Applicable Programs: All

Grappling with Extreme Heat

CLIMATE CHANGE–RELATED HEAT EMERGENCIES ARE BECOMING MORE FREQUENT AND SEVERE AND LONGER LASTING. HERE ARE SOME INSIGHTS AND TIPS FOR HEALTH CARE FACILITIES

"Heat is one of the most dangerous weather-related killers in the United States, causing hundreds of deaths every year," writes Angela Murray, MSN, RN, Project Director, The Joint Commission's Department of Standards and Survey Methods, in a blog posted on JointCommission.org in August 2021.[1] This may, in fact, be an understatement.

Extreme-temperature heat waves are lasting longer, arriving earlier in the season, and occurring in unexpected places.[2] For example, the unprecedented heat dome in the Pacific Northwest last summer caused temperatures to reach all-time highs of 108°F in Seattle and 116°F in Portland, Oregon, on June 28, 2021. During the most intense week of that heat wave, approximately 600 people died due to heat-related causes.[3] Because this geographic area traditionally has mild summer temperatures, many homes and other buildings lack air conditioning, which exacerbated the suffering.

The pattern is repeating itself this summer. On July 19, 2022, a particularly hot day, more than 100 million people in the United States faced excessive heat warnings or advisories, while approximately 265 million people (80% of the US population) dealt with extended highs of more than 90°F.[4] Both Oklahoma City and Abilene, Texas, reached 110°F, breaking records set in 1936.[4]

"Heat waves generally and EHEs [extreme heat events] specifically have occurred more frequently and increasingly in locations unaccustomed to such events," reports a recent *NEJM Catalyst* article.[2] "EHEs cause excess morbidity and mortality directly from heat illness, aggravation of comorbid conditions, and exacerbation of untoward health effects of socioeconomic and cultural circumstances, as well as indirectly from often associated events such as wildfires, drought, and air pollution," the article states.[2]

To be sure, extreme heat worsens health disparities and brings into sharp relief the need for the health care sector to address both health equity and climate change, two priorities of Joint Commission President and CEO Jonathan B. Perlin, MD, PhD. In urban areas across the country, lower-income individuals fare worse in extreme temperatures because they are less likely to have air-conditioned homes (if they have housing), less likely to live in neighborhoods with trees that provide

shade, and more likely to have underlying chronic health conditions that make exposure to intense heat more deadly.

According to the authors of the *NEJM Catalyst* article, the health care sector should embrace three levels of prevention in addressing heat emergencies[2]:

- **Primary—**Eliminate or reduce exposure to heat such as by supporting urban greening campaigns with community benefit dollars.[2]
- **Secondary—**Lessen the impact of exposure to extreme heat such as by disseminating information on cooling centers during patient encounters.[2]
- **Tertiary—**Decrease adverse outcomes from extreme heat exposure such as by partnering with public health departments to coordinate messaging during heat waves and permitting individuals without housing and other susceptible community members to cool off inside air-conditioned health care facilities.[2]

Surge in people seeking care, relief

Health care organizations (HCOs) must grapple with a multitude of consequences when temperatures rise to dangerous highs, notes Gene Monago, a *Life Safety Code*®* Surveyor for The Joint Commission. "The biggest impact to a hospital during extreme heat," Monago says, "is the influx of patients due to heat exhaustion, heatstroke, and other heat-related conditions—maybe even due to a patient's lack of available air conditioning where they live."

Hospitals and critical access hospitals should address extreme heat in their hazard vulnerability analyses (HVAs). The requirements under Emergency Management (EM) **Standard EM.11.01.01:** "The hospital [or critical access hospital] conducts a hazard vulnerability analysis using an all-hazards approach" include evaluating and prioritizing the impact the hazard (extreme heat) would have on the operating status of the hospital (EM.11.01.01, Element of Performance [EP] 3) and identifying and implementing (extreme heat-related) mitigation and preparedness actions (EM.11.01.01, EP 4).

