpose. One man on home cycling promptly made his own arrangements to get a new machine delivered to a relative's house so that he could continue his treatments. In spite of these efforts, some patients still need-

ed transportation to the hospital via helicopter in order receive their treatments. Some had long stays because of their inability to find living arrangements after suffering the total loss of their homes.

### **The Inpatient Dialysis Unit Story**

Hurricane Floyd was predicted to hit during the night. The hospital declared emergency status, and no one could go home. Most staff had come prepared to stay that night, but little did they know that nearly a week would be spent at the hospital. The 12-bed hemodialysis unit was filled to capacity that night with RNs, nursing assistants, a social worker, and the only nephrologist who was able to get to the hospital. The dialysis day began as usual at around 6 a.m. Around the same time, the storm hit and power failures occurred at four different times. Each time the generator kicked in, but the dialysis machines had to be re-started. The generators did not power the lights or the air conditioning. The one nephrologist made rounds on patients belonging to all five renal groups. Patients were dialyzed all day. Later, when the rain stopped, those staff members who lived in town went home.

The next day, a few staff made it in before the roads were closed due to flooding. The hospital area and certain other parts of town were on higher ground and above the rising water. Two shifts of 12 patients each were done on their regular schedules. Just as they were finishing, a helicopter brought another full shift from a chronic unit. Machines were set back up and more treatments were done! No dialysis information was available on these patients so the nephrologist ordered loading doses of heparin 2,000 units, and fluid was removed according to self-reported usual gains. All of the patients came in with no medications and no clothing except what they were wearing. After dialysis they were taken to a temporary shelter where they stayed for the next week. Since the roads were open to that particular shelter, they were transported to the outpatient unit by van for subsequent treatments.

Later the same day, city water was



*View of flooded homes along the Tar River in Greenville, North Carolina.*

turned off due to flooding of the main treatment plant located near the river. In order to have enough water for dialysis, fire trucks pumped water into the large swimming pool in the Rehabilitation Center, which is located down a long hallway from the dialysis unit. Water was then pumped through pipes to the reverse osmosis unit and then to the dialysis machines. This system provided an adequate supply throughout the disaster. Drinking water became contaminated, so bottled water was used. After supplies on hand had been used, additional water was trucked in and later airlifted.

In order to keep the dialysis machines running, extra generators were placed in several parking lots. These were unable to support the air conditioning system so the hospital provided fans. It was very warm in the dialysis unit with all the patients and staff present, as well as from heat generated by the machines.

During the flood, the sound of helicopters meant two things in the hemodialysis unit – either more patients were arriving, or staff were coming and going from work. Helicopters also brought food and other supplies to the hospital. Trucks could make it only so far and then the items had to be airlifted to the hospi-

tal. During the height of the disaster, the hospital cafeteria was the only source of food available to visitors and local city residents. The hospital supported staff by distributing snacks and drinks, as well as free meals. One of the nephrologists who had a gas stove at home made large pans of chicken stew and brought it in for the dialysis staff.

Making it through this disaster required a great amount of brainstorming, teamwork, and good spirits in order to provide continuing service to patients. Many staff stayed in the hospital, worked for 5 straight days, and did not know if their own homes were still there. One person was not able to get back into his house for 3 months after the flood. A great deal was learned from this experience and will aid in preparation for future disasters, although everyone hopes that time is a long way off!

### **Other Services**

Many support services were utilized during the disaster in eastern North Carolina. The Public Health service provided tetanus shots, which were given at the shelters and also at food distribution centers in the city. Nursing staff at the hospital who were not directly involved in patient care,

such as discharge planners and clinical nurse specialists, assisted the community health nurses with this. Many nurses had their first helicopter rides during this time. Some of these people helped staff the shelter first aid stations, and others assisted back at the hospital doing everything from direct patient care to running errands for other staff. Nurses were needed to assist in the Special Needs Shelter. People on ventilators and those with various other needs were brought into this shelter and stayed there along with a family member. Some nurses and others served in the childcare centers that were set up in adjoining meeting rooms. This enabled staff to continue working without worrying about the needs of their children. Other ancillary staff helped in the Command Center. In addition, many employees and city residents took in those staff members who were unable to get home.

### **Miscellaneous Problems**

During a disaster such as this, it is important to remember to take steps to keep staff protected from flood related illness. Several nurses became ill with gastrointestinal upsets, and it was suspected that they might have drunk contaminated water before warnings were given.

One nurse who, along with her 6-month-old daughter, was staying with a co-worker in a small one-bedroom apartment became ill in the early morning hours of the third day of the flood. She became dehydrated so quickly that she had to be taken to a local urgent care center where she received normal saline and intramuscular promethazine hydrochloride (Phenergan®). Later that day, the co-worker also became ill, but managed to avoid becoming too sick by taking Phenergan by mouth that was prescribed for the first nurse. Somehow, between the two, they managed to care for the baby, and she did not become sick. Neither of the two adults had been aware that they drank any of the water after warnings first came out, but it was felt that contamination might have occurred more quickly than was realized. People were being warned not only to avoid drinking the water, but also not to even use it for brushing teeth.

