Chapter 8

Establishing Strategies for Managing Utilities

Utilities are essential to the proper operation of the environment of care and significantly contribute to effective, safe, and reliable care. Yet utilities are often one of the first losses during internal or external emergencies, both natural and man-made. Managing essential utilities—the functioning of an organization's electricity, water, fuel, ventilation, and so forth—in the face of an emergency must not be compromised or adverse events could occur. This chapter, as detailed in Sidebar 8-1, addresses the importance of planning for alternative means for providing the following:

- Electrical power
- Water
- Fuel
- Other needs—ventilation, medical gas, vacuum systems

Managing Utilities

Different types of emergencies can have the same detrimental impact on an organization's utility systems. For example, hurricanes and earthquakes could both knock out electricity. Or, flooding could interrupt water service. In 2003 something as innocuous as a falling tree limb cut power lines in Ohio and knocked out power across a swath of New England and the Mid-Atlantic states.[1]

No matter the emergency, the loss of utilities in itself can create an emergency for health care organizations. The need to plan for utility requirements during an emergency has long been part of Joint Commission emergency management standards and environment of care standards and is now given special emphasis as one of the six critical functions.

The loss of utilities is not uncommon during emergencies. Disasters such as ice storms, hurricanes, and tornadoes can all result in loss of utilities required for care, treatment, and services. Organizations should identify alternative means of providing for essential utilities. The standard under discussion breaks down these utilities into greater detail by separating water into potable (for consumption and care) and nonpotable sources (for equipment and sanitation).

Sidebar 8-1.

Applicable Emergency Management Standard

The organization establishes strategies for managing utilities during emergencies.

This standard requires the following:

Organizations identify an alternative means of providing for the following utilities in the event that their supply is compromised or disrupted:

1. Electricity
2. Water needed for consumption and essential care activities
3. Water needed for equipment and sanitary purposes
4. Fuel required for building operations or essential transport activities
5. Other essential utility needs (for example, ventilation, medical gas/vacuum systems)

Key questions to consider for utility failure might include the following:

- Does your organization's emergency management plan address how the organization would handle a utility failure caused by an interruption in service by a utility provider? A lightning strike?
- What effect would a utility failure have on your organization? How has your emergency management plan addressed such effects?
- What backup systems are in place in the event of a utility failure?

Facilities must identify alternative means of meeting essential building utility needs when the facility must provide continuous service during an emergency. Electricity, water, ventilation, fuel sources, and medical gas/vacuum systems might each require special consideration. For example, organizations must consider supplemental emergency generators, the operation of emergency generators, the placement of emergency generators to protect them from potential hazards as well as theft, and other critical equipment. Generators and the fuel necessary to power them should be situated so that they are not at risk from flooding. In addition to placing generators above possible flood zones, it is important to ensure that switching components necessary to go from normal electrical operations to generator operations are not located in low-lying areas.[2] Organizations should also consider what happens if the generator designed to serve as a backup also fails. Most generators are not designed to power a facility for extended periods of time.[2] Having parts to repair a broken-down generator could make a difference in the success or failure of the emergency operations plan (EOP). In essence, utility management issues come down to contingency planning.

To address the need for water, many organizations plan for tankers of water to be brought to the facility if normal sources are not available. Organizations should consider, though, what will happen if the tankers cannot arrive due to blocked roads. To meet the need for water required for equipment and sanitary and sewer operations, one approach is to develop a "plug-and-play" capability that connects nonpotable water lines to alternative water supplies from tanker trucks, existing wells, or other sources.[3]

One organization that was hit by Hurricane Katrina also found that its plans for nonpotable water necessary to wash floors did not work as planned. Trash cans used to collect water came apart under the weight of the water, and the organization was forced to clean its floors with alcohol and peroxide.[4] This shows the need to consider how nonpotable water for cleaning, equipment, and toilets will be collected and stored.

To prepare for a utility failure, an organization's EOP should outline procedures for the following:

- Prompt repair or replacement
- Provision of appropriate alternative clinical care so that little or no increase in risk to care recipients occurs during failure
- The partial or total cessation of services
- The possible evacuation of care recipients in the event of a prolonged system outage

Organizations should identify alternative means of providing for essential utilities, whether through negotiated relationships with primary suppliers, memoranda of understanding with other organizations, redundant or alternative equipment at the organization, or provision through a parent entity. Organizations should also consider how they would address utilities management if community resources were not available. They should not rely solely on single-source providers in the community but should identify other suppliers outside the local community.

To ensure that utilities will be available during an emergency, an organization must have accurate and current contingency plans. These plans should be exercised or confirmed to ensure that the system will be reliable. Without these tests, the risk of failure is unknown.