Non-acute-care settings—such as nursing care centers, assisted living communities, home care organizations, ambulatory care facilities, and behavioral health care and human services facilities—should also take extreme heat into account in their hazard vulnerability assessments. The requirements under **Standard EM.01.01.01:** "The organization engages in planning activities prior to developing its Emergency Operations Plan [or Emergency Management Plan]" include developing (extreme heat) mitigation activities (EM.01.01.01, EP 5) and (extreme heat) preparedness activities that will organize and mobilize essential resources (EM.01.01.01, EP 6).

While residential settings must consider the potential need for evacuation during extreme heat, especially if power outages occur, hospitals and critical access hospitals must be prepared for influxes of individuals from the community seeking to cool off, as well as people suffering from heat-related ailments and worsening symptoms of conditions such as asthma, chronic obstructive pulmonary disease (COPD), and cardiovascular disease. Knowing when to implement the Emergency

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Operations Plan (EOP) and activate incident command is essential for hospitals, says Monago, who advises close monitoring of weather events.

Stocking up on ice, having sufficient bottled water on hand to give to patients and visitors, and setting up large fans to keep air moving and enhance the comfort of building occupants are among the solutions implemented by hospitals during extended heat waves.[5] If enclosed outdoor tents need to be erected during heat-related patient surges, portable air-conditioning units should be used in these temporary screening or care sites as well.

During the Pacific Northwest's extended heat wave in 2021, hospital emergency departments (EDs) even placed heatstroke patients in ice-filled body bags to cool them down quickly. This became a go-to solution in the mass-casualty heat emergency because it was inexpensive, convenient, and scalable (albeit rather grisly).[6]

Occupational health and safety

Patient surges during extreme heat call for increased staffing at a time when clinicians and other health care staff are also vulnerable to the dire impact of intense heat. For example, consider the additional personal protective equipment (PPE) worn by many health care staff members during the COVID-19 pandemic and how the extra protective layers would affect staff exposure to extreme heat (for example, staff who screen potentially infectious patients outdoors before they enter a hospital's ED).

Health care facilities, suggests Monago, should encourage their teams to stay hydrated and take breaks whenever necessary when working in hot conditions, whether outdoors or indoors (working in boiler rooms or performing hot work such as welding, for example). Indeed, he notes, facilities staff members, depending on their job, may wear fire-rated uniforms as part of their required PPE, which can be less comfortable in a particularly hot environment than non-fire-rated cotton or cotton-blend uniforms. "Team members need to pay close attention to their own ability to manage heat and not overdo it," Monago says.

Staff exposure to intense heat is increasingly on the radar of the Occupational Safety and Health Administration (OSHA). On October 27, 2021, OSHA published an Advance Notice of Proposed Rulemaking (ANPRM) for Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings in the *Federal Register*.[7] Effective April 8, 2022, the federal agency published an *OSHA Instruction* informing employers of its new National Emphasis Program—Outdoor and Indoor Heat-Related Hazards.[8] This program is intended "to identify and eliminate or reduce exposures to heat-related hazards, both indoors and outdoors, resulting in illnesses, injuries, and deaths, through inspection targeting, outreach, and compliance assistance," OSHA states in the document.[8]

Besides its National Emphasis Program, OSHA offers considerable online guidance[9] to employers regarding staff who are new to working in outdoor or indoor high-heat environments. "Some workers are more susceptible to heat-related illness," OSHA observes in the "Personal Risk Factors" section of its heat exposure guidance. Risk factors include but are not limited to the following[10]:

- Obesity (body mass index of at least 30)
- Diabetes
- High blood pressure
- Heart disease
- Relatively low level of physical fitness
- Alcohol use
- Use of certain medications, such as diuretics (water pills) and some psychiatric or blood pressure medicines

"Some medications can result in a worker's inability to feel heat conditions and/or inability to sweat, so symptoms of heat stress may not be evident," OSHA states.[10]

What's more, OSHA recently issued a *Temporary Worker Initiative (TWI) Bulletin* titled Exposure to Outdoor and Indoor Heat-Related Hazards, which outlines the responsibilities of host employers. This bulletin includes the following tips, which would benefit all health care staff, not just temporary workers[11]:

- **Implement a "buddy system"** that pairs workers so that they can recognize symptoms in each other and take action before heat illness develops. (This advice may be challenging to implement due to staffing shortages, however.)
- **Implement administrative controls** such as earlier start times for day shifts and employee/job rotation to limit heat exposure.
- **Train workers on heat illness signs**, how to report signs and symptoms, first aid, and the importance of hydration.

