Epidemic/Pandemic Emergency Planning for Water Utilities

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Key Takeaways

Epidemics and pandemics are natural disasters that water utilities must prepare for and respond to.

There are mitigation measures that utilities can employ during an epidemic or pandemic to reduce the impact of these disasters on their operations and the communities that they serve.

The guidance and resources in this article should help drinking water utilities deal with present and future COVID-19 concerns, as well as other public health emergencies that will undoubtedly occur in the future.
The year 2020 will be remembered for the coronavirus (SARS-CoV-2) that spread across the globe and became a major pandemic. Daily life everywhere has been severely disrupted, and lacking clarity as to the final outcome of this public health emergency, it is important to recognize the tremendous challenges that water and wastewater utilities must overcome. In the United States, water and wastewater systems are designated as critical infrastructure, meaning that they are vital to public confidence and the nation’s safety, prosperity, and wellbeing (Presidential Policy Directive/PPD-21 2013). Furthermore, drinking water and wastewater services are designated as essential community lifelines per the US National Response Framework (USDHS 2019), which means these services enable the continuous operation of critical government and business functions essential to human health, safety, and economic wellbeing.

America’s Water Infrastructure Act of 2018 (AWIA) imposed several requirements on US drinking water systems serving more than 3,300 consumers—notably, a mandate for utilities to conduct comprehensive risk and resilience assessments (RRAs) to determine their risk from a wide variety of hazards. AWIA also requires that utilities prepare or update detailed emergency response plans (ERPs) outlining how the utilities, working with their emergency response partners, would respond to emergencies identified in their RRAs. The RRAs and ERPs focus on all hazards, including consideration of natural disasters, accidents, and intentional acts. While wastewater utilities and smaller drinking water utilities are not legally mandated to comply with AWIA’s RRA and ERP requirements, these systems can leverage extensive AWIA guidance made available to the larger drinking water utilities to conduct their own RRAs and update their ERPs.

Epidemics and pandemics should be included among the natural disasters to which drinking water and wastewater systems are potentially vulnerable (States 2010). Epidemics are regional outbreaks of communicable disease while pandemics, officially designated by the World Health Organization (WHO), are outbreaks that affect populations around the world. In certain respects, epidemics and pandemics differ from other natural disasters like hurricanes or severe winter storms in that the epidemic/pandemic can have a prolonged duration, lasting for longer than a year, with no predictable end date in sight.

This article describes consequences that may be experienced by drinking water and wastewater utilities during a severe epidemic or pandemic and mitigation measures that they can employ to reduce the impact of such disasters on their operations. This guidance is directly applicable to COVID-19 and should be useful for informing epidemic/pandemic response plans. Plans to deal with these public health emergencies, which are certain to occur again in the future, should be included in utility ERPs.

Pandemics Over the Past Century
While the coronavirus pandemic of 2019–2020 seems to be a unique incident, COVID-19 is actually the fifth officially declared pandemic to occur during the past 102 years.

• The 1918 pandemic, also known as the Spanish flu, hit the world in several waves during 1918–1920. The pathogen responsible for the pandemic was an influenza type A virus of the strain H1N1. Estimates of deaths attributed to this pandemic included approximately 685,000 Americans and more than 50 million people worldwide. It is estimated that approximately 40% of the world’s population was infected during this pandemic. With the development of vaccines and antibiotics to combat secondary bacterial pneumonia, the morbidity and mortality rates for influenza pandemics after the Spanish flu outbreak were significantly lowered.

• During the 1956–1958 influenza pandemic, also known as the Asian flu, the responsible agent was again an influenza A virus (H2N2 strain). Deaths resulting from this outbreak totaled 2 million worldwide.

• The 1968 pandemic, also known as the Hong Kong flu (influenza A, H3N2 strain), resulted in an estimated 1 million deaths.

