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## Another Powerful Hurricane Season Underscores Importance of Strategic Planning

**W**ith climate change producing larger and more powerful weather events more often, hospitals and emergency providers have every reason to take their disaster planning and practice drills seriously. It is a lesson medical centers along the East and Gulf Coasts know well. However, this season brought a double dose of reality in the form of Hurricane Florence, which swept through the Carolinas in September, and Hurricane Michael, the most powerful storm to make landfall on Florida's Gulf Coast, in October.

Some hospitals in the Florida Panhandle sustained so much damage from Hurricane Michael that they had to evacuate most or all their patients even while keeping their EDs open. Weeks after the storm, some facilities still are not admitting patients. It likely will be months before normal operations resume in the coastal communities that were largely flattened by the hurricane-force winds and accompanying storm surge there.

In the Carolinas, the problem had everything to do with water as a slow-

moving storm saturated the region with pounding rain for several days, flooding even inland communities like never before. Hospital resources were strained as high-needs patients driven from their homes sought care and assistance in their local EDs.

While emergency providers in the region proved up to the task, some hospitals report that it was fortuitous that forecasters originally anticipated that Hurricane Florence would make landfall with much stronger winds. This caused many to make additional preparations, which paid big dividends.

### Stock Up

By Sept. 10, New Hanover Regional Medical Center (NHRMC) in Wilmington, NC, was in full preparation for Hurricane Florence. Hospital administrators anticipated that the city was going to get hit hard. Forecasters expected the eye of Florence to make landfall near the city center. At that point, emergency planners were predicting a Category 4 storm.

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“Like all hospitals, we have 96-hour [reserves] of food, water, and fuel, but given the nature of the storm, we decided we needed a little bit more, so we made arrangements to have additional food and water on site,” explains **James Bryant**, DNP, RN, CEN, CPEN, CCRN, NEA-BC, administrator of emergency services at NHRMC. “We also made arrangements for additional tankers of fuel for our generators just in case we needed them for an extended period.”

Additionally, the hospital worked with its pharmacy and other vendors to ensure extra supplies were on hand. “One of the challenges we had is that the Red Cross made the decision to actually evacuate Wilmington, so agency [administrators] closed their blood center and took their blood products with them,” Bryant says. Concerned that platelets and other blood products could run short during the storm, the hospital imported extra supplies so they would be in place if needed.

NHRMC activated its command center on Sept. 11 and went on lockdown Sept. 12. Consequently, as of 7 p.m. on Sept. 12, staff could not leave the hospital until the lockdown was cleared. Staff members were divided into two 12-hour shifts. One group worked the day shift and the other worked the night shift, Bryant explains. In this case, the in-house staff members were at the hospital for six days before a designated after-storm group provided relief, Bryant notes.

Some of the hospital workers questioned why the hospital went on lockdown a full two days before the brunt of the storm hit. Bryant explains that it was to give families time and initiative to make their own arrangements. For example,

some staff members' families were planning to evacuate the area.

“People could say their goodbyes and hunker down in the hospital, knowing that their families were safely out of the area,” Bryant says.

## Prepare to Innovate

The storm made landfall on Wrightsville Beach, just east of Wilmington's city center, early on Sept. 14. Although the hurricane had been downgraded to a Category 1 storm, the winds still were significant and rain was torrential. The slow-moving storm hovered over the Wilmington area for an extended period, resulting in significant roof damage to NHRMC and leaks throughout the facility. Bryant explains that while the roof remained largely intact, some internal ceilings collapsed. “We closed probably 12 to 15 patient rooms because of significant leaking and we relocated those patients to other areas,” he recalls.

More significant steps were needed to stop water from pouring into NHRMC's behavioral health hospital where a new building was under construction. First, staff used sandbags, blankets, and dry vacuums to combat the influx, but they then resorted to using a backhoe that was stationed next to the building.

“We were able to take that bulldozer and created a trench around the hospital at about 2 a.m. when the storm was actually hitting,” Bryant says. “This helped to divert water away from the building and to reduce damage.”

When wind velocity exceeds 30 miles per hour, EMS vehicles are pulled off the roads in Wilmington. During the storm's early hours, volume into the NHRMS ED was very low. “At that point, the

only people who were coming in were coming by personal vehicle,” Bryant notes. However, by Sept. 15, the hospital was alerted to an emergency situation nearby where a tree had fallen on a house, killing a mother and her baby and pinning the father down. “The hospital sent over a trauma surgeon, an emergency physician, and one other physician to the scene with EMS,” Bryant says. “We thought the only way to save that patient was to potentially do a field amputation.”

Even though the emergency scene was only a few miles from the hospital, the wind and downed trees slowed the medical team. “Fortunately, by the time the team arrived, crews had already freed the patient, and they were able to transport him to the hospital for care; we did not have to do the procedure,” Bryant says.

## Plan for Post-storm Surge

As soon as the winds decreased, ED volume increased, especially patients with significant medical challenges seeking help. These included people on home oxygen who began to run out of oxygen and renal patients who were overdue for dialysis. “Even though they had been given instructions on how to manage for a few days beyond their normal dialysis appointments ... as they started to feel bad, they wanted to come to the ED,” Bryant explains.

To manage these patients, the hospital created what staff affectionately referred to as their oxygen bar. “It was actually just a waiting area that we took over. We placed recliners in there, oxygen concentrators and nursing staff,” Bryant explains. “We cared for these

## EXECUTIVE SUMMARY

Hospitals in the Carolinas faced multiple challenges as Hurricane Florence swept through the region, causing widespread flooding to even inland communities. Facilities in Wilmington and New Bern, NC, report they accommodated many high-needs patients who were inadequately prepared to weather the storm at home or were forced from their homes by floodwaters. Concurrently, hospitals housed and fed staff throughout the storm emergency, which lasted several days.

