Wastewater Surveillance In COVID-19 Control

By **BusinessToday** - January 19, 2023

Recently, local media reported that the Ministry of Health, Malaysia had detected SARS-CoV-2 during wastewater surveillance at entry points (airports) in the country, and internationally, it was also reported that China had begun SARS-CoV-2 wastewater surveillance for selected cities after the cessation of the country's 'Zero Covid Policy'.

Wastewater is primarily defined as water flushed down toilets and entering the local sewage treatment system. It represents the pooled faecal sample of the communities linked to this sewage system. Wastewater surveillance is part of the environmental surveillance for diseases where the pathogens are excreted in human faeces such as COVID-19, polio, and cholera. In wastewater surveillance, samples of untreated sewage from selected communities and institutions are routinely collected and sent to laboratories for identification and quantification of virus content and testing for different or new virus variants. The advantage of wastewater surveillance is it provides a rapid real-time 'snapshot' of the disease prevalence in the community where the wastewater was sampled from.

Wastewater surveillance also addresses challenges of disease underreporting due to asymptomatic infections, self-home treatment, and delayed or absent notifications

from medical practitioners. Information from wastewater surveillance can be used to monitor disease burden patterns, reintroduction or emergence of a new pathogen/variant, and even evaluate the impact of community behavioural campaigns such as masking and physical distancing.

An example of the importance of wastewater surveillance is the detection, in 2022, of wild polio virus in sewage samples during routine testing in London and New York before any clinical cases were reported. This prompted the local health authorities to implement immediate measures to enhance the coverage of primary polio vaccination together with polio boosters in at-risk communities.

Wastewater surveillance cannot replace the existing disease notification system and clinical testing as the wastewater comes from pooled community sewage samples and cannot be used for individual diagnosis. Apart from this, technical and logistic challenges can also affect the accuracy of the results of wastewater surveillance. However, the information from an effective wastewater surveillance system can greatly complement existing notification system as it provides an early warning alert for local health authorities to implement prompt targeted interventions in the communities at risk as wastewater surveillance picks up the pathogens earlier before an outbreak occurs in a community.

Since the emergence of the COVID-19 pandemic in 2020, there has been ongoing research into the transmission dynamics and ways to curb the disease spread. It is known that the SARS-CoV-2 virus spreads mainly through oral and nasal secretions. However, the virus is also shed in stools for prolonged periods of time. Individuals infected with the virus can shed the virus in their stools, irrespective of whether they have symptoms of COVID-19.

As a measure to control the spread of COVID-19, countries worldwide have set up surveillance systems to closely monitor the disease trends and understand the nature of the virus variant strains. Wastewater surveillance has been implemented in many countries as an environmental monitoring tool to rapidly detect the presence of the SARS-CoV-2 virus in the community to enable local health authorities to be aware of the transmission risk factors, emergence of new variants, and the impact of community preventive measures.

Hong Kong detected the Delta variant in the sewage samples since the end of December 2020 and strengthened the public health interventions by informing the public about the common symptoms, and the importance of continuing physical distancing and masking, in addition to hand hygiene and respiratory etiquette. Research in different parts of the world has shown that mandatory testing/screening before travel is unlikely to keep new variants out of the country given the nature of the virus.

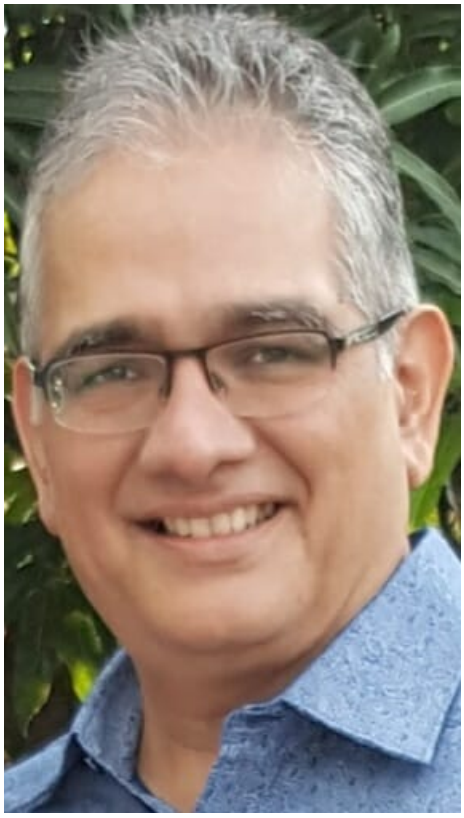
In July 2022, California researchers reported that sampling of community wastewater in San Diego detected the presence of the alpha, delta, epsilon, and omicron variants up to 14 days before they started showing up on nasal swabs. This implies that wastewater surveillance applied to transportation-based sanitation systems can serve as an early indicator of possible community transmission which can prioritise clinical testing.

The general public need not be alarmed by the news regarding the detection of the SARS-CoV-2 virus in human waste as from the Ministry of Health's initial reports, the variants isolated are already in circulation in Malaysia and the risk posed to human health and the environment is minimal. However, being aware of such a system enables all of us to be better receptive of updated information shared by the Ministry of Health from time to time.

As COVID-19 has now become endemic across most countries around the world, the detection of the SARS-CoV-2 virus in sewage samples is not an unusual finding. Results from the wastewater surveillance can be used to augment risk communication and warn communities about the virus (re)emergence and inform community behaviour with regards to testing, quarantine, isolation, vaccination, and healthcare seeking.

All in all, wastewater surveillance in COVID-19 control is important for several factors. Firstly, by measuring SARS-CoV-2 levels in untreated sewage over time, public health officials can determine if infections are increasing or decreasing in a community. In hand with clinical for COVID-19 as well patients' access to healthcare facilities, wastewater surveillance data can also guide the health care system regarding the need for the provision of diagnostic testing and vaccination.

They would be able to proactively identify "hotspots" of disease emergence and spread early and the data can also suggest how the pandemic may evolve down the line with a particular focus on new virus variants.



By Dr Sapna Shridhar Patil and Associate Professor Dr Venugopalan Kulankara Balan, School of Medicine, Faculty of Health and Medical Sciences, Taylor's University

BusinessToday