

COVID Event Safety: Follow the Science

Greta Fox, FNP-BC

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As conferences and events open back up, we in the meetings and events industry are excited to be back. But the truth is that COVID is not yet over, no matter how much we want it to be. We have a special responsibility to lead by keeping on the cutting edge of science-based event safety. And with the return of these gatherings, and the resulting travel and tourism, at a time when both the very contagious Delta and the even more contagious Omicron variants are spreading, and cases are going up, this becomes more important now than ever. So, the better we understand the science and recognize that no layer of protection alone is enough, and the more layers of protection we have in place, the less chance that this airborne virus will get through them.

This is a companion document to my [video](#), COVID Event Safety: Follow the Science. I have a unique perspective – besides managing my husband's photography company, I'm also a nurse practitioner on the experts and advisors team of the [COVID Action Group](#), which is the scientific arm of our umbrella organization, the [World Health Network](#). We're a global coalition of experts in pandemics and related fields, united with groups of concerned citizens, with a mission to promote and preserve health and economies by advising policymakers and empowering communities with information and practical, science-based strategies to progressively eliminate COVID-19. For more information and resources, or to volunteer, please visit us on the web.

Disclaimers:

1. My science-based position is that existing health agencies continue to provide incomplete guidance, particularly on issues which are essential to event safety, such as ventilation, masking, vaccination, and testing, and that because most [areas](#) are experiencing increasing transmission, the safest thing would be to limit live events and non-essential travel for now.
2. This article focuses on health and safety, and does not cover liability, contractual considerations, contingency plans, etc.
3. This was originally written and recorded on August 3, 2021, and this information and guidance will continue to evolve. In this December 27, 2021 update I expand mask recommendations, specifying that branded/swag masks are not advisable, address Omicron and boosters, expand tips for evaluating venue ventilation, and expand the resources.
4. I have no conflicts of interest in any products referenced here.
5. All guidance here is my own.

Let's look at seven myths and facts about how COVID spreads, and see how we can leverage science and technology to best protect ourselves, our families, and our clients and colleagues.

MYTH #1: COVID is over because: Vaccines!

FACTS: Vaccines are an incredibly powerful tool. But:

- **Vaccines alone are not enough to end the pandemic, and they need us to do more to help them work.**
- COVID is [still spreading](#), and we are nowhere near [herd immunity](#).
- While vaccines are [highly effective](#) at keeping you out of the ICU and the morgue, they are not 100%, they are less effective against the Delta variant, and they are even less effective against Omicron, which has overtaken Delta as the dominant strain.
- People with milder and breakthrough infections can still develop Long Covid and can still [infect others](#), and [research](#) indicates that more than half of all cases may lead to long term illness.
- You are not fully vaccinated without a [booster](#). Anyone vaccinated 15 weeks ago or more with two doses of Pfizer have only ~35% protection against severe disease before getting a booster. Boosters bring immunity up to ~ 75%, which is much better, but you're still walking around with a ~25% chance of getting infected. (No Moderna or J&J data is available as of this writing).
- At the time of this writing, only about 61% of the [eligible population](#) in the US is vaccinated with two doses, and only about 32% of those have received a booster.
- No children under 16 are eligible for a booster, so no kids are fully vaccinated, and no-one under 5 has been vaccinated at all.
- As COVID spreads, it continues to mutate in ways which eventually will [outpace vaccines](#) if we allow the spread to continue unchecked.
- And let's be honest – the honor system for vaccine reporting was never going to be reliable, and we need a standardized, centralized, nationwide vaccine verification system, even if it's voluntary.
- **So we need to do everything we can to help the vaccines work.**

ACTIONS:

- **Get fully vaccinated**, get a booster as soon as you are eligible, and encourage and enable others to do so.
- But don't rely on it to **fully** protect you - keep wearing a well-fitting, high-filtration mask indoors and keep social distancing.
- **And pay special attention to ventilation** - more detail on this to follow.
- While you should confirm that this is still the case in your area, at this time, you [can](#) legally require your employees, and attendees at private events, to be vaccinated and to [show proof of vaccination](#) including booster. Unless you are the person's health care provider, HIPAA does not apply.
- The more planners who ask venues and vendors if their staff is fully vaccinated, the better! Let them know that this is important to prospective paying clients.