• In 2009–2010, an outbreak of influenza A virus (H1N1 subtype) characterized as a swine flu spread across the world, resulting in as many as 500,000 deaths. In addition to these pandemics, there have been a number of infectious disease epidemics over the past decades involving non-influenza viruses such as Ebola and Zika. Although the Spanish flu catastrophe and subsequent widespread infectious disease outbreaks have had a significant effect on human health around the world, it is interesting to note that the bubonic plague outbreak of the 14th century—also known as Black Death—caused by a bacterium rather than a virus, surpassed the severity of the Spanish flu and is believed to have been responsible for more than 75 million deaths worldwide, including 30%–50% of Europe’s population.

Prompted by an avian influenza epidemic in Asia in the early 2000s, a number of drinking water and wastewater utilities began preparing flu emergency response plans, many of which were incorporated into the water system’s overall ERP (Van Atta & Newsad 2009). This planning was encouraged by regulatory agencies like the US Environmental Protection Agency (USEPA) and water industry organizations like AWWA.
While accelerated efforts are being made to control COVID-19, these measures take time, and as past pandemics have shown, a resurgence of the infection may occur. Another pandemic from a different novel pathogen is also possible. Therefore, epidemics and pandemics remain as natural disasters that drinking water and wastewater systems must constantly consider, and utility leaders should develop and maintain response plans in their utility ERPs.

**Potential Impacts**

The services drinking water and wastewater utilities provide are critical to protecting public health and maintaining public safety, economic wellbeing, and normal day-to-day life as we know it. Therefore, drinking water and wastewater systems are considered critical infrastructure sectors and lifelines for the communities they serve.

In addition to providing essential services to the general public, water utilities serve critical customers, including hospitals, nursing homes, and dialysis centers that require uninterrupted service, especially during a public health emergency. More broadly, water and wastewater services are critically important to the entire population during a pandemic/epidemic because pathogen transmission control specifically requires actions that rely on water, such as frequent handwashing.

One of the most likely negative consequences that utilities should anticipate during an epidemic or pandemic is worker shortages—especially among critical personnel such as treatment plant and distribution/collection system operators. Personnel may not be available to report to work for a variety of reasons:

- They are ill from the pathogen of concern.
- Workers are feeling sick and are not sure whether they have been infected with the pathogen of concern and are quarantining themselves until they can be properly diagnosed.
- Employees have been exposed to individuals who have tested positive for the illness of concern.
- Personnel are caring for sick family members.
- Employees are caring for children who are home due to school or day care closures.
- Personnel are reluctant to come to work for fear of becoming infected by fellow workers.

Another important contingency that water utilities must plan for during a major public health crisis is a shortage of treatment chemicals, critical supplies, and equipment resulting from disruptions in the national or international supply chains. Any potential supply disruption could be exacerbated by the common practice of operating inventories on a “just-in-time” basis. Supply chain disruptions could result from production slowdowns or stoppages in manufacturing as well as interruptions or slowdowns in transportation.

Additionally, utilities could experience budgetary problems resulting from (1) increased costs of chemicals and supplies during a crisis or (2) revenue shortfalls because potentially high unemployment could lead to increased payment delinquencies and the need for broader economic assistance to rate payers.

Finally, a utility’s day-to-day work activities could be impaired by an inability to perform routine field operations. It will be difficult to collect mandatory routine compliance samples if businesses, where samples are normally collected, are closed, or customers are reluctant to allow utility personnel to enter their homes because they are ill or fear coming into contact with possibly infected utility workers. Similarly, it may be difficult to gain access to businesses or private residences for activities such as reading or replacing water meters or lead service lines. Flint, Mich., recently resumed lead line replacement after an extended COVID-19–related pause.

**Pandemic Mitigation Measures**

There are a number of specific steps that water and wastewater utilities should include in their pandemic response plans to mitigate how these kinds of emergencies can affect their systems and customers. Specific areas of concern include maintaining an adequate workforce, protecting employees’ health, ensuring the system’s regulatory compliance is maintained, and reasonably continuing business operations. The following sections provide recommendations for utilities to address as they consider their pandemic responses.

