

HURRICANE MICHAEL CASE STUDY: HOSPITAL SURGE CAPACITY

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Overview

This case study explores the lessons learned when Hurricane Michael struck Florida's panhandle on October 10, 2018. With a magnitude of Category 5 versus the predicted Category 3 hurricane, the devastating impact was worse than expected. Many hospitals, nursing homes, assisted living facilities, and other healthcare agencies needed to be evacuated after the storm hit. The evacuation, transport, and placement of over 6,000 patients or residents over 8 days went smoothly and without any resulting deaths or serious injuries.

Surge capacity is the ability to provide health and medical care during a sudden increase in the number of patients or victims of disasters, and it is one of the most important components of hospital preparedness for responding to emergencies and disasters¹. Planning for hospital surge requires having the resources to accommodate large volumes of patients (capacity) as well as certain patient groups and patients with specific injuries or exposures, which in this case relate to storm surge, wind damage, and hurricane debris².

The intent of this case study is:

- To share the experience of regional hospitals before, during and after Hurricane Michael so that other health care facilities may benefit from it
- To identify policy changes that will improve hospitals' ability to respond to the medical surge of patients and patient transfers, as well as the resulting burden of patient's families in waiting room areas.

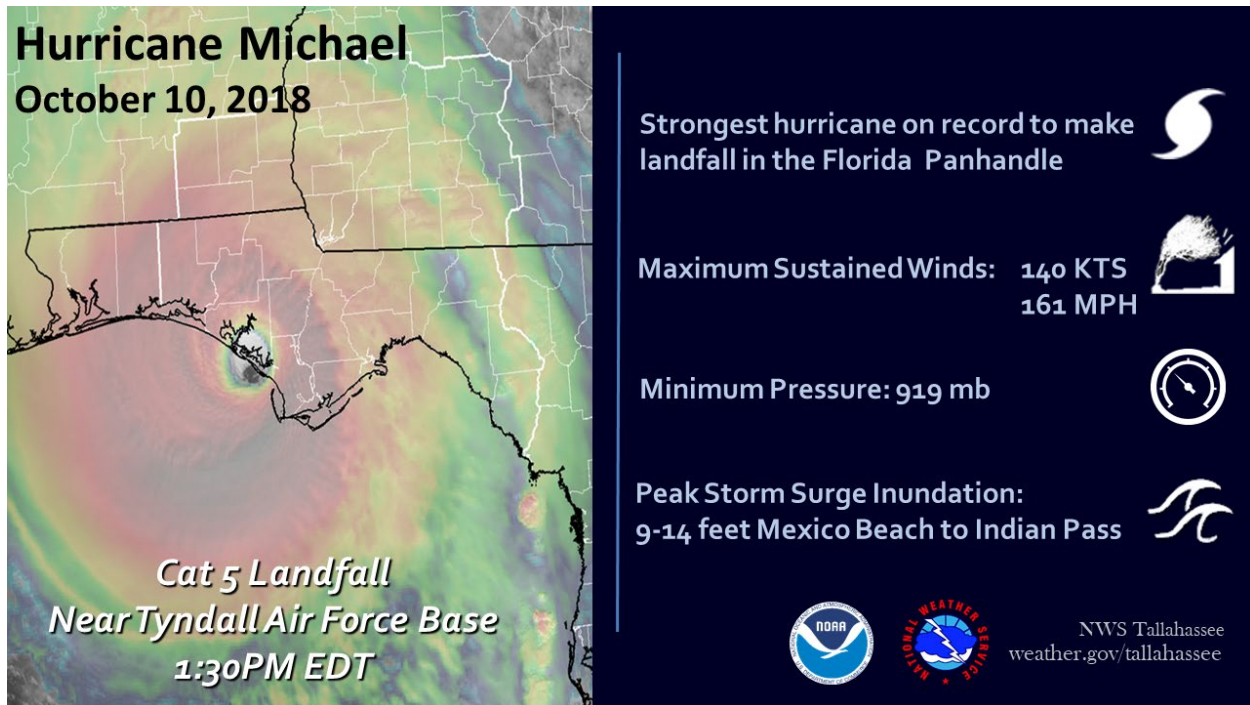
Hurricane Michael Set Many Records

Hurricane Michael was a very powerful and destructive tropical cyclone that became the first Category 5 hurricane to strike the state since Andrew in 1992. In addition, it was the third-most intense Atlantic hurricane to make landfall in the contiguous United States in terms of pressure. It was the first Category 5 hurricane on record to impact the Florida Panhandle and the most intense hurricane on record to strike in the month of October. Along the Florida panhandle, the cities of Mexico Beach and Panama City suffered the worst of Michael, with catastrophic damage reported due to the extreme winds and storm

¹ Sheikhbardsiri H, Raeisi AR, Nekoei-Moghadam M, Rezaei F. Surge Capacity of Hospitals in Emergencies and Disasters With a Preparedness Approach: A Systematic Review. *Disaster Med Public Health Prep.* 2017 Oct;11(5):612-620. doi: 10.1017/dmp.2016.178. Epub 2017 Mar 7. PMID: 28264731.

