RAPID REPORTS AND PERSPECTIVES FROM THE FIELD

Disinfection measures and control of SARS-COV-2 transmission

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Abstract

A new virus, classified as a variant of the coronavirus that causes severe acute respiratory syndrome (SARS), is severe acute respiratory syndrome coronavirus 2 or SARS-CoV-2. The virus can be inactivated by heating at 56 ºC for 30 minutes and by using lipid solvents such as ethanol (> 75%), isopropanol (> 70%), formaldehyde (> 0.7%), povidone iodine (> 0, 23%), sodium hypochlorite (> 0.21%), or hydrogen peroxide (> 0.5%), but not chlorhexidine. Another approach is to use a footbath at the entrance of a house. The use of irradiation with ultraviolet light for 60 minutes resulted in the inactivation of several coronaviruses.

Key words: Infectious disease, Covid-19, disinfectants, respiratory infection, coronavirus.

The Huanan Seafood Wholesale Market, located in Wuhan, Hubei, China, was the starting point of the outbreak of COVID-19, caused by a novel coronavirus SARS-CoV-2 in late 2019. The illness can cause pneumonia, plus symptoms such as fever, dry cough and fatigue [1].

At first, transmission from person-to-person was limited, with the possible origin being wild, contaminated or sick animals, which were sold on the market [1,2]. These were possibly improperly handled and/or prepared for human consumption, facilitating contamination by SARS-CoV-2.

In a report published by the United States Agency for International Development (USAID), most of the emerging diseases that have affected humans in the last century (more than 75%), originate from animals, and are called zoonoses[3].

Given this fact, it is essential that there is greater integration and unity between health systems, due to the close connection between the triad of animals, human beings and the environment.

Other zoonotic coronaviruses have already been identified as responsible for outbreaks. An example is SARS-CoV, which was first identified as causing outbreaks of Severe Acute Respiratory Syndrome (SARS) in 2002 in China, and then ten years later causing outbreaks of Middle Eastern Respiratory Syndrome (MERS) in the Middle East in 2012[4,5].

Classified as a variant of the coronavirus that causes SARS, the new virus was named Severe Acute Respiratory Syndrome Corona Virus 2, or SARS-CoV-2[6].

According to Chan et al[7] and CDC[8], transmission occurs through the respiratory tract, through droplets and aerosols. As in several other emerging or reemerging diseases transmitted by droplets or aerosols, good hygiene practices should be promoted, such as the correct washing of hands with soap and water for at least twenty seconds, followed by the use of 70% alcohol gel. In addition, it is essential to adopt social distancing as a preventive measure, by avoiding both large crowds and contact with people who are possibly infected.

In addition to hand hygiene, the use of personal protective equipment is essential to contain person-to-person transmission. The use of surgical masks is a measure that can be used to decrease the elimination of contaminated droplets by potentially infected people, and to also decrease the risk of contagion by healthy people [9,10]. FPP2 and FPP3 masks are more efficient and should be used by healthcare professionals, as they are exposed to the secretions, droplets and aerosols of people who are sick for long periods[11]. The use of disposable gloves, long-sleeved coats and eye protection is also necessary.

According to Dowell et al[12] and Kampf et al[13], HCoVs can survive on dry surfaces for up to nine days. In an experiment conducted by Van Dorelman et al[14] , the viability of SARS-CoV-1 and SARS-CoV-2 in aerosol medium on different surfaces was compared. The results showed that the viability of SARS-CoV-2 in aerosols, was for a total of three hours. The same viral agent showed greater stability on plastic and stainless steel surfaces than on copper and cardboard, as they were detectable on these surfaces for up to 72 hours after aerosol application.

The virus can be inactivated by heating it up to 56 ° C for 30 minutes or by using lipid solvents, such as ethanol (> 75%), isopropanol (> 70%), formaldehyde (> 0.7%), povidone-iodine (> 0.23%), sodium hypochlorite (> 0.21%), or hydrogen peroxide (> 0.5%), however, not chlorhexidine [14,15,16].

In a study by Ong et al[16], the authors evaluated samples from the hospital environment and from health professionals who had contact with patients that were diagnosed with COVID-19 and were admitted to a Hospital in Singapore. The samples of one patient were collected before routine cleaning. Cleaning in high-touch areas was performed twice a day with 5000 ppm sodium dichloroisocyanurate. The floor was cleaned with the same product on a daily basis at a concentration of 1000 ppm. The results revealed the presence of the virus in the environment, including in a toilet and bathroom sink, suggesting that it can be shed in faeces, in addition to the spread by aerosols with viruses detected in the exhaust vents of the air.

For disinfection, sodium hypochlorite can be used at 0.1% dilution, and bleach solutions with 5.25-6.00% sodium hypochlorite can be diluted with one part bleach in 49 parts water. Alcohol can be used for surfaces where the use of bleach is not suitable[17].

An interesting method for decontaminating footwear is the use of a footbath at the entrance of a house. The footbath is a box, which can be made from plastic, and it houses a sponge in which a disinfectant solution is added, making it ideal for cleaning shoes before entering the home. Such a procedure can help reduce the spread of SARS-CoV-2 that has been detected on the front of shoes[16]. However, according to Ong et al's[16] study, the risk of transmission through this route is low, since the agent was only detected in the hospital area where the experiment was carried out, and was undetectable in nearby sectors. However, further studies into potential means of transmission are necessary.

According to Skorzewska[18], we should think about control alternatives such as UV radiation, ventilation, and even opening windows and increasing sunlight exposure to decrease viral load, taking into account the probable evolution of the virus in cave environments. Anthony et al[19], report particular associations between bat families and viral sub-clades that suggest co-evolution. In the study by Menachery et al[20], the authors say that Coronavirus accessory genes have co-evolved with their natural host for optimum functionality. The accessory proteins of the coronavirus also play a fundamental role in adapting the virus to the host's natural environment [20,21].

A study carried out by Duan et al[22], used irradiation with ultraviolet light for 60 minutes on several coronaviruses in culture medium, resulting in undetectable levels of viral infectivity. In another study, Bedell et al[23] used an automated triple-emitter whole room disinfection system to inactivate the MHV-A59 and the MERS-CoV viruses on surfaces with a greater than 5 log10 reduction on MERS in 5 minutes of UV-C exposure.

Coronavirus stability on multiple surfaces, including SARS-CoV-2, has been reported in several studies. Despite this, an association of measures such as the use of disinfectants, UV radiation, heating, and use of air circulation in contaminated environments can reduce the risk of transmission.

Competing Interests

The author(s) has/have no competing interests to declare.

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