

Water, sanitation, hygiene and waste management for COVID-19

Technical Brief
03 March 2020

1.0 Introduction and background

In late 2019, an acute respiratory disease, known as COVID-19, emerged. The pathogen responsible for COVID-19 is severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2, also referred to as the COVID-19 virus), a member of the coronavirus family. In response to the growing spread of COVID-19, WHO has published a number of technical guidance documents on specific topics, including infection prevention and control (IPC). These recent documents are available at: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/infection-prevention-and-control>.

This Technical Brief supplement these IPC documents by referring to and summarizing WHO guidance on water, sanitation and health care waste which is relevant for viruses (including coronaviruses). This Technical Brief is written in particular for water and sanitation practitioners and providers. It is also for health care providers who want to know more about water, sanitation and hygiene (WASH) risks and practices.

Provision of safe water, sanitation and hygienic conditions play an essential role in protecting human health during all infectious disease outbreaks, including the current COVID-19 outbreak. Good and consistently applied WASH and waste management practices, in communities, homes, schools, marketplaces and health care facilities will further help to prevent human-to-human transmission of COVID-19.

The most important information concerning WASH and COVID-19 are:

- **Frequent and proper hand hygiene is one of the most important prevention measures for COVID-19.** WASH practitioners should work to enable more frequent and regular hand hygiene through improved facilities and proven behaviour change techniques.
- **Existing WHO guidance on safe management of drinking-water and sanitation apply to COVID-19.** Extra measures are not needed. Disinfection, in particular, will facilitate more rapid die-off of COVID-19 virus.
- **Many co-benefits will be realized by safely managing water and sanitation services and applying good hygiene practices.** Such efforts will prevent many other infectious diseases, which cause millions of deaths each year.

Currently, there is no evidence on the survival of COVID-19 virus in drinking water or sewage. The morphology and chemical structure of COVID-19 virus is very similar to other surrogate human coronaviruses for which there is evidence on both survival in the environment and effective inactivation measures. Thus, this brief draw upon the existing evidence base and, more generally, existing WHO guidance on how to protect against viruses in sewage and drinking-water. This document is based on the current knowledge of the COVID-19 virus and it will be updated as new information becomes available.

1.1 COVID-19 transmission

There are two main routes of transmission of COVID-19; respiratory and contact. Respiratory droplets are generated when an infected person coughs or sneezes. Any person who is in close contact with someone who has respiratory symptoms (e.g., sneezing, coughing, etc.) is at risk of being exposed to potentially infective respiratory droplets¹. Droplets may also land on surfaces where the virus could remain viable and thus the immediate environment of an infected individual can serve as a source of transmission (known as contact transmission).

The risk of catching COVID-19 from the faeces of an infected person appears to be low. There is some evidence to indicate that COVID-19 may lead to intestinal infection and be present in faeces. Approximately 2-10% of cases with confirmed COVID-19 presented with diarrhoea.^{2,3,4}, and two studies reported detection of COVID-19 viral RNA fragments in faecal matter of COVID-19 patients^{5,6}. However, to date, only one study has cultured the COVID-19 virus from a single stool specimen⁷. There have not been reports of fecal-oral transmission of COVID-19 to date.

1.2 Persistence of the COVID-19 virus in drinking-water, faeces/sewage and surfaces

While persistence in drinking-water is possible, there is no current evidence that surrogate human coronaviruses are present in surface or ground water sources or transmitted through contaminated drinking-water. COVID-19 virus is an enveloped virus, with a fragile outer membrane. Enveloped viruses, generally, are less stable in the environment and are more susceptible to oxidants, like chlorine. While there is no evidence, to date, on the COVID-19 virus survival in water or sewage, the virus is likely to become inactivated significantly faster than non-enveloped human enteric viruses with known waterborne transmission (e.g., adenovirus, norovirus, rotavirus and Hepatitis A). For example, one study found that human coronavirus survived only 2 days in dechlorinated tap water and hospital wastewater at 20^o C⁸. Other studies concur; noting that human coronavirus⁹

¹WHO, 2020. COVID-19 advice for the public. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>.

