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Alert for SARS-CoV-2 infection caused by fecal aerosols in rural areas in China

Xiujuan Meng Xun Huang Pengcheng Zhou Chunhui Li* Anhua Wu*

Author Affiliations:

Xiangya Hospital of Central South University, Changsha, Hunan Province, China

* Address for Correspondence:

Chunhui Li, M.D, Infection Control Center, Xiangya Hospital, Central South University,
Changsha, Hunan Province, China.

Tel: +86 731 89753953; Fax: +86 731 84327237

E-mail address: lichunhui@csu.edu.cn

Anhua Wu, M.D, Infection Control Center, Xiangya Hospital, Central South University,
Changsha, Hunan Province, China.

Tel: +86 731 89753266; Fax: +86 731 84327237

E-mail address: xywuanhua@csu.edu.cn

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To the Editor:

The World Health Organization (WHO) Director declared that there were more than 118,000 COVID-19 cases in 114 countries, and 4,291 people had lost their lives on 11 March 2020; COVID-19 could be characterized as a worldwide pandemic[1]. The virus causing COVID-19, designated as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which was recognized as a sister to SARS-CoV [2]. In 2003, an outbreak of SARS at Amoy Gardens in Hong Kong led to 329 confirmed cases of infection and 42 deaths[3]. Studies suggested that the plumbing and ventilation systems at Amoy Gardens interacted to allow transmission of the SARS virus, and high concentrations of viral aerosols in the plumbing were the primary mode of transmission in this outbreak. Testing result indicated that the hydraulic action caused by flushing toilets generated huge quantities of aerosols in vertical sewer pipes or sanitary risers [4].

Recent studies found that SARS-CoV-2 can be detected in fecal and urine of COVID-19 cases, especially the asymptomatic cases [5]. SARS-CoV can persist in feces from infected people for as long as four days, and SARS-CoV-2 may persist in feces for a longer time. Based on these characteristics, COVID-19 is prone to cause outbreaks in the community, particularly in rural areas. Excreta treatment in scattered rural areas is generally decentralized and self-processing. In concentrated areas, residents mainly use flush toilets, which can generate huge quantities of aerosols; the ventilation and plumbing systems in these places are not effective for maximal hygiene. The feces may form high concentrations of viral aerosols, and travel through the air to cause infection [6].

In order to prevent the spread of fecal aerosols, we recommend the following points. First, to avoid wide spread viral aerosols in concentrated areas, state-of-the-art ventilation and plumbing systems should be constructed and maintained. Pouring half a liter of water into each bathroom floor drain should be done weekly. In addition, the toilet lid should be covered when flushing the toilet to prevent aerosolization, and wipe the toilet lid with a disinfectant after flushing the toilet. Second, a safety program for environmental monitoring and feedback is an effective way to prevent the spread of COVID-19. Be alert to sewer gas, unusual noises, or bubbles in pipes and toilets, and respond immediately [4]. Third, three-segment septic tank toilets and biogas tank toilets are the main sanitary toilets used in scattered areas; more effective raw sewage management should be explored in these areas. Another important aspect includes natural ventilation which can reduce viral density and is the most effective measure to reduce the risk of airborne contagion[7]. By managing the feces of COVID-19 cases, we can effectively minimize the risks of viral spread in the community. Although the COVID-19 is described as a pandemic, we believe this is a controllable pandemic through our efforts.

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