Q and As Discussion from Harvard School of Public Health Healthy Buildings Discussion

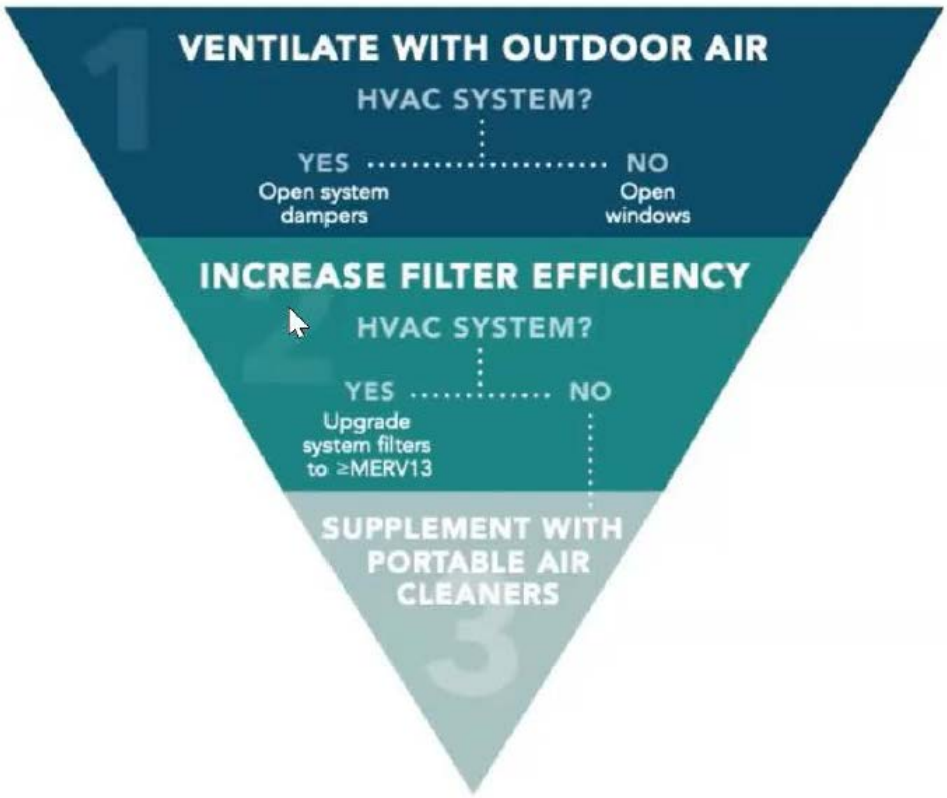
For more information see - https://forhealth.org

The focus was on airborne transmission, which only recently has been recognized by CDC and WHO is a key component of transmission of Covid-19. Key findings that seem relevant:

1. There is a higher viral load with smaller particles, and they can travel a greater distance. *(See interview with Dr. Linsey Marr of Virginia Tech on the aerosol particles. https://www.youtube.com/watch?v=9i7uRxZhoVk&feature=youtu.be)*
2. In an indoor space these particles will spread throughout a room – far beyond 6 feet.
3. Recirculation of ventilated air is particularly bad, exacerbated by lack of or insufficient filtering through the HVAC system.
4. Many (the majority) of buildings are under-ventilated. The best defense is more fresh air from open windows.

There is a growing recognition of the need to mitigate airborne transmission.

Control strategies graphic on page 27 of slide deck



Minimizing hazards in the workplace graphic on page 28 of the slide deck

Minimizing hazards in the workplace is an important consideration. We need to ask, "Who guarantees workplace is safe for return (auditing/monitoring)?"

For the long term, in order to increase health, wellbeing and productivity, it is important to consider a more holistic approach. Thus, focusing not only on addressing the immediate need and mitigating the immediate problem, but a longer term health promotion strategy (less transmission of all diseases, creating better health for all who come in to the building).

Question: Would you recommend a mask and plexiglass as safe?
Answer: Singing and loud talking are particularly problematic, and would not recommend it. But if we are going to do it what is needed are high-efficiency masks, greater distance from those who sing and mechanical systems to bring in extra amounts of outdoor air which is also filtered. Plexiglass does not help much and it only captures larger droplets, but as a control measure it will not lower the smaller droplets.

