

Sentinel Event Alert

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Environmental disasters: Preparing to safely evacuate or shelter in place

More than ever, even in places not previously considered to be at risk, United States healthcare facilities must prepare for environmental disasters such as hurricanes, tornadoes, wildfires, floods, and extreme heat, especially as more people move into coastal and wilderness areas.¹ Whenever a disaster occurs, healthcare organizations must be prepared to rapidly evacuate or shelter in place everyone on-site – patients, healthcare workers, and others. This alert outlines steps for your healthcare organization to consider as you prepare for weather- and climate-related disasters.

As Hurricane Milton moved toward Florida earlier this year, “there were over 400 total healthcare facilities that evacuated, the largest evacuation of healthcare facilities the state has ever experienced in advance of a storm,” Florida Hospital Association President and CEO Mary Mayhew told *Chief Healthcare Executive*.² Because of the preparation required to safely evacuate and take other precautions, patients were kept safe. “Our hospitals have fared remarkably well,” Mayhew said. John Couris, president and CEO of Tampa General Hospital, said “preparing for Hurricane Milton was an incredible effort by the entire team and a true test of our resources, but it ensured we could continue to provide exceptional care for our patients in a high-quality, safe and uninterrupted environment before, during and after the storm.”²

Disasters on the rise due to climate change

Since 1980, the number of weather and climate-related disasters has increased exponentially because of climate change. The U.S. has seen 396 weather and climate disasters in that timeframe, resulting in a cost of over \$2.780 trillion.¹ According to the National Centers for Environmental Information (NCEI), 2023 was the fourth consecutive year (2020-2023) in which 18 or more separate billion-dollar disaster events have impacted the U.S., marking a consistent pattern. Between 1980 and 2023 the annual average was 8.5 events (Consumer Price Index-adjusted); while the annual average for the most recent 5 years (2019-2023) is 20.4 events (CPI-adjusted).¹ The data is telling us that this is not a blip on the radar, but a consistent trend from which we need to learn.

Increasing disasters have also led to increases in deaths and damage costs. In the 2000s, the U.S. experienced 3,102 fatalities due to natural disasters and CPI-adjusted costs of \$619 billion. In the 2010s, the U.S. saw those same figures increase to 5,227 fatalities and \$993 billion. So far in the 2020s, fatalities and costs are potentially on pace toward new highs, with 2,101 fatalities and \$615 billion in costs since Jan. 1, 2020.¹

The time to respond to a disaster may be short

Natural disasters can devastate communities at a moment’s notice. The best thing anyone can do is be prepared with knowledge and a plan.

In recent years, hurricanes have been intensifying at a more rapid pace due to increased ocean temperatures. According to a report published by *National Geographic*,³ a tropical storm heading toward Mexico in October 2023 turned into a Category 5 hurricane in less than 24 hours. A month earlier in the U.S., Hurricane Lee developed from an 80 mph Category 1 storm to a 165 mph Category 5 storm within a day. Knowing that these storms can change intensity levels within 24 hours or less means that changes are needed in preparation planning.

Published for Joint Commission accredited organizations and interested healthcare professionals, *Sentinel Event Alert* identifies specific types of sentinel and adverse events and high-risk conditions, describes their common underlying causes, and recommends steps to reduce risk and prevent future occurrences.

Accredited organizations should consider information in a *Sentinel Event Alert* when designing or redesigning processes and consider implementing relevant suggestions contained in the alert or reasonable alternatives.

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Wildfires, tornadoes, and floods also can develop very quickly. During the August 2023 Lahaina, Hawaii, fire, high winds drove the fire from the outskirts of Lahaina to the city proper in 15 minutes. This resulted in burning critical areas near the town's primary access roads, hindering evacuation, destroying telecommunication infrastructure, and cutting power required for 911 and wireless services. The fire also was hot enough to melt water pipes, inhibiting efforts to contain the blaze.⁴

Another study in the *American Journal of Public Health* found that half of California's inpatient capacity is less than a mile from a high fire threat zone and reminds us that fire can indirectly impact healthcare organizations by blocking routes of access to and from facilities.⁵

Healthcare facilities find themselves in harm's way

Extreme heat and heat waves are occurring at a higher frequency throughout the United States. According to the U.S. EPA, heat wave frequency has nearly tripled since the 1960s. Within the U.S. EPA report, 46 of 50 metropolitan areas measured experienced an increase in extreme heat frequency between the 1960s and 2020s.⁶ These extreme heat events present challenges to hospitals, such as keeping operating rooms cool *and* at low humidity, or for many healthcare organizations, keeping supplies and medications stable when heating, ventilation and air conditioning (HVAC) systems fail.

