Wastewater monitoring supplies data for preventative public health action

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The Ohio Department of Health established a statewide wastewater monitoring network as an indicator of COVID-19 transmission in the community. The robust network has resulted in expanded partnerships and supports early, broad, and equitable detection of disease.

The "What"

In the early stages of the COVID-19 pandemic, community lockdowns, mask mandates, and the identification and isolation of infected individuals were a few of the strategies implemented to limit the spread of the disease. These control strategies relied on implementation of widespread and effective clinical testing, which was challenging due to high associated cost and issues surrounding access and timely results reporting. Additionally, a large proportion of COVID-19 virus carriers are asymptomatic.

In response to these clinical testing shortcomings, Governor Mike DeWine asked the Ohio Department of Health (ODH) and the Ohio Environmental Protection Agency in May 2020 to develop a statewide wastewater monitoring program capable of detecting SARS-CoV-2 in untreated wastewater to provide an early warning of disease increase in communities. Within two months, the Ohio Wastewater Monitoring Network (OWMN) transitioned from theory to reality. With assistance from state and federal agencies (including funding from the Epidemiology and Laboratory Capacity for the Prevention and Control of Emerging Infectious Diseases (ELC) Cooperative Agreement), university researchers, and commercial laboratories, a robust sampling, analyses, and application strategy was developed.

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The "So What"

OWMN quickly grew to include over 70 monitoring locations around the state contributing a total of 147 wastewater samples each week. By September 2020, graphical representations of the trend of SARS-CoV-2 concentration in wastewater and normalized viral gene copy results at each of the participating locations were available on ODH's website making it easy for local health districts, communities, utilities, and the general public to retrieve information that could help inform public health action and personal decision making.

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Additionally, OWMN helped forge new partnerships between wastewater treatment facilities and personnel at local health districts. For example, epidemiologists at the City of Cincinnati's Health Department observed that levels of SARS-CoV-2 virus in wastewater were following the same patterns as clinical cases in the area. This changed around mid-October 2022, when increasing levels of the virus were being detected in wastewater while clinical cases were trending down to very low community transmission rates. The epidemiologists took a closer look at historical clinical data compared to the wastewater data being collected at the Cincinnati Metropolitan Sewer District (MSD) and determined that exacerbation of COVID-19 transmission in the community was common at the end of October.

The health department acted on this finding by sending an alert to their high-risk congregate settings and healthcare providers. Due to an increase in at-home testing and a decrease in case reporting, Cincinnati's Health Commissioner and Regional Infection Board acknowledged that wastewater monitoring was becoming a better indicator of disease transmission in the community than clinical case analysis. Since then, the partnership between the health department and MSD has continued to grow, and the two entities have begun a subsewershed monitoring project in the area in collaboration with ODH.

The "Now What"

Wastewater monitoring for community health has proven to be a reliable and inexpensive tool to assess infectious disease trends in a community. It supports early, broad, and equitable detection of disease by capturing stool from everyone in a given wastewater system and is therefore not dependent on the availability of clinical testing resources or health services. The success of wastewater testing during the COVID-19 pandemic reinforced its potential as a useful public health tool going forward. With sustainable ELC funding and investment, wastewater could be used to monitor a variety of infectious pathogens and provide useful insights into patterns of disease in communities, support disease investigations and control, health services planning, as well as the evaluation of prevention and control measures.