COVID-19 Effects on Volunteer Pilot Organizations

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The rapidly evolving global COVID-19 pandemic, and national, regional and local government responses to it, have created an environment for volunteer airlift organizations that adds complexity and health concerns for both individuals and for the health of the public at large. Scientific knowledge about COVID-19 is changing day by day, and recommendations regarding safe operational practices have to be based on a combination of best available data about this particular virus and, where specifics are not known, an approach of "reasoning by analogy" to similar health threats from the past. This document represents interim guidance, based on what has been published in the scientific literature to date, supplemented by an abundance of caution where risks are as yet uncertain or unknown.

A non-exhaustive list of issues that potentially affect the safety of volunteer airlift operations include the following.

1. Physical limitations of aircraft interiors

   An essential component of the design of medical transport vehicles such as ambulances—both ground and air ambulances—is the incorporation of a containment space that can be disinfected and which does not expose the driver or pilot to infectious disease risks. As a general rule, it is not possible to create such containment spaces in general aviation aircraft having only 6 seats or less. This means that pilots and passengers will likely share a common respiratory space where droplets* that accompany a sneeze or cough may briefly circulate in the cabin before settling. Finer particles (aerosols) may occasionally be produced by a cough or sneeze but probably not from normal speech and

* For purposes of respiratory infection transmission risk, droplets are expelled fluids of sufficient size that they rapidly settle out of the air. Aerosol particles are smaller and circulate in the air, sometimes indefinitely. SARS-CoV-2, the virus that causes COVID-19, is transmitted primarily through droplets; or by contact with surfaces onto which infected droplets have settled. Aerosols can be created by certain medical procedures, but are not otherwise frequently produced from the respiratory tracts of persons with COVID-19.

uncommonly by infected persons without symptoms. When present, aerosols remain infectious for at least three hours. [i]

The current professional consensus is that 6 foot social distancing is an effective measure to limit person-to-person spread by expelled droplets. It is important to understand that the safety from 6 foot distancing is based on incidental, momentary exposure; the risk of infection undoubtedly rises from more prolonged exposure as would be expected to occur on cross-country flights, involving up to several hours of shared respiratory space exposure. Cabin air flow and recirculation vary between aircraft. Many non pressurized general aviation aircraft probably have substantial air exchange, which likely reduces risk of exposure, whereas others may have substantial air recirculation.

2. Persistence of the virus on surfaces

   Surfaces contaminated by virus-containing droplets, or by mechanical transfer of secretions on infected persons' hands, remain infectious for several hours to as long as 17 days, depending on the surface. Contaminated surfaces risk inoculation by contact with hands or through intermediaries such as aviation oxygen masks and cannulas and microphones contacting eyes, nose or mouth. Research on persistence in aerosols has also found viral persistence sufficient to cause infection for up to 72 hours when fluids containing virus were applied to plastic and 48 hours on stainless steel surfaces. Important for the transport of boxed materials, cardboard surfaces support viable virus for approximately 20 hours. Another report by the Centers for Disease Control and Prevention (CDC) found persistent virus RNA on surfaces of a cruise ship up to 17 days after cabins were vacated, but before cleaning occurred.[ii]

3. Knowing with certainty that pilots and passengers are not infected

   Current best evidence suggests that the average incubation period between exposure to COVID-19 and developing symptoms is about 5 days, though a small percentage of symptomatic cases may take up to 14 days to develop.[iii] The virus is detectable in the nose and mouth during the incubation period before symptoms appear. In addition, the experience of cruise ship passengers was that about 1 in 5 individuals who tested positive for COVID-19 were asymptomatic when tested but potentially capable of transmitting the disease.[iv] Many infections in cruise ship passengers apparently were acquired from persons who did not (yet) have symptoms themselves. Some of these persons were pre-symptomatic, soon becoming ill; others remained asymptomatic. Taken as a whole, the present data are conflicting on the risk of transmission by asymptomatic persons, who by definition are not sneezing or coughing. In general, such persons are less likely to transmit virus than those with symptoms. On the other hand, all humans cough or sneeze from time to time, which creates transmission risk even if coronavirus is not the cause.

   The inability to know with certainty who does and does not have COVID-19 is the partly basis of school closures, lockdowns, travel restrictions, and shelter in place orders, whose goal is to slow spread of the pandemic so that healthcare facilities will not be overwhelmed with severe cases. The lag period between infection and onset of symptoms, the possibility of silent infection, and the potential for transmission in absence of symptoms means that self reports of being healthy by pilots and passengers does not guarantee they are not infected or that virus transmission will not occur. Rapid coronavirus testing, with results available in 15 minutes—with one such test recently approved by the Food and Drug Administration—may help ameliorate this uncertainty, but as of this writing, such testing is not widely available.