² Huang C, et al, 2020. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. pii: S0140-6736(20)30183-5. doi: 10.1016/S0140-6736(20)30183-5. [Epub ahead of print].

³ Che, et al., 2020. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet* 395: 507-13.

⁴ Wang, et al., 2020. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. *Jama*. doi:10.1001/jama.2020.1585.

⁵ Xiao, E, et al., 2020. Evidence for gastrointestinal infection of SARS-CoV. <https://doi.org/10.1101/2020.02.17.20023721>

⁶ Holshue ML, et al, 2020. Washington State 2019-nCoV Case Investigation Team. First Case of 2019 Novel Coronavirus in the United States. *N Engl J Med*. Jan 31. doi: 10.1056/NEJMoa2001191.

⁷ Zhong, Y et al., 2020. Isolation of 2019-nCoV from a Stool Specimen of a Laboratory-Confirmed Case of the Coronavirus Disease 2019 (COVID-19). *China CDC Weekly*.

⁸ Wang, XW, et al., 2005. *Journal of Virological Methods* (126) 171-177.

⁹ These surrogates include: Transmissible Gastroenteritis coronavirus and Mouse Hepatitis Virus

demonstrated a 99.9% die-off from 2 days¹⁰ to 2 weeks¹¹ at 23°C and 25°C, respectively. Heat, high or low pH, sunlight and common disinfectants (e.g. chlorine) all facilitate die-off.

It is not certain how long the virus that causes COVID-19 survives on surfaces, but it seems likely to behave like other coronaviruses. A recent review of the survival of human coronaviruses on surfaces found large variability, ranging from 2 hours to 9 days¹². Survival time depends on a number of factors including the type of surface, temperature, relative humidity, and specific virus strain. This review also found effective inactivation (within 1 min) using common disinfectants such as 70% ethanol and sodium hypochlorite (see Section 2.5 cleaning practices, for details).

1.3 Keeping water supplies safe

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 low¹³. While laboratory studies of surrogate coronaviruses taking place in well controlled environments indicate that the virus can remain infectious in fecally contaminated water for days to weeks¹⁴. A number of measures can be taken to improve water safety starting with source water protection, treatment of water (at point of distribution, collection, or consumption), and safe storage of treated water in regularly cleaned and covered containers at home. Furthermore, conventional, centralized water treatment methods which utilize filtration and disinfection should inactivate COVID-19 virus. Other human coronaviruses have been shown to be sensitive to chlorination and UV disinfection¹⁵. As enveloped viruses are surrounded by a lipid host cell membrane, which is not very robust, COVID-19 virus is likely to be more sensitive to chlorine and other oxidant disinfection processes than many other viruses such as coxsackieviruses, which have a protein coat. For effective centralized disinfection, there should be a residual concentration of free chlorine of ≥ 0.5 mg/l after at least 30 min contact time at pH < 8.0¹⁶. A chlorine residual should be maintained throughout the distribution system.

In places where centralized treatment and safe piped water supplies are not available, a number of household water treatment technologies are effective in removing or destroying viruses, including boiling, high performing ultra- and nano-membrane filters, solar irradiation, and in non-turbid waters, UV irradiation and appropriately dosed, free chlorine¹⁷.

1.4 Safely managing wastewater and/or fecal waste

There is no evidence to date that COVID-19 virus has been transmitted via sewerage systems, with or without wastewater treatment. Furthermore, there is no evidence that sewage and wastewater treatment workers contracted SARS, another type of coronavirus that caused a large outbreak of acute respiratory illness in 2003. As part of an integrated public health policy, wastewater carried in sewerage systems should ideally be treated in well-designed and well-managed centralised

¹⁰ Gundy, P et al., 2009. Survival of coronaviruses in water and wastewater. *Food Environ Virol* (2019) 1:10-14.