- Prior to the storm, New Hanover Regional Medical Center in Wilmington arranged for extra supplies of food, water, fuel, and pharmaceuticals — a step that proved key to helping the community get through the emergency.
- The hospital went on lockdown a full two days before the storm, giving staff the time and initiative to make arrangements for their families.
- At CarolinaEast Medical Center in New Bern, patients with high needs began flocking to the ED the day before the storm hit because they were afraid they would be unable to manage at home.
- While the hospital escaped any major storm damage, administrators note they faced challenges finding the space and resources to house more than 300 staff members adequately while also maintaining a high patient census.

people ... and provided all of their meals until they were able to go back home or to a shelter. We did the same thing with our dialysis patients.”

The dialysis vendor in the area was closed for about two days. When the vendor reopened, it worked with NHRMC to take patients from the ED, staying open almost around the clock to help patients catch up on their dialysis needs, Bryant shares. “Once people were dialyzed, if they had no place to go, they went to shelters,” he adds.

The hospital also ended up caring for several patients who were evacuated from area nursing homes. “Many of these patients were able to stay at other facilities, but some patients had to come to the hospital. We created another area in one of our corridors where we had patients and nursing staff to care for these patients until a special needs shelter could be opened by the county,” Bryant explains. “The hospital’s case management department set up a

space in the ED where they worked with nursing homes in the region and the state to relocate patients to other temporary locations.”

On a typical day, the ED at NHRMC sees about 250 people. By Sept. 17, volume had swelled to 360, reaching a peak of 387 patients on Sept. 18. In the aftermath of the storm, patients were streaming into the ED with storm-related illnesses and injuries. “There were significant numbers of people who fell from either trying to cut limbs from trees or from their rooftops while trying to make repairs,” Bryant notes. People whose homes were flooded beyond repair came to the ED looking for answers, too, often with signs of stress or anxiety. “We were dealing with a lot of social issues,” Bryant adds.

Other patients presented with symptoms of possible heart attack or stroke. While most of these cases were ruled out, some patients experienced strokes and heart attacks

from all the storm-related exertion that went along with trying to keep their homes safe. “We also saw an uptick in snake bites as snakes and other animals were relocated from their homes due to flooding as well,” Bryant says.

In some areas of the city, raw sewage had seeped into the water, raising the risk of flesh-eating bacteria. Consequently, emergency staff members were alerted to consider this possibility for any patients exposed to floodwaters. “If a patient had a scratch, that was highlighted in our computer system,” Bryant observes. “The physician would get an alert to make sure we informed the patient how to take care of any minor wounds, what signs or symptoms to look for, and to come back if they needed added treatment.”

Staff remained on duty despite the fact many faced storm-related hardships at home. “We had 71 staff members at NHRMC who had significant or total-loss damages to their homes,” Bryant laments.

## Recognize Pressure Points

Even though Hurricane Florence weakened significantly before coming ashore, the hospital’s overpreparation proved extremely valuable to the community. “We were able to give fuel to the city of Wilmington to help them keep their fire systems operational during the storm. We were able to take some of the water we did not need and give it to another hospital ... so their chillers and their water would continue running and they would not have to evacuate,” Bryant reports. “Also, our kitchens at NHRMC were so well-supplied with food that they

were able to supply food to all of our shelters in the area until the state and other agencies could take over those operations.”

Likewise, the pharmacy at NHRMC filled all prescriptions for all ED patients, dialysis patients, and for all the shelters in the area until relief supplies could arrive, Bryant adds. “I think it was a testament to how well the hospital prepared for this event.”

Nonetheless, there were several pressure points that became apparent during the storm. Hospital staff plan to work with community partners to use what they learned to make improvements going forward. For example, Bryant says it would have been very helpful if the oxygen-dependent and dialysis patients in the region had been better educated on how to optimally prepare for the storm so that they could maintain themselves in their homes for four or five days.

Further, Bryant notes that NHRMC intends to work with county and state authorities on how they can set up special needs shelters sooner next time. “In this case, the special needs shelters weren’t identified [beforehand]. They were set up after the storm. It would really have been nice to have those in place before they were actually needed,” Bryant offers.

While communications channels within the facility performed well, the NHRMC struggled to interact with military assets that were activated during the storm. “The Army and the Coast Guard were using Black Hawk helicopters and other [air transporters] to drop supplies and also to bring patients to our campus, but we weren’t able to always talk to them directly. We were getting messages second- and third-hand,” Bryant recalls. It is an area

emergency planners intend to address in the coming months so everyone will be better prepared next time.

Finally, with all the leaks the facility sustained during the storm, administrators had to keep moving the children of staff members who were housed in the hospital during the storm emergency. “We actually cared for 171 children who were sheltered in place with us,” Bryant notes.

The children were housed in conference rooms and other areas that were not used for medical purposes during the storm, but they had to be relocated a couple of times when water began leaking into these areas. Although safety was never an issue, Bryant wants to identify areas that are not so prone to leaking so the children can be housed in a safe, dry area next time, and administrators will not have to deal with the inconvenience of moving such a large group of people during an emergency situation.

## Double Down on Preparation

Even several weeks after the hurricane swept through the area, the NHRMC ED continues to see higher-than-average volumes. Many of these patients are reporting with storm-related anxiety or other behavioral health issues. Other patients are presenting with storm repair-related injuries. “We believe this will continue for the next 60 to 90 days at least,” Bryant predicts.

After withstanding the storm’s test, Bryant advises colleagues to consider the benefits of added preparation in their emergency planning.

“We were prepared for a Category 4 storm, but that additional

preparation really helped us,” he notes.

For EDs in particular, plan for an onslaught of people with special medical needs, Bryant advises. “Identify nontraditional spaces in your hospital that you can work out of,” he says. “For us, having that vertical intensive care waiting room ... to create space for about 15 patients who were oxygen-dependent, and having a concourse that was kind of isolated but perfect for lining up beds and stretchers to take care of our skilled nursing home patients [were very helpful],” he says. “We were always looking at the next space we were going to go to ... be flexible, because you never know what is going to happen.”

