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LEARNING OBJECTIVES

1. Define potable water
2. Identify areas within SPD impacted by a water crisis
3. Describe actions to take during and after a mandated boil advisory
4. Develop an emergency water supply plan

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SELF-STUDY SERIES

Managing a water crisis

What do you mean we don't have any water?!

by Robert Williams

Sterile processing professionals face daily challenges. Specifically, steam quality issues, biologic failures, equipment breakdowns and staffing issues are common problems in sterile processing departments (SPDs) and managers typically have plans in place for when these happen. But there is a less common challenge that can catch the team off-guard and possibly turn the SPD upside down – a water crisis.

Water crises are often not top-of-mind for hospital leaders or sterile processing managers. Yet when water is not available or can't be used, instrument processing must come to a halt, which dramatically impacts the hospital's surgical schedule.

The crisis may be related to a breakdown in the water supply that causes an outage, but it may also be a lack of access to a specific quality of water needed for SPD systems and processes. Just as with all other potential problems, hospitals and especially sterile processing departments should have an emergency water supply plan (EWSP) in place to address these issues if they should arise.

It begins with potable water

Potable water is defined as water that has been deemed safe for human use or consumption. Potable water is also referred to as tap water or drinking water. To be considered potable, testing must confirm that contaminants and microorganisms in the water are below certain levels as specified by the U.S. Environmental Protection Agency (EPA).

Water can come from lakes, rivers, reservoirs, wells or a combination of these sources. None of these sources are potable. Often, they contain contaminants and microorganisms. Water utility companies that supply potable water are responsible for testing and treating water to achieve compliance with EPA regulations.

Each municipal water supply is maintained by local water agencies in each state. This includes the source from which water is drawn, treatment facilities, supply pipes to homes and facilities and all

required testing and monitoring. However, water supplied by a facility-owned well is the responsibility of the facility. The facility must ensure proper testing and treatment of the water prior to its use, as dictated by the EPA.

A number of things can happen to interrupt the flow of potable water to a healthcare facility. Water pipes can break, treatment facilities can malfunction, and major weather events like hurricanes and floods can contaminate the water sources on which facilities rely. When potable water is contaminated, municipalities may issue a boil alert to make water safe to drink or they may temporarily stop supplying it.

Impacted functions, systems

Water is a critical component of sterile processing. National standards and guidelines specify the water quality needed for various functions. For example, according to AAMI TIR 34 2014, "Water for the reprocessing of medical devices," manual cleaning of instruments should be carried out with tap water that is free from any contaminants that may cause a risk to the public (also referred to as potable water). Final rinses, however, require the use of *critical water*, which is achieved by using filtration systems to remove many of the minerals and metals in potable water, creating deionized or reverse osmosis water. These components are removed because they can cause staining, hard water deposits and other types of damage to surgical instruments and devices. The type of water required is determined by the process and equipment for which it is used.

The sinks used for reprocessing in an SPD require large volumes of water. Sinks are used when manually cleaning soiled or contaminated instruments and devices sent through for reprocessing. Water is used in initial rinse sinks, soak and wash sinks and for the final rinse after cleaning. After manual cleaning, instrumentation may go through additional automated cleaning processes.

Washer-disinfectors and cart washers are automated machines that clean, rinse and thermally disinfect instrumentation and case carts. They also use large quantities of water. Today's washer-disinfectors are designed to recycle some of the clean rinse water, but they still need gallons of water for proper function.

Ultrasonic cleaners use potable water to create cleaning solutions that are compatible with the cavitation action of the unit. Some ultrasonic cleaners are also capable of rinsing and thermally disinfecting the instrumentation. In these systems, appropriately treated water is used for the final rinse.

Cleaning and rinsing accounts for most of the water used in SPDs. However, high-level disinfection processes, both automated and manual, also use water to rinse instruments and devices after the cycle.

Some sterilization processes also use water. Steam sterilizers generate steam from tap water, and water is supplied to ethylene oxide systems to humidify the load. Liquid chemical sterilant processing systems use water to create the sterilant use dilution and to rinse the devices at the end of the process.

Lastly, water is used at eyewash stations, for hand hygiene and to create disinfectant solutions to clean department floors, counters and surfaces.

SPDs rely on continuously available potable water to clean, disinfect and sterilize devices and surfaces. Whether a department loses water pressure, is placed on a boil advisory or loses water completely, the unexpected change to the water supply can delay all processes within the department, which ultimately affects the sterile instrument supply and thus, the surgical schedule.