¹¹ Casanova, L et al., 2009. Survival of surrogate coronaviruses in water. *Water Research* 43:1893-1898.

¹² Kampf, et al., 2020. Persistence of Coronaviruses on inanimate surfaces and their inactivation with biocidal agents. *J Hos Infect*. DOI: [10.1016/j.jhin.2020.01.022](https://doi.org/10.1016/j.jhin.2020.01.022).

¹³ WHO, 2011. Guidelines on drinking-water quality: 4th edition.

https://www.who.int/water_sanitation_health/publications/drinking-water-quality-guidelines-4-including-1st-addendum/en/.

¹⁴ Casanova, L, et al. 2009. Survival of surrogate coronaviruses in water. *Water research* 43: 1893-1898.

¹⁵ Water research Australia. 2020. Fact sheet. Novel Coronavirus (COVID-19) water and sanitation.

<https://www.waterra.com.au/publications/factsheets/>.

¹⁶ WHO, 2011. Guidelines on drinking-water quality: 4th edition.

https://www.who.int/water_sanitation_health/publications/drinking-water-quality-guidelines-4-including-1st-addendum/en/.

¹⁷ Generally, these listed types technologies are effective in inactivating viruses, but performance can vary widely depending on the manufacturing process, type of materials, design and use. It is important to verify performance of the specific technology.

wastewater treatment works. Each stage of treatment (as well as retention time and dilution) results in further reduction of potential risk. Waste stabilisation ponds (oxidation ponds or lagoons) are generally considered to be a practical and simple wastewater treatment technology that is particularly well-suited to the destruction of pathogens as relatively long retention times (20 days or more) combined with sunlight, elevated pH levels, biological activity and other factors serve to accelerate pathogen destruction. A final disinfection step may be considered if existing wastewater treatment plants are not optimized to remove viruses. Best practices for protecting the occupational health of workers at sanitation treatment facilities should be followed. Workers should wear appropriate personal protective equipment (PPE), which includes protective outer wear, gloves, boots, goggles or face shield, mask, perform frequently hand hygiene, and avoid touching eyes, nose and mouth with unwashed hands.

2.0 WASH in health care settings

Existing recommended water, sanitation and hygiene measures in health care settings are important for providing adequate care for patients and protecting patients, staff¹⁸ and caregivers from infection risks¹⁹. Of particular importance are the following actions: 1) safe excreta management including keeping excreta (faeces and urine) separated from human contact and safe treatment and disposal in the environment; 2) frequent hand hygiene using appropriate technique 3) regular cleaning and disinfection and 4) safe management of health care waste. Other important recommended measures include providing sufficient provision of safe drinking-water to staff, caregivers and patients, personal hygiene, laundry and cleaning, adequate and accessible toilets (including separate facilities for confirmed and suspected cases) segregation and safe disposal of health care waste. For details refer to *Essential Environmental Health Standards in Health Care*²⁰.

2.1 Hand hygiene practices

Hand hygiene is extremely important. Cleansing of hands with soap and water or alcohol-based hand rub (ABHR) should be performed according to the 5 moments for hand hygiene²¹. The preferred method is hand hygiene with ABHR for 20-30 seconds, using the appropriate technique, if hands are not visibly soiled²². When hands are visibly soiled they should be washed with soap and water for 40-60 seconds, using the appropriate technique²³. Hand hygiene should be performed at the 5 moments, including before putting on personal protective equipment (PPE) and after removing it, whenever changing gloves, after any contact with a suspected or confirmed COVID-19 patient or their waste, after contact with any respiratory secretions, before eating and after using the toilet²⁴. Where ABHR and soap is not available, chlorinated handwashing water (0.05%) is an option but it is not ideal because frequent use may lead to dermatitis, which could increase risk of infection, asthma

¹⁸ Staff includes ancillary staff such as cleaning staff, hygienists, laundry staff, waste workers, etc.

