

Spillover and Cascading Crises in Public Health and Water Systems: The Orlando Liquid Oxygen Shortage

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Abstract: In August 2021, COVID cases spiked in Florida with over 24,000 breakthrough cases per day making Florida the state with the highest increase at the time. Florida saw an increase in hospitalized COVID-19 patients during the last two weeks of August and became the 3rd state in the U.S. to exceed 3 million COVID cases. Not only did this impact public health, but it also created an unforeseen impact on the municipal water system. The surge in COVID cases created a surge in demand for treatment, one in which included liquid oxygen, used for respiratory therapy. Without liquid oxygen, ozone cannot be created and without ozone, the drinking water would be limited, leading to discoloration, a smell like rotten eggs, and questions about safety for consumption. Orlando officials issued an advisory requesting that residents reduced their frivolous water usage for at least two weeks. We use the Orlando case to explore the convergence, cascading and overlapping conditions of crises events. We argue that multiple events, interacting and overlapping will become increasingly common.

Keywords — Cascading crises, crisis communication, Orlando, public health, water

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INTRODUCTION

The prolonged nature of many public health emergencies such as the COVID-19 pandemic, means that these events are likely to have unforeseen consequences and intersect and spill over into other domains. Management of multi-event crises or crises that create secondary spillover impacts is complex and more difficult. Traditional crisis management approaches may not be appropriate when multiple events occur simultaneously. Unfortunately, the existing crisis literature primarily theorizes about responding to single events that are largely contained [7]. Some research traditions, however, have recently been evolving surrounding the multi-hazards risks, such as compounding crisis [9], spillover crisis [10], and the cascading crisis [3]. While these concepts explain the complexities surrounding multi-event or interconnected crises, the concepts have different exigencies and theorized different types and natures of crisis events. For example, a compounding crisis combines two unrelated crises that occur in close succession. Meanwhile, the spillover crisis concerns the effects of a crisis that creates uncertainty and disruptions for other systems or organizations

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[10]. In this case study, we examine case of a spillover crisis involving a community's public health system and municipal water system.

CASE OVERVIEW

Amid the spike in COVID cases in Florida, Orlando faces an intersecting crisis implicating both water and public health systems and demonstrating unanticipated connections. In late August of 2021, Florida has reported more breakthrough COVID cases than any other state with around 24,000 cases per day [5]. This COVID surge resulted in increased demand for treatment, including resources such as liquid oxygen used in respiratory therapy [1]. Rising hospitalization rates have reduced the supply of liquid oxygen. Liquid oxygen is also used by Orlando Utilities Commission (OUC), for purifying water for customers in Orlando surrounding cities in Orange County. Liquid oxygen is used to create ozone, one of the most potent disinfectants used to purify drinking water. Ozone also removes hydrogen sulfide gas from the water. Without ozonation, drinking water may not be safe and will smell like rotten eggs and have a brown color [8]. On average, OUC receives about 10 tanks of liquid oxygen every week. During the COVID surge August 2021, deliveries slowed by around 50% [8,5]

On Friday, August 20th, Orlando officials requested that residents cut back on frivolous water usage, such as long showers, filling pools, watering lawns, and washing cars for at least a two-week span [1,4,5,] OCU noted: "We ask that customers continue to limit watering their yard and other non-essential water use until further notice. We appreciate our community's effort to conserve water, and it's critical that we continue to work together every day to reduce our demand for water even more" [4]. The OUC specifically requested limits to lawn watering. The utility targeted a 25% reduction in water usage, much of which could be achieved by suspending watering [4]. Although the initial expectation was that supplies of liquid oxygen would be restored within two weeks although officials noted that there were no guarantees.

