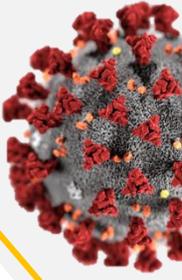




**DISINFECTATION BOX / CHAMBER / TUNNEL /  
BOOTH / PARTITION / GATE  
TO REDUCE TRANSMISSION OF COVID-19**  
**Based on available evidence up to 7 April 2020**



## INTRODUCTION

Disinfection describes a process that eliminates many or all pathogenic microorganisms, except bacterial spores, on inanimate objects. Disinfection is further classified into high, intermediate and low-level disinfection. Low-level disinfectants can kill most vegetative bacteria, some fungi, and some viruses in a practical period of time ( $\leq 10$  minutes). Disinfection is essential for ensuring that hosts do not transmit infectious pathogens to other person. Failure to properly disinfect carries not only risk associated with breach of host barriers but also risk for person-to-person transmission, and transmission of environmental pathogens. Factors that affect the efficacy of disinfection include prior cleaning of the object; organic and inorganic load present; type and level of microbial contamination; concentration of and exposure time to the germicide; physical nature of the object (e.g., crevices); presence of biofilms; temperature and pH of the disinfection process; and in some cases, relative humidity.<sup>1</sup>

Recently, innovative approaches have been generated in the disinfection process to assist in reducing the transmission of COVID-19. A variety of approaches has been invented to execute the disinfection process, physically via box, chamber, tunnel, partition, confined space or gate. Automatic dispersion of disinfectant to individuals is activated once a person steps in or passes through the box, chamber, tunnel, partition, booth or gate, which is made possible by an infra-red sensor or motion sensor embedded in the device. The spraying process takes approximately 20 to 30 seconds in each round of disinfection.

There is a claim that this technology could prevent and limit the spread of bacteria and virus in the current COVID-19 pandemic. The box used is modular designed, and can be transported, easily installed and uninstalled. This technology has been used in Turkey, India, China, Thailand in a variety of settings, namely hospital, market, industrial complex and administrative buildings. Disinfectants being used in the device vary as well, as reported and illustrated in Annex 1. As claimed, this device can be installed at every entrance of high risk areas, such as hospitals, airports, train stations, bus stations, supermarkets, factories, schools, and other crowded areas. Hence, this rapid evidence review is conducted to provide brief information on the safety,

effectiveness and cost-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 by a company to introduce the technology to Ministry of Health Malaysia.

## EVIDENCE ON EFFECTIVENESS AND SAFETY

There was no article retrieved from the 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 (USFDA)] on disinfection box / chamber / tunnel / booth / partition / gate.

The effectiveness of disinfection box / chamber / tunnel / booth / partition / gate depends on the disinfectant used. Research on SARS-CoV and MERS-CoV revealed that coronavirus is sensitive to ultraviolet and heat. Exposure to 56 degree Celcius for 30 minutes and lipid solvents such as ether, 75% ethanol, chlorine-containing disinfectant, peracetic and chloroform can effectively inactivate the virus.<sup>2</sup> Chlorhexidine has not been effective in inactivating the virus.<sup>2</sup> The US CDC guidelines recommend the use of USEPA registered disinfectant to clean and disinfect facilities.<sup>3</sup> 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.<sup>4</sup> Most of the products listed are suitable for hard non-porous surfaces<sup>4</sup> e.g. glass and metals.<sup>5</sup>

Clothings are considered as porous surfaces / materials<sup>5</sup> and US CDC recommends to launder / wash the items using the warmest appropriate water setting and dry it completely.<sup>2</sup> Otherwise, products that are suitable for porous materials and listed in EPA-registered for use against SARS-CoV-2 list can be used.<sup>3</sup> However, the products that are listed, as of 7 April 2020 (contain quaternary ammonium) need five to ten minutes contact time (to be use as laundry presoak) to be effective in deactivating human coronavirus.<sup>4</sup> Most of the spraying process in / at the disinfection box / chamber / tunnel / booth / partition / gate takes approximately 20 to 30 seconds in each round of disinfection which is not enough to deactivate coronavirus. Furthermore, 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).<sup>6</sup> The disinfection box / chamber / tunnel / partition / gate costs varies between products, ranging approximately from RM1000 to RM7000.