¹⁹ WHO, 2008. *Essential environmental health standards for health care facilities*. World Health Organization, Geneva.

²⁰ WHO, 2008. *Essential environmental health standards for health care facilities*. World Health Organization, Geneva.

²¹ WHO, My 5 moments of hand hygiene. <https://www.who.int/infection-prevention/campaigns/clean-hands/5moments/en/>.

²² Siddharta A et al. Virucidal activity of world health organization-recommended formulations against enveloped viruses, including zika, ebola, and emerging coronaviruses. *Journal of Infectious Diseases*. 2017;215(6):902–6.

²³ WHO, 2009, Guidelines on hand hygiene in health care settings. World Health Organization, Geneva. https://apps.who.int/iris/bitstream/handle/10665/44102/9789241597906_eng.pdf?sequence=1&isAllowed=y.

²⁴ WHO, 2020. Infection prevention and control during health care when COVID-19 is suspected. [https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-\(ncov\)-infection-is-suspected-20200125](https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-(ncov)-infection-is-suspected-20200125).

and because prepared dilutions might be inaccurate²⁵. However, if other options are not available or feasible, using chlorinated handwashing water should be continued.

Functional hand hygiene facilities should be present at all points of care for health care workers and in areas for donning and doffing PPE. In addition, functional hand hygiene facilities should be available for all patients, family members and visitors should be made available within 5m of toilets as well as in waiting and dining rooms and other public areas.

2.2 Sanitation and plumbing

Suspected or confirmed COVID-19 cases should be provided with separate flush toilets or latrines that have a door that closes from the patient room and are not used by neither non COVID-19 individuals nor other individuals with COVID-19. Flush toilets should be properly operating with functioning drain traps. When possible, flushing should occur with the lid down to prevent droplet splatter and aerosol clouds. If separate toilets are not possible, the toilet should be cleaned and disinfected at least twice daily by a trained cleaner wearing PPE (gown, gloves, boots, mask and face shield/goggles). Furthermore, consistent with existing guidance, staff and health care workers should have separate toilet facilities from all patients.

WHO recommends standard, well-maintained plumbing such as sealed bathroom drains, and backflow valves on sprayers and faucets to prevent aerosolized faecal matter from entering the plumbing and/or ventilation system²⁶ together with standard wastewater treatment²⁷. Faulty plumbing and a poorly designed air ventilation system was implicated as a contributing factor to the spread of aerosolized SARS coronavirus in a high-rise apartment building complex in Hong Kong in 2003²⁸. Similar concerns have been raised about COVID-19 spread from faulty toilets in high-rise apartment buildings.²⁹ If health care facilities are connected to sewers, a risk assessment should be conducted to confirm that wastewater is contained within the system (i.e. does not leak) prior to its arrival at a functioning treatment and/or disposal site. Risks pertaining to the adequacy of the collection system, or to treatment and disposal methods, should be assessed according to a “safety planning” approach³⁰, with critical control points prioritized for mitigation.

For smaller health care facilities in low resource settings, if space and local conditions allow, pit latrines may be the preferred option. Standard precautions should be taken to prevent contamination of the environment by excreta. These precautions include ensuring that, at least, 1.5 metres exist between the bottom of the pit and the groundwater table (more in coarse sands, gravels and fissured formations), and that the latrine(s) are located at least 30 metres horizontally from any groundwater source (including both shallow wells and boreholes)³¹. If there is a high groundwater table and/or lack of space to dig pits, excreta (faeces and urine) should be retained in

²⁵ WHO, 2020. Q&A on infection prevention and control for health care workers caring for patients with suspected or confirmed 2019-nCoV. <https://www.who.int/news-room/q-a-detail/q-a-on-infection-prevention-and-control-for-health-care-workers-caring-for-patients-with-suspected-or-confirmed-2019-ncov>.