**Maintaining an Adequate Workforce**

Measures must be taken to ensure that the utility maintains an adequate workforce to assure uninterrupted service during the course of the public health crisis.

- Communicate clearly and often with employees to reduce misinformation, fear, and anxiety.
- Identify employee positions critical for utility operations.
• Identify critical utility functions (e.g., treatment and distribution of finished drinking water, collection and treatment of wastewater, purchasing, etc.).
• Cross-train utility personnel to serve as backups.
• Maintain a roster of retired employees to serve as potential fill-ins.
• Use contract labor to fill in for absent employees.
• Reduce person-to-person contact by assigning administrative personnel to work from home and use video conferencing in place of in-person meetings.
• Prepare detailed standard operating procedures to assist replacement personnel in performing tasks they may not be familiar with.
• Prepare clear succession plans in case key supervisors cannot report to work.
• Re-examine leave policies for employees to stay at home to care for sick family members or children who are home because of school or daycare closures.
• Establish protocols for absent and previously sick individuals to return to work (especially if they were positive for the disease of concern).
• Keep employees updated about the utility’s pandemic response plan and any unique policies relative to leave, pay, and benefits.
• Encourage employees to develop individual response plans to ensure that their families and dependents are safe (e.g., plans for caring for children who are home because their school has closed).

Protecting Workforce Health
Utilities are not only concerned with preserving the physical health of their employees; they must also address everyone’s mental and psychological wellbeing. It is important that staff members not feel unduly stressed by the idea of reporting for work.

• To the extent possible, encourage employees to follow recommended infection control protocols such as social distancing, wearing face masks and other personal protective equipment (PPE), avoiding touching their faces, and regularly washing their hands.
• If tasks require employees to work closely together in confined spaces, issue and replace PPE as necessary.
• Encourage employees to obtain immunization for seasonal influenza, as well as the vaccine for the COVID-19 virus when it becomes available.
• As possible, stagger shifts and schedules and spread workstations and offices to reduce worker-to-worker contact.
• Divide personnel into teams or pods so that if one team member tests positive for the pathogen, other teams will limit their exposure; e.g., one team may be on duty for a week while the alternate team stays home.

• Make hand soap and sanitizer available and set up sanitizing stations.
• Don’t allow employees to share headsets or computer keyboards, and clean commonly touched surfaces such as workstations, countertops, doorknobs, light switches, and vehicle interiors (e.g., steering wheels, door handles).
• Place no-contact infrared thermometers in work areas to facilitate worker self-checks.
• Advise employees to be aware of signs of illness before coming to work each day, and to stay home if sick.
• Advise employees to go home if they become sick while at work.
• Establish a work policy for workers who have been exposed to people who have tested positive for the pathogen of concern.

Water and wastewater services are critically important to the entire population during a pandemic/epidemic because pathogen transmission control specifically requires actions that rely on water, such as frequent handwashing.

• Conduct health screenings when personnel arrive at work (may include a temperature check).
• Close nonessential facilities such as fitness centers, lunchrooms, and other areas where people congregate.
• Thoroughly clean and sanitize areas used by workers who have recently tested positive for the pathogen of concern (deep cleaning).
• Increase air exchange in the workplace and increase the contribution of outside air. Add air filtration units if practical.
• Immediately report employee illnesses to the human resources department.
• Consider safe practices for receiving deliveries and shipments to reduce contact between employees and delivery personnel (e.g., drop boxes for deliveries).
• Discourage or postpone nonessential business travel or meetings, especially to epidemic hot zones.
• Reduce shared travel; e.g., direct employees to individually drive rental vehicles or even personal vehicles
to dispatch to a work site in the field rather than have several employees ride in the same vehicle cab.