Be Prepared Tip

Information Technology Needs

If information technology is part of emergency operations considerations, is it included on the electrical backup systems? Are the computers that need to access the system also on the backup systems?[1]

Reference

1. American Health Lawyers Association: *Emergency Preparedness, Response & Recovery Checklist: Beyond the Emergency Management Plan.* Washington, DC: American Health Lawyers Association, 2004.

Be Prepared Tip

Know the Facility

Organizations should understand clearly which parts of the facility are served by generators, as well as how the water system works. If the water supply is disrupted or polluted, water use might need to be limited in order to conserve scarce supplies. And water pumped from wells might not be available without electricity.

Coordinating with the Media

Organizations should be prepared to communicate with the media about utilities. During the early stages of an emergency, the media might wish to know if utilities are still functioning. This provides an opportunity to explain that the organization has plans for alternatives that will ensure that essential utilities are available to care for patients. If utility failures occur, the organization should provide the most up-to-date information about the situation and how it is being handled.

In health care organizations that establish their own media center, organizations should consider what types of utilities will be needed. For example, electricity and wireless capabilities are basic to ensuring access to telephones, computers, faxes, modems, and so forth and might be an issue to consider in managing utilities during an emergency.

Case Example: Lessons from One Storm and Multiple Disasters

The escalating disaster scenario of Hurricane Katrina put emergency management plans to a severe test at hospitals in New Orleans and elsewhere along the Gulf Coast in August and September 2005. One organization that was affected was Tulane University Hospital & Clinic, a 235-bed academic medical center near the Louisiana Superdome. In the chaos that was brought about by Hurricane Katrina and the subsequent flood, the hospital protected itself from widespread civil unrest, and the entire facility was successfully evacuated.

George Jamison, Tulane's director of facilities management and a *Life Safety Code*®* Specialist, played a key role in the hospital's emergency response. Shortly after the evacuation, Jamison described 10 lessons learned from the multiple disasters brought about by the storm. The 10 lessons cover aspects across all of the Joint Commission's emergency management standards, including managing utilities as described in Lesson 7. Although Hurricane Katrina left behind incredible damage, it also yielded important information about how health care organizations can make sure they are ready for escalating and multiple disasters.

1. Invest in the planning process.

Jamison says conducting hazard vulnerability analyses (HVAs) and developing a written emergency management plan have been among the hospital's top priorities. "We update our HVA every six months when we do our Statement of Conditions™," he says. Because of the risks identified in an HVA, the hospital augmented its stock of emergency items

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Case Example: Lessons from One Storm and Multiple Disasters, *continued*

such as pumps, sandbags, and inflatable door dams—items that proved essential in the disaster. Jamison says effort put into the emergency management plan paid off as well: "Staff were familiar with it and they did it. This experience shows that the more you put into the planning process, the more you get out of it.

"One thing hospitals need to tighten up on is actually 'walking out' their plan." Jamison encourages facilities managers to test their plans physically: "Walk to the triage area, walk to the decontamination area," he says. "You may even want to make a video of it to show during orientation." Jamison also recommends exercising contingency plans, particularly regarding utility systems. He places particular importance on shutoff valves; you should not only identify your main valves but operate them as part of regular testing.

2. Realize you might have to go it alone.

As part of its disaster planning program, Tulane established links with both the community at large and neighboring health care organizations. However, because the Katrina disaster was so widespread, these resources did not ultimately prove useful. In addition, police and public utility support were limited or nonexistent through much of the crisis. Although government and peer backup is a legitimate element of any emergency plan, Katrina showed the importance of mapping out an extra layer of protection for handling extreme and escalating situations.

"It's not so much the situation," says Jamison, "it's how you handle it." He notes that stocking up on emergency supplies is important; Tulane had food and water for five days and pharmaceutical supplies for seven days. Jamison also advocated establishing dependable relationships with key suppliers.

3. Exercise to the breaking point.

If Hurricane Katrina proved anything, it is that disasters do not always come in neat, single packages. New Orleans experienced not one disaster scenario but four—hurricane, flooding, utilities failure, and civil disturbance. "During Katrina, we had a series of multiple events," says Jamison. "I think the only way you can be prepared for that is to exercise it."

When conducting emergency management exercises, says Jamison, organizations should simulate the domino effect of actual disasters—sequential failures in power, communication, equipment, and so forth. "When you are exercising your emergency plan, your aim should be to stress the plan until it breaks. This is the real world." He says that instead of demoralizing staff, exercising to failure actually makes them more confident. "When you exercise to one thing after another, people learn they can always find a way to deal with the situation."

