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SYNOPSIS

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Review of "Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1"

Article citation: van Doremalen N, Bushmaker T, Morris DH, Holbrook MG, Gamble A, Williamson BN, et al. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. N Engl J Med. 2020 Mar 17 [Epub ahead of print]. Available from: https://dx.doi.org/10.1056/NEJMc2004973

One-Minute Summary

- The authors report on an **experimental study analyzing the stability of the SARS-CoV-2**, the virus that causes coronavirus disease 2019 (COVID-19, which is the term we will use subsequently in this summary for clarity), **in aerosols and on four surfaces** (plastic, stainless steel, copper and cardboard), compared to that of SARS-CoV-1.
- An **exponential decay in virus titre** was seen for both viruses in all experimental conditions:
    - **In aerosols: COVID-19 was detectable for up to three hours** at 65% relative humidity and 21°C–23°C. The half-lives of COVID-19 and SARS-CoV-1 were similar in aerosols with median estimates of the half-life of 1.1-1.2 hours.
    - At 40% relative humidity and 21°C–23°C, both COVID-19 and SARS-CoV-1 were detectable for **up to 24 hours on cardboard and up to two to three days on plastic and stainless steel**. On **copper**, live COVID-19 and SARS-CoV-1 were **not found** after four hours and eight hours, respectively.
    - The estimate **median half-lives** for COVID-19 on these surfaces were: 0.7 hours for copper, 3.5 hours for cardboard, 5.6 hours for stainless steel, and 6.8 hours for plastic.
- The authors conclude that **aerosol and fomite transmission of COVID-19 is plausible** (however, we note that this study does not demonstrate that it occurs - see PHO Reviewer's Comments below).
- As the stability of COVID-19 and SARS-CoV-1 is similar in this experiment, the authors suggest that the differences in the epidemiologic characteristics of the viruses likely arise from other factors, including viral load in the upper respiratory tract and the potential for people with COVID-19 to transmit the virus while asymptomatic.

Additional Information

- Aerosols in this study were generated using a three-jet collision nebulizer and fed into a Goldberg drum as an aerosolized environment. Sampling took place at 0, 30, 60, 120 and 180 minutes after aerosolization on a 47mm gelatin filter.
- An inoculum of 10^5 $TCID_{50}$/mL of both viruses was applied on each surface tested on three replicate experiments.

PHO Reviewer's Comments

- This is an experimental study and caution must be exercised when extrapolating from these findings. Transmission of infectious diseases by the airborne route depends on an interplay of multiple factors, including droplet size, viability of the virus, degree of viral shedding, infective dose, and virulence of the virus.
- An artificially-generated aerosol is not representative of the natural transmission mechanisms of respiratory pathogens (e.g., coughing and sneezing) with deposition in the respiratory tract. Findings from other studies (Cheng, 2020, Ng, 2020) involving COVID-19 cases did not yield evidence of aerosol transmission of COVID-19.
- As the viral particles in this model survive in aerosol particles, that supports the use of N95 respirators when performing an aerosol-generating procedure. This data does not demonstrate or measure the risk of transmission related to aerosols.

Citation

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