

Using Wastewater-Based Epidemiology (WBE) to Track the Prevalence of SARS-CoV-2 in Municipality Sewers

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The COVID-19 pandemic had a profound impact on communities around the world. Wastewater-based epidemiology (WBE) has emerged as an effective tool to support public health decisions and actions. Wastewater surveillance has many advantages because it is independent of clinical testing and captures the whole community including asymptomatic individuals. Methods were developed to measure SARS-CoV-2 viral fragments in wastewater using PEG precipitation with centrifugation, RNA extraction and qPCR focused on the CDC N1 and N2 gene targets. In addition, the pepper mild mottle virus (PMMoV) was measured and applied to normalize the SARS-CoV-2 signal. Extensive QA/QC has been applied, including testing for qPCR inhibition. Collaborating closely with Public Health Units and municipalities, a surveillance program was established in several communities in southern Ontario with over eight routine sites. Sampling has occurred three to six days per week since the summer of 2020 and reported directly and rapidly to the public health teams and made available on several public dashboards. Comparisons with conventional clinical testing have demonstrated that the use of WBE was very effective at tracking trends in the spread of the virus within a community. When the Omicron wave hit Ontario in December 2021, it overwhelmed the clinical testing, and this was further impacted by changes and reductions in the clinical testing programs. Wastewater surveillance of SARS-CoV-2 emerged as an independent, well-documented approach to continue monitoring the spread within the community and was used to estimate clinical cases in a region. WBE continues to be one of the most effective ways to monitor SARS-CoV-2 in communities and the lessons learned will be important for future monitoring of existing and emerging diseases.