

A potential hidden reservoir: The role of nail hygiene in preventing transmission of COVID-19



To the Editor: High transmissibility of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has necessitated careful personal preventative techniques among health care workers, including handwashing and personal protective equipment. Nail hygiene is an often overlooked and important potential component of disease transmission through contact, because microbes are more concentrated in the subungual area compared with other parts of the hand or digits.¹ The Centers for Disease Control and

Prevention issued guidance on nail maintenance as part of prevention of coronavirus disease 2019 (COVID-19) spread, including nail trimming/scrubbing and cleaning nail-grooming tools.² We analyzed the literature for the potential of nails and nail modifications as sources of microbial transmission and make evidence-based recommendations to guide physicians and patients in practicing proper nail grooming to limit COVID-19 spread.

Increased nail length has been consistently shown to harbor greater numbers of microorganisms compared with shorter nails (Table I). Although the relationship between nail length and viral load has not been analyzed, fingernails are reservoirs for

Table I. Recommendations for nail hygiene to prevent severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) transmission

| Modification | Pathogens | Evidence | Recommendations |
|------------------|---|---|--|
| Nail length | <ul style="list-style-type: none"> Gram-positive cocci, including <i>Staphylococcus aureus</i>, <i>Streptococcus mitis</i>, and <i>Enterococcus faecalis</i>. Gram-negative bacilli, including <i>Escherichia coli</i>, <i>Klebsiella</i>, and <i>Citrobacter freundii</i>. Human papillomavirus, Hepatitis B virus, Hepatitis C virus | <ul style="list-style-type: none"> Longer nails are correlated with greater microbial counts than shorter nails. Longer nails are more likely to harbor pathogenic organisms than shorter nails. | <ul style="list-style-type: none"> Nails should be kept short (2 mm past fingertip). Nail clippers and other nail grooming equipment should be properly cleaned after each use. Use a scrub brush soaked in 70%-90% alcohol to scrub equipment. Then rinse tools in hot water and dry completely. The underside of the nail should be gently cleansed as part of handwashing. |
| Nail polish | <ul style="list-style-type: none"> The number of pathogenic organisms on an intact coat of polish is similar to that of unpolished fingernails. | <ul style="list-style-type: none"> Nails with intact coats of polish are not associated with greater counts of pathogenic organisms compared with unpolished nails. Damaged nail polish has the potential to act as sources of microbial growth. Use of nail polish is associated with poorer handwashing technique. | <ul style="list-style-type: none"> Nail polish with signs of wear should be promptly removed or replaced. Proper hand-washing technique is essential with and without nail polish. |
| Artificial nails | <ul style="list-style-type: none"> Gram-positive cocci, including <i>S aureus</i> and <i>Enterococcus sp</i>. Gram-negative bacilli, including <i>Enterobacter</i>, <i>Pseudomonas</i>, <i>Klebsiella</i>, <i>Serratia</i>. | <ul style="list-style-type: none"> Artificial nails carry both greater counts and more species of microbes compared with bare nails. Artificial nails inhibit thorough hand sanitization technique. | <ul style="list-style-type: none"> Artificial nails should be avoided while COVID-19 is prevalent. |
| Gel nails | <ul style="list-style-type: none"> Gram-positive cocci, including <i>S aureus</i>, <i>S mitis</i>, and <i>E faecalis</i>. Enterobacteriaceae, including <i>E coli</i>, <i>Klebsiella</i>, and <i>C freundii</i>. | <ul style="list-style-type: none"> Gel nails are associated with higher numbers and more species of microbes compared to bare nails. | <ul style="list-style-type: none"> Gel nails should be avoided while COVID-19 is prevalent. |
| Hand jewelry | <ul style="list-style-type: none"> Increased bacterial numbers (nonspecific) | <ul style="list-style-type: none"> Includes rings, bracelets, and watches. Jewelry inhibits proper hand-washing technique. | <ul style="list-style-type: none"> Jewelry should not be worn in the workplace. |

COVID-19, Coronavirus disease 2019.

hepatitis B, hepatitis C,³ and human papillomavirus.⁴ Because COVID-19 survives for long time periods on environmental surfaces, it is likely to retain viability on the nails. Longer nail length is also associated with higher probability of practicing ineffective hand hygiene. We therefore recommend that nails are kept short and emphasize cleansing of nail undersides as part of proper handwashing.

The role of nail polish in harboring microbes is controversial. Fingernails with intact nail polish do not harbor more microbes than unpolished nails. However, nails with chipped polish may serve as reservoirs for microbes.¹ Gel nails are cured by ultraviolet, and although they are unlikely to chip, physical gaps form as the natural nail grows out. Gel nails have a greater number of pathogenic microorganisms compared with bare nails and should be avoided (Table D). Damaged nail polish should also be promptly removed, although intact polish is acceptable practice and likely does not promote pathogen spread.

Artificial nails encompass a wide range of materials that adhere to the biologic nail plate, including acrylics and wraps. Most evidence supports the presence of greater numbers and species of microbes in artificial nails compared with bare nails (Table D). Small cracks and separation of artificial nails from the natural nail plate create crevices for microbial invasion even with handwashing.^{1,5} Therefore, we recommend that physicians, other health care professionals, and their patients abstain from applying artificial nails to prevent SARS-CoV-2 transmission.

Most studies to date have analyzed bacterial counts and species in fingernails and nail polish, with less data on viral types and numbers. Therefore, further investigation of common transmissible viruses and the hygienic impacts of nail modifications is necessary.

Although SARS-CoV-2 is mainly spread via inhaled droplets, fingernails may act as reservoirs

for viruses that are transmitted to the oral-nasal mucosa. Adherence to good nail grooming practices that facilitate effective cleansing of the hands is essential in reducing transmission for physicians and patients.

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REFERENCES

1. Jane Ward D. Hand adornment and infection control. *Br J Nurs*. 2007;16(11):654-656.
2. Centers for Disease Control and Prevention. Nail Hygiene. May 19, 2020. Available from: https://www.cdc.gov/healthywater/hygiene/hand/nail_hygiene.html. Accessed May 20, 2020.
3. Koroglu M, Demiray T, Ozbek A, et al. Nail scissors and fingernails as reservoirs of hepatitis B virus DNA: role of nail scissors in household transmission of hepatitis B virus. *Am J Infect Control*. 2018;46(7):793-797.
4. Winer RL, Gheit T, Cherne S, et al. Prevalence and correlates of beta human papillomavirus detection in fingernail samples from mid-adult women. *Papillomavirus Res*. 2018;5:1-5.
5. Lin C-M, Wu F-M, Kim H-K, Doyle MP, Michaels BS, Williams LK. A comparison of hand washing techniques to remove *Escherichia coli* and caliciviruses under natural or artificial fingernails. *J Food Prot*. 2003;66(12):2296-2301.

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