- Allow workers to take their work vehicles home and back again to the field or work site.
- Close facilities to the public, including plant tours and visits from salespeople.
- Postpone nonessential tasks requiring employees to enter the homes of customers and require employees to wear PPE if they must enter customer homes and businesses.
- With public health officials, explore the possibility of critical utility personnel receiving priority consideration for distribution of PPE, medications, and immunizations.
- Consider the possibility of housing and/or sequestering critical employees at utility facilities (“essential employee shelter in place”).
- Ensure that contractors whose employees physically interact with utility staff have their own safety plans.
- Consider administrative leave for employees who can’t work from home but are immunocompromised or at too high of a health risk to be exposed to others at work.

**Ensuring Regulatory Compliance**

Even though the utility is dealing with an international health crisis, it must still comply with routine drinking water and wastewater regulations designed to guarantee the public’s health.

- Keep regulatory agencies up to date on your utility’s operational status.
- Discuss with these agencies potential regulatory compliance flexibility during the emergency.
- Communicate regularly with laboratories performing compliance testing to ensure their ability to receive samples, conduct tests, and report results in a timely fashion.
- In the distribution system, investigate alternate sites for compliance sampling and testing in case primary sites are unavailable because of closed businesses or sick residents.

**Maintaining Business Operations**

While drinking water and wastewater activities are fundamentally public health functions, they are also businesses and must ensure that they can stay in business during the public health emergency.

- Designate a utility pandemic response team and schedule regular meetings along with frequent communications with utility management.
- Ensure that utility emergency response plans, pandemic response plans, continuity of operation plans, and business continuity plans are up to date.
- Share plans and coordinate responses with consecutive water systems, emergency management agencies, etc.
- Revisit mutual aid agreements with other utilities to share critical resources like personnel, equipment, and supplies (e.g., Water/Wastewater Agency Response Network [WARN]).
- Identify essential supplies and services needed to sustain utility operations and maintain adequate supplies.
- Communicate frequently with suppliers of treatment chemicals and supplies and develop contingency plans for alternate sources and/or substitute products.
- Prepare business plans for operating on reduced revenues that might occur during a prolonged regional economic downturn.
- Examine policies for financial reserves and adjust as needed for potentially higher material and labor costs as well as increased pandemic-related expenses (e.g., office shielding, air system filtration).
- Determine which utility functions/operations/projects are critical and which could be postponed.
- Encourage alternative payment methods to replace face-to-face transactions with customers (e.g., online, mail, drop boxes).
- Postpone customer shutoffs for nonpayment to sustain public health and sanitation during the outbreak; restore services that had previously been shut off.
- Consider suspending late fees, expanding customer payment assistance programs, and postponing planned rate increases.
- Determine and address any business impacts from increased employee absenteeism.
- Increase support for employees working remotely.
- Increase awareness of cybersecurity concerns and protective measures for personnel working remotely, possibly on less secure computer networks.
- Provide necessary equipment for employees working from home.
- Before the incident ends, begin putting together an after-action report and corresponding improvement plan.

**Legal Considerations**

Certain legal considerations may be associated with changes in some policies or operations when responding to a pandemic. The following comments do not constitute official legal advice, and utilities must discuss all issues with their legal counsel and human resources divisions. The following are some areas that may need legal review or confirmation as they apply to all applicable regulations.

- All medical information concerning an employee must be kept strictly confidential.
• When an employee calls in sick or returns to work following an absence, the employer can ask the individual whether they have experienced symptoms associated with the current public health emergency.
• An employer cannot question an employee about underlying medical conditions the employee may have.
• Employees may be entitled to leave, for their own illnesses, under the federal Americans With Disabilities Act.
• Employees may be entitled to leave to care for sick family members under the federal Family and Medical Leave Act.
• An employer can require employees with symptoms of the epidemic/pandemic disease to stay home or to leave work.
• An employer can require a doctor’s note of fitness for an employee to return to work after an absence.
• Importantly, if an employer becomes aware that an employee has tested positive for COVID-19 (or the pathogen of concern), the employer may not disclose the identity of the infected individual to other members of the workforce; employers may only advise other employees that there has been a reported case among staff and the steps that are being taken to protect the rest of the workforce.

