Ventilation Basics for Head Start Programs

Nancy Topping-Tailby: It's my pleasure to introduce you to today's presenters. To the right is Dr. Abbey Alkon. Abbey is a nurse practitioner. She's an epidemiologist, and she is a professor at the University of California San Francisco School of Nursing. She's also the director of the University of California San Francisco California Child Care Health Program for anyone who's from the fine state of California. And she's an investigator at the University of California at Berkeley Center for Environmental Research and Children's Health. Abbey has over 20 years of clinical education and research experience in the fields of pediatrics, public health, and epidemiology. And she's a member of our Center's leadership team.

My colleague Dan Heintzman, who I had the privilege of meeting during the hurricanes or the aftermath of the hurricanes in Region II in Puerto Rico and the Virgin Islands, is a professional engineer, and he is a board-certified environmental engineer working as an expert consultant for the Office of Head Start in our Center. He's also a retired captain in the U.S. Public Health Service. As I just noted, Dan previously worked with the Office of Head Start disaster team to support recovery efforts in Region II after the hurricanes in that area. Good afternoon all.

Next slide, please. A little bit of a lag, but one back Abbey. There we go. I just want to review what we're intending to do today. These are the objectives of what we hope and intend to cover and we prepared for you. We will first explain how ventilation is a key risk-reduction strategy to reduce the airborne transmission of COVID-19. If you attended our previous sessions, you know that we have been promoting ventilation as a key risk-reduction strategy because this is an airborne virus. We want to really talk to you about how you can maximize opportunities to keep your facilities as safe as possible.

We want to describe the different types of ventilation strategies that you can use. We want to help you think about some potential upgrades or improvements that you might want to use your American Rescue Plan funds for to increase access to clean air in your facilities. And by facilities, we're going to be talking about centers as well as family child care homes.

We want to give you some ideas if you work with a ventilation consultant because this is complicated stuff. What are some things that you might want to ask a consultant? Then, finally, we have some resources for you to learn more about strategies to promote healthy indoor air and a couple of new things that were just posted to the ECLKC. We want to be sure that you have the links to all of these good materials.

Having said that, it's my pleasure now to turn it over to Abbey. Abbey, go ahead. Abbey, you're on mute still. There you go.

Abbey Alkon: I know that my slides are not advancing in the way that I thought, so I am going to just try and push the button. But I'm sorry, I don't know why. Just a second, let me see if I can try a different. Oops, I'm sorry.

Nancy: Oh, give everyone a preview what to come.

[Laughter]

Abbey: Like moving around.

Nancy: OK.

Abbey: We wanted to start with kind of a big picture. We've been talking about risk-reduction strategies a lot in a lot of the National Center webinars. I just wanted to review them in terms of making sure that we're all aware of the effective risk-reduction strategies that have been supported by the Office of Head Start.

First is screening, and this is about ensuring that the children, families, and staff who are sick stay home. The second one is about masks, and we know that masks can help reduce the spread of COVID-19 in the air. Third is about appropriate physical distancing. And then hand hygiene, we know that this has been a constant and always has been important in reducing the spread of germs. Next is cleaning, sanitizing, and disinfecting to minimize the number of germs in the environment. And then, ventilation. These are strategies to bring in more fresh air from the outdoors into our indoor environments. The newest strategy is vaccines for children 12 years of age and older and all adults.

As Nancy said, today we're going to focus on ventilation as one of the key risk-reduction strategies. We've learned that the coronavirus is transmitted or spread through the air. When we breathe, talk, or sing, the respiratory droplets and aerosols come out of our mouths. These respiratory droplets travel through the air, and they land in different places. They can land on the table, another person's hand or face, or on the ground.

This supports our strategies of regular cleaning, sanitizing, and disinfecting as per the guidance of all Head Start programs. We've learned that the virus spreads most easily in the air, and that's why we're going to focus today on ways you can reduce your risk of being exposed to coronavirus in the air. In this poster, you can see some of the best practices for having healthy air and increasing your exposures to healthy air. We know that being outdoors is safer than being indoors since the coronavirus is spread easily indoors when there is poor ventilation.

Here are some things you can do to increase the circulation of outdoor air and bring it inside. First, if it's possible, safely open the windows. Be sure you have window guards in place on the windows. Another way to increase a circulation of fresh air is to open the doors if it's safe and possible. It also depends on the air quality outside. Another option is to maximize the ventilation of the air inside your classroom. There are different ways to move air around inside. Things like using a portable fan, a fan installed in the ceiling or an exhaust fan, or a ventilation system that's maintained by your building's facility staff, administrators, or maybe yourself.