²⁶ WHO, 2006. Health aspects of plumbing. World Health Organization, Geneva. https://www.who.int/water_sanitation_health/publications/plumbing-health-aspects/en/.

²⁷ WHO, 2018. Guidelines on sanitation and health. World Health Organization, Geneva. https://www.who.int/water_sanitation_health/publications/guidelines-on-sanitation-and-health/en/.

²⁸ Yu, et al., 2004. Evidence of airborne transmission of the severe acute respiratory syndrome virus. *New England Journal of Medicine*. 350(17): 1731-9.

https://www.nejm.org/doi/10.1056/NEJMoa032867?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%3dwww.ncbi.nlm.nih.gov.

²⁹ <https://www.cnn.com/2020/02/12/asia/hong-kong-coronavirus-pipes-intl-hnk/index.html>

³⁰ WHO, 2016. Sanitation safety planning. World Health Organization, Geneva. https://www.who.int/water_sanitation_health/publications/ssp-manual/en/.

³¹ WHO, 2018. Guidelines on sanitation and health. World Health Organization, Geneva. https://www.who.int/water_sanitation_health/publications/guidelines-on-sanitation-and-health/en/.

impermeable storage containers and left as long as is feasibly possible to allow for reduction in virus levels before moving off-site for additional treatment and/or safe disposal. A two-tank system with parallel tanks would help to facilitate inactivation by maximising retention times, as one tank could be used until full, then allowed to sit while the next tank is being filled. Particular care should be taken to avoid splashing and release of droplets during use, cleaning or emptying of the toilet.

2.3 Toilets and handling faeces

It is critical to conduct hand hygiene when there is suspected or direct contact with faeces (if hands are soiled soap and water are preferred to alcohol-based hand rub). If the patient is unable to use a latrine, excreta should be collected in either a diaper or a clean bedpan and immediately and carefully disposed of into a separate toilet or latrine used only by COVID-19 confirmed or suspected cases. In all health care settings, including those with suspected or confirmed COVID-19 cases, faeces must be treated as a biohazard and handled at a minimum. Anyone handling faeces should follow WHO contact and droplet precautions³² and use PPE including long-sleeve gowns, gloves, boots, masks and goggles/face shield to prevent exposure. If diapers are used, they should be disposed of, as they would in all situations, as infectious waste. Workers should be properly trained in putting on, using and removing PPE so that these protective barriers are maintained and not breached.³³ If PPE materials are not available or in limited supply, hand hygiene should be regularly practiced, and workers should keep their distance (at least 1 meters) from any suspected or confirmed cases.

If a bedpan is used after collection and disposal of the excreta from the bedpan, the bedpan should be cleaned with a neutral detergent and water, disinfected with a 0.5% chlorine solution, and then rinsed with clean water (disposing of the rinse water in drains or a toilet/latrine). Other effective disinfectants include commercially available quaternary ammonium compounds, such as cetylpyridinium chloride, used according to manufacturer's instructions and peracetic or peroxyacetic acids at concentrations of 500 to 2000 mg/L³⁴.

Chlorine is an ineffective means to disinfect media containing large amounts of solid and dissolved organic matter. Therefore, there will be limited benefit to adding chlorine solution to fresh excreta, and possibly, may introduce risks associated with splashing.

2.4 Emptying latrines and holding tanks and off-site transportation of excreta

In the context of waste inputs from suspected or confirmed COVID-19 cases, there is no reason to empty latrines and holding tanks unless they are at capacity. In general, best practices of safely managing excreta should be followed. Latrines or holding tanks should be designed to meet patient demand, considering potential sudden increases in cases and have a regular emptying schedule based on generated wastewater volumes. Appropriate PPE (i.e., long-sleeve gown, gloves, boots, masks, and goggles/face shield) should be worn at all times when handling or transporting excreta off-site and great care should be taken to avoid splashing. For crews, this includes pumping out tanks or unloading pumper trucks. After handling, and once there is no risk of further exposure, individuals should safely remove PPE and perform hand hygiene before entering the transport vehicle. Where there is no off-site treatment, in-situ treatment can be done using lime. Such treatment includes using a 10% lime slurry added at a 1 part of 10% lime slurry per 10 parts of waste.