Communications
During any disaster, it is important for water and wastewater utilities to communicate clearly and regularly with their employees and customers. Critical messages must be communicated to employees:
• The utility is committed to keeping all workers safe.
• While employees’ work is important, this is especially true when a community responds to a public health emergency.
• The utility is open to workers’ suggestions on how to better respond to ongoing and new challenges.
There are critical messages for customers and the public:
• The utility is committed to keeping all customers and the public safe.
• The utility can handle this emergency with the community’s support and understanding.
• While public interactions may be limited to prevent the virus’s spread, the public should anticipate no disruption in their drinking water and wastewater services as a result of the pandemic.
• Care should be taken when restarting building water supplies after a shutdown.
Communications delivered to employees, customers, and the public are most credible if they are supported by official statements from authoritative agencies. Examples of statements issued by several key organizations in 2020 relative to the COVID-19 pandemic are listed in the sidebar. “Statements From Agencies and Organizations Concerning Drinking Water Safety.”

Drinking Water and Wastewater Workers Are Essential Employees
The water sector is considered a critical infrastructure industry in the United States, and according to the National Response Framework, the water sector is also considered to be an “essential community lifeline.” Like medical personnel, emergency responders, food supply workers, and individuals working in other critical infrastructure industries (e.g., electricity, communications), water industry employees are considered essential workers. During the COVID-19 crisis, when many US state governors closed “non-life-sustaining businesses” and directed the general public to stay at home, water utility workers were exempted from these orders. Essential workers such as water and wastewater personnel need to have access to roads when restrictions have been put in place.

In March 2018, the US Department of Homeland Security’s Infrastructure Security Division published the Crisis Event Response and Recovery Act Framework. This framework outlines phased re-access levels to areas impacted by a disaster, ranging from Level 1 (Emergency Response) to Level 4, (General Return). Level 1 provides first responders, along with utility crews, immediate access to the affected area (Pickard & Howachyn 2020).

Along these lines, the US Centers for Disease Control and Prevention (CDC) has issued guidelines for critical infrastructure workers to help determine when they can report to work if they have been exposed to individuals who have tested positive for the COVID-19. According to the CDC, exposed personnel may return to work as long as they are asymptomatic and follow conditions like taking their temperature before going to work, wearing PPE, and practicing social distancing as much as possible (CDC 2020).

Important Sources of Information for Utilities Dealing With Epidemic/Pandemic Situations
Much information has been published concerning COVID-19 response plans and guidance for drinking water and wastewater utilities, but an especially useful report is USEPA’s “Incident Action Checklist for Pandemic Incidents” (USEPA 2020). This document, issued in March 2020, contains specific suggestions for water utilities to continue providing services during this pandemic or future public health emergencies.

Several key websites provide official guidance from authoritative agencies dealing with the pandemic. These websites are regularly updated with new advice based on
developing information. Important sources of information include the following:

- USEPA: https://epa.gov/coronavirus
- CDC: https://cdc.gov/coronavirus
- US Department of Homeland Security: https://cisa.gov/coronavirus
- WHO: https://who.int/coronavirus
- Water Environment Federation: https://wef.org/coronavirus
- AWWA: https://awwa.org/coronavirus

The resources and guidance in this article should help drinking water and wastewater utilities deal with the coronavirus emergency now and with any future resurgence. However, this information is also useful in the development or improvement of epidemic/pandemic response plans that utilities need for addressing future public health emergencies.

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AWWA Resources

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These resources have been supplied by Journal AWWA staff. For information on these and other AWWA resources, visit www.awwa.org.