


Commercial Hand Sanitizers use amid COVID-19 Pandemic: the Concerns of Antimicrobial Resistance

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Abstract: Following the outbreak of novel coronavirus disease, the rising concerns about the prevalence of alcohol-based hand sanitizers' inappropriate use and substandard products in the market create an ongoing safety concern. They can cause frequent exposure of microorganisms to below the alcohol concentrations to the range recommended for infection prevention and development of mutations. Thus, it is invaluable to sensitize the scientific community for further researches to provide additional evidence. Additionally, regulation of quality and proper use of alcohol-based hand sanitizers should be effectively promoted. This commentary justifies the impact of COVID-19 on the current and future use of alcohol-based hand sanitizers.

Keywords: COVID-19, alcohol-based hand sanitizers, antimicrobial resistance

Commentary

Following its outbreak, the contagious novel coronavirus (COVID-19) spread more rapidly across the world. It becomes an unprecedented challenge to global health.¹⁻⁴ Due to no effective antiviral drug discovered yet, the World Health Organization (WHO) recommended vaccines and preventive measures to fight and stay safe from it. Especially in developing countries, keeping hand hygiene using soap and water or alcohol-based hand sanitizers (ABHSs) plays an inevitable role in inactivating and preventing the spread.⁵⁻⁸

Unless hands are visibly soiled, alcohol-based hand sanitizer is preferred to keep hand hygiene in most healthcare settings and communities during COVID-19.⁹⁻¹¹ It should be due to ABHS is time and cost-effective, available at the point of care, has improved skin tolerance and broad microbiological spectrum. Thus, the emergent COVID-19 situation caused a sudden spike in demand of ABHSs, generated a substantial shortage in supply, less rigorous quality control, and prevalence of inappropriate use and substandard products in the market.^{9,10,12,13}

Amid COVID-19, inappropriate use, less rigorous quality control, and the increased prevalence of substandard ABHS products in the markets can create ongoing safety concerns. They can cause frequent microbial exposure to low doses or substandard concentrations of alcohol. It becomes ineffective and leads to the development of mutation.¹³⁻¹⁶ Especially utilizing ABHSs at five moments in the healthcare setting amid COVID-19 can lead to prolonged exposure of susceptible resident bacteria on human hands to below alcoholic concentrations range

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recommended for infection prevention. It generates a progressive stepwise accumulation of natural mutations and emerging of alcoholic tolerance in microbes.

Because ABHS is the most commonly used disinfectant, the development of resistance mutation can put more burdens on already struggling healthcare professionals and global growing problems in healthcare.^{17–19} It clarifies the chance for the failure of using ABHSs mainly for hygienic hand disinfection in the healthcare setting and community in the near future if the current trend continues.

Conclusion

Amid COVID-19, in addition to dynamic human life losses, the inappropriate use and prevalence of substandard alcohol-based sanitizer are highly increased. Misuse and substandard products can lead to common resident bacteria on human hand exposure to a low dose of alcohol (sub-disinfecting concentrations). It creates a chance for stepwise accumulation of resistance mutations. In the near future, it can be a great challenge to use ABHSs.

Operational Definition

Alcohol: Isopropanol, ethanol, n-propanol, or their combinations.

Five essential moments: before patient contact, before clean/aseptic procedures, after the risk of body fluids, after patient contact, and after contact with patient surroundings.

Resident bacteria on human hands: include *Enterococcus faecalis*, *Staphylococcus epidermidis*, *Staphylococcus warneri*, *Acinetobacter lwoffii*, *Enterobacter cloacae*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Pseudomonas fluorescens/putida*, *Staphylococcus aureus*.

Data Sharing Statement

Not applicable.

Ethics Approval and Consent to Participate

Not applicable.

Consent for Publication

Not applicable.

Author Contributions

Both authors made substantial contributions to conceptualize and design the manuscript. And together, data

acquisition, analysis, and interpretation, drafting or revising the article critically for important intellectual content were performed. They agreed to submit to the current journal, gave final approval of the version to be published, and agreed to be accountable for all aspects of the work.