Also, consider how all hospital entrances can be used strategically, Bryant says. For example, he notes that administrators at NHRMC identified specific entrances that could be used for shuttle buses to take patients and families to shelters. Other entrances were designated for ambulances to pick up special needs patients for transport to dialysis centers. “It was almost like an airport, so we could direct people and vehicles to the right space,” he says.

Involving case management at an early stage is a must, as well as leaders rounding with the staff regularly, Bryant advises. “We were all in this together. We were all going to make it through together.”

## Anticipate High-needs Patients

Farther up the coast, Hurricane Florence also hit New Bern, NC, hard as constant rain and a fierce storm surge flooded the city to unprecedented levels. Administrators at CarolinaEast Medical Center

(CEMC), northwest of the New Bern city center, activated the hospital’s incident command center on Sept. 13, just ahead of the storm’s arrival.

“The day before the storm hit, people were coming in who were afraid they would be left without power and had medical issues at home,” explains **Jim Davis**, MSN, RN, NEA-BC, assistant vice president of nursing at CEMC. “We got medical necessity types of patients ... bedridden patients and patients who were on oxygen at home.”

The authorities issued mandatory evacuation orders for the area, but people who believed they could not evacuate came to the ED. “Everybody who presented to the ED got a medical screening exam. If they didn’t have a medical issue, and they could go to a shelter, we helped them [find out] where the shelters were and helped them get there, if needed,” Davis recalls. “For those patients who didn’t have another means of receiving their care elsewhere or needed more than a shelter ... we created space to help house them. There were some patients who couldn’t go home because they didn’t have power or couldn’t [access] the medical care that they needed.”

Although downtown New Bern flooded, CEMC managed to escape any serious damage beyond window leaks. However, many staff members were not so fortunate. “One of our nurses was actually rescued from her home and brought into the ED. Of course, she slept for a little while, and then came to work,” Davis shares. “Another nurse I talked to knew her house was flooding. Her significant other was at home and was on the second floor because there was water on the first floor. She was here taking care of her patients with a great attitude.”

The hospital housed more than 300 staff members for the duration of the storm emergency. They slept during the day or at night, depending on when they were designated to work, Davis adds.

## Consider Staff Needs

While the storm was bearing down on New Bern, the CEMC only received patients who were brought in by the National Guard or EMS because there was a short period during which people could not get out easily, Davis recalls. “However, during the beginning and ending stages of the storm, there were lots of EMS calls. We saw everything from chest pains and shortness of breath to injuries,” he says. There also were many patients who were rescued from the deluge, some of them with wounds that were infected from floodwater exposure, Davis adds.

Even weeks after the storm, volume into CEMC’s 40-bed ED continues to include storm-related maladies. “We are in the clean-up phase, and we are still seeing lots of injuries,” Davis reports. “If you drive through our town, there are large piles of debris on both sides of the streets from downed trees to peoples’ belongings because so many people were affected here in New Bern ... we will still be experiencing cleanup and rebuilding for six months, if not a year.”

As was the case with the staff at NHRMC, Davis notes that CEMC learned a lot from the Hurricane Florence response. They also intend to use these lessons to make improvements in their emergency response plans. For example, some staff members were holed up in the hospital for four or five days. With sleeping arrangements far

from optimal, that is one area administrators intend to address as they prepare for future emergencies. “We learned it is really difficult when you have a large capacity of patients in the hospital to make room for staff to sleep,” Davis offers. “We wanted staff to be able to get rest. However, we had two or three staff members sleeping in one patient room ... all of our staff beds were full of patients.”

Another challenge was finding space and resources to care for people who did not require inpatient care, but could not be discharged. “We had patients who had lost their

homes or didn’t have power ... and they had to stay in the hospital for five or six days before we could [find alternative arrangements],” Davis says. “They weren’t really inpatients ... but they were boarding in the hospital.”

Davis notes there also were some high points. “We were very lucky. There were a couple of organizations in the community that really stepped up during the storm and were very helpful to us in helping patients get some of the things they needed so they could go back to their homes ... or to shelters,” he says. “We have

learned a lot from storms in the past ... and we will continue to try to get better.” ■

## SOURCES

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# Hospital Uses Hurricane Florence Near-miss to Improve Emergency Plans

**E**ast Cooper Medical Center in Mount Pleasant, SC, is not far from water in any direction. In fact, when Hurricane Florence was threatening, the hospital, which sees 15,000-18,000 patients a year in its ED, seemed particularly vulnerable.

“We immediately set up our incident command center. That in and of itself activates our ‘code disaster,’ which basically puts people on alert that they need to [get ready] and make preparations for their families,” explains **Tracy Hunter**, SPHR, SHRM-SCP, emergency commander and chief human resources officer. “That Monday [Sept. 10] is when we started having a discussion. The governor was issuing an evacuation order. By

Tuesday, we had all of our elective cases canceled.”

Administrators reduced the facility’s patient census to a minimum and arranged to house staff for the duration of the storm emergency, but they also appealed to the state for an exemption to the mandatory evacuation order.

“The primary reason was so that we would be able to shelter in place at the hospital ... and keep our ED open,” Hunter says. An exemption also would enable the hospital to continue to care for its inpatients, thereby avoiding the arduous process of transferring them to other facilities.

Eventually, the state granted the exemption, and in the end the

hospital escaped any significant impact from Florence.

“The storm hit about 50 miles north of us, so we were very lucky,” Hunter notes. However, the near miss provided the hospital with an opportunity to exercise all its emergency plans to find out what worked well and what did not.

“A lot of times we struggle with communications because there is always that one person who doesn’t like to get an email or doesn’t like to get a text message, but we had multiple modes of communication that went to the staff so that they were involved every step of the way,” observes **Theresa Lynn**, RN, BSN, CNE, director of the ED. “We were very prepared, and I think that showed in our set up of the incident command.” What did not work as well was the emergency plan for staffing the hospital’s designated response and recovery team. “We activated [the team] on Thursday [Sept. 13] at 7 p.m. That meant if

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[a member of that team] worked Monday, Tuesday, and Wednesday nights, [he or she] also worked Thursday night, Friday night, and Saturday night, which has [the person] on six 12-hour shifts working consecutively,” Lynn shares.

