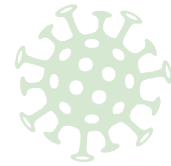
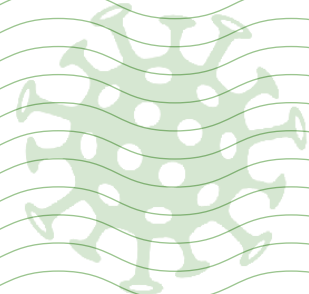
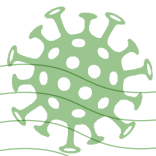


# FACT SHEET OF WATER, SANITATION AND WASTEWATER MANAGEMENT FOR



# COVID-19 PREVENTION AND CONTROL



中国 - 斯里兰卡水技术研究与示范中心  
中国科学院中国 - 斯里兰卡联合科教中心  
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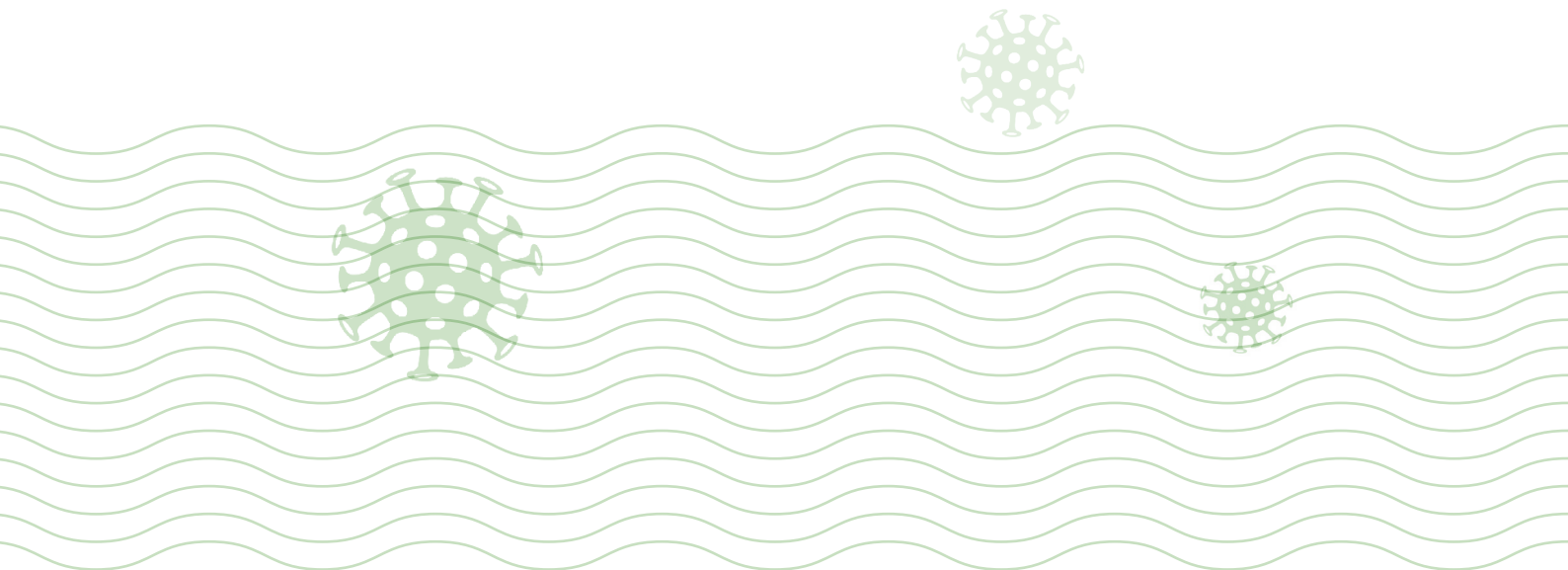
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Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus.

Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people, and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness.

The best way to prevent and slow down transmission is be well informed about the COVID-19 virus, the disease it causes and how it spreads. Protect yourself and others from infection by washing your hands or using an alcohol-based rub frequently and not touching your face.

The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes, so it's important that you also practice respiratory etiquette (for example, by coughing into a flexed elbow).



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## More information

1. World Health Organization, 2020. Coronavirus disease (COVID-19) Pandemic. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>



To prevent infection and to slow down transmission of COVID-19, WHO recommends to do the following:

- Wash your hands regularly with soap and water, or clean them with alcohol-based hand rub.
- Maintain at least 1-meter distance between you and people coughing or sneezing.
- Avoid touching your face.
- Cover your mouth and nose when coughing or sneezing.
- Stay home if you feel unwell.
- Refrain from smoking and other activities that weaken the lungs.
- Practice physical distancing by avoiding unnecessary travel and staying away from large groups of people.



