



AIR CABIN CLEANING AND DISINFECTION

IN BRIEF

- **THE RISKS:** While not a primary route, infection can occur if SARS-CoV-2 virus on surfaces is transferred by touch to facial mucous membranes: eyes, mouth, and/or nose. Intact skin is considered a barrier to viral entry. Reducing risk is a responsibility of both the airline and the individual.
- **AIRLINE RISK REDUCTION:** Airline service teams should focus cabin cleaning on high-frequency touch surfaces, with systematic disinfection of surfaces between flights or on a daily basis. When administered properly, the active ingredients in approved disinfecting agents are effective in eliminating viruses on surfaces.
- **INDIVIDUAL RISK REDUCTION:** Passengers and workforce personnel can reduce transfer from contaminated surfaces by frequent hand washing with soap, use of hand sanitizers and avoiding touching their face. Wearing a mask and physical distancing are very important ways to reduce risk of infection.
- **THE MULTI-LAYERED STRATEGY:** Disinfecting the cabin is part of a multi-layered aviation public health risk-reduction strategy. This includes screening and health attestations to help exclude symptomatic people, use of advanced ventilation and filtration systems on aircraft, and personal protections such as wearing facemasks and good hand hygiene. The combination of interventions has additive benefits that, taken together, offer significant protection against respiratory infections including COVID-19.

COVID-19 infection: direct vs. indirect contact

COVID-19 is an infectious respiratory disease caused by the SARS-CoV-2 virus. Millions of people have been infected with the virus and many thousands worldwide have died as a consequence.¹⁻³ More than 50% of infected individuals are asymptomatic or have mild symptoms.⁴⁻⁶ Those with a mild disease may be unaware that they are infected and able to spread the virus.⁵ SARS-CoV-2 is transmitted when respiratory droplets (>5 µm in diameter) or aerosols (≤5 µm in diameter) containing the virus are exhaled from infected individuals while speaking, coughing, and/or sneezing.⁷⁻⁹

Individuals may become infected by direct contact with respiratory particles from a contagious person, for example, inhaling aerosols or droplets containing SARS-CoV-2.^{5,7,8} Some may land on surfaces, or become transferred to objects touched by an infected individual.^{10,11} Contaminated surfaces that can transfer disease to a new host are called ‘fomites’. Individuals could become infected with SARS-CoV-2 by touching a surface contaminated with the virus and then transferring it to their mouth, nose and/or eyes.^{3,10,12,13} Fomites can continue to harbor infectious viral particles until surfaces are disinfected or the virus naturally degrades over time.^{14,15}

Research suggests that contact with a fomite accounts for less than 10% of the overall risk of transmission of SARS-CoV-2 in certain settings.¹⁶ However, scientists continue to caution that until more information is obtained, transmission from surfaces should be considered relevant.^{13,17,18} Diligent use of **Non-Pharmaceutical Interventions (NPIs)**, including disinfection, is therefore recommended as an effective addition to a comprehensive public health risk-reduction strategy.^{19,20,21}

In the absence of medical therapies to counteract SARS-CoV-2, airlines can diminish the risk of infection by combining NPIs, or ‘layering’ them to secure additive benefits. Minimizing virus particles in the environment by frequent cleaning and disinfection of high-touch surfaces can help mitigate the spread of infections via fomites in the aircraft cabin.¹⁴ The disinfecting agents used should be those approved for safety and efficacy by governmental agencies, and recommended by industry oversight bodies.²²⁻²⁴

Current research in infection control^{15,17,25-27} recommends enhanced cleaning be combined with other risk reduction strategies by airports, airlines, passengers, and aircraft crewmembers to minimize the amount of infectious virus in the environment. These include the use of approved masks, health screenings (temperature checks, health attestations), increasing ventilation and enhancing filtration on aircraft and in the airports.^{23,24,28-31} Additionally, travelers should take responsibility themselves for effective hand hygiene to reduce further the risk of viral transfer from surfaces.

SARS-CoV-2 survival times on different materials

The length of time a virus such as SARS-CoV-2 will survive in the environment depends on a number of factors. These include the type of material it deposits upon, environmental conditions to which they are subjected (e.g., temperature, UV light, humidity^{12,32}), amount and composition of any carrier fluid (e.g., saliva, mucous^{15,33}), and the quantity of virus deposited.³³ As such, how long a virus particle can survive on a surface is highly variable.