Concurrently, other hospital employees were short a shift that week. Those employees had to take paid time off to receive payment for that period, a problem that did not go over well with staff. “Emotions were high, and that contributed to our opportunity to rethink that approach,” Lynn notes. Following the storm emergency, leadership sent

out a survey to staff to inquire about how the hospital could have handled the situation better. Employees also discussed the issue at a staff meeting, Lynn says.

“Staff [members] were able to provide some good, constructive feedback. For the next disaster, we will probably alter our plans so that those teams are a little bit more fluid and we can manage it a little bit better.”

Aside from the staffing issue, administrators were pleased with how well their emergency plans were executed. “We had just had some retraining in our incident command

structure and it worked extremely well,” Lynn reports. “People were very responsive and they were aware of their roles and responsibilities during a disaster. I think that is why it went so smoothly.” ■

## SOURCES

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# Standardizing Diagnosis, Management of Young Patients Who Present With Head Injuries

New guidelines from the CDC have established practice-changing recommendations in the diagnosis and treatment of pediatric mild traumatic brain injury (TBI).<sup>1</sup> This information is especially important to frontline providers, as statistics suggest an increasing number of children are presenting to the ED with concussions. Investigators noted that in 2013, 642,000 children presented to the ED for TBI-related injuries, a sharp increase from 2007 (461,000 visits).<sup>2</sup>

The guidelines include 19 sets of recommendations pertaining to the diagnosis, prognosis, and management of pediatric mild TBI. The guidelines identify best practices based on current evidence and are intended to help standardize and improve the way these cases are managed, both while patients are in the doctor’s office or ED and after they have been discharged. “These [recommendations] represent the

only evidence-based guidelines on the management of pediatric mild TBI in the U.S. They [apply to] all pediatric ages and mechanisms of injury,” says **Angela Lumba-Brown**, MD,<sup>1</sup> lead author of the new guidelines. Lumba-Brown is a clinical assistant professor of emergency medicine and pediatrics at Stanford University School of Medicine and co-director of the Stanford Concussion and Brain Performance Center. “This is key because the majority of head injuries in children are not attributable exclusively to organized sports. They [are caused by] motor vehicle collisions, bike accidents, [and] falls from play equipment.”

The recommendations, which are generalizable to injuries sustained from all these potential causes, were co-authored by a multidisciplinary team of experts from fields ranging from emergency medicine and neurosurgery to neuropsychology and imaging specialists, Lumba-

Brown says. “Most importantly, they represent a review of evidence to provide support for management and counseling strategies that are based in fact,” she adds.

## Refrain From Routine Imaging

Lumba-Brown says emergency providers should pay close attention to the recommendation about refraining from routinely imaging children to diagnose mild TBI. Rather, TBI should be a clinical diagnosis supported by adjuncts such as age-appropriate, post-concussive symptom scales, she explains. “Similarly, blood tests are not needed to make this diagnosis and should be reserved for research purposes at this time,” Lumba-Brown offers.

The guidelines also emphasize the importance of providing families with appropriate guidance on the care

of mild TBI. “Counseling families regarding a child’s diagnosis of mild TBI and likely prognosis for recovery begins in the ED,” Lumba-Brown says. “Often, children may not be able to see their regular doctor for days following injury. The ED clinician is then critical to give support and information to these families.”

In an editorial published in the *Annals of Emergency Medicine*, Lumba-Brown and colleagues adapted key aspects of the larger guidelines specifically for emergency providers, in part because they view the counseling piece as such a crucial aspect of providing effective care.<sup>3</sup>

“Whether it be what to watch for in a 2-month-old with fever or how to move forward with an asthma action plan in a 10-year-old ... or what to watch for in a 7-year-old with mild TBI, counseling our pediatric patients and their families is key,” Lumba-Brown stresses. “Effective counseling is best and most succinctly delivered when we fully understand the information we are trying to get across.”

In children diagnosed with mild TBI, the guideline authors recommend a gradual return to activities after no more than two to three days of rest in most cases. “[This] includes physical and cognitive activity such as school re-integration and participation during play,” Lumba-Brown explains.

“However, an ED physician cannot clear a child to return to sports or activities such as mountain biking or jumping on a trampoline that pose significant risk for repeat head injury at any point following the [original] injury.”

## Use EMR

What steps can ED leaders take to ensure clinicians adhere to the new guidelines? Lumba-Brown recommends that they review what aspects of their electronic medical record (EMR) can be used to function as reminders and to easily incorporate important aspects of the clinical visit into documentation.

“It is not aspects of counseling a family that strain a physician’s time, but rather their extensive and often cumbersome requirements for documentation that require time and energy that could be better spent,” Lumba-Brown observes. “By streamlining an approach to any type of guideline with EMR integration, including updated discharge instructions, we can focus on our patients.”

*(Editor’s Note: In accordance with the new guidelines, the CDC offers provider tools and other resources to assist clinicians in implementing the guidelines and effectively caring for young patients with mild TBI. Also available are resources for patients and*

*families affected by mild TBI. These resources can be accessed online at: <https://bit.ly/2MQ0rOQ>.)* ■

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## SOURCE

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# Collaborative Slashes Sepsis Mortality, Produces Tool to Help All Hospitals

While sharing solutions can offer great benefits, investigators working in concert with The Joint Commission's (TJC) Center for Transforming Healthcare (CTH) have learned that making headway against sepsis mortality requires individual hospitals to go through a detailed process of self-examination first.

"It is important that organizations drill down to the specific root causes for why sepsis is not recognized and/or why the sepsis bundle elements are not being done in a timely manner. This will help them focus their solutions on those barriers to timely recognition and treatment," explains **Kelly Barnes**, project lead for CTH's multiyear effort aimed at reducing sepsis mortality.