## More Information

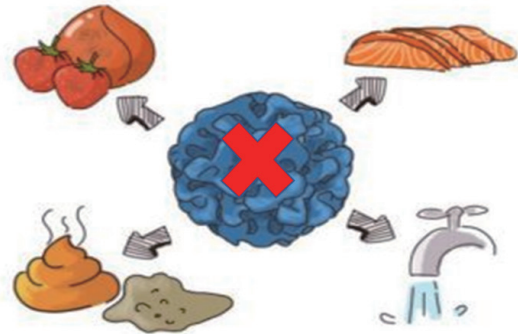
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2. The First Affiliated Hospital, Zhejiang University School of Medicine. Handbook of COVID-19 Prevention and Treatment  
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# OVERVIEW OF SANITATION MANAGEMENT

Coronavirus-positive was detected in oral swabs and anal swabs of patients with COVID-19 virus infection patients<sup>1</sup>. The Shenzhen Third People's Hospital also detected positive COVID-19 nucleic acid in the stool of patients with coronavirus pneumonia. However, according to the current evidence, The World Health Organization (WHO)<sup>3</sup> has stated that the, "presence of the COVID-19 virus has not been detected in drinking-water supplies and based on current evidence the risk to water supplies is low." COVID-19 is a type of virus that is particularly susceptible to disinfection. Standard treatment and disinfectant processes at wastewater treatment plants are expected to be effective. WHO has indicated that "there is no evidence to date that COVID-19 virus has been transmitted via sewerage systems, with or without wastewater treatment<sup>2</sup>.

The COVID-19 virus may have the risk of water-borne transmission, and the removal and control of viruses in drinking water need to be considered. To prevent water-borne pathogens, such as viruses, from contaminating drinking water, treatment methods can be considered including disinfectants such as filtration and chlorine, which can be removed or killed before reaching the tap. In addition, conventional centralized water treatment methods using filtration and disinfection should inactivate the COVID-19 virus<sup>3</sup>.

## No evidence of fecal transmission yet for COVID-19



## References

1. Zhang, W.; Du, R.-H.; Li, B.; Zheng, X.-S.; Yang, X.-L.; Hu, B.; Wang, Y.-Y.; Xiao, G.-F.; Yan, B.; Shi, Z.-L. et al. Molecular and serological investigation of 2019-nCoV infected patients: implication of multiple shedding routes. *Emerging Microbes & Infections* 2020, 9 (1), 386.
2. World Health Organization. 2020. Technical Brief. Water, sanitation, hygiene and waste management for the COVID-19 virus. March.  
Website: <https://www.who.int/publications-detail/water-sanitation-hygiene-and-waste-management-for-covid-19>. Reference number: WHO/2019-nCoV/IPC\_WASH/2020.1
3. USEPA, 2020. Coronavirus and Drinking Water and Wastewater.  
<https://www.epa.gov/coronavirus/coronavirus-and-drinking-water-and-wastewater>

Drinking water utilities that produce their water from surface water sources should set up multiple disinfection barriers for the purpose of removing bacteria, viruses and protozoa, which should be safeguarded by the Analysis of Microbial Safety of Drinking Water. Groundwater, in turn, is commonly well protected in the subsurface against all microbial contaminants, including viruses. Moreover, the strict hygiene regulations covering the installation of pipes and work on the distribution networks, can ensure that the drinking water sector is well protected against all microbial contaminants.

During the epidemic period of the COVID-19, the following aspects need to be done in the drinking water plants as following:

1. Strengthen the supervision and monitoring of drinking water sources. Based on routine analysis indicators, it should also increase detection of residual chlorine and biological toxicity, but should not add disinfectants in ponds, reservoirs, artificial lakes etc<sup>1</sup>.
2. The existing disinfection process of WTPs is effective in inactivating the virus, but for the COVID-19 virus, it is necessary to ensure sufficient disinfectant concentration and contact time (CT value). It can use chlorine-containing disinfectants, for example, chlorine dioxide<sup>2</sup>, etc.

Disinfectant name	Contact time /min	Residual chlorine in water/ (mg/L)	Free chlorine in end of water distribution system / (mg/L)
Chlorine/free chlorine	≥30	≥0.3	≥0.05
Monochloramine/ Total Chlorine	≥120	≥0.5	≥0.05
Chlorine dioxide/ ClO <sub>2</sub>	≥30	≥0.1	≥0.02

General requirements for disinfectants in drinking water<sup>3</sup>

3. Strengthen the performance of drinking water treatment through controlling the turbidity of filtered water at less than 0.3 NTU, which means that the virus removal rate can reach as high as 99%<sup>4</sup>.
4. According to characteristics of the COVID-19 virus, it can effectively inactivate the COVID-19 virus in boiling water for more than 20 minutes or at 56°C for 30 minutes<sup>5</sup>. It would be helpful for protection yourself to drink water after boiling the water.