4. Establish command.

Jamison believes the most important lessons from Hurricane Katrina is "the three Cs"—command, control, and communicate. "Set up command, control it, and communicate it," he says. "If you do that, everything else will fit into place."

Jamison says Tulane's command model, a modified version of the Hospital Incident Command Systems, worked exceptionally well during the crisis. He cautions that organizations need to ensure that several backup people understand the emergency plan and be able to implement it. He also stresses the importance of identifying alternative roles and reporting lines within the command structure. One strength of the plan is that it clarifies the role of physicians, who are organized into teams under the chief medical officer. Jamison says assigning staff to cover essential functions took place early in the disaster response.

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Case Example: Lessons from One Storm and Multiple Disasters, *continued*

One way to support the command function is to create a condensed version of the emergency management plan that can be used for instant reference during a crisis. Tulane's condensed plan document includes key information broken out into bullet points.

5. Establish control.

Controlling the situation is always important during an emergency. In the aftermath of Katrina, it became a serious issue. Following the storm, it was critically important to limit and screen persons entering the hospital (including new patients). Jamison says emergency plans should map out all possible entrances. At Tulane, armed security staff acted quickly to lock down and guard entrance points. Internal security was also an issue; officers had to isolate and closely monitor certain individuals who threatened trouble.

Other aspects of control are maintaining fire safety (the hospital organized six two-person fire watch patrols) and handling the media. At one point, Jamison had to insist that a national television news crew follow his safety-related orders or leave the facility.

Jamison says that one of the most effective tools for maintaining control is giving key staffers badges identifying them as safety officers. "Any kind of badge of authority means a lot," he says. "When you're wearing a badge, people come up to you and ask what's happening and what you want them to do."

6. Communicate.

During the Katrina crisis, Jamison found that communication is half the battle. One element is having processes in place for communicating with patients. According to Jamison, patient communication during the crisis was "mouth to ear"—a hospital leader gave regular briefings to ambulatory patients, and then nurses carried key information to inpatients. Jamison says staff communication was also a priority. "Every five hours, we mustered the entire staff, everyone from the VP to the floor cleaners," he says. "We let them know what was happening, what they could expect, and what we wanted from them."

Katrina inflicted heavy damage on many hospitals' communication technologies—the storm not only downed telephone lines, it also ripped off the radio antennas from some of the hospitals' roofs. In addition, cell phones became inoperable. Fortunately, Tulane staff were ably to amplify the signal of a satellite telephone to achieve outside communication. It is important for organizations to reexamine the integrity of their backup communication systems. As the result of Katrina, Jamison planned to install a removable radio antenna that can be taken down before a storm and put up again after the winds have died down. The organization also found that it needed to train staff members in the use of basic radio equipment.

7. Take a hard look at utilities.

Joint Commission standards require health care organizations to plan alternative means of meeting essential building utility needs. Tulane's experience shows that ensuring utility backup requires foresight and creativity.

Jamison says Tulane's main emergency generator was vulnerable to flooding during the disaster. What saved the hospital were its portable generator sets, which could be moved to safe positions. Portable generators were able to support ventilators for critically ill patients. In addition, engineering staff had previously constructed portable power panels that provided flexibility in addressing electricity needs. Staff met fuel needs by siphoning gasoline from cars left in the hospital's parking structure.

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Case Example: Lessons from One Storm and Multiple Disasters, *continued*

Although expensive, positioning main generator units higher could be considered a priority for health care organizations in flood zones. Jamison says that when Katrina hit, Tulane had just committed the funds for putting two generators on the second floor of the parking structure.

Jamison notes that one utility issue often overlooked is sewer service. Prior to Katrina, he had obtained 1,500 pounds of cat litter. To help control rising sewage, bags of the material were placed around toilets in the days before the storm. Later, after sewer service was knocked out, the litter was used in the toilets. "It absorbs 80% of its weight," says Jamison. "You put two cups of it in a red bag and place it in the bowl." This method helped ensure sanitation throughout the crisis.

8. Plan seriously for an evacuation.

For most health care organizations, the primary strategy for responding to an emergency is "defend in place." Hurricane Katrina showed that this cannot be the only strategy, as do the emergency management standards. At Tulane, utilities failures, limited supplies, and civil unrest forced the command team to order an evacuation a day after serious flooding began.

