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Transfer efficiency of bacteria and viruses from porous and nonporous fomites to fingers under different relative humidity conditions

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Abstract

Fomites can serve as routes of transmission for both enteric and respiratory pathogens. The present study examined the effect of low and high relative humidity on fomite-to-finger transfer efficiency of five model organisms from several common inanimate surfaces (fomites). Nine fomites representing porous and nonporous surfaces of different compositions were studied. Escherichia coli, Staphylococcus aureus, Bacillus thuringiensis, MS2 coliphage, and poliovirus 1 were placed on fomites in 10-μl drops and allowed to dry for 30 min under low (15% to 32%) or high (40% to 65%) relative humidity. Fomite-to-finger transfers were performed using 1.0 kg/cm(2) of pressure for 10 s.

Transfer efficiencies were greater under high relative humidity for both porous and nonporous surfaces. Most organisms on average had greater transfer efficiencies under high relative humidity than under low relative humidity. Nonporous surfaces had a greater transfer efficiency (up to 57%) than porous surfaces (<6.8%) under low relative humidity, as well as under high relative humidity (nonporous, up to 79.5%; porous, <13.4%). Transfer efficiency also varied with fomite material and organism type. The data generated can be used in quantitative microbial risk assessment models to assess the risk of infection from fomite-transmitted human pathogens and the relative levels of exposure to different types of fomites and microorganisms.