Utility system issues

To prepare for extreme heat emergencies, HCOs need to assess the impact of power outages on their facilities and how the electrical grid system could affect their organizations, Murray emphasizes in her blog post.[1] An HVA, she says, should describe how an organization will monitor protocols related to weather forecasts, coordinate with local EM or public safety officials to address alternate sources of power, and discuss strategies for maintaining essential utilities such as electricity and heating, ventilation, and air conditioning (HVAC) during and after a heat emergency.

Joint Commission–accredited organizations must comply with the requirements set forth in state law and regulation as well as in the National Fire Protection Association (NFPA) *Health Care Facilities Code* (NFPA 99-2012). As Murray points out, the requirements related to power outages in NFPA 99-2012, summarized and paraphrased here, provide a framework for risk assessment and preparedness strategies[1]:

- **Section 12.5.3.3.6.5—Essential Utilities.** Before declaring any emergency, an organization must assess whether its infrastructure can support electricity and HVAC.

- **Section 12.5.3.3.6.6—Exterior Connections.** For essential utility systems in Category 1 facilities only (those in which failed equipment or systems are likely to cause major injury or death) and based on a facility's HVA, an organization must consider installing exterior building connectors to allow attachment of portable emergency utility modules.
- **Section 15.5.1.3—Emergency Generators and Standby Power Systems.** Emergency generators and standby power systems, where required for compliance with NFPA 99-2012, must be installed, tested, and maintained in accordance with NFPA 110 *Standard for Emergency and Standby Power Systems*.
- **Section 15.5.1.4—Stored Electrical Energy Systems.** Stored electrical energy systems must be installed, tested, and maintained in accordance with NFPA 111 *Standard on Stored Electrical Energy Emergency and Standby Power Systems*.
- **Section B.12.3.2.5—Power Loss.** To get a facility up and running after a power loss, the first operational priority is clinical care, and the second is infrastructure. When ordering backup generators, know the size needed and the method used to connect the generators to the facility.
- **Section B.12.3.4—Activation of Emergency Utility Resources.** Planning for a loss of utilities is essential. An organization should evaluate its ability to be self-sufficient over a period of at least 96 hours, including its fuel on hand. An organization that has backup generators must establish how long it can operate on those generators if it loses electricity.

Besides these requirements, organizations should consider OSHA guidance. For example, to optimize the comfort of building occupants, OSHA's Standard 1910.1000 recommends temperature control settings in the range of 68°F–76°F and relative humidity control settings in the range of 20%–60%.

Monago offers additional insights related to utility system performance in extreme heat and emergency power system considerations. When health care facilities have well-maintained HVAC systems, this equipment should perform appropriately during very hot weather, he says.

"Most HVAC equipment, if well maintained, would be expected to be operable," Monago notes. "But poorly maintained or extremely old equipment (beyond its expected useful life) could be at an increased risk of failure. In a hospital, if the space maintained by the equipment is critical to operations, I would expect the hospital to bring in temporary equipment should a failure occur."

Making sure that emergency generators are functioning in the event of a power outage is also extremely important. "All generators—located inside or outside—rely on cooling, either by air or water," says Monago. Health care facilities should monitor the operating temperature of their generators, he emphasizes, noting that additional radiators can be brought in to increase the cooling capacity of the water used to cool the generators.

"As the generators approach maximum operating temperature, the effective output would be reduced, and their 'rating' would be lower than what they may

be designed for," Monago explains. "That conceivably could impact a hospital if normal power is lost and the building relies only on emergency power. In an event like this, the facilities team would need to shed noncritical loads to best maintain important patient services."

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