## CONCLUSION

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

The disinfection box / chamber / tunnel / booth / partition / gate is an innovative approach that has the potential to assist 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. However, type of disinfectant used in the devices plays a major role in the effectiveness of the devices. Disinfectants that are suitable for porous materials and listed in EPA-registered for use against SARS-CoV-2, for use on surface need five to ten minutes contact time (for all listed disinfectants, and for quaternary ammonium to be use as laundry presoak) to be effective in deactivating human coronavirus. Most of the spraying process in / at the disinfection box / chamber / tunnel / booth / partition / gate takes approximately 20 to 30 seconds in each round of disinfection which is not enough to deactivate coronavirus. Furthermore, 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).<sup>6</sup>

***\*Characteristics of disinfection box / chamber / tunnel / booth / partition / gate are listed in Annex 1***

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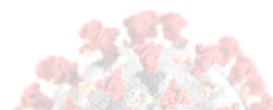
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Based on available evidence up to 7<sup>th</sup> April 2020.

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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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**CHARACTERISTICS OF DISINFECTION BOX/ CHAMBER/ TUNNEL/ PARTITION/ GATE (AS OF 7 APRIL 2020)**

No.	Product	Company / Organisation	Origin/Country	Physical specification	Disinfectant Used	Product Cost
1	Ikarus (Body disinfection chamber)	Plast Grup	Turkey	The chamber is equipped with: <ul style="list-style-type: none"> <li>• an antibacterial and corrosion-resistant composite body</li> <li>• 60-degree swivel base</li> <li>• fingerprint reading</li> <li>• self-cleaning with ultraviolet</li> <li>• a camera</li> <li>• body temperature detection with thermal camera,</li> </ul>	Not available (Claimed can disinfect 500 people with 100 liters of disinfectant)	\$10,000 (lira)
<a href="https://www.aa.com.tr/en/latest-on-coronavirus-outbreak/turkish-firm-pioneers-disinfection-against-covid-19/1776693">https://www.aa.com.tr/en/latest-on-coronavirus-outbreak/turkish-firm-pioneers-disinfection-against-covid-19/1776693</a>						
2	Human Sterilizer Box	hiSehat	Indonesia	<u>Chamber size:</u> 1.2m x 1.2m x 2.2m <ul style="list-style-type: none"> <li>• A walk through chamber</li> <li>• Auto spraying of disinfectant</li> <li>• Around 5 seconds</li> </ul>	Hypochlorus acid (HoCl) without alcohol  Water, HoCl free chlorine of 210ppm, pH 5.5-6.9  <b>Note:</b> Chlorine and chlorine compounds is registered as disinfectants that	Not available

					can be used against SARS - CoV2 (for use on surface) <sup>1,2</sup>	
3	Disinfection Tunnel	Not available	South-Western Chinese City Of Chongqing	Tunnel is equipped with infrared detectors	Not available	Not available
4	Mobile Sterilization Chamber	The Institute of Occupational Health and Environment (Ministry of Health), in collaboration with the Hanoi University of Technology	Vietnam	<p><u>Chamber size:</u> One meter wide and two meters tall, movable</p> <p><u>Wet chamber</u></p> <ul style="list-style-type: none"> <li>• Step in and stand still for 15 to 20 seconds</li> <li>• An infrared sensor that automatically activates the spraying</li> <li>• 360-degree fog mist sprayer</li> </ul>	<p>Ionized saline solution (Anolyte)</p> <p><b>Note:</b> Chlorine and chlorine compounds is registered as disinfectants that can be used against SARS - CoV2 (for use on surface)<sup>1,2</sup></p>	Not available
				<p><u>Dry chamber</u></p> <ul style="list-style-type: none"> <li>• Around 30 seconds</li> </ul>	<p>Heat (temperature was not mention) and ozone</p>	
5	Personnel Sanitization Enclosure	The Vehicle Research and Development Establishment, a Defence Research and Development Organization (DRDO)	India	<ul style="list-style-type: none"> <li>• A walk-through enclosure</li> <li>• Portable</li> <li>• Equipped with sanitizer and soap dispenser</li> <li>• Automatic mist spray of</li> </ul>	<p>Mist of sodium chloride</p> <p>CAUTION: Personnel undergoing</p>	Not available