Lastly, you can maximize the filtration by using a portable air cleaner or what we call an HVAC system that cleans the air and actually removes the virus from the air. Now I'm going to turn it over to Dan who's going to explain a lot about ventilation in more detail.

Daniel Heintzman: Thank you, Abbey. I'd like to thank everyone for participating in this conversation about engineering and the science behind it in our fight against this pandemic and what we can do to stop the spread of COVID-19.

What does ventilation do? If we think about ventilation it really is pretty simple. It's to provide healthy air for both breathing by the occupants of the building and also by diluting the pollutants and the particles that are found in the building or may have come into the building or, even if we think about, even if a person is infected, how to dilute that particular viral load inside that building.

Ventilation really brings outdoor air into a building or a room and moves the air within that particular area. We also look at ventilation systems to exhaust inside air to the outside, just so we can always have more air coming in and more air going out. Ventilation systems always also control humidity and temperature, which are two factors that influence the transmission of the infectious disease such as COVID-19 and some other particular contaminants that might be in an air. Yeah, those things do have to have an impact on that. And lastly, if we think about it inside our ventilation systems we have the capacity to remove infectious particles and pollutants. Those are some really important aspects of ventilation.

Next slide, please. What is the air exchange and why does it matter? Ventilation systems measure air exchange per minute per person. We usually measure this in cubic feet per minute. We have an idea of what it is happening inside our particular rooms. The larger the cubic feet per minute, the more air is moved in and out of that room. Really, if we think about it from an engineering standpoint, we look for a goal of about 15 cubic feet per minute per person in any particular space.

Just as a rough example, if you have 20 children in a room and we assume that room is about 1,000 square feet, the air will be exchanged 100% of the time in about every 24 minutes. We're trying to get at least fresh air into these spaces on a pretty regular basis. Fresh air is important in that dilution factor that we talk about with contaminants. But also, we have to think about what happens in that room. Kids and active adults, we breathe in oxygen and exhale carbon dioxide.

The amount of oxygen in our rooms is somewhat governed by our altitude, our temperature, and atmospheric pressures very slightly. Just kind of give you an example, I live at 8,900 feet in southern Colorado. And believe me, the amount of oxygen at my house is a lot less than at sea level. For me, oxygen is important because it does have an impact on what I can do and how I can do it. But the amount of CO_2 going back into the room from respiration does have a slight impact on the air quality in a room.

We strive to keep the oxygen levels as high as possible in our spaces. We bring fresh air in to improve air quality. And always have to remember, in thinking about this, it's kind of Q in Q out. So the volume of air that comes into our spaces should equal the volume of air that goes out of our spaces.

Next slide. Thank you. Natural ventilation. Opening windows safely brings outside air into a room or building. We all know that. That's pretty straightforward. It does have its advantages in the fact that it really is pretty inexpensive to do that and to operate that. Also one of the advantages is it's accessible to our family child care homes. So we're not talking about really fancy systems. We're just simply looking at how do we open windows and get natural ventilation.

Some of the disadvantages to opening windows is we always have safety concerns about where the windows are located, what the height is, what the opening areas are in that particular window. Another disadvantage is, we have to realize that this air is not filtered. So we're not getting the benefit of running our air through a filter inside of our HVAC system. And then another disadvantage is that the airflow may not be sufficient. Yeah, on a nice calm day, we may not be getting much air or wind blowing across or through our house or through our facility. And we just may not get enough.

One of the other things that we also kind of think about is, with using outside air, we do have to manage or monitor that outside air quality. And sometimes there are problems with outdoor air and how it does have an impact on our indoor spaces.

Next slide, please. Mechanical ventilation or we call them HVAC, which is heating, ventilation, and air conditioning systems. That's kind of the heart of a lot of our facilities. They control filtration, humidity, and the temperature of any room or building. These are what we see the most of at least in a lot of Head Start areas.

Advantage of the HVAC system is that we can actually measure and quantify the number of air exchanges we have in an hour. We can actually put a number to it and know that we're in a proper range for how we operate our facilities. With that mechanical HVAC system, we can reduce the number of viral particulates children and adults may be exposed to in a building. As we said earlier, we have the advantage with these HVAC systems of getting a dilution by bringing outside air in at a certain number of air exchanges per hour. Also we have the capacity to provide filtration and remove what's in the particular facility or even what might be in the outside air.