In addition, hospitals in coastal areas are much more susceptible to flooding. A study published in *GeoHealth* found that hundreds of hospitals on the Atlantic and Gulf Coasts are at risk of flooding during a relatively mild Category 1 or Category 2 hurricane.⁷

Environmental disasters can cause loss of essential utilities and services; staffing deficiencies; supply shortages due to damage or increased demand; compromised safety and security; and structural and non-structural damage.⁸ These impacts can affect healthcare services provided on-site, in the home, and through telehealth.

Joint Commission Emergency Management standards provide a basis for preparation

Protecting patients and staff during weather- and climate-related emergencies requires proactive risk management. Joint Commission Emergency Management (EM) standards require healthcare

organizations to have a **comprehensive emergency management (EM) program** that provides a systematic analysis for planning, shared decision-making, internal and external collaborations, and assignment of available resources including staff, space, and supplies. Through this program, organizations can effectively prepare for, respond to, and recover from emergencies.

The EM program structure can be designed to respond to any type of emergency through an **all-hazards approach** that prepares for the wide array of possible emergencies at a healthcare facility.

Also required by the EM standards are:

- The oversight and support of **organizational leadership** in keeping the EM program up to date, as they make certain that necessary policies and procedures are developed; enough resources are available before, during, and after an emergency/disaster incident; and the priorities of the EM program are fulfilled.
- The **hazards vulnerability analysis (HVA)**, which enables organizations to continually evaluate their known risks and prioritize them to clearly understand their vulnerabilities and how best to prepare for, recognize, respond to, and recover from emergencies. The HVA drives education and training so that staff can quickly recognize and respond to a variety of emergencies. The HVA can help to plan exercises through which your organization can practice evacuating or transferring to other healthcare facilities high-risk patients such as neonates, critical care patients, and frail elders. Testing and evaluating these procedures ensure continuity of care under the most extreme circumstances, which can include quickly approaching events such as wildfires and tornadoes.
- An **Emergency Operations Plan (EOP)** that is created after your organization has evaluated and prioritized potential risks and hazards. The EOP coordinates communications, resources and assets, safety and security, staff responsibilities, utilities, and clinical and support activities during an emergency. The EOP also includes written procedures for when and how an organization will shelter in place or evacuate (partially or completely) its staff, patients, and volunteers.
- A **Continuity of Operations Plan (COOP)** that will enable your organization to maintain your

business, communications, information technology and physical infrastructure during and after a disaster.⁹

Although not required by the EM standards, The Joint Commission suggests that institutions understand the documentation requirements of the **Federal Emergency Management Agency (FEMA)** and related insurance reimbursement issues. A team of individuals from safety, security, finance, risk management, and other areas, can support this effort. To qualify for FEMA reimbursement for damages occurring during a disaster, an organization must document and photograph damage and repairs. If a FEMA audit determines that an organization's documentation is unacceptable, it may result in loss of funding.¹⁰

Actions for consideration by healthcare organizations

The following actions provide additional detail relating to environmental disasters and Joint Commission EM standards, which may assist in safe evacuation or sheltering in place in the event of environmental disaster. The accompanying sidebars are real-life stories of facilities and patients who experienced disasters; there are many compelling and informative stories in the literature.

- 1. Revisit and update your emergency plans.**
Considering the increased threat of weather- and climate-related disasters, update your organization's emergency plans according to your HVA's findings annually or even more frequently. Also update your facility's EM program and EOP, since updates to the emergency plans may affect those. Reevaluate risks or hazards known to recur, and assess new risks or hazards, both internal and external to your organization. Determine the kinds of disasters to which your organization is susceptible and whether evacuation or sheltering in place may be required for each. Your current plans may not be adequate, particularly if your organization is subject to rapidly changing and accelerating threats (i.e., intensifying hurricanes and fast-moving wildfires).
- 2. Establish and build collaborative relationships.**
Annual planning for potential environmental disasters requires renewing and establishing relationships with local, state and federal authorities; ambulance and other transportation providers; and other healthcare organizations in your area, including home care

providers. Also, organizations in systems of care should consider how best to leverage system resources and remote assistance in the event of a disaster in one location or region. These relationships can facilitate collaboration and cooperation during an emergency. The planning can lead to smooth evacuations of patients to pre-determined healthcare facilities through pre-arrangements made with local emergency medical services, non-emergent ambulance providers, and school bus providers. For nursing homes and assisted living communities, identify alternative housing and sites for care, treatment, and services that meet the needs of patients during an emergency.