³² WHO, 2020. Infection prevention and control during health care when novel coronavirus is suspected. [https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-\(ncov\)-infection-is-suspected-20200125](https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-(ncov)-infection-is-suspected-20200125)

³³ WHO, 2008. How to put on and take off personal protective equipment. <https://www.who.int/csr/resources/publications/putontakeoffPPE/en/>

³⁴ CDC, 2008. Chemical disinfectants. Guideline for Disinfection and Sterilization in Health Care Facilities <https://www.cdc.gov/infectioncontrol/guidelines/disinfection/disinfection-methods/chemical.html>

2.5 Cleaning practices

Existing recommended cleaning and disinfection procedures in health care facilities should be followed consistently and correctly³⁵. Laundry and surfaces in all environments in which COVID-19 cases receive care (treatment units, community care centres) should be regularly (at least once a day and when a patient is discharged) cleaned.³⁶ There are many disinfectants, that are active against enveloped viruses, such as the COVID-19 virus, including commonly used hospital disinfectants.

Currently, WHO recommends the use of:

- 70% Ethyl alcohol to disinfect small areas e.g. reusable dedicated equipment (e.g., thermometers) between uses.
- Sodium hypochlorite at 0.5% (equivalent 5000ppm) for disinfection of surfaces

All individuals dealing with soiled bedding, towels and clothes from patients with COVID-19 should wear appropriate PPE, which includes heavy duty gloves, mask, eye protection (goggles/face shield), long-sleeved gown, apron (if gown is not fluid resistant), and boots or closed shoes before touching any soiled linen. They should perform hand hygiene after blood/body fluid exposure and after PPE removal. Soiled linen should be placed in clearly labelled, leak-proof bags or containers, carefully removing any solid excrement and putting in covered bucket to dispose of in the toilet or latrine. Washing by machine with warm water (60-90°C) with laundry detergent is recommended.. If machine washing is not possible, linens can be soaked in hot water and soap in a large drum, using a stick to stir, avoiding splashing. The drum should then be emptied, and linen soaked in 0.05% chlorine for approximately 30 minutes. Finally, rinse with clean water and let linens dry fully in the sunlight.

If excreta are on surfaces (linens, floor, etc.) the excreta should be carefully removed with towels and immediately safely disposed of in a toilet/latrine. If the towels are single use, they should be treated as infectious waste and if they are re-usable they should be treated as soiled linens for reprocessing. The area should then be cleaned and disinfected (with, for example, 0.5% free chlorine solution) following published guidance on cleaning and disinfection procedures for body fluid spills.³⁷

2.6 Safely disposing of greywater, or water from washing of PPE, surfaces and floors

Current WHO recommendations indicate to clean utility gloves or heavy duty, reusable plastic aprons with soap and water and decontaminate with 0.5% of sodium hypochlorite after each use. Single-use gloves (nitrile or latex or nitrile) or gowns should be discarded after each use and not reused and hand hygiene should be performed after removal of PPE. If greywater includes prior disinfectant treatment, it does not need to be chlorinated or treated again. It is important however, that such water is disposed of in drains connected to a septic system, sewer or in a soak-away pit. If greywater is disposed of in a soakaway pit, the pit should be fenced off within the health facility grounds to prevent tampering and to avoid possible exposure in the case of overflow.