What can happen

When water has become contaminated or the conditions create an opportunity for contaminated water, advisories are issued by the water supplier, local and state governments, EPA or Federal Emergency Management Agency (FEMA). Advisories fall into three categories: Boil Advisory, Do Not Drink Advisory and Do Not Use Advisory.

Boil advisories are issued when a known or potential microbial contamination is present in the water that when ingested may make persons ill. Boiling the water kills the microorganisms, making the water safe to drink. Water can still be used for handwashing, hygiene, cleaning and laundry, but should first be boiled for one minute when the affected geographical area is below 6,500 feet elevation and for three minutes when above 6,500 feet.

Do Not Drink advisories are issued when chemicals or toxins in the water will harm a person when consumed. It may still be safe to use the water to flush toilets or wash hands, depending on the chemical or toxin in the water. However, using this water for preparing foods, drinking, oral hygiene, baby formula and ice is prohibited.

A Do Not Use advisory indicates that a harmful microorganism, chemical, toxin or radioactive material is in the water that cannot be safely removed with boiling and will harm persons when skin, lungs or eyes contact the water. Healthcare facilities must not use this water for any reason.

Contaminants can enter the water supply through a variety of events:

- Broken water lines that allow soil to enter the pipe.
- Faulty backflow valves or preventors that allow sewage or untreated water to enter the water supply.

- Flood water from heavy rains and natural disasters that enter the treatment centers and contaminate the water at the origination point.
- Low water pressure that allows contaminants to enter the water lines through microcracks within the lines. When pressure drops below 20 psi for more than one hour, contaminants can flow into the water supply from the cracks.
- Construction crews who strike water mains while digging, causing pressure drops in the system and allowing contamination to enter the supply lines.
- Freezing weather for long periods of time that interrupts water supplies. Frozen pipes can impede the flow, but during the thaw the pipes can also burst, and both conditions can leave areas without water.
- Dead animals at the origination of the water or in holding tanks that introduce contamination.
- Earthquakes and fracking that disturb ground water and introduce contamination.

All water advisories stay in effect until the underlying problem is located and corrected and the water is determined to be safe to drink once more. Of the types of advisories that can be issued, the most likely to impact healthcare facilities is the boil advisory.

What are a department's options when on a boil advisory? Most boil advisories are short-lived but can still have a significant impact on the facility. A boil advisory will directly affect sterile processing functions and indirectly affect operating rooms because of potential instrument shortages. Instruments exposed to potentially contaminated water may be subject to increased levels of microbial bioburden. In addition, because the department's washing, disinfecting, high-level disinfecting and sterilizing equipment typically requires potable water for operation, and a boil advisory indicates that the water is no longer potable, this equipment can't be used during the advisory. Furthermore, any instrument sets that were already processed with potentially contaminated water are considered contaminated and must be removed from inventory, both in sterile storage and assembly areas.

What to do

To minimize the negative surgical consequences of a water crisis, SPD and OR managers and directors should work together. First, they should take a count of all the available sterile instrument sets in inventory and match these to the needs of the



Photo courtesy STERIS

surgery schedule during the expected boil advisory period. Surgery schedulers will need to communicate with the surgeons and possibly move or reschedule elective surgeries. Critical instrument sets should also be allotted for unexpected emergency procedures. Depending on the anticipated length of the boil alert, it may also be necessary to arrange for instrument sets to be transported to another facility for reprocessing.

Boil advisories due to natural disasters may take days to resolve. For this reason, facilities should include water management as part of their disaster recovery planning, and their contingency planning should include water for the SPD.

When advisories are lifted

Your water utility company will notify everyone when the water is safe to use without boiling. Once this happens, SPD management should contact their local water facility to determine the best steps to proceed after the advisory is lifted. The Centers for Disease Control and Prevention (CDC) recommends flushing all equipment water lines following each manufacturer's instructions, draining and refilling hot water heaters and changing all point-of-entry filters of equipment that uses water (such as automated endoscope reprocessors). Water softeners should also be flushed, or specific cycles run according to the manufacturer's instructions. Water quality should be monitored by each facility's water department and monitored by their risk management and infection prevention departments. Equipment may need to be decontaminated before use if it was down for a longer period. Departments should always refer to each equipment manufacturer for recommendations.

At this time, SPD managers should also review instrument needs with the surgical team to prioritize any instrument backlogs requiring immediate sterilization.