² <https://asprtracie.hhs.gov/technical-resources/58/hospital-surge-capacity-and-immediate-bed-availability>

surge. Numerous homes were flattened, and trees felled over a wide swath of the panhandle. A maximum wind gust of 140 mph (224 km/h) was measured at Tyndall Air Force Base before the sensors failed. As Michael tracked across the Southeastern United States, strong winds caused extensive power outages across the region.



Source: <https://www.weather.gov/tae/HurricaneMichael2018>

Cascading Impacts to Healthcare Facilities

There were 35 hospitals or nursing homes in the area left without electricity and operating with generators. Three hospitals needed to evacuate patients and to remain closed: Universal Health Services' Emerald Coast Behavioral Hospital in Fort Walton Beach, Encompass Health Rehabilitation Hospital in Panama City and George E. Weems Memorial Hospital in Apalachicola³. After the closures, residents needing urgent care were turned away⁴. Additionally, five hospitals (including the severely damaged Bay Medical Center Sacred Heart) evacuated patients but remained open for emergency patients.



Building at the Bay Medical Center Sacred Heart hospital in Panama City, Fla., Thursday, Oct. 11, 2018³.

³ <https://www.modernhealthcare.com/article/20181012/NEWS/181019944/eight-hospitals-evacuate-patients-in-wake-of-hurricane-michael>

⁴ <https://www.nytimes.com/2018/10/11/us/hurricane-michael-hospitals-damage-florida.html>

Despite preparedness through trainings and exercises, many healthcare agencies were impacted due to the velocity of this storm. Hurricane Michael's widespread power outages and catastrophic damages caused evacuations and medical surge at several of the region's facilities, as the influx of patients coincided with obstacles that occurred with the transportation, housing, and shelter systems.

For health care facilities, the storm posed substantial challenges. Most of the time, patients and their families had no transportation or home to return to in the damaged areas. Facilities were faced with the resulting complication of patients' families in waiting room areas, hunkered down with no availability in lodging or shelter locations. Subsequently, there were challenges with how to transport discharged patients back to the counties they were evacuated from.

Shortfalls in Emergency Operations Plans

Hospitals are required under regulations from the [Joint Commission](#) to have emergency operations plans which explain how the facility will handle medical surge of patients. However, these plans do not address how to deal with issues associated with discharged patients staying in non-patient bed areas of the hospital and how to transport them or offer assistance with lodging.

When reports of damage from Hurricane Michael first appeared, state and county emergency officials, along with health system leaders, knew that it was critical to evacuate hundreds of patients from the impacted and damaged areas. Transportation was compromised at first due to debris and damage to roads. Over 300 ambulance strike teams were dispatched to the area, coordinated by the State of Florida Emergency Preparedness Division.

What was not considered immediately, and later identified as a shortcoming, came after patients were evacuated and transferred. In each transfer, either the patient's families followed, or the patient was sent to other areas alone. Once patients were discharged, hospitals were not prepared for the next surge in which they had nowhere to go. The patients had no transportation to return to their homes, and if their home had been damaged or demolished during the hurricane, then they had no place for temporary shelter or lodging. Shelters in the impacted areas were already overflowing and exceeding capacity, and shelters in surrounding counties had been closed because they were not in impacted areas.

Vulnerable Patients

Evacuated patients who still needed care were predominantly transported by advanced and basic life-support ambulances, ambulettes, and public and private buses, with a few transports by helicopter. Evacuated patients were tracked at each facility on a master list.

Non-evacuating health system hospitals were overwhelmed, as they not only received patient surges according to the evacuation plan, but they also housed many homebound people whose needs could not be met in a shelter. These vulnerable individuals included mechanically ventilated people who feared the loss of power at their homes. The hospitals also needed to accommodate walk-ins who simply sought safe haven from the storm.

Emerald Coast Health Care Coalition's Enhanced Response

Members of the Emerald Coast HCC have access to activities and exercises that maximize their ability to respond to emergencies and disasters⁵. In November 2017, the ECHCC used HPP funds to conduct regional trainings and tabletop exercises, including the Coalition Surge Test (CST), which is an exercise all HCCs conduct annually to identify gaps in surge and response readiness. These activities provide opportunities for coalition staff to test evacuation plans and procedures, as well as develop strategies for successful responses to disasters and emergencies. By participating in HPP-funded activities, like the CST, the Emerald Coast HCC was able to build a base level of readiness long before disaster struck.