Q: Is it good enough to just upgrade systems to local building codes?
Answer: It is probably not enough to just go to "code" minimums, but latest guidance that takes into account reality of Covid-19. Visit ASHRE (https://www.ashrae.org)

Q: What is a good mask?
Answer: A 3-layer surgical mask is effective at capturing a good deal of the particles. The 'fit' of the mask is also important – and there can be training for how to wear mask correctly for all who are on staff (as well as visitors)

Q: Bi-polar ionization – is there evidence this works?
Answer: It is costly to implement and maintain, and there is not enough . If you cannot bring in outdoor air and a good filter, UV light could be used. But a good fan with a HEPA filter is likely more than sufficient (see the "Tools for Schools" on the website).

Q: how about singing outdoors?
Answer: It's better, but wearing a mask, not directionally facing each other and maintaining distance would be best (at least 10' between singers). He was reluctant to recommend multiple singers indoors.

Q: One person (cantor) singing vs. a choir or congregational singing?
Answer: This is far more comfortable for him, particularly if others are not singing, as that lowers the opportunity for transmission of the virus.

Q: How long will we be having to deal with this mitigation efforts?
Answer: minimally, mid-2021.

Q: How the virus is spread. What we know about singing as part of worship services
We know when we sing, we emit a lot more of the virus—it's more like coughing. Loud talking emits more virus than softly talking. It's a function of emission rate and the controls. Singing indoors is higher risk activity. Masks will help, but they need to be high efficiency masks. The more people singing together, the more the emission rate will increase and the higher efficiency mask you will need.

If you are going to sing, you need:
1. Extra spacing between people. Minimum of ten feet. Don't face each other.
2. High efficiency masks—at least three ply with a good fit and not gaping around your nose and mouth.
3. Your mechanical systems MUST be bringing in extra outdoor air.

Most of the following Q&A can be also be referenced in the Schools for Health, Risk Reduction Strategies for Reopening Schools, June 2020.

HVAC Systems, Filters and Recommendations
We installed new HVAC systems in the last few years and were told the systems met code. What I am hearing is that code may not be enough. What do we do first?

> Recognizing that there is no "building code" that can account for the current situation with the SARS-CvV-2 virus, it is important to bring in more outside air. Buildings should eliminate or minimize air recirculation which will maximize fresh outdoor air as much as possible. You may need to bring in an engineer who can

measure the amount of fresh air being brought into your building.

Filter indoor air:
- Increase the level of the air filter to MERV 13 or higher on recirculated air
- Inspect filters to make sure they are installed and fit correctly
- Check that sufficient airflow can be maintained across the filter
- Maintain and change filters based on manufacturer's recommendation

Verify ventilation and filtration performance
- Verify through commissioning and testing
- Work with an expert to evaluate building systems, ventilation, filtration, and air cleaning
- Measure carbon dioxide (CO_2) as a proxy for ventilation

Q: Who can we trust to advise us as to whether our filtration systems are safe?
Start with your HVAC company and work with them as they are most familiar with your building and systems. If they are not equipped to assist you, it may be necessary to bring in a building or mechanical engineer to assess your system. Contact ASHRAE (https://www.ashrae.org) for a qualified resource in your area.

Q: Does HEPA filter out the small micron size indicated?
Portable air cleaners with high-efficiency particulate air (HEPA) filters may be useful to reduce exposures to airborne droplets and aerosols emitted from infectious individuals in buildings. Portable air cleaners are typically most effective in smaller spaces, and care must be taken when choosing a device to ensure it is the correct size for the room where it will be used.

Q: Is there a benefit to UV lights in air handlers?
UVGI is an air cleaning technology that is sometimes used in buildings. UVGI uses low-wavelength ultraviolet light (UVC light) to destroy viruses. UVGI has been shown to be effective in disinfecting surfaces and air from bacteria and viruses such as influenza. In buildings, this technology is usually deployed as upper room UVGI to destroy airborne virus in the upper airspace of a room or as UVGI in supply air ducts to destroy airborne virus present in recirculated air. UVGI may be able to reduce exposures to airborne COVID-19. In order for UVGI to be effective, there must be sufficient contact time between the virus and the UV light; this often presents a challenge for installing an effective in-duct UVGI system. Similarly, upper room UVGI works best when the air in a room is well mixed so that airborne virus emitted by people in the lower portion of the room is lofted into the upper airspaces where it can be treated. Other potential issues with UVGI in schools include cost, maintenance, and potential health concerns of inadvertent UV exposures.