MYTH #2: COVID is spread by droplets, and you're safe if you social distance and keep 6' away.

FACTS: Nope. [COVID is AIRBORNE](#).

The virus is primarily spread by inhaling aerosols at both close and long range. This central fact has not been explained clearly to the public because of a serious [error](#) from the early days of epidemiology, which [mistook](#) close-proximity aerosol infection for spray-borne droplet infection. Part of the reason for this mistake was that aerosols are more concentrated in the air closer to the infected person. However, despite mountains of [conclusive evidence](#) to the contrary, this error in guidance [disastrously persists](#). This is the most detailed section, because when we clearly understand airborne spread, we can know how to readily and effectively protect ourselves against COVID - so, here we go!

- [We breathe out particles of different sizes.](#)
- The larger ones are droplets, and as their name suggests, they do drop to the ground or onto surfaces within a limited radius, and this is NOT how the virus spreads.
- But AEROSOLS are inhaled deeply into your lungs, and that IS [the main way](#) that the virus infects people.
- Aerosols containing virus, which are breathed out by infected people, can linger and swirl around in the air [like smoke](#), and any virus in these particles can remain airborne and viable indoors for hours.
 - Those of us old enough to remember how ineffective it was to have smoking and non-smoking sections in a restaurant can relate to the smoke analogy; the rest of you: think about how effective it would be to have peeing and non-peeing ends of a swimming pool. ("eww," right?)
 - Or to put it another way, clean air is the new clean drinking water, and you wouldn't drink water that someone else just spit out, right? ("EEW!")
- Droplets are too large to inhale. If someone coughs in your face, it's primarily the aerosols, not the droplets, which infect you, though they may be able to get in through tear ducts, so eye protection makes sense for people providing literally in-your-face services, like your dentist.
- Aerosols are more concentrated around the source (infected person), which is why social distancing does help in the short run, but there is just no getting around the fact that after a while in an under-ventilated room, [everyone is breathing each other's air](#).
- [Plexiglass barriers](#) are an example of something you'd intuitively think would work, but science shows us that only do they not block aerosols, they actually make things worse by creating a negative pressure zone that funnels any floating aerosols directly at the person behind the barrier.

ACTIONS:

- Keep this in mind as your guiding principle, and everything else will follow:
DON'T SHARE YOUR AIR!

- Here is a link to an [FAQ website](#) on how to protect yourself from aerosol transmission of COVID-19, which is a fantastic resource created by some of the world's leading aerosol scientists, and here are some highlights:
- Proper **masks** indoors, and in crowded outdoor settings, for everybody, vaccinated or not; more on masks to follow.
- Social **distance**, but without plexiglass partitions.
- Transition activities to **outdoor** spaces whenever possible. If using tents, they must be open-sided, otherwise [it's just like being indoors](#), and avoid outdoor dining pods and "igloos" for this reason.
- Make sure your DJ knows to **keep the music down** – this is not what they're accustomed to doing, so let them know that this is part of your Covid policy because you don't want to make people have to lean in and shout to be heard.
- And super important, when you're booking a venue, **ask about ventilation and filtration**.

WHAT TO KNOW, WHAT TO ASK.

Here's a primer on indoor air, followed by tips on how and what to ask venues about it.

UNDERSTANDING VENTILATION AND FILTRATION BASICS:

(if your eyes start to cross, skip ahead to What to Ask)

- **Ventilation** is flushing out indoor air and bringing in outdoor air. The venue's HVAC system's ability to exchange air and remove small particles is measured by its MERV rating, which should be [>13](#). Engineering can increase ventilation by [opening outdoor air dampers](#). You can increase it by opening doors and windows to the outside, if weather, safety and building structure permit, and you can also use window exhaust fans. But depending on the weather and the side of the building you're on, though this helps, it may not be enough.
- **ACH** is air changes per hour. The minimum should be [6, or more](#), depending on occupancy and activities, e.g. 8-15 for auditoriums and theatres.
- **Filtration** is cleaning particles out of the air. This should be done by using **only true HEPA** air filtration units which have a CADR (clean air delivery rate) that is appropriate for the room size. While [upper room UV](#) is also highly effective, **beware of non-HEPA** electronic air cleaning devices and systems like ionizers, needlepoint bipolar ionizers, electrostatic precipitators, plasma generators and photochemical oxidators. Despite the research claims and all the hype, they have largely not been properly tested under real-use conditions, they may lack scientific peer-review, they have largely not been FDA approved for non-medical-device use, because [they have not actually been proven safe and effective, and they may produce very harmful particles which have been linked to heart disease, diabetes and cancer](#). Unfortunately, many venues have invested heavily in this technology. If you have a standing HEPA unit with ionizer and UV options in your home or workplace, turn those options off – they [may emit ozone](#) or other harmful particles no matter what the product manual says.

