Review

Wastewater Based Epidemiology Perspective as a Faster Protocol for Detecting Coronavirus RNA in Human Populations: A Review with Specific Reference to SARS-CoV-2 Virus

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Abstract: Wastewater-based epidemiology (WBE) has a long history of identifying a variety of viruses from poliovirus to coronaviruses, including novel Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). The presence and detection of SARS-CoV-2 in human feces and its passage into the water bodies are significant public health challenges. Hence, the hot issue of WBE of SARS-CoV-2 in the coronavirus respiratory disease (COVID-19) pandemic is a matter of utmost importance (e.g., SARS-CoV-1). The present review discusses the background, state of the art, actual status, and prospects of WBE, as well as the detection and quantification protocols of SARS-CoV-2 in wastewater. The SARS-CoV-2 detection studies have been performed in different water matrixes such as influent and effluent of wastewater treatment plants, suburban pumping stations, hospital wastewater, and sewer networks around the globe except for Antarctica. The findings revealed that all WBE studies were in accordance with clinical and epidemiological data, which correlates the presence of SARS-CoV-2 ribonucleic acid (RNA) with the number of new daily positive cases officially reported. This last was confirmed via Reverse Transcriptase-quantitative Polymerase Chain Reaction (RT-qPCR) testing which unfortunately is not suitable for real-time surveillance. In addition, WBE concept may act as a faster protocol to alert the public health authorities to take administrative orders (possible re-emerging infections) due to the impracticality of testing all citizens in a short time with limited diagnostic facilities. A comprehensive and integrated review covering all steps starting