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Influenza virus detection in wastewater: Method evaluation and relevance for One Health surveillance

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Influenza viruses (FLUV) pose a significant threat to global health and require comprehensive surveillance approaches. Although wastewater-based surveillance (WBS) has proven valuable for pathogen monitoring at the community level, its application to FLUV remains methodologically under-explored.

We evaluated the performance of various method combinations that included virus concentration and RNA extraction for the detection of FLUV RNA in municipal wastewater. Using genomic RNA and spiked wastewater samples, we assessed the sensitivity of the protocols and their efficiency in terms of recovery.

Our results demonstrate substantial differences in detection performance depending on the combination of methods used. The best-performing method (PureYield™ filtration + Maxwell® extraction) achieved recovery efficiencies of up to 80% and enabled detection estimated two weeks earlier compared to protocols exhibiting less sensitivity. These differences are critical when targeting low-abundance pathogens like FLUV. Delays in detecting the onset of a seasonal FLUV wave due to employment of less sensitive method combinations could significantly impair early warning capabilities in WBS. Our findings highlight that rigorous method evaluation is essential not only for reliable quantification but also for timely public health response. Similar challenges are likely to apply to other infectious agents, emphasizing the need to integrate validated protocols into One Health surveillance frameworks.

Keywords

Influenza virus, waste water based epidemiology, public health

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Professional Status of the Speaker

Senior Scientist

Junior Scientist Status

No, I am not a Junior Scientist.

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