Barnes notes that hospitals can conduct this examination in multiple ways. For example, they can collect data in real time when they identify a patient with sepsis within 24 hours of presenting to the hospital. Typically, this would involve speaking to all the clinicians involved in the patient's care to determine why specific sepsis bundle elements may not have been completed.

"They can also collect data retrospectively, in which case they would meet with the nurses and physicians and identify a list of common causes or barriers to bundle element compliance or sepsis recognition," Barnes explains.

It is painstaking work, but the approach has enabled the participating organizations in CTH's reducing sepsis mortality project to target solutions toward their own root causes, reducing sepsis by nearly 25% in the aggregate. So far,

participants have been able to sustain their improvements.

The five hospital systems involved at the start of the project in 2012 include Atlantic Health System (Morristown, NJ), Floyd Medical Center (Rome, GA), Kaiser Permanente (Oakland, CA), Northwell Health at Staten Island University Hospital (New York), and Texas Health Resources (Arlington, TX).

Barnes notes that while the top two identified root causes for lack of bundle element compliance were lack of recognition and staff not following a hospital's established protocol when a patient was diagnosed with sepsis, the hospital systems collectively uncovered 40 distinct root causes. Each hospital identified its own specific set of root causes to address.

Interestingly, while most sepsis improvement efforts have focused on severe sepsis and septic shock, CTH leaders decided to aim their project more broadly, focusing on sepsis, severe sepsis, and septic shock. Barnes explains this is because project teams determined that when looking at mortality, sepsis is just as important to catch and treat as severe sepsis and septic shock.

"While percentage-wise, septic shock patients have the highest mortality, the organizations on our project had far more sepsis and severe sepsis patients than they had septic shock patients," she says. "There were more deaths by number for sepsis and severe sepsis patients because the volume of those patients was much higher than the volume of septic shock patients."

## EXECUTIVE SUMMARY

For the past six years, The Joint Commission's (TJC) Center for Transforming Healthcare (CTH) has been working with health system partners to identify the root causes for sepsis mortality as well as solutions that will address these problems effectively. In the process, participating organizations have reduced their own sepsis mortality rates by a collective 25%, although some organizations have made even greater strides. The work with CTH will culminate in a Targeted Solutions Tool that will enable all accredited hospitals to take on the issue in their own settings.

- While most sepsis improvement efforts have focused on severe sepsis and septic shock, CTH leaders decided to aim their project more broadly, focusing on sepsis, severe sepsis, and septic shock, recognizing that many deaths occur among patients with sepsis and severe sepsis.
- Finding out that 90% of their sepsis cases were present on admission and came into the hospital through the ED, Texas Health Plano developed an early recognition tool and a process for responding to sepsis cases. The approach enabled the hospital to cut its sepsis mortality rate by half.
- Investigators at Roseville Medical Center in Roseville, CA, identified which groups of sepsis patients could be managed safely outside the ICU, improving resource management while also preserving quality care.

Also, rather than prescribing a particular improvement process for each hospital to follow, each organization developed its own approach for taking on sepsis mortality. “Some organizations developed the project hospital-wide while others started in one area and expanded that across the organization or system over time,” Barnes says. “Our project was designed so that each organization could set the project up however it best fit for them.”

The chosen leadership team for each hospital’s improvement effort also was specific to the organization. “We had sepsis projects led by an organization’s quality improvement team, infection control specialist, ED physicians, and pharmacists,” says Baner. “It does not matter where the project is being led as long as you have the buy-in from leadership and staff involved in treating the sepsis patients.”

## Drill Down

**Stephen Hadzima**, MD, MBA, chief medical officer for Texas Health Plano, notes that he and colleagues there discovered that the biggest opportunity for improvement was around identifying sepsis. “We had patients with sepsis, but we had never tried to figure out where they came from. Did they come out of the operating room, were they on the floors, or did they come through the ED?” Hadzima says. “First, we had to

find out where the cases were. Then, we had to create a process.”

When investigators conducted their data analysis, they found that 90% of sepsis cases were present on admission and came through the ED. “We had no systematic approach for identifying [cases] in a timely fashion, much less than delivering a three-hour bundle after that point,” Hadzima says.

Consequently, the hospital focused on how they could identify the sepsis cases most effectively among all patients coming through the ED at the same time. “We developed a tool that was used on every single patient, whether they had chest pain, shortness of breath, or had fallen down and their ankle was swollen,” Hadzima reports. “We screened all patients with the tool essentially for systemic inflammatory response syndrome [SIRS].”

If the screen was positive, it triggered a code sepsis, at which point the patient was taken directly to a room in the back of triage. Then, the hospital completed a sepsis bundle in a timely fashion, Hadzima says.

When the sepsis project began, three-hour sepsis bundle compliance was somewhere in the 20% range. “After creating and implementing the screening tool and the process to get the patient to the appropriate level of care, three-hour bundle success ... went up to around 70% to 75%,” he says. “In the end, our sepsis mortality dropped by about 50%.”

While the approach has undergone continual refinements, the same basic process is still in place today. “In the ED, the code sepsis is called when [the screening tool] triggers at least two SIRS indicators in triage,” he says. “It is called by the triage nurse in the ED using our paging device.”

In response, an emergency physician, the charge nurse in the ED, and a bedside nurse will act. Staff from the lab and pharmacy will report to where the sepsis bundle will commence. “Then, we have a systematic approach in the room, making sure the physician is getting the basic history and confirming that, yes, there is a suspicion of sepsis,” Hadzima says.

This group takes blood cultures and starts fluids. Antibiotics are administered in a timely fashion, although Hadzima acknowledges that the approach is resource-intensive. “We call a code sepsis in the ED between three and five times a day, or roughly 100 to 150 times a month.”