³⁵ WHO, 2008. Essential environmental health standards for health care facilities.

https://www.who.int/water_sanitation_health/publications/ehs_hc/en/

³⁶ WHO, 2020. Q&A on infection prevention and control for health care workers caring for patients with suspected or confirmed 2019-nCoV. <https://www.who.int/news-room/q-a-detail/q-a-on-infection-prevention-and-control-for-health-care-workers-caring-for-patients-with-suspected-or-confirmed-2019-ncov>

³⁷ CDC, 2019. Best practices for environmental cleaning in resource limited settings. <https://www.cdc.gov/hai/pdfs/resource-limited/environmental-cleaning-508.pdf>

2.7 Safe management of health-care waste

Best practices for safely managing health care waste should be followed including assigning responsibility and sufficient human and material resources to dispose of such waste safely. There is no evidence that direct, unprotected human contact during handling of healthcare waste has resulted in the transmission of COVID-19. All health-care waste produced during the care of COVID-19 patients should be collected safely in designated containers and bags, treated, and then safely disposed of and/or treated, preferably on-site. If waste is moved off-site, it is critical to understand where and how it will be treated and destroyed. All those handling health-care waste should wear appropriate PPE (boots, apron, long-sleeved gown, thick gloves, mask and goggles) and perform hand hygiene after removal. For more information refer to WHO *Safe Management of Wastes from Health-Care Activities* guidance³⁸.

3.0 Considerations for WASH practices in homes and community

3.1 Hand hygiene

Hand hygiene in non-health care settings is one of the most important measures to prevent COVID-19. In homes, schools, and crowded public spaces such as markets, places of worship, train/bus stations, etc regular handwashing should occur before preparing food, before and after eating, after using the toilet and changing a child's nappy, and after touching and handling animals. Functioning handwashing facilities with water and soap should be near toilets (within 5 min).

3.2 Treatment and handling requirements of excreta

Best WASH practices, particularly handwashing with soap and clean water, should be strictly applied and maintained as these forms an important additional barrier to COVID-19 transmission, and to the transmission of infectious diseases in general (WHO, 2002). Consideration should be given on how to safely manage human excreta through the entire sanitation chain starting with access to regularly cleaned, accessible and functioning toilets or latrines to the safe containment, conveyance, treatment and eventual disposal of sewage.

When there are suspected or confirmed cases of COVID-19 in the home setting, immediate action must be taken to protect caregivers and other family members from the risk of contact with respiratory secretions and/or excreta which may contain COVID-19 virus. Regular cleaning frequently touched surfaces throughout the patient's care area such as beside tables, bedframes and other bedroom furniture. Cleaning and disinfection of bathrooms should be done at least daily. Regular household soap or detergent should be used for cleaning first and then, after rinsing, regular household disinfectant containing 0.5% sodium hypochlorite (i.e. equivalent 5000 ppm or 1-part of household bleach with 5% sodium hypochlorite to 9 parts of water) should be applied. PPE should be worn while cleaning, including mask, goggles, fluid-resistant apron, and gloves,³⁹ and hand hygiene with ABHR or soap and water should be performed after removal of PPE.

Note on document development and background

The content in this Technical Brief is based on the information currently available for COVID-19 virus and the persistence of other viruses in the coronavirus family. It reflects input and advice from microbiologists and virologists, infection control experts, and those with practical knowledge about WASH and IPC in emergencies and disease outbreaks.

³⁸ WHO, 2014. *Safe Management of Wastes from Health-Care Activities*. WHO, 2019. *Overview of technologies for the treatment of infectious and sharp waste from health care facilities*.

³⁹ WHO, 2020. Home care for patients with suspected or confirmed COVID-19.

[https://www.who.int/publications-detail/home-care-for-patients-with-suspected-novel-coronavirus-\(ncov\)-infection-presenting-with-mild-symptoms-and-management-of-contacts](https://www.who.int/publications-detail/home-care-for-patients-with-suspected-novel-coronavirus-(ncov)-infection-presenting-with-mild-symptoms-and-management-of-contacts).

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