One of the disadvantages, it is expensive. It costs us money, it costs us energy, and that's always a concern for how we operate our facilities. Sometimes we have to consult with an expert in order to make a good-quality choice about what kind of HVAC system we have, what kind of HVAC system we should have, and what the costs are to operate and to purchase it. One of the things about HVAC systems that always comes into play is they do require maintenance. And obviously we ask people to have these particular systems set up on a maintenance

schedule so that we can operate them properly, cleanly, and to the best advantage that we possibly can.

Next slide, please. Natural ventilation, windows. Now windows can be used in combination with an HVAC system or without an HVAC system. But the important thing to remember always with windows is that we do need to open these safely. If we have the capacity to open the windows toward the top, if it's a double-hung window and we could open up the top, that works out really well because we want to make sure that children and their reach heights is such that they can't get up and get out of the windows and cause some problems.

If there's a position or a window that you can't do that, then we have to start to consider window guards. There's specific requirements, an ASTM requirement on window guards for Head Start facilities. We can't – sort of trying to keep them so that kids can't climb out of them. One of the things that I've always kind of looked at when I think about windows is I kind of look at the opening and the size of the opening. I always kind of use my fist. If I can fit my fist through a particular window opening, that's probably open too far. Somewhere in that three-inch range maybe give or take is probably the proper width for a particular opening on a window.

Now always when you have natural ventilation, you're getting air coming in from the outside. You need to make some quality decisions about what the outside air is like and whether or not you should have the windows open and for how long and what have you. EPA actually has a site now. It's called airnow.gov. That'll list based on location if there are some problems or some known problems with particular air or outside air.

Also, in a lot of jurisdictions, a lot of cities, counties what have you have air quality or air monitoring boards that'll put out alerts on everything from particulates to ozone to smoke and small particulates. We have to be kind of careful and just kind of watch those and be aware of what might be happening in our particular community. Then based on that, make sure that we kind of think about how our natural ventilation with windows occurs.

Next slide, please. Natural ventilation on buses. Oh, yeah. Look at this. This is probably one of those things that kids really love. What kid doesn't like riding in a bus with the windows open and feeling the wind in their face? Really it is, yeah, open the windows on the buses if air quality is healthy. We want to make sure that it is in a place where we can have nice fresh air coming into it. Also look at how those windows are locked and the proper amount of opening hopefully up on the top of that particular window.

Next slide, please. Fans, wow. This is kind of a hot topic and things that we've received a lot of questions about and had lots of discussions with folks about. Here's the conversation about fans. Fans can increase the effectiveness of an open window. We can move inside air out by putting a fan and having a discharge air out of a window into the outside. Then that allows fresh air to come in through other windows in that particular space and come in at a very gentle, nice even velocity. Fans can improve air mixing by having that inside here get pushed to the outside.

Outside air come in at different locations in that room. Really we're getting a slow mixed dilution of viral particles and contaminants that might be in that particular room.

When we start thinking about fans, we always have to think about, well, what kind of fan is it? Is it a free-standing fan? Is it a window fan? Is it a ceiling fan? Is it an exhaust fan? With any kind of fan, certainly safety is one of the biggest concerns and how we might use those. Really we have to also think about when we put a fan into a space, where is that air moving to and where is it moving from. Really, as Abbey even talked about earlier, we understand that COVID is transmitted through the air. Having air moving can directly impact how that particular virus can be moved across to space. Yeah, we have to always be kind of careful about that.

One of the things that we also need to think about is we need to position fans so that they're out of reach of small children. That they're stable, won't fall over. If we put them in a window make sure that they're fully attached. They're not going to be able to be pulled down. Really, really make sure that the rotating blades, the rotating mechanical devices are out of reach of little hands and little fingers and what have you.

I kind of think of my own childhood. I remember seeing a fan, or we had a fan in one of our rooms that was blowing air out. And lo and behold, I remember sticking something in that fan just to see what would happen and watching it get chewed up by the fan blades. Please keep that in mind when we start to look at those locations and how those particular things are installed.

Typically, these are not hardwired into our buildings. They're usually done through a plug with a switch, so we do have to make sure that we don't create other problems in our facilities though. There are safety problems such as tripping hazards for that particular cord or climbing hazard if the cord is up on the wall and in our outlet is fairly low to ground. Children can move very quickly inside a classroom and what have you. We always have to be careful of where these are operating, how they're operating, and what have you. Here's my big plug for something that we've always talked about, and especially for me as I've helped in some of the designs of facilities, is that we always look very closely at practicing active supervision at a classroom and considering what's happening in that particular classroom and how we're using fans.