Q: What are higher rates of outside air?
Turning over the air two to three times in a hour is reasonable.

Increase the outdoor air ventilation rate to at least the ASHRAE minimum to help dilute any airborne virus. If possible, consider increasing the outdoor air ventilation rate above the ASHRAE minimum to promote occupant health.

As the next best solution, mechanical ventilation systems in buildings can forcibly bring outdoor air inside and then distribute that fresh air to different areas of the building. Some fraction of the indoor air is usually recirculated and mixed with the outdoor air coming in to save on cooling and heating energy costs. However, during a pandemic, when long-range airborne viral transmission can occur, air recirculation can lead to a buildup of airborne viral particles indoors and also potentially spread the virus to other areas of the building. Therefore, buildings should eliminate or minimize air recirculation (thus maximizing fresh outdoor air) to the extent possible during this period. In addition, buildings should not shut off or reduce their mechanical ventilation during before-school or after-school hours when there still may be people in the building, including students, staff, and custodians during any student programs, cleaning times, teacher class preparation, sports (e.g., if students are returning to lockers), or other activities.

Q: What about systems with water towers that don't have standard filtration?
All HVAC systems have some kind of filtration system. Your HVAC professionals can recommend the proper type of filters. Systems can and should also be set to bring in more outside air.

Q: Most of our buildings have been empty for months. I imagine some have turned off the HVAC systems, at least in some parts of the building, to reduce expenses. Are there other things that need to be done to the HVAC system before opening? Duct cleaning? Testing for mold?
Your HVAC system, especially if it has been off the entire time, will need to be serviced and have filters changed. Allow the building's systems to run without occupancy for enough time to bring in fresh air and circulate through the building.

Q: How do we best protect ourselves if we are returning to a totally enclosed sanctuary with no windows or ventilation with an old HVAC system? Is wearing a mask and social distancing enough? Do we, as clergy, need to wear a face shield or have a plexiglass barrier too in order to protect ourselves?
Masks are and will continue to be your best defense against COVID-19. In spaces where you cannot socially distance and with less than ideal ventilation, a mask is a requirement.

When you can't get sufficient ventilation is a smaller space—perhaps an office or even a sanctuary without windows that will open, supplement your systems with portable air cleaners:

- Supplement with air cleaning devices
- Select portable air cleaners with HEPA filters
- Size devices carefully based on the size of the room

Portable air cleaners with high-efficiency particulate air (HEPA) filters may be useful to reduce exposures to airborne droplets and aerosols emitted from infectious individuals in buildings. Portable air cleaners are typically most effective in smaller spaces, and care must be taken when choosing a device to ensure it is the correct size for the room where it will be used. One metric to consider is the clean air delivery rate (CADR). The CADR reflects both the amount of air that a unit can process per unit time and the particle removal efficiency of the filter. A helpful rule of thumb is that for every 250 square feet of space, a CADR of about 100 cfm is desirable. CADR is not the only factor to consider. Portable air cleaners vary in their ability to circulate air in the room, so not all devices with the same CADR rating are equivalent. Devices that provide better mixing of the indoor air can capture particles from more of the room's airspace and are therefore preferred. Because potential viral sources could be in various locations within a room, it may be beneficial to have several units that meet the target CADR values rather than a single larger unit. In larger spaces, industrial-sized supplemental ventilation and filtration units are available and should be considered.

Furthermore, room airflow patterns and the distribution of people in the room should be considered when deciding on air cleaner placement that maximizes source control and prevents airflow from crossing people. Since air cleaners should be operated while people are present, it may be important to compare different models to find one that does not generate disruptive noise.

Additional Resource: Schools for Health: Risk Reduction Strategies for Reopening Schools (COVID-19) June 2020 https://schools.forhealth.org/wp-content/uploads/sites/19/2020/06/Harvard-Healthy-Buildings-Program-Schools-For-Health-Reopening-Covid19-June2020.pdf

Masks, Plexi-Glass, and other barriers

Q: Could you please speak to the need and effectiveness of plexiglass in a sanctuary or chapel setting? Is it effective outside?
Plexiglass is most effective in an area with "fixed interactions such as a reception desk or checkout counter. It is not effective in a sanctuary setting because the virus will travel up, down and around the plexiglass. You may want to view Virginia Tech's Dr. Linsey Marr's discussion on aerosols vs. droplets, ventilation and more.

