COVID-19 effects on Volunteer Pilot Operations

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The rapidly changing 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 what constitutes 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 suggested guidance, based on what has been published in the scientific literature to date, supplemented by 'an abundance of caution' where risks are simply unknown at this point.

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 the pilots and passengers will likely share a common 'respiratory space' where the aerosolized droplets that accompany a sneeze or cough will circulate in the cabin for some period of time. Recent COVID-19 research, published March 17, 2020 showed that these aerosol droplets remain infectious for at least three hours. [i]

   Public health authorities have popularized that notion that staying six feet apart is an effective distancing measure to limit person-to-person spread. It is important to understand that this guidance is based on incidental, momentary exposure and not on prolonged exposure such as would be expected to occur on cross-country flights, involving several hours of "shared respiratory space" exposure. Cabin air recirculation remains a critical aspect of design in aircraft even where the ‘six foot distancing’ guidance might be accommodated.

2. Persistence of the virus on surfaces

   Just as the virus remains infectious for hours in aerosolized droplets from a cough or sneeze, it retains its ability to cause infection on surfaces onto which droplets have settled, or have been inoculated by contact with hands, other body parts (e.g, aviation oxygen masks and cannulas and microphones touching face, nose or mouth). The research on persistence in aerosols also found viral persistence sufficient to cause infection for up to 72 hours when fluids containing virus were applied to plastic and 48 hours when applied to stainless steel surfaces. Important for the transport of boxed materials, cardboard surfaces also supported viable virus for approximately 20 hours. A subsequent report published by the Centers for Disease Control and Prevention (CDC) on March 23, 2020 found persistent virus on surfaces of the Diamond Princess cruise ship up to 17 days after cabins were vacated, but before cleaning occurred.[ii]

3. Knowing with certainty that pilots and passengers are well.

   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] Shedding of virus may occur during the incubation period before symptoms appear. In addition, the experience of passengers on the Diamond Princess cruise ship was that about 1 in 5 individuals who tested positive for COVID-19 were completely asymptomatic but capable of transmitting the disease.[iv] Evidence including the cruise ship experience suggests that in addition to ‘pre-symptomatic spread’ there are individuals who show no sign of infection themselves at any time, but are capable of transmitting it to others.

   This inability to know with certainty who does and does not have the disease is the basis of government lockdowns 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.

   This lag period between infection and onset of symptoms, and possibility of ‘silent infection’ means that self reports of being healthy by pilots and passengers are not sufficient to support safe volunteer airlift operations. Rapid turnaround testing methods may help ameliorate this uncertainty, but as of this writing, testing for COVID-19 is not widely available.

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

   The N95 respiratory mask is the current most 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 (specifically, they have to remove at least 95% of very small [0.3 micron] particles, but not all of them.) 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.

Most importantly, masks are useful only in decreasing the number of outgoing droplets associated with coughs, sneezes and normal breathing. They do not protect against the inhalation of aerosol droplets unless properly fitted and combined with a full suite of personal protective equipment such as gowns and face shields. Thus, their use is indicated only for symptomatic, actively infected individuals who should not be in close contact with others and in most cases should not be flying.

Operational Recommendations for volunteer airlift operations

1. Because of the known problem of asymptomatic and pre-symptomatic virus shedding associated with COVID-19, all pilots and passengers have to be, at this point in the growing pandemic, assumed to be infected with the virus. When complicated by other issues described above, there is currently no safe role for volunteer airlift operations in transporting human passengers using small (6 seat or less) aircraft. More sophisticated aircraft, such as pressurized turbine aircraft, may in principle have a role in movement of passengers depending upon aircraft size, physical configuration, air recirculation and ability to provide a biohazard-safe containment space.

   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 1 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 author:

Dr. Daniel R. Masys 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, where he received the US Surgeon General's Exemplary Service medal for contributions to the creation of national and international scale information systems and resources. He served on the faculty of the UC San Diego School of Medicine and Vanderbilt University Department of Biomedical Informatics, and 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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