Next slide, please, Abbey. Thank you. All right, we're going to get kind of down into a little more detail on an HVAC system. If we think about mechanical ventilation, which is pretty common. It's common in a lot of places. We have an HVAC system with an air handling unit and quite often we have exhaust fans in our facilities. Let's kind of look at the starting point of that, and that's the air handler unit. That's a device, a mechanical device that has a fan in it. It also has a capacity to add heat and/or cooling into the air that passes through that particular air handler unit.

Now it's kind of a fancy term, and I'll share something with you. I have a really fancy air handler unit at my house in here. It's called a furnace. It has a fan. It has a capacity to put heat in it and also has an air conditioning fan coil unit. When we start thinking about air handlers and they

sound really complicated, think about your own house and if you have a furnace in there. It does work primarily on the same level. The air handler or the furnace will push air out or blow air out through ductwork to different rooms throughout the Head Start facilities. Great, pushes it out, moves it into different rooms. We get cooling. We get heating into those particular spaces.

As we push air into those rooms or blow it into those rooms, we have to have a way for that air to come back. So we always look at air balances and the balance of supply-side air and then the air that's returned back to the air handler. Some of it may even go back outside or some of it just goes straight back into the air handler, goes through the filters inside the furnace or inside the air handler, and then comes right back into our spaces that we occupy.

If we look on the very far right side of this little sketch, we can see an exhaust fan. We have exhaust fans everywhere. In our restrooms, in our kitchens, numerous exhaust fans exist in our facilities. Really, what they do is they just take that particular air, that particular contaminant, or that particular thing they're trying to mitigate and just sends it right up through the roof or through the wall just straight out to the outside.

That air going outside does have to be balanced back with air coming in from the outside. And, like in this drawing, it shows on the air handler unit, it does show a place where outdoor air comes back into the facility. That's part of that air exchange that we have to kind of take into consideration, is how much air comes out of our building versus how much air comes in and how much is just simply moved around from place to place.

Really when we start getting into supply-side air and return ventilation duckwork and grills and what have you, we really can get into some pretty complex engineering and so everything from duck sizes and locations to return air locations. We've got some crazy boundary conditions that may occur inside a facility, and that's where I know some folks have asked questions about partitions and what have you. Partitions can have an impact on how air moves from the supply side into the room and then back out again.

Then one of the more interesting things that always happens in all of this is we get some thermal mixing. I mean we've all been in spaces, we've all been in rooms where you just feel really cold or really warm and you can walk across the room and there's hot spots, there's cold spots, what have you. With that, that's just kind of what happens, in that very complex dynamics that happens, with thermal mixing that occurs in these HVAC systems. And, like I said, every room is very different, every facility is going to be different, and even every time of day it can be different. So yes, mechanical ventilation is a very complex process. I think this is probably as good a graphic as we're going to find to at least get down to some very, very basic premises for all of that.

Next slide, please. One of the things that we've discovered with COVID is that air velocity is important. Abbey had that slide earlier where it showed a person coughing or sneezing and, [Coughs] excuse me, and we talked about projecting. We project basically as we're expelling air

from our lungs out into that particular room. Those velocities are important when we start to think about COVID.

Air velocities are very important also when we think about an HVAC system. So the speed at which air moves through our buildings does have an impact. If we have – maybe some of us have been in rooms or have been in buildings where you could actually – you can hear and you can feel the air conditioner kick in and it blows out a massive amount of air. It blows paper off your desk or what have you. Really air velocity is an important consideration as we think about COVID-19. And certainly lower velocities, velocities and air spread out over much greater areas is something that we're looking for.

I think that if we look at that drawing on the right-hand side that shows vectors, or at least how air moves in a particular space from a supply side in the upper right-hand corner to a return air. Like I indicated earlier, it can be a really, really complex discussion and computation of how your HVAC system works, what the air velocities are, and what the directions are in a particular room.

Thank you. Next slide. Very early on when CDC and folks were starting to look at COVID-19, this is a slide from a CDC publication "Morbidity and Mortality Weekly Report" that I saw probably last summer I think it was back in June or July. This is about a place in China, and it was a small restaurant, and like I said they were still trying to make the determination as to how COVID-19 was transferred from person to person. If we look at this little sketch we've got little red circles indicating people that were seated at tables in this particular restaurant. Those folks through contact tracing were discovered to be positive.