## Spread Best Practices

**Thomas J. Russell**, MD, sepsis clinical lead for Kaiser’s Northern California region and an emergency physician at Roseville Medical Center in Roseville, CA, was representing his hospital when CTH’s sepsis program was first launched. At the time, based on the strength of Kaiser Permanente’s extensive internal data, the hospital had implemented many improvements regarding the early recognition of sepsis that some other hospitals in the collaborative were working on.

“We recognized that we had a very solid approach for our septic shock patients, but we determined that with [patients] who had severe

## CME/CE OBJECTIVES

After completing this activity, participants will be able to:

1. Apply new information about various approaches to ED management;
2. Discuss how developments in the regulatory arena apply to the ED setting; and
3. Implement managerial procedures suggested by your peers in the publication.

sepsis, our approach was much less organized. Yet, this population had a great number of deaths at our hospital,” Russell recalls. “We focused on putting in a treatment bundle based on some internal data we had used to derive the correct fluid amount.”

Throughout the improvement effort, investigators took pains to ensure they were not causing harm and that they were seeing benefits from the treatment bundle. “Most of our patients were getting some fluids even before we implemented [the new] bundle. Overall, our mortality went from 8.8% to 7.9%,” Russell reports.

Investigators also focused on a second piece in their sepsis work, this time concerning a growing trend of up-transferring patients in the hospital. “[Certain patients] would be admitted to med/surg or telemetry, and they would go to the ICU within 48 hours,” Russell says.

While studying the data, investigators sought to determine which sepsis patients could be managed outside the ICU safely, and they identified two such groups, Russell explains. The first group included septic shock patients with initial lactic acid readings higher than 4 mmol/L. Investigators found that if lactic acid levels decreased below 3 mmol/L or by 50%, then it was safe for these patients to be placed somewhere other than the ICU. The second group that could move safely out of the ICU included patients who were no longer hypotensive and were not on vasopressors.

“With this information, we got together with our critical care folks and came up with an admission guideline that not only turned out to decrease ICU admissions, but in the long run it also decreased ICU days as well,” Russell says. “We

don’t have the numbers yet to say this decreased mortality because the numbers are too small, but we would expect mortality to go down in that population as well.”

One tradeoff to implementation of the admission guideline was that length of stay in the ED increased by about one hour, but that was a tradeoff the hospital was willing to make, Russell notes.

Now that he is overseeing sepsis improvements across 21 facilities, Russell looks for processes that are going well at one and tries to apply those processes at others. However, he stresses that not every solution is a fit for all facilities. “A small facility that doesn’t have pulmonary critical care fellows cannot do the same sorts of solutions that a large facility that has a pulmonary critical care fellow in house 24/7 can do,” he warns.

## Leverage Data

Ultimately, all the work partnering hospitals are conducting with CTH is aimed at producing a Targeted Solutions Tool, an online application that all accredited organizations can use to guide their hospitals or health systems through a sepsis project, Barnes explains.

“The organization will set up a project in the tool and enter data on sepsis recognition and bundle element compliance timing,” she says. “The tool will then analyze [the hospital’s] data for [administrators] and show them where in the process they are having issues with recognition and/or bundle element compliance.”

The tool will provide hospitals with a roadmap of sorts, including proven solutions that other organizations have used to solve the same issues. “The tool will also track

[a hospital’s] mortality over time to compare baseline rates with improve rates,” Barnes adds. The Targeted Solutions Tool for sepsis mortality is expected to be available free of charge for TJC-accredited hospitals in 2019.

Hospitals interested in beginning the hard work of tackling their sepsis mortality rates in an effective way need to focus on collecting and analyzing their own data first, Barnes advises. “So many organizations request best practices from us. They want to know what other organizations are doing to combat sepsis, and then they want to take their tools and just implement them in their own organizations,” she says.

However, Barnes stresses the importance of understanding where in the process a hospital is struggling with recognition and bundle compliance. “For example, if an organization does not get its lactate results within three hours, is it because they ordered the lactates late, they drew the lactates late, or the results from the pharmacy were late?” she offers. “Only if you understand where things are going wrong can you target specific solutions that will address your biggest problems.” ■

## SOURCES

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## CME/CE QUESTIONS

1. Which patients in and around Wilmington, NC, would have benefitted from education on how to prepare for Hurricane Florence optimally so that they could maintain themselves in their homes for four or five days after a storm?
  - a. Diabetic
  - b. Oxygen-dependent
  - c. Dialysis
  - d. Both b and c
2. Even though Hurricane Florence did not hit East Cooper Medical Center in Mount Pleasant, SC, directly, administrators used the event as a chance to practice emergency preparedness. What was one area leaders identified for improvement?
  - a. Stocking enough food to last through a prolonged disaster
  - b. Staffing the hospital's designated response and recovery team appropriately
  - c. Providing for adequate communication among staff members
  - d. Buying more batteries for flashlights
3. According to the new guidelines on the diagnosis of pediatric mild traumatic brain injury, emergency providers should refrain from:
  - a. routinely imaging children.
  - b. consulting a neurologist.
  - c. taking a patient history.
  - d. using the patient evaluation.
4. When investigators at Texas Health Plano conducted a data analysis, they found that 90% of the sepsis cases at the hospital were:
  - a. on the inpatient floors.
  - b. present on admission and came through the ED.
  - c. identified in the ICU.
  - d. None of the above

## Health Systems Tackle Opioid Epidemic With Comprehensive Initiatives

It has been nearly a year since The Joint Commission (TJC) unveiled new pain management standards as part of an effort to combat the opioid epidemic. While all accredited hospitals are held accountable for their implementation and adherence to the standards, some health systems have responded by centralizing their opioid-related initiatives under a single, purposeful umbrella to produce more powerful results.

Recently, TJC highlighted the comprehensive steps taken by the Hospital of the University of Pennsylvania (HUP) in Philadelphia and Brigham and Women's Hospital in Boston to establish effective opioid stewardship programs and stem the tide of opioid overdose deaths in the regions they serve.