A recent study found SARS-CoV-2 survived on cloth for 2-days, 4-days on glass, and 7-days on stainless steel and plastic.³⁴ Another study reported the virus survived for up to 3-days on plastic and stainless steel, was undetectable on copper after 4-hours and on cardboard after 24-hours³⁵; an early publication cited shorter survival times.³⁶ Unfortunately, the experimental conditions used in these studies bear little resemblance to conditions that will be found in real life, primarily due to the suspending medium that was used and the very high concentrations of infectious viral particles applied to very small surface areas under ideal laboratory conditions, may dramatically overestimate the survival time of SARS-CoV-2 on surfaces.³⁷ Furthermore, many factors

can influence the transfer of viruses from surfaces including force of the touch, rubbing, and surface roughness.¹¹ While SARS-CoV-2 does naturally degrade on surfaces over time, disinfection with appropriate agents is recommended to minimize the risk from infectious viral particles in the environment.^{15,21,32,38,39}

Cleaning practices in airplane cabins to reduce indirect transmission of SARS-CoV-2

Airline service teams focus cabin disinfection on high-frequency touch surfaces, as prescribed by current recommendations.^{14,25,27} In addition to routine cabin cleaning,⁴⁰ high-touch surfaces are systematically disinfected between flights or daily, dependent on the contact frequency of the surface.^{29,30} Appropriate disinfectants are those approved by the Environmental Protection Agency (EPA) and effectively inactivate SARS-CoV-2; see EPA List N: Disinfectants for Use Against SARS-CoV-2 (COVID-19).²²

The EPA List N contains several active ingredients and more than 475 disinfectant products. However, only a few of them are suitable for use on aircraft given the nature of the surfaces and recommended specifications of aircraft manufacturers and SAE International standards. These restrictions ensure that disinfectants are compatible with cabin materials and safe to use at the appropriate concentration, prescribed application method and contact time needed for disinfection. Some disinfectants can oxidize and degrade susceptible materials found in the cabin and should not be utilized aboard aircraft,²³ and most disinfectants are not indicated for use on porous surfaces.²² Therefore, careful selection of appropriate agents and application method is required. Aircraft manufacturers recommend disinfecting high-touch surfaces in the cockpit and cabin with 70% isopropyl alcohol.^{23,29,41}

Aircraft lavatories are high-frequency touch areas, subject to special maintenance and cleaning between flights.^{14,30} In addition, several airlines are testing the efficacy of extra disinfection protocols for aircraft. Some airlines are using antimicrobial materials on surfaces^{31,42} and/or UV disinfection.^{32,38,39} Germicidal ultraviolet irradiation can be used to disinfect air and surfaces on airplanes. SARS-CoV-2 is highly susceptible to germicidal UV – UV C in the 222 nm and 254 nm wavelengths.³⁸

Recommendations for reducing SARS-CoV-2 infection contact with fomites while traveling

Unbroken skin is a barrier against entry of SARS-CoV-2.^{43,44} There is a risk of becoming infected if the virus is conveyed through mucous membranes of the face (mouth, nose and/or eyes). Travelers can protect themselves and others against direct transmission by droplets and aerosols by wearing a mask.^{9,45} They can protect themselves against indirect transmission via fomites by:

Being mindful of high-touch surfaces and/or objects in public spaces. While it is not possible to clean and disinfect all potential surfaces a traveler may come into contact with between each trip, a traveler should use hand sanitizer after touching certain types of high-frequency touch surfaces²⁵ (e.g., door handles, elevator buttons, faucets, self-service kiosks, point-of-sale keypads, security trays, and luggage carts).

Wash or sanitize hands properly and regularly. When handwashing, soap should cover all the surfaces of both hands, including the back of the hand, between the fingers, and under the nails, scrubbing for at least 20 seconds.^{46,47,48} Hand sanitizers that contain at least 60% alcohol can be used to inactivate the virus if hand-washing facilities are not readily available.^{46,47,49} Both soap and the active ingredients in disinfectants destroy the SARS-CoV-2 virus.⁴⁶

Avoid touching eyes, nose, and mouth. While intact unbroken skin is a barrier to SARS-CoV-2 infection, the virus may still survive on hands.⁴⁴ Travelers should avoid touching their eyes, nose, mouth (and mask where worn) as much as possible.⁵⁰



Figure 1. High-frequency touch areas of the seat are: 1) seat cushion; 2) seatbelt (buckle, latch and strap on both sides); 3) seatback cushion; 4) headrest, and 5) armrest (including seat recline button).



Figure 2. High-frequency touch areas subject to repeated use during a flight include: 1) tray table latch; 2) tray table; 3) compartment and/or personal entertainment screen, and 4) top edge of the pocket. The surfaces in front of each passenger require special attention, as they pose a higher likelihood of respiratory particle deposition.

Images courtesy of the Boeing Corporation

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