

Urgent Needs to Consider and Assess the Transmission of Coronavirus (COVID-19) via Hospital Sewage and Wastewater

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ABSTRACT

The emergence and spread of SARS-CoV-2 responsible for COVID-19 disease are considered as a major threat to human health since WHO declared COVID-19 outbreak a global pandemic. In recent studies, scientists confirmed the presence of SARS-CoV-2 RNA in feces of COVID-19 patients and wastewater. In several areas, particularly low-income countries, hospital effluents are not disinfected or pretreated and they are mostly discharged into urban sewerage systems reaching wastewater treatment plants depending if it exists or not, consequently several infectious agents could be developed such as Coronavirus COVID-19 causing significant environmental and health risks. Several researchers across the world suggested that wastewater surveillance could be a sensitive tool to monitor the circulation of the virus in the population and may represent a complementary approach to measure the presence and the prevalence of current infectious disease when the capacity for clinical testing is limited. Only a few studies were done on the survival of Coronaviruses in wastewater and still there is limited information on its transmission potential through the environment. Taking into account the current situation, there is an urgent need to consider and assess the transmission of Coronavirus (COVID-19) via hospital sewage and wastewater. Further researches are imperative to fill the knowledge gaps in COVID-19 behavior in hospital and urban sewage, and wastewater treatment plants, identify the safety measures and better manage the pandemic phenomena.

Keywords: COVID-19 outbreak, transmission, hospital sewage, wastewater, assessment

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INTRODUCTION

On 11 March 2020 the World Health Organization declared the COVID-19 outbreak a global pandemic, since then COVID-19 cases has been increasing rapidly up to 3.5 million confirmed cases and more than 238,628 deaths around the world [1,2]. The emergence and spread of SARS-CoV-2 responsible for COVID-19 disease are considered as a major threat to human health. Since then, scientists have been working hardly to determine different ways of transmission of COVID-19 virus. A recent study at the Zhongnan Hospital of Wuhan University (China), confirmed the presence of SARS-CoV-2 RNA in feces of COVID-19 patients [3]. The authors demonstrate that viral shedding from feces might remain for a long time after negative

conversion in pharyngeal swabs, suggesting that fecal-oral transmission may serve as an alternative infection route for SARS-CoV-2 [3]. COVID-19 can therefore, reach surface water and groundwater through different routes, such as hospital sewage, urban sewerage system and, wastewater treatment plants (WWTP) effluent. It has been already demonstrated that wastewater plumbing system is a harbinger of pathogenic microorganisms with, under some circumstances, the potential to enable airborne transmission of viruses such as severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2), responsible for COVID-19 disease [4,5]. SARS-CoV-2 genetic material—viral RNA has been detected in several wastewater treatment plants in the Netherlands while monitoring sewage samples during COVID-19

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pandemic [6]. Researchers detected in March 2020 the new Coronavirus in wastewater in Amersfoort one day before the city's first confirmed case of COVID-19 [6]. Furthermore, SARS-CoV-2 was found at high titers in wastewater samples collected at major urban treatment facilities in Massachusetts (USA) [7]. The feasibility of measuring SARS-CoV-2 in wastewater using RT-qPCR and direct DNA sequencing was demonstrated by several researchers across the world during COVID-19 Outbreak [6,7] and could be adopted to monitor effluent to provide better estimates for how widespread the Coronavirus is. Wastewater surveillance could be a sensitive tool to monitor the circulation of the virus in the population and may represent a complementary approach to measure the presence and even the prevalence of infectious diseases when the capacity for clinical testing is limited [6,7]. In fact, Wastewater-Based Epidemiology (WBE) could be considered as a new epidemiological tool that has potential to act as a complementary approach for current infectious disease surveillance systems and an early warning system for disease outbreaks [8]. Also, a new method was developed to identify the most significant risk factor and continuous monitoring of death due to Covid-19 by New TOPSIS approach and Group Method of Data Handling (GMDH) based predictive model [9].

The World Health Organization (WHO) recommends that consideration should be given to safely managing human excreta throughout the entire sanitation chain, starting with ensuring access to regularly cleaned, accessible, and functioning toilets or latrines and to the safe containment, conveyance, treatment, and eventual disposal of sewage [1]. However, in several areas hospital effluents are not disinfected or pretreated and they are mostly discharged into urban sewerage system reaching wastewater treatment plant depending if it exists or not [10]. At COVID-19 outbreak, hospitals are a place where a lot of people infected with COVID-19 virus are present and consequently several infectious agents could be developed.

Moreover, the existence of significant disparities between urban and rural health care system could contribute to increased mortality rate to COVID-19. Deliberate and proactive measures are needed acutely to prevent the spread of COVID-19 to rural areas [11]. Scientists strengthened the importance of health care system dealing with COVID-19 challenges and recommend to adopt future health care viewpoints that public centered to overcome the pandemic [12]. In Addition, more attention should be paid to the societal response to pandemic phenomena as the attitude of people could be different with negative aspects of risk perception [13].

In the view of the current situation regarding possible COVID-19 virus spreading several authors around the world are expressing the needs to develop research to understand more the routes of transmission of this Novel Coronavirus (COVID-19) in one hand and its behavior in different



Figure 1. Discharge of wastewater into the environment

environments in the other hand [14,15,16,17]. Analyzing sewage from its discharge until treatment facility is one way that researchers can track infectious diseases that are excreted in urine or feces, such as COVID-19 [14].

Coronaviruses as emerging pathogens were not considered of concern for waterborne transmission, until a new Coronavirus, the causative agent of severe acute respiratory syndrome (SARS), was detected in the feces of infected patients [18]. In fact, only a few studies were done on the survival of Coronaviruses in water and wastewater and still there is limited information on its transmission potential through the environment [19]. Research is still needed to straighten out on the persistence of COVI-19 in the environment, its zoonotic reservoirs, and its potential transmission through waterborne routes. Further research is imperative to fill the knowledge gaps in COVID-19 behavior in hospital and urban sewage and wastewater treatment plants.

Considering and assessing the transmission of Coronavirus (COVID-19) via hospital sewage and

wastewater is very important for future research to better prevent, detect, and manage COVID-19; and identify safety measures to rapidly adopt in hospital effluent, wastewater sewerage system, and wastewater treatment plants. It could contribute to better track the COVID-19 outbreak and functioning as an early warning system to help preemptively enact public health measures prior to the widespread onset of disease.

In order to cope with the situation's complexity of COVID-19 outbreak, worsen by limited economic resources and difficult socio-environmental conditions particularly, in low income countries, there is an urgent call for collaborative research projects both at national, regional and international levels to develop novel schemes and methodologies for knowledge transfer and application, for education and training, and for raising awareness to fight SARS-CoV-2 responsible for COVID-19 disease.

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