Both organizations report significant progress in caring for patients who present with opioid use disorders (OUD), changing the prescribing habits of their clinicians, and leveraging information technology (IT) to maximize their efforts. Further, to disseminate some of the best practices they have cultivated, leaders from the two hospitals outlined their initiatives and shared what they have learned along the way in a TJC-sponsored webinar on Oct. 10.

Philadelphia has one of the highest per-capita death rates due to opioid overdoses in the country, so HUP had been working on several fronts to address the problem by the beginning of 2018, explained **Jeanmarie Perrone**, MD, director of the division of medical toxicology and a professor of emergency medicine at the University of Pennsylvania and an emergency physician at HUP.

“When The Joint Commission released their initiative in January 2018 recommending that hospitals have a standard leadership committee to address safe opioid prescribing, we used that to formalize some of our initiatives into a cohesive group,” Perrone noted. “There were several different smaller efforts going on, but at this point we went to the decision-makers: the chief medical officer, the chief nursing officer, all of the C-suite executives, and the quality leaders.”

At this stage, HUP had collected relevant data it could use to formulate its opioid-related efforts. These data included the total number of pills prescribed, the average amount of those prescriptions for acute pain, and the top opioid-prescribing departments. There were some surprises, Perrone reported. “Departments like dermatology had a surprisingly high prescribing rate, so there were a lot of fairly easy things to address when we had the data across the

health system,” she said.

When meeting with colleagues to discuss the issue, Perrone identified people with whom the issue resonated. Often, these were clinicians or administrators who knew a family member with an OUD. Such individuals — people with first-hand experience with the epidemic — tended to be particularly motivated to support HUP's efforts in this area, she observed.

Perrone and colleagues divided their efforts into several groups, beginning with an executive committee that would provide oversight for the entire organization. “Included in that was a regulatory body that consisted

SOME HEALTH SYSTEMS HAVE RESPONDED BY CENTRALIZING THEIR OPIOID-RELATED INITIATIVES UNDER A SINGLE, PURPOSEFUL UMBRELLA TO PRODUCE MORE POWERFUL RESULTS.

of our health system lawyers, which were helpful when we ran into state guidelines we were trying to implement into our electronic medical record [EMR],” she said.

Also, there was an IT group, which proved important to implementing certain recommendations, such as changing the default number of pills. “You need to have a rapid and smooth gateway to your IT support so that these changes can be made relatively quickly,” Perrone advised.

Other distinct committees focused on patients with OUD, clinician education, acute pain management, and management of patients with chronic pain who were in opioid therapy already.

Among other goals, the initiative aimed to bring HUP into compliance with requirements set forth in guidelines from a range of organizations such as TJC, some insurers, as well as state mandates from both Pennsylvania and New Jersey. The opioid initiative also established a mandatory education program that all levels of clinicians could take, including faculty, house staff, advance practice personnel, nurses, and pharmacists.

“The program came with CME credit so that it met the state requirements for relicensure. In Pennsylvania, as in many states, there is a requirement to have some dedicated opioid prescribing safety CME,” Perrone said.

Using IT interventions, opioid program staff changed the defaults for several opioid medications and optimized choice architecture to prioritize nonopioid analgesics over opioids in revamped pain order sets for specific procedures. “It was also very helpful to have IT [expert] help to enumerate the number of patient visits we had for OUD, the number of patients who were being admitted with OUD as one of their problems ... and then to create some pathways to improve the treatment of those patients in and out of the hospital,” Perrone explained.

One of the first steps the opioid program organizers took toward reducing the use of opioids for pain was to encourage multimodal analgesia, Perrone said. This included adding new options, such as gabapentin, some anticonvulsants, and local anesthetics. Ketamine also was added for specific perioperative procedures.

“Then, we put together an education module that met CME requirements ... and brought everyone up to speed on the idea that we were trying to manage pain more judiciously, but without the umbrella of aiming for a zero-pain floor,” Perrone reported.

A major accomplishment, achieved with the help of IT expertise, was finding a way to integrate the state’s prescription drug monitoring program (PDMP) into HUP’s EMR so that providers could access a patient’s entire controlled substance prescribing history with the click of a button. Previously, providers had to exit the EMR, log into the state PDMP website, and then enter a patient’s information to bring up the prescribing information.

“Now, directly from the EMR, we are able to smoothly get this one-button integration ... and it has greatly increased our compliance with PDMP access,” Perrone explained.

Patients who were hospitalized with OUD received considerable attention in the initiative. Perrone and colleagues believed the health system’s care of these patients was falling short. “We had a very high rate of patients who would leave against medical advice in the middle of their treatment,” she said. “Patients who were admitted for endocarditis or cellulitis or any of the complications of OUD were really being poorly cared for in terms of having their opioid withdrawal managed on the inpatient side.”

To rectify the problem, buprenorphine was added to the formulary for new starts; this meant patients could get either buprenorphine or methadone to treat their withdrawal while they were in the hospital, Perrone noted. Mechanisms also were put in place to bridge these patients to outpatient

## EXECUTIVE SUMMARY

In response to the opioid epidemic, some pioneering health systems are making progress by consolidating disparate efforts under one umbrella and using data and leadership to drive improvement in several areas.

- The Hospital of the University of Pennsylvania in Philadelphia has leveraged IT interventions successfully to assist physicians in easily accessing patient prescribing histories in state prescription drug monitoring programs, changing the defaults for opioid prescriptions, and strategically reminding physicians about best practices.
- Brigham and Women’s Hospital in Boston established the Comprehensive Opioid Response and Education program to drive its improvement efforts in this area. Leaders are championing a multidisciplinary, nonstigmatizing approach to treatment.

treatment after they were discharged. “One of the more effective ways to do this was to reach out to the medical students, pharmacists, and residents who were real advocates for this patient population and also came face to face with the patients who wanted to leave in the middle of their care [only to return] even more sick a few days or a few weeks later,” Perrone said.

The hospital set up outpatient practices to take these patients after hospitalization. These practices were staffed by the same clinicians who were advocating for them.