Water treatment professionals have long recognized the need to maintain critical supplies to ensure drinking water safety and reliability. Common engineering practice is to maintain a 30-day or longer supply of critical chemicals. In June 2021, Section 1441 of the Safe Drinking Water Act was enacted to address supply chain issues. Under this program, when public water systems encounter potential challenges in securing chemicals and supplies necessary to ensure the safety of drinking water they can apply to the EPA for assistance. The EPA then publishes a notice in the Federal Register of the application, unless waived protect the public health, and will decide to issue or deny the certification of need. If certification is granted, the Undersecretary for Business and Industrial Security in the Department of Commerce require "manufacturers, producers, processors, distributors, and repackagers of the chemical or substance identified in the certification of need...to provide the chemical or substance in the amount EPA determined was necessary" [2].

Throughout the pandemic, chemical supply issues have emerged and been routinely resolved. Since the Section 1441 of the SDWA was enacted (June 2021) until August 23rd, the EPA received 15 applications. In the August 13, 2021, edition of the Federal Register, 10 of these 15 applicants were published. Of the 10 applications published, 9 requested assistance securing forms of chlorine used for disinfection. The remaining application requested assistance securing a chemical (coagulant) used to remove suspended particles from drinking water.

POSSIBLE CAUSES

The August 2021 surge in COVID cases and hospitalizations in Florida were twice the rate of previous spikes. An official from AdventHealth stated that hospitals are "dealing with a crisis of unprecedented proportions" [6]. Buddy Dyer, Orlando's Mayor, noted that the influx in cases and shortage of liquid oxygen was a result of the low vaccination rate in Florida. He described the pandemic as now voluntary, and that people could simply opt-out by getting vaccinated [6]. His stance was supported by the memo that John Hopkins issued in January 2021 that included a warning about shortages of liquid oxygen [6]. Mary Mayhew, with the Florida Hospital Association stated, "We are using an unprecedented volume and level of oxygen," [6]. Dyer pointed to the ripple effect of the lack of residents receiving the vaccine, hospitals filling up with COVID patients, and a rising demand for liquid oxygen.

PROJECTED EFFECT

The duration of the liquid oxygen shortage was not clear given its relationship to COVID-19 hospitalizations. Florida saw a 28 percent increase in hospitalized COVID-19 patients during the last two weeks of August 2021 and had become the 3rd state in the U.S. to exceed 3 million COVID cases [1]. Failure of vaccine uptake and failure to lowering water usage, could exacerbate the shortage and further limit water treatment [4]. Even if residents and companies refrain from the non-essential use of water, shortages may persist. In late August, WFTV-TV reported that only around a two-weeks supply liquid oxygen was available for treating the water that is provided to over a million people [5].

In addition, although Orlando was the only city affected by this shortage in late August concern was expressed about impact on other water systems. The high number of cases in Florida places other major cities like Tampa and Jacksonville at risk. A survey administered by the Florida Hospital Association, found that statewide there were 68

hospitals that had less than 48 hours left of oxygen [5]. A warning was sent out in the Tampa Bay area to over 2.5 million residents that due to the shortage they might begin to notice a change to the taste and smell of their drinking water [5].

Jacksonville, in contrast, has two facilities that treat water with oxygen. Jacksonville officials do not perceive that they will be impacted by the shortages because unlike OUC, they only use oxygen for “aesthetic water improvements” such as smell and taste and not to purify the water [6]. In fact, JEA Engineer, Ryan Popko, stated that the distribution of liquid oxygen has ceased at the downtown location over the last several months for reasons unrelated to the shortage and demand. He followed up to say, “But both our systems could be shut off and it would not affect our supply or the quality of our water” [6].

CONCLUSION

This study brought attention to water as an essential resource that is closely tied to many other activities and systems. The case in Orlando urges citizens, not just in Orlando, but in places everywhere to be more cognizant of potential opportunities for crises to coexist. Crisis planning needs to consider cases where crises intersect, including those involving water systems. Large scale risks, such as climate change and emerging infectious diseases, create greater possibility of cascading and converging crises and should also be considered. Future research studies should examine other cases where crises coexist and should create conceptual distinctions between cascading, intersecting, spillover and converging crises.

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