Photo courtesy STERIS

Putting heads together

We have all heard it takes a village to raise a child, but it also takes a village to devise an emergency water supply plan (EWSP). Your facility should determine the appropriate departments and leaders needed to brainstorm, write a policy and implement it when needed. Identify all departments that use water and include them on the team. Members may include a facility/maintenance department manager, an infection preventionist, a perioperative manager/director, a surgical department manager/director, a sterile processing manager, a hemodialysis manager, a risk manager, a medical director, an operations officer and a food service manager.

Some important questions to consider when writing an EWSP are:

- How will the boil alert be communicated internally and externally?
- Is this a partial or complete loss of water?

- How long will the water crisis last; days, weeks or months?
- Which departments will be affected?
- How will these departments be affected (slowdown, shutdown or another compromise of use)?
- What should be done with soiled instruments and devices during a stoppage?
- What processes can continue with bottled or boiled water? Where can it be bought? Can the facility supply boiled water? How much is needed?
- Where can water be sourced (tankers, private wells, mobile water purification systems, etc.)?
- What alternative high-level disinfection or sterilization processes can be used during the event (vaporized hydrogen peroxide sterilizers, tabletop steam sterilizers using bottled water, etc.)?
- Where can reprocessing be outsourced?
- What specific steps are needed to bring the facility back online (e.g., flushing lines, changing filters, cleaning equipment, etc.)?

There are many details to consider when developing an EWSP, and plans should include short-term solutions for limited boil alert advisories as well as steps for long-term water outages. For example, one facility experienced a weeks-long unexpected regional water shortage caused by several burst public pipes. After being forced to cancel a high number of surgical procedures and incurring considerable extra costs for back-up water sources, it was easy for leaders to justify the \$500,000 expense to dig a private well and purchase water treatment equipment. This assured that the facility would have potable water during future long-term outages.

Don't get caught off-guard

A water emergency can cause a multitude of negative operational and financial consequences for healthcare providers. If your facility doesn't yet have a thorough EWSP to address water crises, it would be wise to put one in place as soon as possible. Both the EPA and the CDC offer great information to help with this planning. The "Emergency Water Supply Planning Guide for Hospitals and Healthcare Facilities" from the CDC is the perfect place to start.

If you are already prepared with a long- and short-term plan, review your plans regularly to assure that each stakeholder department knows its role and has what it needs to execute the plan. This will assure that you are prepared to minimize the negative impact to the facility, its staff and its patients and visitors. **HPN**

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CONTINUING EDUCATION TEST • JULY 2021

Managing a water crisis

What do you mean we don't have any water?!

Circle the one correct answer:

1. Which sterile processing equipment can be used during a water crisis?
 - A. Washer disinfecter
 - B. Steam sterilizer
 - C. Vaporized hydrogen peroxide sterilizer
 - D. Wash sink
2. A boil advisory is issued when known or potentially harmful microbial contamination is present in potable water.
 - A. True
 - B. False
3. What is present in the water during a No Drink Advisory?
 - A. Harmful microorganisms
 - B. Chemicals or toxins that are harmful when drunk
 - C. Radioactive materials
 - D. Food coloring
4. Who mandates a water boil advisory?
 - A. Central sterile department
 - B. CEO of facility
 - C. EPA, CDC, FEMA or local governments
 - D. Wildlife and Fishery Department
5. How long must the water pressure be below 20 psi to create an opportunity for contamination through microcracks?
 - A. 30 minutes
 - B. 45 minutes
 - C. One hour
 - D. 24 hours
6. Which would not cause a boil advisory?
 - A. Washer-disinfecter malfunction
 - B. Freezing temperatures
 - C. Construction
 - D. Low water pressure
7. Who would NOT be included on the team when forming an EWPS?
 - A. Facility manager
 - B. Security
 - C. OR supervisor
 - D. Chief of Operations
8. Which is the regulating body for water safety parameters?
 - A. Facility water manager
 - B. Central sterile manger
 - C. Environmental Protection Agency
 - D. Centers for Disease Control and Prevention
9. What can you use water for during a boil advisory?
 - A. Handwashing
 - B. Drinking
 - C. Washing instruments
 - D. Both A & B.
10. Which task is necessary before starting up SPD equipment after a boil alert?
 - A. Cleaning and decontaminating the sink
 - B. Disinfecting all work surfaces
 - C. Flushing water lines
 - D. Changing air filters

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