If we look at January 24 and person number A1, that was the person that was first diagnosed with COVID in that particular place. A couple of things about this. If we look on the very right-hand side, there was an air conditioning unit that was sat up in the top of the wall in that particular restaurant. It pulled air in and cooled it and then just blew it right back out. Also some things to understand – exhaust fans were off. We really didn't have any kind of capacity for basically removing inside air, pushing it to the outside, and then having new air come into that particular space.

Some other risk factors that occurred was, there was no masks, we had limited distances, and we had some, probably some pretty long exposure times. One of the things I just want to bring forward on just looking at this and how we try to understand what happened here, is that this is where a ventilation system actually didn't provide any relief for COVID-19. It actually contributed to the disease actually being spread to more people. We do have to be careful of that. That's why we look at trying to get as much outside air coming into our facilities, why we try to get it filtered so that we could move as much of the particles as possible.

Thank you. Next slide, please, Abbey. All right, filtration. Let's kind of think about filtration. Quite a few of us are familiar with filters that we put in our furnaces or somewhere in our homes or in our facilities. Really, the purpose of that particular filtration is just to remove particles from the air. As we've discovered and as we think about this, as we remove some of

these aerosols, droplets, particles, some of the contaminants that might be in air, we can actually reduce our exposure to COVID-19.

That's important. I think that's the basis for why filtration really works inside of our HVAC systems. Our level of filtration is measured in what we call MERV ratings. We may see these on the filters especially if you have commercial filters in your facilities. You'll see a minimum efficiency reporting value. For right now, inside the COVID-19 world that we're looking at, we're looking at MERV ratings of about 13 or above. That's a piece that we need to look at.

Now one of the interesting things too about filtration and adding filters, always check to see what your manufacturers of your air handler units are in your system as to how you can achieve the highest MERV rating possible for that particular facility. Sometimes we can add multiple filters together to get a higher rating.

Next slide, please. MERV, minimum efficiency reported value. Really what we're looking for in air filters is, whether it's ones we put up on our air handler or on our return ducts or wherever, we look at trying to get one that has a rating of about 13 or above. What has been shown is that 85% of the COVID-19 particles are a certain size. A MERV 13 filter will remove those. For me in my mindset, that's actually a pretty good percentage of removal. That really, really does cut down on the potential problems. If we combine that with how many air exchanges we might have in a particular room, if we can replace that air every 20, 25 minutes, or even less, to me that's telling me that we're having good clean filtered air in that room all the time.

One of the things we have to be concerned about with filters is even though they may not look dirty, they might be past their useful life. So we have to change our filters on the schedule set by the manufacturer. Follow that as best you possibly can as far as, if they say every two months, every three months, every one month. That's what they're recommending, so that's what we have to look at. There's a phenomenon called filter breakthrough that we have to be concerned about. That's one reason why the manufacturers will have a particular time frame as to how long that particular filter works. Always consult this with your HVAC specialist. Please do.

Next slide, please. Everyone's heard about HEPA. HEPA, high efficiency particulate air filter. HEPA filters are kind of a … Well, I come from a public health service background, so for me being in hospitals and clinics is where I spent a good majority of my career. HEPA filtration is commonly used in our hospitals, clinics, surgical centers, what have you. Those are things that we've been around. They've been around for a very long time. But the important thing is that they remove 99.9% of particles, 0.3 microns, and larger. So 0.3 microns is very small. That's way smaller than a human hair. It's a very, very small particle that that removes.

Typically, in the past, HEPA air filters were available pretty much through commercial facilities and commercial air handlers and what have you. They are easy to use in a short term because they work. They really remove a lot of particulate matter. Most of the HEPA filters are a MERV of 16 or above. They really do work exceptionally well, but they also need to be replaced regularly. They can cost a little bit more money too, that's always a consideration. We need to

always check for the schedule for maintenance and what needs to be handed, how often they need to be removed and replaced. One of the notes here on this is like use gloves to replace your filters. Wash your hands with soap and water after replacing a filter.

Important thing to remember about any kind of filters, especially a HEPA filter where you're actually going to probably trap a lot of contaminants and with the actual virus itself, the filter doesn't kill the virus. It just simply holds it in place as a physical property. So need to make sure that you handle these and dispose of these properly because we don't want to have a filter become part of a problem as we're trying to dispose of it.

Next slide, please. Thank you, Abbey. Portable air cleaners. We've seen a lot of these come on the market recently since COVID has come into place. Really what they are is they're free-standing units that filter air in the room. Now most of these are a plug-in type. There's not very many of them that are hard wired into a building. They require connection to an electrical outlet. Generally, they have a HEPA filter associated with them which then basically, it's telling me that it'll bring air in, run it through a HEPA filter, and then allow the discharge of a really good air quality, high-quality discharge back into the room.