Plexiglass will be even less effective outside. The airborne nature of the virus will have traveling beyond and around what you can protect with plexiglass.

Q: What is a high efficiency mask? How do we determine the effectiveness of any given mask? I know to look for multiple layers, and good coverage around mouth and nose — do we look for particular materials?

It is at least a 3-ply mask that fits well over your nose and mouth. You don't want to have gaping areas where the virus can seep out. A surgical mask that fits well is a good alternative. You don't want to put on a bandana and call it "good." That's not effective especially if singing. N95 and KN95 masks, which are considered half-face respirators, are great, but probably not necessary.

Q: Does the singer need to wear a mask to sing outdoors.
If you are unable to socially distance to at least 10 feet, yes. Also, be aware of airflow and wind.

What is the risk associated with one singer in a sanctuary, social distanced, etc.
Depending upon the situation, if you have controls in place, it could be OK. One person singing, with masks, and a limited time, with good ventilation it could be OK. Be sure that the rest of your activities are low risk as well—meaning that when you are singing, it isn't the only time you are being careful. This is the shared responsibility part—making sure you don't have the virus—which is particularly needed when people are going to be singing.

Q: I am a Cantor and have been told that singing with a mask, especially for the length of the service, is dangerous. Several of my colleagues have almost passed out. Personally, I don't even like to talk with a mask on let alone sing in one. What is your take on this?

Medical professionals perform highly exerting activities in N95 masks regularly. There is no scientific data to show any increased CO2 levels when wearing a mask.

Q: Our Synagogue live streams with one Cantor behind plexiglass and two guitar players at least 20 feet away from the Cantor. What do I bring back to them regarding the safety in this kind of case?
Again, the plexiglass is not going to be as helpful as you might think. In this case, distance and airflow are going to be what you need to gage. If they are not facing each other and if they are wearing masks, 20 feet is most likely a good distance.

Q: My congregation is wanting to open up to larger groups on congregants. What is safe?

Starting place should always be from the local guidelines.) The larger the group, the larger the risk. We've seen that in super-spreading events. There is a calculation of risk for any larger gathering. People with underlying conditions and at greater risk should really be able to consider those risks. You want to provide an alternative to mitigate the exposure and the risks.

Q: What about a small group singing outside, with distance, masks and shields?
Again, shields are not as helpful as you might think. They do little to protect you from airborne particles. Socially distanced, masks, etc. are what will protect you and the congregation.

Q: Let's talk about building visits, timing, fomite spread. If you take a normal medium sized synagogue, and have a service with safety protocols (masks, no singing, shorter service) how much time should there be between services or programs?
The air is going to turn over pretty quickly. If you have three air changes per hour (which is not all that high or crazy), it is going to take about an hour (of an empty room) to remove 95% of the contaminants. It doesn't take long.

Q: You addressed airborne transmission, how much is infection is associated with touching surfaces; if a person touches an infected surface, but they don't touch their nose or mouth, is there still a high risk?
Fomite transmission can happen, but there is not a lot of it being documented. It isn't anywhere close to airborne transmission, but you still need to be careful and wipe down often used surfaces. This is where washing your hands and hand sanitizer comes into play. If you touch a surface immediately after someone else who is transmitting the virus and then immediately touch your face, you could be at greater risk. It's been detected up to 24 hours on a surface, it does decay and over time, there is less and less virus detected. To be safe, wash your hands frequently and don't touch your face.

Q: Thoughts about strategies for bathrooms and other small spaces? They are small rooms, often no windows. Upgrading air circulation? HEPA filter? UV? Do we need to limit the number of people in there at a time?
All bathrooms and smaller interior rooms should have some kind of ventilation system so make sure that is working. Make sure fans are working. You can have a contractor measure the airflow and set the number of people who can be in that room based on the airflow and ventilation.

This is where the small portable systems can be helpful.

Additional resources and links
SCHOOLS FOR HEALTH: Main website
SCHOOLS FOR HEALTH: Risk Reduction Strategies for Reopening Schools