**Table 1**  
**Continuous Quality Improvement Action Plan**

<b>Action Plan</b>	<b>Responsible Person</b>	<b>Start Date</b>	<b>Update Frequency</b>	<b>Comments</b>
<ul style="list-style-type: none"> <li>Review disaster plan, condense and share with all staff.</li> </ul>	Charge nurse Social Worker	Pre-hurricane season	Monthly	Quarterly review with patient newsletter. Give copy of the plan.  Provide patient with home medicines list, HD/PD orders, and demographic sheet. SPS solution. Instruct patients to bring 3 days worth of meds/clothing and sleeping gear. PD patients bring PD supplies for at least a day. Give instruction list on emergency cleaning of exit site without using contaminated water.
<ul style="list-style-type: none"> <li>Update patient/employee demographics and emergency contact.</li> </ul>	Administrative Secretary	Pre-hurricane season	Monthly	
<ul style="list-style-type: none"> <li>Identify shelter locations and provide list of needed items.</li> </ul>	Social Worker	Pre-hurricane season		
<ul style="list-style-type: none"> <li>Identify peritoneal dialysis (PD) patient needs: supplies/storage.</li> </ul>	Social Worker	Pre-hurricane season		
<ul style="list-style-type: none"> <li>Transportation needs: list of patient transportation method and schedule.</li> </ul>	Social Worker	Pre-hurricane season	Ongoing	Contact person and home phone number.
<ul style="list-style-type: none"> <li>Communication of the specific plan.</li> </ul>	Charge Nurse Director of Nursing (DON)	Just prior to the disaster		Give written instructions with specifics. Post notices on main door to the facility and phone messages on machines. Staff need to be prepared to stay at the facility for 3 days. All staff are on call.
<ul style="list-style-type: none"> <li>Communicate plan to medical director, administrator, and regional managers.</li> </ul>	DON	Just prior to the disaster		
<ul style="list-style-type: none"> <li>Ensure adequate supplies and medications including home training.</li> </ul>	DON Chief Tech	Just prior to the disaster		Need 7 days worth of supplies, EPO, etc. 2K+ bath. Get extra PD supplies to home patients: Home HD flashlights, batteries, and technical supplies.
<ul style="list-style-type: none"> <li>Set up accounts with local food and lodging chain.</li> </ul>	DON or Administrator	Just prior to the disaster		
<ul style="list-style-type: none"> <li>Culture water 2 times per day.</li> </ul>	Chief Tech	When disaster begins		Do not prime machines until "you see the whites of their eyes."
<ul style="list-style-type: none"> <li>Instruct staff to conserve supplies.</li> </ul>	Charge Nurse DON	When disaster begins		

## Patient Stories

**Mr. B.** Mr. B. hooked himself up to his cyclor that night and went to bed. His wife had fallen asleep on the sofa, and his son's fiancé and baby were also asleep. At about 2 or 3 a.m., Mrs. B. awoke to find that her foot, which was resting on the floor, was submerged in water. She got up, opened the front door and water immediately rushed in up to her waist. Mr. B. unhooked himself from the cyclor and helped get everyone out and into the van as he walked in water up to his chest. Partway up the hill leading away from the house, the van stalled but fortunately he was able to get it started and made it to the residence of his mother-in-law. Soon after they arrived, the Sheriff's department told them to evacuate, and the whole family ended up in a shelter. On Friday, Mr. B. made it to the Home Training unit and was able to run on the cyclor. He continued treatments there for 1 week. His own cyclor sat ruined in his flooded and abandoned house. After a few days, Mr. B. and his wife moved in with their son and had a new cyclor and supplies shipped there. Things went along fairly well until Mr. B. developed a pseudomonas exit site infection, which caused the ultimate loss of his catheter. He later went back on peritoneal dialysis (PD) with a new Tenckhoff after being on hemodialysis most of the winter. He remains in a trailer in a nearby community.

**Mr. S.** Mr. S., a continuous ambulatory peritoneal dialysis (CAPD) patient, awoke during the night to the sound of someone banging on his door. His neighbors and the sheriff's deputies were outside telling him to hurry and get out, as the water was rising. Mr. S. only had time to grab a couple of items and rush out to a waiting boat to get away. He subsequently ended up at a shelter without any way to perform his dialysis treatments. The next day he was taken by car to the local hospital, which did not have facilities to perform dialysis. To make things worse, all the roads between his city and Greenville were under water. Since all of his supplies were at his house and underwater, the only way he could receive treatment was to be airlifted via helicopter to Pitt County Memorial Hospital in

Greenville where his dialysis could be done.

## Preparations for the Future: An Action Plan

After the emergency period was over, most facilities pulled together teams of people to discuss what had happened and what could be done to make things easier during future disasters.

Planning included designation of people responsible for various tasks such as development of direction, alerts and warnings, communication, and evacuation. Also included was a time line for initiation of the plan and regular updating of information contained in the Continuous Quality Improvement Action Plan (see Table 1).

## Conclusion

Thorough preparation is essential for getting through disasters, especially when facing one of this magnitude. One lesson taken from Hurricane Floyd and the ensuing flood is the need to expect and be ready for the very worst possible scenario. Teamwork, creative thinking, and the generosity of strangers also enabled the people of eastern North Carolina to survive this unanticipated occurrence. The importance of making plans and identifying the people who will be responsible for carrying them out cannot be over emphasized. In this way, all facilities can be prepared as much as possible to deal with the catastrophe and to prevent harm to patients and staff.