Ongoing communication during an event with local and state officials (including police and fire and regional healthcare coalitions) and other key providers and organizations through pre-identified individuals within your organization (such as your security or EM director) ensures that the needs of the healthcare facility are reported quickly so that resources can be routed and appropriately triaged to the correct location.

WellMed's tailored plan for hurricane readiness

With clinics along the Texas and Florida coasts, the WellMed Medical Group has various resources at the ready in case of a hurricane. This organization has a meteorologist on staff who helps clinics prepare when a storm looks imminent. Following a checklist tailored to meet the needs of their setting, the clinics protect their facilities with sandbags and shutters, place equipment above the floor and cover it with plastic, power down servers, and move vaccines and medications requiring refrigeration to areas with backup power.

Secured texting technology connects WellMed's hospitalists to primary care providers. A WhatsApp chat keeps leadership and clinic managers in touch via the internet if cellular service is interrupted. Distributed ahead of the storm to staff are emergency backpacks with drinking water, energy bars, space blankets, and other necessities in case sheltering in place or evacuation is required. The WellMed Charitable Foundation maintains food pantries for seniors and their caregivers in areas prone to hurricanes.¹¹

3. **Develop a resilient communications infrastructure.** As part of your organization's emergency management communications plan, develop primary and alternative communication methods. Include how you will provide warning and notification alerts about weather- and climate-related events to staff and other healthcare organizations in your area. The alerts can warn of the possibility or implementation of evacuation or sheltering-in-place and notify other healthcare organizations that the emergency plan has been activated and transferring patients may be imminent. Back up primary communication methods with other options if primary methods become inoperable. Alternatives for both incoming and outgoing communication, in addition to telephone landlines and cellphones, include Voice over Internet Protocol (VoIP) phones, satellite phones, cloud-based messaging apps, cable and satellite television, walkie-talkies, and ham radio.

4. **Plan how to meet essential needs and provide care to staff and patients.** Whether your facility is sheltering-in-place or evacuating, plan to meet essential needs and provide care (e.g., food, potable and non-potable water, linen, medications, infusion fluids, and other supplies) for everyone present. Plan for how you will obtain, allocate, mobilize, replenish, and conserve your resources, assets, and supplies when these become critical and challenging to obtain, especially during widespread, catastrophic events, as other healthcare organizations may be competing for delivery of the same resources during supply chain disruptions. Plan for how to maintain patient documentation and orders if the electronic medical record is not functional. The Joint Commission requires organizations to plan for up to 96 hours of sustainability of their resources. In some disaster situations, sustainability may need to be extended for a longer time.

Plan how your organization will provide staffing during an emergency or disaster. Creating disaster response teams is one way to effectively deploy staff before, during and after a disaster. Also, consider when and how these teams can be relieved during stressful situations. Staff members on-site during the disaster will need a place of respite, where they are temporarily unavailable to coworkers and patients. Quiet, darkened spaces can be set aside for short naps, and meals and shower

Tampa General protects critical assets from flooding and storm surges

Tampa General Hospital, located on Davis Islands, Florida, is at high risk of flooding and storm surge damage. To keep the hospital operational during and after a severe storm, the hospital erected a water-impermeable barrier surrounding the hospital campus. The barrier can withstand a storm surge of up to 15 feet above ground level. In addition, the hospital's lower floors are equipped with 6-inch-thick metal submarine doors with inflatable barriers that create watertight seals. The hospital also relocated its electrical, air conditioning and other critical systems to floors 25 feet above ground.¹²

Diligent planning leads to time-efficient evacuation at Avista Adventist

While green space surrounding Colorado's Avista Adventist Hospital protected it from the flames of the devastating Marshall Fire, smoke from the fire reached every part of the hospital. An emergency evacuation to nearby St. Anthony North Hospital tested the limits of Avista Adventist's Emergency Operations Plan. After activating incident command, the hospital sent home staff who lived in affected areas and implemented pre-evacuation procedures including assembling resources for patient transport and protecting routes for emergency vehicles. Once the evacuation began, it took only two hours to complete due to diligent planning.