Jamison and his crew created a helicopter landing pad on the top level of the parking structure by taking down light poles and painting large yellow arrows. The organization had determined that the structure would support a helicopter's weight. In accordance with the emergency management standard, the emergency plan included processes for tracking evacuated patients. When a helicopter arrived, a coordinator at the pad called down to the triage center for a specified number of patients. Nursing staff matched charts to wristbands and sent the requested patients up, sometimes with medications and intravenous apparatus. As a final check, an associate vice president stationed on the roof did a final confirmation before the patient was loaded onto the helicopter and flown to the preplanned alternative care site.

9. Plan to lock down.

In an evacuation, the main priority is getting everyone out safely. A complete emergency response, however, also includes strategies for mitigation and recovery. Jamison says it is crucial to secure potentially dangerous materials and take steps to support recovery. "If you can leave on your own terms, you will be better off," he says. "Our approach was to secure anything that people could use to hurt themselves, hurt others, or sell on the black market."

Jamison also took several steps to support the eventual recovery efforts. Staff stayed on top of garbage control—compartmentalizing trash in designated sections of the hospital during the crisis and continuing to bag garbage even as the evacuation drew to a close. Staffers also opened certain windows for ventilation. Before evacuating, Jamison and his crew disconnected breakers and demagnetized and degaussed MRI equipment. The bottom line: Minimize damage to the facility and enable a future reoccupation.

10. Rethink plans for family of staff.

In keeping with another Joint Commission standard, emergency management plans commonly include provisions for supporting family members of essential staff. Under normal circumstances, Tulane's approach—arranging discounted rates for family members at a nearby hotel—is a reasonable arrangement. The civil unrest following Hurricane Katrina, however, put everyone in serious danger.

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Case Example: Lessons from One Storm and Multiple Disasters, *continued*

Jamison says that although concern about family did not keep his staff from doing their jobs, it did slow them down. "It was hard, but this is probably the most awesome staff I have ever had." He said the experience was a sobering lesson for everyone. In light of it, health care organizations saw a need to rethink their strategies for ensuring the safety of family members during an emergency.

Not if, but when

Jamison says the biggest challenges of Katrina came not from the hurricane itself but from the aftermath. "We have 12 or 15 storms a year," says Jamison. "It's not a matter of if a storm will hit but when it will hit and how severe it will be."

No matter their location, all health care organizations can benefit by taking a similar attitude toward emergency management. Katrina showed that organizations need to make the worst-case scenario part of their emergency plans. The only way to survive an emergency is to expect it.

Source: Reprinted from Joint Commission Resources: 10 lessons from escalating disasters. *Environment of Care News* 9:2, Feb. 2006.

Case Example: Contingency Plans for Utility Systems

It's a Sunday evening in January, and your organization is weathering the biggest snowstorm it has seen in years. It is 25°F (–3.9°C) outside, and the windchill factor makes it feel like –10°F (–23°C). You just got off the phone with the manager of the city's steam power plant. There has been a failure due to the weather, and the plant is temporarily off-line. Consequently, your organization is without its city-generated steam heat. Fortunately, you have a contingency plan for just this type of situation; are you confident that the contingency plan will be effective?

The answer to that question might depend on whether your organization has recently tested its steam contingency plan. For example, what if your organization's steam contingency plan involves shutting off a valve in the street behind the main facility so that steam can be diverted back into the building, and what if the valve is the same one that was installed when the building was built in 1940, and the contingency plan was created by the individual who managed utilities at the time? In other words, what if the valve has never been tested? If the valve has not been tested recently, there is a good chance that the valve will break off in your hand when you try to shut it off. Not only would this not address the lack-of-steam problem your organization is facing, it would also possibly necessitate evacuating the building to another location where there was heat. What started as a utility outage would quickly transform into a crisis for your organization.

On the other hand, if you tested the valve last summer and it worked, the probability that it will work during the crisis increases. Even if the valve didn't work during the test, but you fixed the valve before colder weather arrived, your organization would have avoided a crisis and ensured the continuation of steam heat during the snowstorm.

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Case Example: Contingency Plans for Utility Systems, *continued*

"Many organizations created contingency plans for their utilities when their buildings were new but have not exercised them since," says George Mills, F.A.S.H.E., C.E.M., C.H.E.M., senior engineer, Standards Interpretation Group, The Joint Commission. "By periodically testing utility contingency plans during controlled situations that do not negatively affect patients, staff, and visitors, organizations can avoid a crisis and ensure the continuous delivery of quality of care.

Another Joint Commission Requirement

Utility systems are essential to the proper operation of the environment of care and significantly contribute to the effective, safe, and reliable provision of care to patients in health care organizations. Although there is an emergency management standard that deals with establishing strategies for managing utilities during an emergency, there is another Joint Commission standard that also addresses an organization's readiness.

