Keralty

Instituto Global de Excelencia Clínica

Títle	Summary of evidence: Use of type C ultraviolet radiation to disinfect objects in care areas to decrease the probability of SARS-CoV-2 infection.
Identification code	04192020IH
Request Área	COVID-191. Comité de Crisis en Salud Pública Keralty
Name	COVID-191. Comité de Crisis en Salud Pública Keralty
Answer date	19 04 2020

1. Is there evidence that type C ultraviolet radiation can eliminate SARS-CoV-2 on objects and surfaces?
2. Does the use of type C ultraviolet radiation cause harm when used to disinfect rooms?

Search Terms:

COVID 19, Coronavirus, ultraviolet rays, disinfection, SARS-CoV-2-, UVGI

Types of study: Summary of evidence from recommendations of scientific societies and national and international health organizations, systematic literature reviews (RSL), meta-analysis, clinical trials and other primary studies.

Information Sources: Directed search on the websites of scientific societies: Centers for Disease Control and Prevention (CDC), World Health Organization (WHO), The National Institute for Occupational Safety and Health (NIOSH), Pubmed and Google Scholar.

Background:

COVID-19 disease is caused by the SARS-CoV-2 virus, a coronavirus that is 96% identical to SARS-CoV. SARS-CoV-2 is transmitted by direct contact and drops. Aerial transmission can occur during aerosol-generating and supportive procedures (eg, orotracheal intubation, non-invasive ventilation). Standard precautions should always be used for all healthcare workers in patient care and contact and airborne precautions should be implemented. The precautionary principle or precautionary principle is a concept that supports the adoption of protective measures in the face of well-founded suspicions that the SARS-CoV-2 virus creates a serious risk to public health, but without definitive scientific evidence. on the transmission modes and virulence of the SARS-CoV-2. This principle applies and should be considered in relation to the use of the maximum possible protection for health equipment.

Summary of Findings

Ultraviolet sterilization also called ultraviolet germicidal irradiation (UVGI) is a disinfection method that uses short-wavelength ultraviolet light (ultraviolet C or UVC) to kill or inactivate microorganisms by destroying nucleic acids and altering their DNA, leaving them unable to perform vital cellular functions. Katara et al. They have pointed out that “The medical profession was the first to endorse the germicidal effect of ultraviolet ray lamps and has traditionally been used to disinfect operating rooms. The absence of any residual effect is the greatest advantage of UV disinfection. Despite its use for more than 50 years, the guidelines for the position of the devices, the effective distance, the required exposure time, etc. they are not well documented in hospital practice’ (Katara et al. 2008).

Stephens et al noted that fomites are generally considered to be any inanimate object that, when contaminated with infectious organisms, can serve as a means of transferring disease-causing agents to a new human host. Therefore, and considering that “since the inhabitants of industrialized countries spend approximately 90% of their time indoors. The most important stimuli for transmission and stimulation tend to be those found in the built environment and with which human beings usually come into direct contact, such as door knobs, counters, medical equipment, handrails, clothes and mobile phones.” (Stephens, 2019).

According to Otter et al, both coronaviruses and influenza have the ability to survive in a wide range of porous and non-porous materials, including metals, plastics (such as light switches, telephones, Plexiglas, latex, rubber, and polystyrene). , woven and non-woven (including cotton, polyester, tissues and disposable tissues), paper (including magazine pages), wood, glass, stethoscopes, tissue, Formica®, banknotes, tiles, eggs, feathers and stuffed toys. (Otter et al. 2016) UVGI according to the CDC is “a promising method but the efficacy of disinfection depends on the dose. Not all UV lamps provide the same intensity, so treatment times would have to be adjusted accordingly.

Heimbuch and others verified the performance of 1 J / cm2 of UVGI against influenza A (H1N1), avian influenza A (H5N1) virus, influenza A (H7N9) A / Anhui / 1/2013, influenza A (H7N9) A / Shanghai / 1/2013, MERS-CoV and SARS-CoV and reported inactivation of the virus from 99.9% to more than 99.999%. UVGI is harmful. Proper precautions are required to avoid UVGI exposure to the skin or eyes. ”(CDC, 2020) Ebola virus (EBOV) and Middle East respiratory syndrome coronavirus (MERS-CoV) have been identified as potential threats to blood safety, however both THERAFLEX UV (UVC) and THERAFLEX MB-Plasma (MB / light) effectively reduce the infectivity of EBOV and MERS-CoV in platelets and plasma, respectively (Eickmann et al. 2018). According to Keil et al. riboflavin and ultraviolet light effectively reduced the MERS-CoV titer in human plasma products below the detection limit, suggesting that the treatment process may reduce the risk of MERS-CoV transfusion transmission (Keil et al. 2016).
Lindsley et al. reported a reduction in the durability of N95 type respirator materials for doses ranging from 120 to 950 J / cm2; however, approximately 99.9% UVGI inactivation of bacteriophage MS2, a non-enveloping virus, and H1N1 A / PR / 8/34 influenza was achieved with much lower doses of approximately 1 J / cm2 (Lindsley et al. al. 2015) Bedell et al. found that efficient and automated methods of disinfecting surfaces contaminated with Middle East respiratory syndrome coronavirus (MERS-CoV) can prevent the spread of the virus and reported the efficacy and use of an automated triple-UV disinfection system room-wide emitter to inactivate mouse hepatitis virus, strain A59 (MHV-A59), and MERS-CoV viruses on surfaces with a reduction of> 5 log10 (Bedell et al, 2016). Bedell et al also conclude that "UV-C disinfection is more effective when used as a complement to standard terminal cleaning of hard surfaces and should not be used as a substitute for good cleaning practices."

Answers to the questions:

1. Is there evidence that type C ultraviolet radiation can eliminate SARS-CoV-2 on objects and surfaces?

   There is evidence that type C ultraviolet radiation eliminates coronaviruses, but there is no specific evidence that it eliminates SARS-CoV-2.

2. Does the use of type C ultraviolet radiation cause harm when used to disinfect rooms?

If it causes skin damage, it can potentially cause cataracts and cancer, if exposed directly. With adequate precautions the potential damage is very low.

Recommendations

1. For the prevention and control of SARS CoV2 infection, administrative and engineering measures should take precedence, as well as hand washing and surface cleaning measures.
2. Disinfection using ultraviolet germicidal irradiation (UVGI) can be used as a complement to good practices for cleaning hard surfaces, avoiding its use on people, to eliminate viruses and bacteria, including SARS-CoV-2.
3. UVGI is one method among others that can be used, with due precautions, to disinfect surfaces and avoid contact infections. There are no cost-benefit evaluations for ultraviolet radiation as a COVID-19 prevention method.
4. A UVGI device should not be used without adequate training and explanation of the risks of its use.
5. Repeated use of UVGI decreases the life of N95 respirator type polymer devices. The same consideration should be evaluated against other devices.

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