A lot of these come in the different sizes, shapes, what have you. Really, if you're going to consider these, you need to understand the size of your room. Some of these have ratings or they could talk about a clean air delivery rating, which is one of their ways of saying or telling you know how big of a space this actually can work in and is it suitable. And then you can even look at the rates as to how often or how quickly it actually will clean up that particular air, how often an air exchange will come through that particular filter.

There are some conversations too about where they should be placed. If we're going to place them in a room where we know we're going to have lots of kids, we have problems, we want to improve the indoor air quality, we need to look very closely at where we going to place those inside there. Look at how that portable air cleaner discharges its air. Does it go straight up? Does it come out the sides? Look at that. Then look at where you want to place that in that particular room knowing that you're going to try and draw air from basically across the entire room, and not try and blow air directly back on to the occupants. That's going to take some trial and error. You have to kind of look at that and see what the recommendations are from that particular manufacturer.

When should we use them? Wow, OK, that's an interesting question. Really, if we think about it and we really want to make sure that when the room is occupied. To a certain degree, we can even use it for a couple of hours after the room is occupied so that we know that, hey, this is nice clean air in this room. It's had an opportunity to be filtered not only by our HVAC system but also maybe by this secondary portable air cleaner. That's going to be part of the plan that you folks need to develop on how you can provide clean air into your systems.

Maintenance measures, manufacturer's recommendations for changing those filters absolutely positively follow those to the letter. Need to dispose of those filters properly. One of the other things about these portable air cleaners, is as we kind of look at overall indoor air quality in our

facilities, realize that these are just kind of a temporary. They're a short-term fix. As you have discussions about HEPA filtration and an advanced filtration in your particular rooms, also consider what some of the long-term results you may want and how you look at and how you do filtration.

Next slide, please. Portable air cleaners. Here's just a little bit of a slide on basically on how that's calculated, how many air exchangers, looking at the size of the room and how often that air can be moved or pushed through that particular filter or so. Like I said, you need to look at the manufacturers of those particular filters because they're going to give you a little more specific information as to how that particular filter works, how you calculate the proper space that that should be used in.

Well, I think that's actually what I have for the moment. I know we pushed a lot of material out in a very short period of time. We understand that. But let you get back to Abbey and talk some more. Thanks.

Abbey: Actually, Dan. I'll just summarize this, and then I'll go back to Dan. This is one of the pictures that you might have seen in one of the CDC documents. It's just a nice summary of what we've been talking about to use the fans with covers. You open windows with screens using portable air cleaners like with HEPA filters like we just talked about and wearing masks indoors. This is just a summary slide of what we've been talking about. And now back to Dan.

Daniel: Here's a particular piece of equipment that we've actually received some, I've actually had some conversations with the folks about. UV light, so I'm going to put on my hat as an environmental engineer. I've been using UV light fixtures for treating water, wastewater, air for a very long time, and they work really well typically for air. We're looking at stuff in the UVC range as the wavelength that it operates at. One of the things that we have to realize is that these things have been used primarily in hospitals, clinics, places where we actually have a very direct need for killing basically everything in the air as possible.

These typically will kill viruses, bacteria, funguses, just about everything. That's important to realize is that they are very strong. They have very strong affinity. If we think about UVC and UV light, UV light transfers and moves very long distances. It goes through a lot of things, and we have to be really exceptionally careful with that.

Also probably one of the things about UV light, that for someone like me who lives in the western United States where we get a lot of UV light, is that basically it can be a hazard to skin, sensitive skin. It'll degrade plastics. It'll degrade things. It really doesn't have – it has an affinity to go after just about everything it comes into contact with. If we think about light purely from the physics standpoint, it operates and will come into a space or come out of a space. It'll be broadcast a fairly wide path. Light is basically as an energy particle of photons will move across very, very wide distances.

Our UV products recommended for Head Start. Right now the National Center does not recommend them. As we look at the possibility of problems for health and skin sensitivity

issues, like I said earlier, these things are really designed for hospital infection control units. They work really hard on products that are in a room.

When I think about some of the early COVID stuff where I would see UV light set up in an emergency room or other places and they'd run those for 15, 20 minutes after a shift or after a particular moment in time. You can't come into those room because those lights are exceedingly strong and exert a lot of energy. We have to be really careful about how they're used. Like I said, the National Center does not recommend them for Head Start.