The Marshall Fire was devastating to the local community, with 20 staff members losing their homes. Avista Adventist continued to deal with the emotional impact of the fire long afterward, underscoring the need to incorporate short- and long-term emergency planning resources that help employees deal with traumatic situations. For example, Colorado offers a Healthcare Worker Resilience and Retention Initiative, launched during the COVID-19 pandemic, which serves as a resource for all types of traumatic situations healthcare workers may experience.¹⁴

facilities can be made available. Exposure to nature and natural light can help to elevate mood.¹³ Identify these respite locations in advance of emergencies and communicate their availability to staff with posters and other communications. Having a record of your employees' skill sets and availability to flex in roles is recommended if a resource pool is needed for prolonged disasters.

5. **Plan and practice how to evacuate and shelter in place.** In addition to having written procedures for when and how the organization will shelter in place or evacuate (partially or completely), organize education and training to meet the risks identified in your HVA. Include staff, volunteers and others providing services in the training so that everyone in the organization understands their individual roles, responsibilities, and actions to take when evacuating or sheltering in place. This training can help decision-makers rehearse evaluating the balance between the risks of evacuating patients and staff versus sheltering in place and, additionally, better appreciate the timeline for decision-making in critical situations.

Planning and conducting emergency management exercises such as table-top training, drills or full-scale disaster simulations can help participants practice high-stress scenarios during which your organization's decision-making process and continuity of care capabilities will be put to the test. Set goals to stress internal and external systems to their breaking points during these drills to find vulnerabilities.

Evacuation practice can cover how to use stairwells and elevators and where and how to move patients to assembly points for evacuation by emergency medical services vehicles and re-entry. Shelter-in-place planning can identify the safest places in the facility and areas to avoid within various disaster scenarios. Planning and practice should include considerations for:

- Patients who are high risk, under hospice care, or dependent on a ventilator or other technology.
- Pediatric patients who may be separated from parents or guardians.
- Individuals with limited English proficiency.
- Hospital at home, outpatients, or home care or hospice patients within your community who require electricity for dialysis, respiratory equipment, or other durable medical equipment.
- Special needs patients, especially those living in remote areas, who should be encouraged to provide their information to special needs registries so that emergency responders are aware of them.

Have a plan for communicating that your facility is "out of service" to the community after implementing an evacuation or sheltering in place. Regional and state coordination among healthcare organizations and stakeholders can help to direct patient flow to facilities that can safely manage additional patients while avoiding locations that are out of service.⁸ In addition, your area may have a network of shelters to be used during emergencies.

6. **Recovery.** Once the event has stabilized, analyze the impacts and criticality of the event and/or secondary events that occurred because of the primary incident. The many phases and steps to disaster recovery may last for days, months, or years following an event. A critical step in any recovery is evaluating the effectiveness of the disaster response.

Resources

[Agency for Healthcare Research and Quality | Hospital Evacuation Decision Guide](#)

[American Hospital Association/Administration for Strategic Preparedness and Response | The CLEAR Field Guide for Emergency Preparedness](#)

[Centers for Disease Control and Prevention | Emergency Preparedness and Response](#)

[Centers for Disease Control and Prevention | Natural Disasters and Severe Weather](#)

[The Joint Commission Emergency Management Toolkit](#) (for sale product)

[U.S. Department of Health & Human Services | ASPR TRACIE Resource Page](#): Curated literature on healthcare facility evacuation and sheltering.

[U.S. Department of Health & Human Services | emPOWER Map](#): Information on emergency preparedness/response/recovery/mitigation data for Medicare at-risk populations.

[U.S. Department of Health & Human Services | Administration for Strategic Preparedness & Response | GeoHEALTH Platform](#): Information on current and potential impending disasters.

[United Nations Office for Disaster Risk Reduction](#)

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Patient Safety Advisory Group

The Patient Safety Advisory Group informs The Joint Commission on patient safety issues and, with other sources, advises on topics and content for *Sentinel Event Alert*.