

Tracking the Spread of Coronavirus through Sewage

By Joan B. Rose, PhD

June 5, 2020

In a nutshell...

Properly treated sewage is essential to public health protection. This article discusses ongoing research into the potential role of wastewater in the spread of coronavirus and how tracking the virus in sewage can help align community resources and approaches in fighting the pandemic.

Researchers all over the world who are studying SARS-CoV-2, the virus that causes coronavirus (COVID-19), are simultaneously involved in a global experiment to fight the pandemic. One area of intense study is the potential for “wastewater surveillance” to address its spread. That is, can evaluating the virus in sewage help track the spread of COVID-19 in U.S. communities? Ideally, to identify and protect at-risk populations without testing every person, especially while diagnostic tests remain in short supply.

This rapidly evolving research is [in the news](#) and has generated many scientific and public health inquiries. New collaborations, studies, and reports emerge almost daily on coronavirus and sewage. I am leading some of this research and wanted to share my perspective on its current status and implications for combating the pandemic.



Coronavirus Is Shed in Feces

The respiratory virus typically enters through the eyes, nose, or mouth. But infected persons can shed large amounts of coronavirus in their stool (feces). As it turns out, the cells for virus replication are also found in the intestinal tract. Similar to other pathogenic viruses, such as adenovirus and hepatitis A virus, shedding can continue for days or even weeks in former patients and in persons who never had symptoms. This underscores the importance of safely managing fecal wastes in healthcare settings. Most current information on fecal shedding of coronavirus comes from hospitalized patients. Less is known about shedding in persons with mild or no symptoms. Most hospital and household sewage is collected and transported to local wastewater treatment plants. The public health implications of coronavirus processing through sewage treatment facilities are [believed to be minimal](#).

Can You Get COVID-19 from Sewage?

Getting COVID-19 through sewage is thought to be unlikely. There is no large database to date and no final consensus on whether the virus leaves the body “unscathed” and remains *viable* (i.e., capable of causing infection) in stool. Further, coronavirus is not expected to survive conventional sewage treatment and disinfection processes. Thus, there is no strong evidence to date of direct transmission of coronaviruses and COVID-19 by a *fecal-oral* route. Nonetheless, [researchers](#) from University of Stirling in the U.K. recently warned that the potential for spread of COVID-19 through sewage “must not be neglected” in the larger fight to end the pandemic. The risks of enteric and possibly respiratory viruses are magnified in developing parts of the world where safely managed sanitation systems are limited or absent.

What is clear is that transporting and treating coronavirus in sewage, often using chlorine and chlorine-based disinfectants, can produce aerosols that increase the potential for the virus to be inhaled. To ensure the protection of wastewater workers during and after the pandemic, the Water Environment Federation recently formed a [Blue Ribbon Panel](#) to evaluate biological hazards and enhance the use of personal protective equipment. (The Water Quality & Health Council previously wrote about [protecting drinking and wastewater workers](#) during the pandemic.)

Tracking Coronavirus in Sewage

Coronavirus is not likely to remain active in sewage, but its “genetic signature” can help [track its spread and levels](#) in urban and suburban communities. Wastewater surveillance may be able to help evaluate how well social distancing, masks, and other approaches are working in a community. It can also help identify hot spots in the “sewershed.” Such sampling can provide a relatively comprehensive snapshot of coronavirus health in a given city, town, or even neighborhood. It may also be able to help give hospitals advance warning of an impending outbreak.

Finding coronavirus in wastewater works much like a diagnostic test for people. Researchers first collect the wastewater sample and extract the genetic material (RNA for this virus) from the sewage samples. They then search for RNA that is specific to SARS-CoV-2. This type of disease surveillance has successfully tracked enteric viruses, including hepatitis A, norovirus, and poliovirus. The strategy may prove particularly useful during the pandemic given lagging diagnostic testing.

So far, the study results have been promising. An [early survey](#) of a large urban sewage treatment facility in Massachusetts found unexpectedly high concentrations of coronavirus genetic material. The results suggested that far more people had been infected than were identified by diagnostic testing. Dozens of surveys are ongoing or planned across the United States, from [Miami](#) to [Minnesota](#). Multiple [international studies](#) are also underway, including early surveys in Netherlands, France, and Australia.

International Task Force

In April 2020, I was appointed chair of the International Water Association’s (IWA) [COVID-19 Task Force](#). We are charged with providing the water sector with state-of-the-art science as it becomes available on the novel coronavirus pandemic and measures needed to protect both workers and public health. Our work will include preparing white papers and fact sheets and organizing webinars on a wide variety of topics, including those discussed in this article. No doubt, one of the biggest challenges will be processing the deluge of information and communicating it effectively to national governments and water utilities alike. The ultimate goal is to provide scientific knowledge to the global community, share lessons learned, and assist in developing practices where support for public health decisions can be implemented.

Final Thoughts

This is an extraordinary time in public health. The IWA Task Force effort aims to make accessible additional water and wastewater research as it emerges in the fight against the pandemic. The Clean Water Act established that wastewater management is a major pillar of U.S. public health. The coronavirus pandemic reminds us that we can do even more to protect our communities by monitoring our sanitation programs.

Joan B. Rose, PhD, is the Homer Nowlin Chair in Water Research at Michigan State University and a member of the Water Quality & Health Council.