Thank you. Next slide, please. All right. Ionizing air cleaners. Wow. This is actually really quite new. A lot of these products that we've seen out on the market are really quite new. Let's think about how they work. An ionizing air cleaner, what it does is it passes air through a couple of plates, and we actually are then adding an electrical charge to that air. What happens is, is that those particles in that air will become highly charged or highly agitated or even they may even, if there's certain chemical compounds in that particular droplet of water, it may create a different kind of chemical compound that's very reactive.

These ionizing products do go after viruses. They go after other particles. They go after bacteria, dust, what have you. But that's part of the problem is that they basically go after everything. Even though they're highly effective at basically killing everything that they come in contact with, they're really not easily controlled because they will attach to basically a lot of surfaces. If they're broadcast into a room, they will come in contact with all the surfaces, and they may sit there for a while. As we kind of think about ionizing products right now, the National Center does not recommend them.

One of the things that we have to be kind of careful of is ozone. If you think about it, if you're charging a particle and that particle might have or has oxygen around it, one of the outcomes from that might be ozone, which is 0_3, which is really tough chemical to deal with. It's very harmful. It's very hazardous. I look at some of my facilities background where I did some research, and we used highly ozonated water to clean things and it really caused us a lot of problems. It was really difficult to handle.

Ozone is always a potential problem with any kind of ionizing effect. And if we think about it too, they're not currently very well regulated except maybe in California and what have you. As these technologies come forward, we'll certainly have to look at them. But right now they're not recommended.

Next one, please. Why consult with an HVAC specialist? Specialist could help programs assess the ventilation systems and provide some recommendations on either upgrades or improvements. Really in a lot of our systems we may have to look very closely at how they're operated, whether or not we might want to think about some improvements or upgrades. Who do we bring into there?

We have to kind look at what's going on with our systems, talk to our building facility management people, get some ideas as to how it is and what it is that we can do with our HVAC

system, and really improve our overall indoor air quality in our facilities also as well as really trying to reduce our risk, trying to support our students and our families by letting them know that we're doing the best we possibly can on our HVAC systems so that we have the best quality environment for everyone to occupy.

Please consult with your HVAC professionals before you start to consider HVAC systems and equipment. Those people can help you. We want to provide healthy code-compliant indoor air. Then also you need to also look at what the design guidance is for the Office of Head Start as well. It's really important that we engage with professionals that can help us make some decisions about what's the best quality air that we can get into our facilities and ultimately what's it going to cost because money does sometimes drive things.

Remember, if we start to buy or start to purchase an updated HVAC system, you need to go through your agency's procurement process when purchasing any kind of ventilation system. You have to have the budget for ongoing maintenance and repairs because as we make improvements, as we add equipment to our HVAC systems, it's always going to cost us more money to operate it, and what have you. Like I said, we need to follow the procurement procedures for the Recovery Act funds. If you're going to make large, large quantity or large, large improvements. One other thing just on that note, I think that's on the next slide.

Abbey: Nancy's going to just say a word.

Daniel: Nancy, I know, yeah, thank you. Give me a little break, thank you.

Nancy: So just to call your attention, Dan referenced the program instruction for the Office of Head Start in May. The links are in English and Spanish, just to call to your attention. I've seen in the chat that some people have already commented that you've used your ARP funds to make facility upgrades. But it is an allowable expense. Thank you. I know we only have six more minutes, so we're not going to have time for too many questions if we get to the end in six more minutes. But we are monitoring all the questions, and we are going to figure out a way to respond back. So stay tuned. OK, thank you.

Daniel: Slide 26, thank you, Abbey. Thank you, Nancy. All right, so I'm going to hurry up here. Ventilation consultants. Who are they and what to ask? I think we've kind of give you some ideas on lots of different things to ask a consultant about your particular system and how to improve it. People to ask. Well, certainly go through the people that are doing the maintenance on your system. I know that in my particular house, I hire a HVAC technician to come out and work on my air conditioner every year. I've been an engineer for 40 years, but I still hire technician to come out and work on my air conditioning system because he can tell me what's going on with it. He can help fix it. He knows what's going on. That's what I try and work through.

Next slide, please. Abbey, I think this one's yours, thank you.

Abbey: Yeah. Thanks, Dan. Thanks so much. This slide is really a summary of what we've been talking about and just wanted to provide a diagram to just summarize. When we think about ventilation, we're thinking about what is happening with mixing of outdoor air bringing it into our system. We asked ourselves some questions about do we have an HVAC system or not. Depending on if you have an HVAC system, you're going to have a different approach to how you want to filter that air. If you don't have an HVAC system, you might be considering supplementing with a portable air cleaner.