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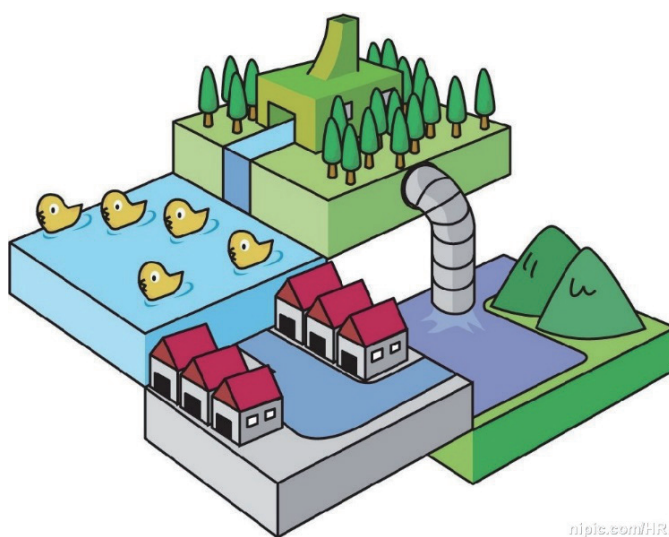
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4. Ministry of Housing and Urban-Rural Development of the People's Republic of China. Suggestions on strengthening operation and management of virus removal and control in drinking water plants (Chinese).
5. National Health Commission of the People's Republic of China. Notification of Novel Coronavirus Pneumonia Prevention and Control Plan (Fourth Edition) (Chinese).

# WASTEWATER MANAGEMENT AND TREATMENT

During the epidemic period of the COVID-19, the following aspects need to be done in the sewage treatment management as following:

1. Municipal and rural sewage treatment facilities should ensure the stable operation of existing disinfection processes. For urban and rural sewage treatment facilities without disinfection processes, emergency disinfection facility should be added. It is recommended to take the methods of adding chlorine-containing disinfectants to control the effective chlorine dosage at 3-5mg/L (contacting time 30minutes at least) and the residual chlorine in the effluent at 0.1-0.2mg/L, respectively. Under the condition that the concentration of faecal coliforms in the effluent at less than 1000 / L required by *Discharge standard of pollutants for municipal wastewater treatment plant (GB 18918-2002)*<sup>1</sup>, the minimum dosage of disinfectant is added for disinfection in order to reduce toxic effects of reclaimed effluent containing the residual chlorine on fish and aquatic organisms in the receiving water<sup>2</sup>.



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2. In rural areas with the epidemic COVID-19, the courtyards and toilets of farmers should be disinfected regularly. It can be disinfected by spraying quicklime, such as newly prepared lime solution (10% ~ 20%) or sodium hypochlorite with effective chlorine content of 0.1% ~ 0.2% around the drainage ditch and the toilet<sup>4</sup>.



3. For landscape rivers recharged with the reclaimed water from the sewage treatment plant, a warning sign should be set up. In areas with severe epidemics COVID-19, it is recommended to suspend the use of the reclaimed water possible in close contact with the people, and formulate strict precautionary measures against mis-drink, misuse and misconnection of the reclaimed water<sup>3</sup>.
4. Strengthen the prevention of the COVID-19 exposure risks for staff in the processes of operation, maintenance and management of municipal sewer system, municipal wastewater treatment, and water environment facility. Appropriate personal protective equipment (protective outer clothing, gloves, boots, safety glasses, mask and / or face protection) could be required. Operator must also observe hand hygiene and not touch eyes, nose and mouth with unwashed hands. This is hygiene advice as frequent hand washing. Ensure that the pipes of the municipal sewer system are unblocked, especially the sewers around the residential communities, designated COVID-19 treatment sites, centralized isolation areas, and medical institutions should be kept clear so as not to overflow<sup>3</sup>.

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## References

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2. Technical Manual on Environmental Risk Prevention, Control and Emergency Management of the Novel Coronavirus Outbreak (first edition).
3. Recommendations to strengthen urban sewage treatment and water environmental risk prevention during the outbreak of novel corona virus. <http://www.cuwa.org.cn/shuiwuyuqing6/2081.html> (Chinese)

# MEDICAL WASTEWATER MANAGEMENT AND TREATMENT

During the epidemic period of the COVID-19, sewage from designated medical institutions such as hospitals, health care centers, temporary isolation places and research institutions that receive treatment for pneumonia patients or suspected patients infected by coronavirus COVID-19 virus, shall be managed and controlled to strengthen disinfection according to sewage from medical institutions of infectious diseases. The following aspects are required in the treatment of medical wastewater:

1. Strengthen source separation, treatment and management for sewage from the sick and non-sick areas of medical institutions, and sewage from the infectious and non-infectious areas, in order to prevent pollution spreading. Forbidden the infectious solids, chemical wastes to discard and dump into the sewer<sup>1</sup>.
2. Infectious diseases medical institutions and general medical institutions should set up a dedicated septic tank to collect infectious wastes such as excrement after disinfection treatment<sup>2</sup>.
3. For infectious disease hospitals, including infectious disease ward in general hospitals, the sewage treatment system located inside the hospital must be equipped with mandatory ventilation equipment, and the staff must be equipped with a full set of work clothes, gloves, masks, goggles and gas masks<sup>3</sup>.
4. Requirements for medical wastewater treatment process and disinfection are as following:
  - (1) The combined process of secondary treatment, disinfection process or advanced treatment and disinfection process should be applied for sewage treatment in medical institutions of infectious diseases<sup>1</sup>.
  - (2) Strengthen disinfection and sterilization to control the spreading of the COVID-19 virus. The most effective disinfection method for the sewage is to dose disinfectant, and disinfectants should be selected according to the technical and economic analysis. For disinfection by liquid chlorine, chlorine dioxide, sodium chlorate, bleaching powder or bleaching essence, the reference effective chlorine dosage is at 50mg/L. The technical control requirements for disinfection with chlorine-containing disinfectants are as follows: the contact time in the disinfection contact tank is  $\geq 1.5$ h, and the total residual chlorine concentration at the outlet of the contact tank is at 6.5-10mg/L. The total residual chlorine concentration is not required for other disinfectants<sup>4</sup>.

- (3) When the sludge is sterilized in the sludge storage tank, the effective volume of the sludge storage tank should not be less than the 24-hour sludge production capacity of the treatment system, and should not be less than 1m<sup>3</sup>. In the sludge storage tank, stirring measures should be adopted to facilitate the sludge disinfection by dosing, and avoid the sludge dewatering treatment exposed to human body. Centrifugal dewatering device should be adopted as far as possible. The sludge produced from hospital wastewater treatment should be disposed by the institutions with the license and permit of hazardous waste disposal according to the disposal requirements<sup>1,3</sup>.
- (4) For wastewater produced from the institution using nucleic acid detection kit inspection or mobile laboratory, shall be treated the same as the infectious disease wastewater, and can be discharged into the hospital comprehensive sewage treatment facility after disinfection<sup>2</sup>.
- (5) Feces disinfection. The infectious excreta, excretions and vomitus produced from the COVID-19 patients or suspected patients shall be collected by dedicated containers for medical institutions treating COVID-patients, and then shall be disinfected through soaking for 2 hours according to the ratio of feces to disinfectant at 1:2 using the disinfectant at effective chlorine 20000mg/L. For the large amount of diluted feces, it shall be disinfected for 2 hours after fully mixing through using bleach powder or fine dry powder with effective chlorine 70%~80%, according to the ratio of feces to disinfectant at 20:1, and then can be discharged into the sewage treatment system<sup>2</sup>.

The wastewater of medical institutions shall meet disinfection requirements of discharge standards for medical organization listed in Table 1.

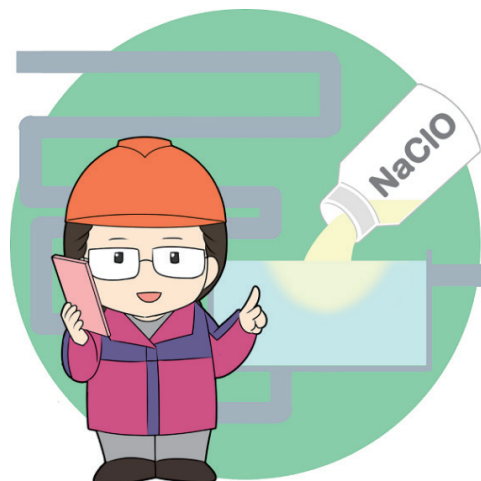


Table 1 Limits of water pollutants discharged from medical institutions (daily mean)<sup>2</sup>

No	Parameter	Limits
1	Fecal coliforms/(MPN/L)	100
2	Enteric pathogen	Not Detectable
3	Enterovirus	Not Detectable
4	Mycobacterium tuberculosis	Not Detectable
5	Total residual chlorine <sup>1,2</sup> /(mg/L) (Requirements for direct discharge into water body)	0.5

Note:

- 1) The process control requirements for disinfection with chlorine-containing disinfectant are as follows: the contact time of disinfection contact tank is  $\geq 1.5$ h, and the total residual chlorine at the contact tank outlet is 6.5-10mg /L.
- 2) the total residual chlorine is not required by other disinfectants.

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1. Notice on the supervision of medical sewage and urban sewage in the pneumonia outbreak of the novel coronavirus. (Chinese)  
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