According to one environment of care standard, organizations must manage their utility risks. This management process should not only ensure the operational reliability of utility systems, but also minimize the potential risks of utility system failures. Creating and exercising contingency plans, which involve backup systems that can be used in an emergency, can help minimize potential risks during a utility failure.

According to The Joint Commission, utility systems can include any of the following:

- Electrical distribution
- Emergency power
- Vertical transport (elevators)
- Horizontal transport (pneumatic tube systems and others)
- Heating, ventilation, and air-conditioning
- Plumbing
- Boiler and steam
- Piped gases
- Vacuum systems
- Communication systems (including data exchange)

Not every health care organization will have all these systems, but for any system present, an organization should have a contingency plan in place in case the system fails.

Determining Priorities

Depending on the type of organization, there might be different utility systems present. Addressing risks and potential failures in all utility backup systems at once is not realistic due to the potential lack of resources, such as time, money, and staff. Before testing contingency plans, an organization needs to make sure it is testing the most critical plans first. For example, addressing the lack of backup steam might be more critical than addressing an issue in the backup pneumatic tube system.

"Organizations should consider conducting a proactive risk assessment, such as failure mode and effects analysis, to prioritize what needs to be addressed first," says Mills. This type of assessment can help the organization determine potential utility backup system failures, identify the risks associated with those failures, prioritize issues to be fixed, determine ways to fix the priorities, and implement solutions to avoid potentially harmful situations. "By conducting a risk analysis first,

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Case Example: Contingency Plans for Utility Systems, *continued*

organizations can address the most critical issues immediately and create a timetable for addressing other issues in the future," says Mills. (Note: The hazard vulnerability analysis process that each organization uses as part of emergency management is also relevant to this approach.)

Timing Is Everything

When testing contingency plans, timing is everything. Organizations should plan to conduct a test when the effects of a potential failure would be minimal and when the safety of patients, staff, and visitors will not be compromised. "While it is important to periodically test contingency plans, it should be done in an appropriate way that does not negatively impact safety," says Mills. "Without careful forethought and planning, an organization's test can cause more harm than good." In the case of the previously mentioned steam example, an organization could consider conducting the valve test in July, when steam heat is not needed. That way, if the valve fails, patients, staff, and visitors are not negatively affected by the failure in the backup system.

"Organizations may also want to consider testing a utility's contingency plan during an emergency management exercise. For example, if an organization is conducting an exercise that involves a loss of potable water, the organization may want to exercise the water valves at this time to see if they function and if an effective contingency plan is in place," says Mills.

Planning for Failure

Before embarking on a test of a utility's contingency plan, organizations should set aside resources to address whatever failures might be discovered during the test. For example, if your organization is going to test the previously mentioned valve to divert steam heat, you should have funds in place to replace that valve if it breaks during the test. If an organization cannot allocate sufficient funds, then plans must be made for a secondary backup to the system being tested to ensure that a loss in backup utility will not affect the environment of care (EC) or patient safety. For example, if an organization tests its emergency power system, it would be appropriate to conduct a test when an alternative generator is present or easily accessible so that any loss of emergency backup power would be for a short duration.

Involving Others in Planning

When planning a test of a utility system's contingency plan, EC professionals should discuss the test with the organization's multidisciplinary group that addresses EC issues (this group might be called the EC committee or the safety committee). "It's important that any discipline that could be affected by the test be aware of it. Also, a multidisciplinary group may help anticipate problems the EC professional might not consider," says Mills. For example, if your organization is planning to test its medical gas utility backup system, everyone in the organization who would use medical gas should be aware that the test is going on and that there is a chance that the backup system could be compromised. Organizations should schedule tests well in advance and process any requests for tests in writing, to ensure that the verification and approval of the tests are documented. Before conducting a test, an organization should make sure any backup equipment or personnel are on site and ready to step in if the backup system fails.

During an actual utility failure is not the time to discover that your contingency plan is not effective. Organizations that regularly test their contingency plans and address any problems that arise are better prepared for emergencies and increase the likelihood of preserving patient safety and quality of care.

Source: Reprinted from Joint Commission Resources: Contingency plans for utility systems. *Environment of Care News* 10:1, Jan. 2007.

For Additional Assistance

The Joint Commission offers strategies on preventing adverse events related to electrical power failures in its *Sentinel Event Alert* Issue #37, found at http://www.jointcommission.org/SentinelEvents/SentinelEventAlert/sea_37.htm.

The *Alert* was published in response to clinical operations that were negatively affected when normal power was lost during the Houston floods of 2001, the northeastern United States blackout in 2003, and major hurricanes Charlie, Francis, Ivan, and Jeanne in 2004 and Katrina and Rita in 2005.

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