- **Measuring CO2.** [Carbon dioxide levels](#) reflect the amount of exhaled breath in the air, which may contain the virus, and you want the ventilation system to be clearing it out to reduce the chance of spreading Covid (or even colds and flu). Some venues' systems do monitor CO2, but there are also good consumer CO2 meters like the [Aranet4](#) if you want to check out an environment for yourself.
- In very broad strokes, a CO2 level of 400–500 ppm is very good, like being outdoors. But when it gets over 700 it starts to become a concern, and you want to keep it under 800, because at 800, 1% of the air you're breathing was [exhaled by someone else](#). At 1000 it's 1.5%, at 1200 it's 2%, and it continues to go up from there. And while 1-2% may not sound like a lot, Omicron is twice as contagious as Delta, which means that it takes less virus to infect you; also the concentration of virus in the air can build up over time.
- When the CO2 level goes up, try to adjust the environment, for example by opening windows and doors, turning on an exhaust fan, and decreasing the number of people in the space. When it starts to exceed 1000, however, and if the environment can't be adjusted, while a proper mask will protect you for a period of time, try to leave as soon as possible.
- HEPA doesn't affect CO2. It removes particles, and particle meters may not yet be commonly used, but with HEPA filtration running, you can push that under 800 figure up to [under 1000](#). However, even when HEPA is robustly removing viral particles, there are other [health risks](#) including effects on cognitive performance when CO2 remains elevated at 1000+.

WHAT TO ASK ABOUT VENUE VENTILATION AND FILTRATION:

- I suggest first asking a general question about their Covid policies. Everyone will talk about cleaning and hand sanitizers (yeah, yeah, see Myth#3), and again, I do suggest asking about staff vaccination/boosters as well as masking, but then turn the conversation to a discussion of indoor air. Be understanding when the event sales folks don't know the answers, and ask to be directed to someone in engineering or maintenance who would. You may find that a friendly engineer is more than happy to discuss and show off their Covid upgrades!

Here are the questions:

- **What is the MERV rating of the HVAC system?**

This should be 13 or more, but older buildings may not have the capacity to upgrade their filters from the old standard of MERV 8, as this can strain the system.

So if it is under 13, you want to know what they're doing to [fill the gap](#) by exchanging more outdoor air (ACH) and/or filtering the indoor air (HEPA).

- **WHAT IS THE ACH?**

While this may vary and they may give you an average, there should be a [minimum ACH of 6](#), however for auditoriums, theatres, and environments of similar capacity, [it should be 8-15](#).

- **WHAT OTHER FILTRATION IS BEING USED?**

If MERV is under 13 and ACH is not sufficient, you want to hear that true HEPA units, with a CADR specific to the event space, are being used. It's awkward

when the venue is all excited about the non-HEPA technology which they have invested in heavily, but be aware that it may be both ineffective and unsafe, so review it with care.

- IS THERE UPPER ROOM UV?

While ultraviolet light bulbs installed inside standing air purifier units are ineffective, because small amounts of air pass through too quickly to be disinfected, upper room UV is [highly effective](#) at inactivating viral particles in indoor air.

- DOES THE AIR CONDITIONER EXCHANGE OUTSIDE AIR?

Worth asking, but be aware that most AC just recirculates indoor air.

CAN DOORS/WINDOWS TO THE OUTSIDE BE LEFT OPEN?

· Ask about this as well, but for indoor events, as above, it may not be sufficient.

WHAT IF IT'S NOT OK?