“They would get full waver training [to prescribe buprenorphine] and then began to see these patients a half morning per week in their clinics,” Perrone said. “That has grown substantially so that now there are seven or eight practices in the health system accepting patients after discharge.”

In the ED, a default was implemented in the EMR to remind clinicians to prescribe naloxone, the opioid antidote, to patients discharged following an overdose as well as to patients seeking treatment. In fact, one project that proved highly successful involved keeping a stock of naloxone in the ED that could be dispensed for free.

“We would then go back and bill the patient’s Medicaid if the patient was on Medicaid so then the patient got [naloxone] directly from us but with a very low cost to us,” Perrone said.

Since the program’s inception, HUP has decreased its overall prescribing of opioids by 10%. Further, HUP has taken steps to disseminate the various interventions through the creation of a stewardship website that houses all the initiative’s protocols, education modules, and guidelines. Still, dissemination

remains one of the bigger challenges. “We have worked hard on trying to communicate, but we realize that health system emails fall short when providers are trying to access this information ... so our website has served a good purpose,” Perrone said.

**Scott Weiner**, MD, MPH, FAAEM, FACEP, is an assistant professor of emergency medicine at Harvard Medical School and an attending physician at Brigham and Women’s Hospital (BWH) in Boston. He also directs the BWH’s Comprehensive Opioid Response and Education (B-CORE) program, a hospital-wide initiative aimed at reducing opioid-related morbidity and mortality. He noted the alarm was sounded in Massachusetts in 2014 when officials projected that more than 1,000 lives would be lost to opioid overdoses.

“That is when our work really started,” he said. “Just like in the rest of the country, by the time we hit 2016, that number had already doubled. Even in 2014, the actual number of lives lost was actually much higher than we had even anticipated.”

Weiner noted that the B-CORE program shares many of the same concepts and features of HUP’s program and that B-CORE has achieved success in changing provider practices regarding opioids and implementing new approaches in the care of patients who present with OUD.

Based on his experience with BWH’s initiative, Weiner advised colleagues interested in establishing their own programs to begin by identifying a champion who is nondepartmental, a person who serves in a hospital role as a surrogate for hospital leadership. “It gives credibility and also the clout that is necessary,” he said. “It

is also important to provide some funding. Of course, it is hard under tight budgets, but it is a significant amount of work. Getting some funding to support a director is, in my experience, crucial.”

Further, the initial goal should be to break down silos, Weiner offered. “What I am sure is happening at all hospitals is that there are excellent projects happening in different departments, but we like to think here of opioid-related issues similarly to how we treat cancer, which is interdisciplinary,” he said.

Noting that high-level support is important, Weiner advised colleagues to enlist the involvement of executive leadership. “For us, it was important to have the chief medical officer and the chief nursing officer [involved]. We also have a separate chief quality officer role, which has been very fundamental to the project,” he said. “We engaged with the chairs of anesthesiology, because they manage the pain clinic, and psychiatry, because they treat addiction in our health system.”

The director of strategy also jumped in to help with the effort, as did the director of addiction psychiatry, Weiner observed. “Take advantage of the momentum ... to solve this problem,” he added.

Similar to HUP’s effort, BWH divided their opioid program into several different groups that work under the direction of an executive committee. For example, there is a prescribing taskforce that has worked on guidelines, an addictions taskforce that works on care for patients with OUD, and another group that handles education.

When developing guidelines and metrics for the program, BWH began with the laws and the guidelines that already existed. From all these sources, the hospital created its own

document, including a guideline for the treatment of acute pain and chronic pain. Program developers crafted broad, aspirational goals as well as specific metrics to measure. For example, the goal of the effort is to reduce the number of fatal and nonfatal overdoses.

“It is a very hard number to capture. Someone can be treated at the hospital across the street, and I might never see them in my hospital. Then, [he or she] overdoses on opioids, and the ambulance brings [him or her] to me,” Weiner noted. “We are looking at this by patients where we know their whole history ... and we can see exactly where they have been.”

For prescribing metrics, the hospital examines a urine toxicology screen at least once a year, prescribes naloxone for patients on high doses of morphine, and asks patients to visit at least every four months if they take opioids chronically, Weiner said.

“On the inpatient side, we look at adverse events, and then the addiction measures include how many times we are giving naloxone in the ED at discharge,” he explained. “The rest is really about increasing access to medication-assisted treatment and getting more wavered providers.”

Similar to HUP, BWH established a small bridge clinic that is staffed

by a social worker, a recovery coach, and a clinician who can provide buprenorphine or naltrexone, Weiner noted. The result of this intervention is that some patients who otherwise likely would be admitted to the hospital for six weeks at a time with complications from injection drug use can be discharged.

“Since we opened [the bridge clinic] in April, we have already had nine patients that we have been able to successfully discharge home,” Weiner said. “They come back to the clinic for their buprenorphine, they have completed their IV antibiotics, and this has saved over 250 inpatient days for just those nine patients.”

Other results from the initiative include a significant drop in the number of opioid prescriptions. “In two years, we have gone from 9,000 prescriptions per month to 6,000 prescriptions per month,” Weiner reported.

“We have also decreased the number of patients who are receiving opioids, which we think is because we are using alternative modalities to address their pain that are nonaddictive.”

Meanwhile, the number of prescriptions for buprenorphine is rising, along with the number of patients receiving buprenorphine, and the number of BWH clinicians

able to prescribe buprenorphine is on the rise, too. “In 2017, we were one of just seven states in the country that actually saw a slight decrease in the number of opioid-related deaths,” Weiner said. “We are hopeful that all of the interventions that are happening at the state level, federal level, and hospital level are actually moving the needle and saving lives.”

*(Editor’s Note: Brigham and Women’s Hospital has established a website that houses many resources used in the B-CORE program. Interested providers are invited to review the materials and adapt them for their own use. The materials can be accessed at: <https://bit.ly/2z42BR1>.)* ■

## SOURCES

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