The key messages that we are trying to really talk about today and summarize here for this webinar is that ventilation is one of the most effective risk-reduction strategies in our layered approach to decreasing the spread of COVID-19. We also know that natural ventilation – for example, opening windows – can be enhanced with fans and portable air cleaners to decrease the spread of COVID-19. We also might have an option of a mechanical ventilation like the HVAC systems that Dan talked about. They also help control humidity and temperature and filter the air to decrease the spread of COVID-19. Lastly, upgrading and improving the ventilation systems are long-term investments for promoting healthy air and a good indoor air quality. So now, I'm going to turn it back to Nancy.

Nancy: Thank you, Abbey. We do have some resources for you. We have a Webinar Resource List with some of the places that you can find additional information. With apologies to our colleagues who are Spanish speakers, at the moment the resource list is only available in English, but it's available through the link that we've been posting in the chat periodically. You should be able to access this resource list. If you have any trouble, you can always write to our info line for it.

We do have a brand-new resource Tips for Working with a Ventilation Consultant. It was just posted two days ago to the ECLKC. It will be available in Spanish, but it's being translated as we speak. At the moment, it's only available in English but stay tuned. It gives you a little bit more information in written form about some of the topics that we talked about today in terms of why it might be to your advantage since this is kind of a complicated topic. You really have to look at the specific needs of your own building or buildings. While you might work with or think about working with a ventilation consultant who you could hire using the additional funds that are now available to you and some additional resources are also in that list. Which again is on the ECLKC at this link and is in English but will be in Spanish. Thank you.

Abbey, next slide, please. At the end of our webinar today, we just gave you a glossary in case you wanted to have a quick reference guide about some of the terms that we use that may not be familiar to you. I will say that, once upon a time, not very long ago, I didn't know what a MERV filter was. And now I know about MERV filters and air handler units and air changes per hour, things that I really never understood before that thanks to Dan.

Next slide. So do we have, oh – we have time for probably one question. I'm just going to let Abbey do this one question before I wrap up. This is a little bit of a different kind of question, but we get it all the time. Why should programs not use air fresheners? Abbey, can you answer that one really quickly?

Abbey: Sure. We know that many programs are using air fresheners because they think that they're going to hide an odor or create a desired smell. But in fact, they don't freshen the air or clean the air. They just add to the air. They add fragrance and sometimes chemicals, so we do not recommend air fresheners.

Nancy: Thank you. And Dan, can you tackle this one just in 30 seconds? I know you're not going to have time to do justice to it. But we have so many facilities to say, "Well, that's great. You just told me to open my windows. But guess what? I don't have any windows." So what would you say to offer suggestions to a program that does not have classrooms that have windows that open up?

Daniel: OK, in a quick 30 seconds or so. If you have windows that don't open in your particular facility, chances are you probably have an HVAC system. Obviously, the first thing to check is to see how that particular air handler, air conditioner works inside or works with your building. Quite often, they have the capacity through dampeners, which are basically nothing more than open and closed doors to adjust the amount of outside air. Really we want to try and get your outside air to the max inside that particular building, especially if you don't have windows that can open.

One of the other things is to have an HVAC person, whether it's a technician or an engineering company, evaluate your supply in return vent locations. And then maybe even adjust your activities inside your particular rooms based on where those are located. Obviously, the biggest one though is to get a MERV 13 filter system inside there because that really is going to give you the best protection.

Nancy: All right, thanks, so much.

Daniel: Am I done? OK.

Nancy: Yes, just because we're out of time.

Daniel: I know.

Nancy: I want to give, not because there is a lot more that you could say on this topic, but I want to make sure people know how to fill out the evaluation and get their certificates, which is very important to our folks. Here is a link to the evaluation. We really encourage you to please use it because it's very important to us and will help us plan future TA and evaluate the TA that we're providing.

After you submit the evaluation, you'll see a new URL, and then through that link, you'll be able to access, download, save, and print your certificate. The evaluation URL that pops up will also appear as soon as this platform closes in just a moment. We're out of time, but we thank you for your participation.

Next slide, if you want to follow some of our activities and find out new resources, you can subscribe to our monthly list of resources using the URL on that slide. And lastly, as you know,

we’re always happy to answer your questions. And you can reach us at our info line at health@ecetta.info.

That concludes our webinar today. Thank you for the extra two minutes. Please stay healthy and safe. And thank you for joining us. And thank you to our presenters, Dan and Abbey. Bye, bye.