"If the HCC had not pushed us to complete the CST tabletop exercise, we might have failed to execute a timely response," said representatives of the Bay Medical Center. "Thanks to the training and preparation exercises facilitated by the Emerald Coast HCC, we had the right forms and supplies in place to successfully evacuate within 36 hours."

The coalition's preparedness activities were instrumental in their coordinated response to Hurricane Michael. As the storm approached, the ECHCC worked together with partners to make the calls needed to provide evacuation assistance, and the State of Florida Department of Health, Division of Preparedness and State ESF-8 agents worked with federal entities to provide the evacuation equipment, personnel, and patient tracking. Throughout the response, the coalition worked with the state and its health care partners to share information. By participating in HPP-funded preparedness exercises, the ECHCC was able to reduce the burden on individual facilities and maintain high quality of care for those affected by the hurricane.

Lessons Learned

In the weeks following Hurricane Michael, many hospitals and facilities that received evacuated patients conducted hot washes (immediate "after-action" discussions and evaluations) of what happened and how the issues were dealt with to capture future needs arising from the experience. One facility has considered implementing a wrist band identification system which would identify discharged patients from family members or other citizens of the community seeking medical care or shelter at their health system facilities.

Fortunately, there was a tracking success with the Disaster Medical Assistance Teams (DMATs) dispatched to several locations in affected areas who assisted with treating patients and tracked patients using E-records.

The most important takeaway lesson from Hurricane Michael is that the best preparation for a successful disaster response in receiving evacuated patients is to have plans for

⁵ <https://www.phe.gov/Preparedness/planning/hpp/events/Pages/hurricane-michael.aspx>

alternate locations of patient families. There must be areas for discharged patients and families to await transportation and sustainment (food, charging stations, bathroom, etc) for them while they wait. The challenges posed by incidents such as Hurricane Michael should not be understated. Extreme weather events are increasing in number and intensity in all regions of the country.

Dual Disasters

In addition to weather related disasters, there is now the impact of COVID 19 pandemic and other future pandemics affecting patient care. Hurricane related surges are occurring in facilities which are already overwhelmed with full capacity due to the pandemic. Hospitals and other health care facilities recognize that their staff are first-line responders during a large-scale emergency, and despite elaborate disaster planning and routine drills, nothing can replicate real-life scenarios.

Next Steps

Overcrowding of emergency departments is not a healthy situation for facilities, staff or other citizens waiting for response. There are standards in disaster preparedness for before, during, and after the event. However, there is a gap when it comes to what may be expected or what will be encountered under incident command and response to certain unique situations in the healthcare sector. Effective communication and coordination among local, state, and regional organizations is extremely vital to the successful response to any disaster situations. In the future, it is recommended that healthcare facilities:

- Arrange for alternate areas for temporary housing
- Assess if the facility's resources for space, staff for assistance, and coordination are sufficient in a range of scenarios
- Increase communication with healthcare coalitions, transportation companies, and State and County resources to be able to assist and decrease large groupings.

To read more about Surge Capacity, refer to the ASPR TRACIE Topic Collection: Hospital Surge Capacity and Immediate Bed Availability⁶

More on the Emerald Coast Health Care Coalition and the Florida Hurricane Response Hub

The areas of Florida most impacted by Hurricane Michael are served by the Emerald Coast Health Care Coalition (ECHCC), which receives funding through the Hospital Preparedness Program (HPP) cooperative agreement, and this case study is funded by the Florida Hurricane Response Hub (FL-HRH). The Emerald Coast HCC, which covers more than 10 counties in Northwest Florida, facilitates collaboration across its 600

⁶ <https://asprtracie.hhs.gov/technical-resources/58/hospital-surge-capacity-and-immediate-bed-availability>

participating organizations and works to strengthen the acute care medical surge capacity of hospitals in the region⁷.

The FL-HRH initiative is a coordinated effort among public health organizations to enhance ongoing environmental and occupational health recovery in jurisdictions affected by the 2017 hurricanes. Through the HRH effort, professionals engaged in hurricane and disaster-related health recovery will have access to quality training and technical assistance⁸.

Funding for the FL-HRH project has been provided to the National Network of Public Health Institutes (NNPHI) through a Cooperative Agreement with the Centers for Disease Control and Prevention (CDC – NU1ROT000004-01-00). NNPHI is collaborating with the Florida Institute for Health Innovation and the CDC's National Center for Environmental Health on this project.

⁷ <https://emeraldcoasthcc.org/>

⁸ <https://flhealthinnovation.org/hrh/>