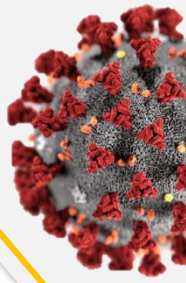
DISINFECTION BOX / CHAMBER / TUNNEL / BOOTH/ PARTITION / GATE TO REDUCE TRANSMISSION OF COVID-19

Based on available evidence up to 27 April 2020



INTRODUCTION

Disinfection is broadly defined as a procedure, the results of which is transient, that eliminates many or all pathogenic microorganisms, except bacterial spores, and/or deactivates undesirable viruses on inanimate objects. Germs include living microorganisms, such as bacteria, fungi, and/or viruses, which can cause infections or diseases. Depending on the achieved amount and type of germ destruction, disinfection is further categorized into high, intermediate and low-level disinfection. Disinfection is essential for ensuring that hosts do not transmit infectious pathogens to other people. Deficiencies in disinfection procedures according to scientifically based guidelines increases the risk associated with (i) breach of host barriers (ii) person-to-person transmission, and (iii) transmission of environmental pathogens.[1] The activity of germicides against microorganisms depends on these factors; intrinsic qualities of the organism, the chemical and external physical environment.[2] Factors that affect the efficacy of disinfection and sterilization include prior cleaning of the object; organic and inorganic load present; type and level of germ contamination; concentration of and exposure time to the germicide; physical nature of the object (e.g., crevices, hinges and lumen); presence of biofilms; temperature and pH of the disinfection process; and in some cases, relative humidity.[1]

Recently, various claims have been made on the effectiveness of using disinfection delivered in a particular confined space such as box / chamber/ tunnel / booth / partition/ gate to reduce the transmission of COVID-19. The disinfection procedure is carried out commonly by automated dispersion of disinfectant on individuals when he or she passes through the disinfection box/ chamber/ tunnel / booth / partition / gate. These devices would possibly be activated by infra-red or motion sensors embedded in the device. Different types of sprayers are being used to disperse the disinfectant. The spraying process takes between 20 to 30 seconds for each round of disinfection.

As claimed, modularity in the design of these devices eases transportation, installation, and removal at the entrance of high-risk areas such as hospitals, airports, train stations, bus stations,

supermarkets, factories, schools, and other crowded areas. However, the World Health Organization (WHO) do not recommend spraying the external part of the body using chemicals such as alcohol or chlorine, does not kill the virus inside the body. Spraying such substances can be harmful to mucous membrane of individuals.[3] There have been mixed opinions on the use of disinfection devices at hospitals, markets, industrial complexes, and administrative buildings in countries across the globe.

Various type of disinfectant used in the device, physical specification of the chamber / tunnel / box, as well as range of the device's price have been reported. This information is available upon request to the reviewer. Hence, this Rapid Evidence Review was conducted to provide evidence on the safety and effectiveness of disinfection box / chamber / tunnel / booth / partition / gate based on request from the Director of Medical Development Division, Ministry of Health Malaysia following proposal to introduce the technology to Ministry of Health Malaysia.

EVIDENCE ON EFFECTIVENESS AND SAFETY

Systematic search was conducted from scientific databases such as Medline, EBM Reviews, EMBASE via OVID, PubMed and from the general search engines [Google Scholar and US Food and Drug Administration (US FDA)] on (i) effectiveness of disinfection devices such as box/ chamber/ tunnel /booth / partition/ gate (ii) safety of disinfection devices such as box/ chamber/ tunnel /booth / partition/ gate (iii) SARS-CoV destruction method (iv) disinfectants for SARS-CoV-2.

There was no retrievable scientific evidence on the effectiveness of disinfection devices such as box / chamber/ tunnel /booth / partition / gate in reducing the COVID-19 transmission. This is regardless of the chemicals (disinfectants) used and the mode of delivery of disinfectants to the body surface.

Systematic search on SARS-CoV and MERS-CoV revealed that coronavirus is sensitive to ultraviolet and heat. Exposure to 56 degrees Celsius for 30 minutes and lipid solvents such as ether, 75% ethanol, chlorine-containing disinfectant, peracetic and chloroform can effectively inactivate the virus.[4] Chlorhexidine has not been effective in inactivating the virus.[4] The US CDC guidelines recommend the use of the United States Environmental Protection Agency (USEPA) registered disinfectant to clean and disinfect facilities.[5] The USEPA has listed out disinfectants that can be used against SARS-CoV-2. Among them are thymol, quaternary ammonium, Isopropanol, ethanol, L-lactic acid, glutaraldehyde, hydrogen peroxide, phenolic, sodium hypochlorite, sodium chlorite, sodium dichloroisocyanurate dehydrate, hypochlorous acid, citric acid, silver,

peroxyoctanoic acid, peroxyacetic acid, peracetic acid and octanoic acid. According to the USEPA, these products are for use on surfaces, not humans.[6] Most of the products listed are suitable for hard nonporous surfaces e.g. glass and metal.[6,7]

Clothings are considered as porous surfaces / materials[7] and US CDC recommends to launder / wash the items using the warmest appropriate water setting and dry it completely.[6] Otherwise, products that are suitable for porous materials and listed in EPA-registered for use against SARS-CoV-2 list can be used.[5] However, of the products that are listed, (last update: 23 April 2020) quaternary ammonium needs five to ten minutes of contact time (to be use as laundry presoak) to be effective in deactivating human coronavirus.[6] Most of the spraying process in / at the disinfection box / chamber / tunnel / booth / partition / gate takes approximately 20 to 30 seconds for each round of disinfection which is not enough to deactivate coronavirus.

The World Health Organization (WHO) does not recommend spraying the external part of the body with alcohol or chlorine as it does not kill the virus inside the body of an infected person and can be harmful to mucous membranes (i.e. eyes, mouth).[3]

CONCLUSION

There was no retrievable scientific evidence from the scientific databases on the effectiveness and safety of disinfection box / chamber / tunnel / booth / partition/ gate on humans to reduce transmission of COVID-19.

The effectiveness of disinfection box / chamber / tunnel / booth / partition / gate in reducing the COVID-19 transmission, in addition to, and not replacing existing strategies and control measures (such as hand washing and social distancing) to combat the spread of coronavirus, is still uncertain.

Spraying the external part of the body with alcohol or chlorine does not kill the virus inside the body of an infected person and can be harmful to mucous membranes (i.e. eyes, mouth). The contact time of 20 to 30 seconds of spraying in / at the disinfection box / chamber / tunnel / booth / partition / gate is insufficient to deactivate coronavirus.

Hence, the use of disinfection box / chamber / tunnel / booth / partition / gate in reducing the COVID-19 transmission may not be recommended given the lack of scientific evidence and unclear risk-benefit profile.

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Based on available evidence up to 27th April 2020.

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Disclaimer: This rapid assessment was prepared to provide urgent evidence-based input during COVID-19 pandemic. The report is prepared based on information available at the time of research and a limited literature. It is not a definitive statement on the safety, effectiveness or cost effectiveness of the health technology covered. Additionally, other relevant scientific findings may have been reported since completion of this report.

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