		laboratory at Ahmednagar in Maharashtra		<p>disinfectant</p> <ul style="list-style-type: none"> <li>• Stop automatically</li> <li>• Duration: 25 seconds</li> <li>• 700-litre capacity tank</li> </ul>	<p>disinfection will need to keep their eyes closed while inside the chamber.</p> <p><b>Note:</b></p> <p>Chlorine and chlorine compounds is registered as disinfectants that can be used against SARS - CoV2 (for use on surface)<sup>1,2</sup></p>	
6	Disinfection Chamber	Trichy Corporation	Tamil Nadu, India	<p><u>Chamber size:</u> Eight feet long and four feet wide</p> <p>Build from: spare metal bars and mist spray nozzles</p> <p>Has 2,000-litre capacity water tank</p> <ul style="list-style-type: none"> <li>• A walk through chamber</li> <li>• Hands raised for 3-5 seconds</li> </ul>	Not available	Not available
7	Disinfection Chamber (Prototype)	BHEL Tiruchy	India	<p><u>Chamber size:</u> 12-foot-long chamber</p> <p>A lightweight structure built with a tubular mild-steel frame fitted with a disinfectant storage tank, a pumping system and</p>	Not available	Not available

				precision spray nozzles		
8	Disinfection Chamber	Not available	Indonesia	<ul style="list-style-type: none"> <li>• A walk through chamber</li> <li>• Spraying of disinfectant in the chamber</li> <li>• 10-15 seconds</li> </ul> <p>The Ministry of Health Indonesia do not recommend using disinfection chambers or spraying disinfectant directly on human bodies as it can harm the skin, eyes and mouth, and could lead to irritation.</p>	Not available	Not available
9	Disinfection Tunnel	Young Indians with Confederation of Indian Industry (CII)	Tiruppur, Tamil Nadu, India	<ul style="list-style-type: none"> <li>• A walk through tunnel</li> <li>• Overhead sprayers sprinkle the disinfectant</li> </ul>	<p>Diluted 1% Sodium Hypochlorite</p> <p>Dilution rate: one part per million (ppm)</p> <p><b>Note:</b></p> <p>Chlorine and chlorine compounds is registered as disinfectants that can be used against SARS - CoV2 (for use on surface)<sup>1,2</sup></p>	Rs90,000

10	Mobile Disinfectant Chamber (MDC)	Rural Industry Entrepreneur Organisation	Penang, Malaysia	<ul style="list-style-type: none"> <li>Automatic system with sensors to activate and deactivate the disinfectant sprays</li> <li>Duration: not mention</li> </ul>	Not available	RM 4,000
11	Virus Buster Nano Spray	Zull Design Autotronic in collaboration with <i>Persatuan Pengguna Islam Malaysia (PPIM)</i>	Malaysia	<p>Chamber size: 2.2m (length) x 1.2m (width) x 2.0m (height)</p> <ul style="list-style-type: none"> <li>A walk through chamber</li> <li>Automatic detection (infrared)</li> <li>14 nozzles to spray disinfectant</li> <li>Capacity: 50 gallons/tank</li> </ul>	<p>Chlorhexidine digluconate 0.12% W/V (Alcohol free mouthwash)</p> <p><b>Note:</b></p> <ol style="list-style-type: none"> <li>Chlorhexidin ehas not been effective in inactivating the coronavirus.<sup>3</sup></li> <li>Bathing with chlorhexidine may cause mild skin reactions.<sup>4,5</sup></li> </ol>	Not available
12	Disinfectant box	TXMR Sdn Bhd	Malaysia	Disinfection box/cabin is equipped with indicator light, tower light, water tank, water pump, host pipe and limit switch	Not available	Not available
13	COS-QUAT	GUMIpRO Solutions	Malaysia	<ul style="list-style-type: none"> <li>A mixture of liquid quaternary ammonium compound – to disinfect, sanitize and deodorize</li> <li>Widely used in</li> </ul>	A mixture of liquid quaternary ammonium compound	Not available