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References

1. World Health Organization. 2020-Novel coronavirus-China. Available from: <https://www.who.int/csr/don/12-january-2020-novel-coronavirus-china/en/>. Accessed June 10, 2020.
2. Lai -C-C, Shih T-P, Ko W-C, Tang H-J, Hsueh P-R. 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
3. Warwick J, McKibbin and Roshen Fernando. The global macroeconomic impacts of COVID-19: seven scenarios; 2020. Available from: <https://www.brookings.edu/research/the-global-macroeconomic-impacts-of-covid-19-seven-scenarios/>. Accessed June 10, 2020.
4. Cennimo DJ, Bergman SJ, Olsen KM. What is COVID-19?; 2021. Available from: <https://www.medscape.com/answers/2500114-197401/what-is-covid-19>. Accessed February 24, 2021.
5. Studies: hand sanitizers kill COVID-19 virus, e-consults appropriate. Available from: <https://www.cidrap.umn.edu/news-perspective/2020/04/studies-hand-sanitizers-kill-covid-19-virus-e-consults-appropriate>. Accessed June 18, 2020.
6. Kingsland J. COVID-19: hand sanitizers inactivate novel coronavirus, study finds; 2020. Available from: <https://www.medicalnewstoday.com/articles/covid-19-hand-sanitizers-inactivate-novel-coronavirus-study-finds>. Accessed June 18, 2020.
7. WHO, 2019. Coronavirus disease (COVID-19) advice for the public; 2021. Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>. Accessed June 18, 2020.
8. Preventing the spread of the coronavirus: physical distancing, masks, vaccines, and other preventive measures; 2021. Available from: <https://www.health.harvard.edu/diseases-and-conditions/preventing-the-spread-of-the-coronavirus>. Accessed February 24, 2021.
9. World Health Organization. WHO guidelines on hand hygiene in health care: first global patient safety challenge clean care is safer care. Geneva: the Organization; 2009. Available from: https://apps.who.int/iris/bitstream/handle/10665/44102/9789241597906_eng.pdf?sequence=1. Accessed February 24, 2021.
10. Hand hygiene recommendations; 2020. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/hand-hygiene.html>. Accessed February 24, 2021.
11. Hand hygiene guidance; 2021. Available from: <https://www.cdc.gov/handhygiene/providers/guideline.html>. Accessed February 24, 2021.
12. Naissan O, Wesley, Talakoub L. Hand washing and hand sanitizer on the skin and COVID-19 infection risk; 2020. Available from: <https://www.the-hospitalist.org/hospitalist/article/219484/aesthetic-dermatology/hand-washing-and-hand-sanitizer-skin-and-covid-19/page/0/2>. Accessed June 18, 2020.

13. Berardi A, Perinelli DR, Merchant HA, et al. Hand sanitisers amid COVID-19: a critical review of alcohol-based products on the market and formulation approaches to respond to increasing demand. *Int J Pharm.* 2020;584:119431. doi:10.1016/j.ijpharm.2020.119431
14. Pidot SJ, Gao W, Buultjens AH, et al. Increasing tolerance of hospital *Enterococcus faecium* to handwash alcohols. *Sci Transl Med.* 2018;10:452. doi:10.1126/scitranslmed.aar6115
15. Mahmood A, Eqan M, Pervez S, et al. COVID-19 and frequent use of hand sanitizers; human health and environmental hazards by exposure pathways. *Sci Total Environ.* 2020;742:140561. doi:10.1016/j.scitotenv.2020.140561
16. Jairoun AA, Al-Hemyari SS, Shahwan M. The pandemic of COVID-19 and its implications for the purity and authenticity of alcohol-based hand sanitizers: the health risks associated with falsified sanitizers and recommendations for regulatory and public health bodies. *Res Social Adm Pharm.* 2021;17(1):2050–2051. doi:10.1016/j.sapharm.2020.04.014
17. Wistrand-Yuen E, Knopp M, Hjort K, Koskiniemi S, Berg OG, Dan I. Andersson. Evolution of high-level resistance during low-level antibiotic exposure. *Nat Commun.* 2018;9(1). doi:10.1038/s41467-018-04059-1
18. Sahay. Will resistant bacteria be the end of alcohol hand sanitizers? Available from: <https://healthcare-in-europe.com/en/news/will-resistant-bacteria-be-the-end-of-alcohol-hand-sanitizers.html>. Accessed June 18, 2020.
19. Rezasoltani S, Yadegar A, Hatami B, Asadzadeh Aghdai H, Zali MR. Antimicrobial resistance as a hidden menace lurking behind the COVID-19 outbreak: the global impacts of too much hygiene on AMR. *Front Microbiol.* 2020;11:590683. doi:10.3389/fmicb.2020.590683

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