4. The limitations of masks to reduce person-to-person transmission

   The N95 respiratory mask is a widely used barrier to respiratory spread of COVID-19[v]. These masks have several important limitations. The first is that, even when carefully fitted, they are designed only to reduce, not eliminate airborne particles. Any air leak around the mask, such as may be caused by sudden inflation of a sub-optimally fitted mask with a sneeze or cough, may bypass the filtering benefit of the mask. Effective N95 masks also reduce the ease of breathing, and can alter speech clarity. Wearing them in a cockpit environment is complicated by risks of interference with headsets, microphones, oxygen equipment, and eye glasses. Turning the head such as to look for air traffic or to check on back seat passengers can break the air seal even on well fitted masks. Accordingly, N95 masks are not a practical means to reduce viral transmission risks among passengers and aircrew in most GA aircraft.

   Standard surgical type masks do not reliably reduce risk of infection in exposed persons; unlike N95 masks, almost all inhaled air is not filtered but bypasses the boundaries of the mask. However, such masks may provide some protection in event of a direct cough or sneeze toward the mask wearers, and there is expert consensus that surgical masks reduce transmission risk from infected persons by limiting expulsion of contaminated droplets. Masking infected patients is routine in clinics and hospitals to help protect health care personnel. Accordingly, masking passengers with suspected COVID-19 or those of unknown infection status probably would reduce but not eliminate risk to pilots and other aircrew or passengers.

Operational considerations for volunteer pilot organizations

1. Because of asymptomatic and pre-symptomatic virus shedding and transmission associated with COVID-19, all pilots and passengers should be assumed, at this point in the growing pandemic, to be infected with the virus. While the risk of virus transmission can be reduced by excluding symptomatic passengers, pilots and other aircrew, and optionally asking passengers to wear surgical masks, complete safety against virus transmission cannot be achieved when transporting human passengers in small (6 seat or less) aircraft. More sophisticated aircraft, such as larger, pressurized, and especially turbine aircraft, may enhance safety depending upon aircraft size, physical configuration, air recirculation and ability to provide a biohazard-safe containment space. As for all flight planning and in-flight operations, the pilot in command has ultimate responsibility and authority to optimize safety in preventing COVID-19 exposure and limitation of infection risk, and should understand that 100% protection against virus transmission cannot be guaranteed when transporting passengers, cargo, or equipment.

Ground transportation in private vehicles shares the same vulnerabilities with respect to need for a separate containment space, so that apparently uninfected volunteer workers should plan to travel one person per vehicle to limit exposure.

2. Volunteer airlift operations may reasonably participate in the movement of cargo such as medical supplies, time sensitive tissue transport such as blood products or diagnostic specimens as long as such flights comply with all relevant transportation regulations. However, even in cases where cargo is of low expected risk, such as transport of canned goods or boxed dry food, all cargo currently needs to be presumed to be a biohazard since handling of it at any step on its journey may have left a biofilm containing infectious COVID-19 virus. To minimize infection risk related to persistence of virus on surfaces, the following operational guidelines are recommended:

   a. Wear disposable latex, vinyl or nitrile gloves for handling of cargo, and discard after a single use.

   b. Wipe down the aircraft's interior surfaces after each flight, including headsets and microphones. If microphones have a foam mic cover, it should be taken off the mic and rinsed in a 10 percent Clorox solution and dried thoroughly before reinstalling. Use disinfectant wipes to clean the underlying microphone and all aircraft controls such as yoke, throttle/mixture/prop controls. Include avionics with touch screens.

   c. Thoroughly clean or discard oxygen masks or cannulas used during the flight.[vi]

3. Do not let the natural human urge to greet people with a handshake or other gesture involving touch cause volunteer pilots or passengers to abandon best practices for hygiene, which include:

   a. Washing hands frequently with soap and water, and use 60% or higher alcohol-based hand sanitizer if soap and water are not available.

   b. Avoiding touching eyes, nose, and mouth with unwashed hands.

   c. Avoiding close contact with others.

   d. Covering mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow. Throw used tissues in the trash. Immediately wash your hands with soap and water for at least 20 seconds. If soap and water are not readily available, clean your hands with a hand sanitizer that contains at least 60% alcohol.[vii]

This document is expected to change as knowledge about the biology, disease effects of the virus, and extent of the pandemic changes.

FAA regulations require that pilots familiarize themselves with all available information relevant to their planned flights. In the current environment, consideration of the latest guidance from public health agencies and governments on COVID-19 joins the list of issues to be considered, before, during and after flights.

About the authors:

Daniel R. Masys, MD is an honors graduate of Princeton University and received his M.D. degree from the Ohio State University College of Medicine as a U.S. Navy scholarship recipient during the Viet Nam conflict. He completed postgraduate training in Internal Medicine, Hematology and Medical Oncology at the University of California, San Diego, and the Naval Regional Medical Center, San Diego. He served 12 years as a Navy Medical Officer board certified in those three specialties. He served in the US Public Health Service Commissioned Corps as a research officer at the US National Institutes of Health. He was a Professor of Medicine at UC San Diego School of Medicine and Vanderbilt University Medical Center, and served on a variety of NASA medical advisory committees. He and his wife have built and flown 3 experimental aircraft, and he has more than 3200 hours of pilot-in-command time, over 1100 of which in his current IFR-equipped RV-10.

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