				<p>breweries, dairy, beverage, confectionery, bakeries and other food processing plants for sanitizing.</p> <ul style="list-style-type: none"> <li>• Effective in controlling mold and mildew.</li> <li>• Not recommended to mix with anionic detergents</li> </ul> <p>Hazards: causes eye and skin irritation</p>	<p><b>Note:</b> Ammonium quaternary compound (QAC) is registered as disinfectants that can be used against SARS - CoV2 (for use on surface)<sup>1,2</sup></p>	
14	Sterilization Chamber	Kolej Universiti TATI (UC TATI), Terengganu	Malaysia	<ul style="list-style-type: none"> <li>• A walk through chamber</li> <li>• Automatic spraying of disinfectant</li> <li>• Within 3 seconds</li> </ul>	Not available	RM 1,000
15	Automated Disinfection Chamber	University Technology Malaysia (UTM) -produced for the Johor Bahru City Council (MBJB)	Malaysia	<ul style="list-style-type: none"> <li>• Motion sensor technology and fluid mechanics</li> <li>• Portable</li> </ul>	Not available	Not available
16	Disinfectant Tunnel	Universiti Malaysia Perlis (UniMAP)	Malaysia	<u>Chamber size:</u> 1.8 metre (6 ft)-wide, 2.7 metre (9 ft)-long and 2.4 metre (8 ft)-tall	Not available	RM6,000
17	Disinfection Tunnel	Sabah Police <ul style="list-style-type: none"> <li>• To be used in all the district headquarters (IPDs) and the contingent headquarters (IPK) in Sabah</li> </ul>	Malaysia	Not available	Not available	Project cost (all sites): RM70,000

18	Automatic Disinfectant Tunnel	School of Electrical and Electronic Engineering (PPKEE), Universiti Sains Malaysia (USM)	Malaysia	<p>The tunnel is equipped with:</p> <ul style="list-style-type: none"> <li>• a touchless temperature detector</li> <li>• no-touch soap dispenser and a hand dryer</li> <li>• sonar detectors</li> </ul>	Not available	RM1,500
19	Personal Spray Booth	Premier Diagnostics Sdn Bhd. Shah Alam, Selangor (Distributor)	Thailand (manufacturer)	<p>Features:</p> <ul style="list-style-type: none"> <li>- 10 litre tank (storage)</li> <li>- 720 sprays per tank</li> <li>- 12 spray nozzles</li> <li>- Sprays :3-5 seconds pulse</li> <li>- Foot switch operation</li> <li>- Auto sensors/operation lights</li> <li>- Fire retardant material</li> <li>- 12v DC pump</li> <li>- Weight : 20kg</li> <li>- Dimension: 2.05(h) x 1.25(w) x 0.85(d)</li> <li>- Installation: plug and go</li> </ul>	Most disinfection liquid	Not available
20	Sanitize Chamber (Model CVD 901)	MTAB Resource Sdn. Bhd., Putrajaya	<p>Gadang Works Sdn. Bhd (Manufacturer)</p> <p>Accredited by Standards Malaysia, Certified by TUV NORD</p>	<p>Components:</p> <ul style="list-style-type: none"> <li>- Metal &amp; PVC Structure</li> <li>- Mist nozzle, plastic flexible tube</li> <li>- High pressure water pump</li> <li>- Sanitize liquid</li> </ul>	<p>75% alcohol</p> <p><b>Note:</b> Alcohol 70% to 90% (ethyl or isopropyl alcohol) is registered as</p>	Not available

			ISO9001.2015	storage container - Motion sensor	disinfectants that can be used against SARS - CoV2 (for use on surface) <sup>1,2</sup>	
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