Avicenna J Environ Health Eng. 2020 June;7(1):x-x http://ajehe.umsha.ac.ir

Letter to editor

doi 10.34172/ajehe.2020.xx

Health Impacts of Long-term Exposure to Disinfectants During SARS-Cov-2 Pandemic

Ali Reza Rahmani[1], Ghasem Azarian[1], Ali Poormohammadi[2*]

[1]Department of Environmental Health Engineering, Faculty of Health and Research Center for Health Sciences, Hamadan University of Medical Sciences, Hamadan, Iran.
[2]Center of Excellence for Occupational Health, Research Center for Health Sciences, School of Public Health, Hamadan University of Medical Sciences, Hamadan, Iran.

***Correspondence to** Ali Poormohammadi, Email: apoormohammadi000@yahoo.com

Received xx 20, 2017; **Revised** xx 10, 2017; **Accepted** xx 25, 2018 **Published online** 30 June, 2020

Open Access
Scan to access more free content

Dear Editor,

In recent months, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), as a newly emerging viral infectious agent, which belongs to the betaCoVs category has become a major public health problem worldwide. SARS-Cov-2 is an RNA virus responsible for the coronavirus disease 2019 (COVID-19). This disease was first identified in Wuhan (Hubei, China) in December 2019, and then it has spread globally. The World Health Organization (WHO) has declared the COVID-19 outbreak a global pandemic on March 11, 2020 (1). COVID-19 infection can be transmitted by direct contact with an infected person through respiratory droplets (generated through coughing and sneezing) or by touching surfaces contaminated with the patient's respiratory droplets (2). The new virus can remain viable on the surface from several hours to nine days and maintain its infectivity. Due to the novelty of this virus and lack of sufficient information on this virus, there are different and contradictory views regarding its transmission modes. According to the WHO reports, transmission of the COVID-19 virus can occur by direct contact with infected people and indirect contact with surfaces contaminated with the patient's respiratory droplets (3). In this regard, frequent disinfection of surfaces with various chemical disinfectants such as alcohol, chlorine, acetic acid, chloroform, and so on is recommended. Moreover, these disinfectants are commonly used to disinfect tools, hospital clothing, and hands of hospital staff to prevent the spread of coronavirus. Sodium hypochlorite as a chlorine compound is often used for disinfection in hospitals, public places, homes, and so on. It is mainly used at high concentrations (between 0.05 and 0.1%) during the epidemic and occurrence of emerging infectious diseases (4). Nowadays, due to the extensive spread of SARS-Cov-2 and being considered a pandemic disease, it is necessary to consider appropriate health measures against this virus. According to WHO reports, the COVID-19 outbreak is likely to last between 18 and 24 months. In this situation, long-term use of chemical disinfectants, especially chlorinated substances and detergents, in addition to causing harmful effects on human health, can pose a threat to the environment, water, and soil resources. Due to their high efficiency, availability, and affordability, the chlorinated compounds are commonly used as the most important disinfectant in preventing the spread of infectious disease. These compounds have a highly toxic effect on the airways and cause short-term and long-term pulmonary complications. Acute and severe exposure to chlorine gas, especially indoors, can lead to acute and severe shortness of breath, airway spasm, wheezing, and pulmonary embolism. These complications are so severe in some cases that can lead to hospitalization. Long-term complications are also observed such as chronic asthma which may require long-term treatment (5,6). Hence, it seems necessary to provide an effective protocol for disinfection for a long time, which poses a low risk to the environment and to human health. In this regard, the use of disinfectants effective against the SARS-Cov-2 virus with less toxic effects can be a good alternative. Accordingly, it is necessary to pay attention to the following points:

- Engineering controls should be considered for decreasing the adverse health effects of frequent use of disinfectants including ventilation and isolation. Therefore, proper ventilation of indoor air in hospitals can prevent overexposure of health care staff and patients with the used disinfectants. Moreover, isolation can be an effective method in engineering control, in which disinfection can mainly be performed in a shift when fewer health care stuff are exposed (7).

- In addition to chemical disinfectants, physical methods can be applied such as heat and ultraviolet radiation, especially in medical centers where patients and staff are permanently present. For example, ultraviolet C (UV-C) light can be used in health centers for disinfecting surfaces, materials, and air. It is commercially available and is currently used in various centers. Until now, there is no study investigating the effect of UV irradiation on SARS-Cov-2 inactivation. However, based on the literature review, UV can inactivate viruses by affecting their spike protein and genome. According to the recommended guideline for disinfection and sterilization in healthcare facilities, ionizing radiation by cobalt-60 gamma rays or electron accelerators can also be used at a low-temperature for disinfecting various medical products such as pharmaceuticals and medical devices. In addition, dry-heat sterilizer and moist heat (autoclave) are used for disinfecting medical instruments. Moreover, microwaves are used in medicine for disinfection of dental instruments, soft contact lenses, dentures, milk, and urinary catheters for intermittent self-catheterization (8)
- Determining areas with the highest probability of contamination and focusing on cleaning and disinfecting these common areas where staff/others providing services may come into contact with patients instead of disinfecting the entire hospital are recommended. For instance, high-touch surfaces such as nursing stations, doorknobs, floors, and bathrooms can be disinfected more frequently and other low-touch surfaces can be disinfected less frequently (8).
- The minimal recommended concentrations of the disinfectants should be used for disinfecting hands and surfaces. According to a recent study, a minimal concentration of 30% ethanol or 2-propanol is sufficient for the inactivation of SARS-Cov-2 (9). Therefore, using a minimum concentration of disinfectants with sufficient efficiency can prevent and decrease acute and chronic health effects of these compounds.

References

1. Cucinotta D, Vanelli M. WHO declares COVID-19 a pandemic. Acta Biomed. 2020;91(1):157-60. doi: 10.23750/abm.v91i1.9397.
2. Kampf G, Todt D, Pfaender S, Steinmann E. Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. J Hosp Infect. 2020;104(3):246-51. doi: 10.1016/j.jhin.2020.01.022.
3. World Health Organization (WHO). Modes of Transmission of Virus Causing COVID-19: Implications for IPC Precaution Recommendations. WHO; 2020.
4. Lai CC, Shih TP, Ko WC, Tang HJ, Hsueh PR. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease-2019 (COVID-19): the epidemic and the challenges. Int J Antimicrob Agents. 2020;55(3):105924. doi: 10.1016/j.ijantimicag.2020.105924.
5. Gapany-Gapanavicius M, Yellin A, Almog S, Tirosh M. Pneumomediastinum. A complication of chlorine exposure from mixing household cleaning agents. Jama. 1982;248(3):349-50. doi: 10.1001/jama.248.3.349.
6. Segal E, Lang E. Toxicity, chlorine gas. Cough. 2004;52:80.Available from: http://www.ecleareu.com/PDF/Segal_%20E_2010_Toxicity_Chlorine_Gas.pdf
7. Occupational Safety and Health Branch, Labour Department. Chemical Safety in the Workplace: Guidance Notes on Safe Use of Chemical Disinfectants. Hong Kong: Occupational Safety and Health Branch, Labour Department; 2007.
8. Rutala WA, Weber DJ. Guideline for Disinfection and Sterilization in Healthcare Facilities, 2008. Washington, DC: Centers for Disease Control and Prevention; 2019.
9. Kratzel A, Todt D, V'kovski P, Steiner S, Gultom ML, Thao TTN, et al. Efficient inactivation of SARS-CoV-2 by WHO-recommended hand rub formulations and alcohols. bioRxiv. 2020. doi: 10.1101/2020.03.10.986711.