- If the ventilation/filtration is not sufficient and can't be improved, or if you can't get clear answers to your questions, consider looking elsewhere to host your event. Let the venue know very clearly that you are declining to book there for this reason, and encourage them to reach out for your reconsideration if they are able to supply the needed information or to make the necessary modifications.
- Recognize that many venues are not yet accustomed to this level of questioning about indoor air, and may be unaware of its importance and unprepared to answer. You're making that better for everyone by being one of the questioners!

MYTH #3: COVID is mainly spread by contact with contaminated surfaces.

This is also called fomite transmission. You'll be safe if you have hand sanitizers everywhere and sterilize everything!

FACTS:

- Cleanliness, of course, is Infection Control 101, and it protects you against other pathogens like norovirus, salmonella, hepatitis A, and other nasties. And while you never say never, it doesn't do much good against COVID without airborne precautions in place as well.
- Outside of healthcare settings, while fomite/surface, transmission is theoretically possible, there is [no clear published evidence](#) of this to date.
- [Focusing on oversanitizing](#) can be wasteful, and even harmful, when putting toxic disinfectants into the environment.

ACTIONS:

- Keep high-touch surfaces clean.
- Have hand sanitizer stations throughout.
- But keep your focus on preventing AIRBORNE transmission!

MYTH #4: Any kind of mask or face shield is good enough protection, and surgical masks are best.

FACTS:

- Masks are another absolutely essential and incredibly [powerful tool against COVID transmission](#).
- But they're only one tool in the toolbox because [all masks leak aerosols to some degree](#), and the current variants are extremely contagious.
- [Recent data](#) on surgical masks has been misinterpreted, and they are [not as protective](#) as claimed.
- You're more likely to breathe each other's air indoors, but while COVID spreads MUCH less readily outdoors, it [can still transmit outdoors](#) in crowds or in very close proximity to others, so masks are needed in these circumstances.

HERE'S WHAT TO KNOW TO GET THE MOST PROTECTION FROM YOUR MASKS:

- This is another very detailed section, because masks are the first line of defense, so here we go!
- To help protect against Covid-19, a mask should provide >90% protection by filtering the air very well and also by forming a tight seal around all of the edges to prevent aerosols containing virus from getting in or leaking out.
- The most reliable options apart from [elastomeric respirators](#) or [PAPRs](#) are N95s, KN95s, and KF94s, which are classified as respirators, and provide \geq 94-95% protection.
- There are many fakes out there, but reliable products can be found at [Project95](#), a nonprofit clearinghouse providing equitable access to supplies.
- Aaron Collins, AKA [The Mask Nerd](#), independently tests and reviews masks for adults and children and provides resources for finding reliable products.
- [Reusable elastomeric respirators](#), or the more lightweight reusable N95s such as [Envo Masks](#), both of which have replaceable filters, reduce environmental waste.
- Cloth masks, bandannas, and gaiters vary widely in quality and fit, providing only between [26–79% protection](#).
- [Ditch the cloth masks](#), unless you are layering a 3-ply medical/surgical mask under a three-layer, well-fitting cloth mask with a nose wire, which [improves protection to up to 85%](#).
- According to the [CDC](#), medical or surgical masks alone are not actual respiratory protection. They are intended for splash protection, but they are NOT very effective against aerosols, despite the current hype. The material does filter very well, but they leak aerosols because they fit so loosely, [making them only about half as effective as respirators](#).
- But adding a [mask brace](#) like [Fix The Mask](#) or [Armbrust](#) to an [ASTM Level 2-3 rated mask](#) brings their effectiveness closer to that of respirators.
- Using [earloop toggles](#) or the [knot-and-tuck technique](#) can achieve [>74% effectiveness](#).

- However, using under-mask brackets or crossing the earloops [does not help and may worsen fit](#).
- Masks with valves which are not [NIOSH-approved respirators](#) should not be used because they only filter inhaled, not exhaled breath and so don't protect others.
- Face shields only protect against droplet splashed, but they [don't block AEROSOLS](#). Like eye protection, they are mainly helpful for people providing in-your-face services, like your dentist.

ACTIONS:

- Well-fitted, high-filtration masks should be worn at all times when indoors with others as well as in outdoor crowds, vaccinated or not.
- Forego offering branded cloth masks as swag. Quality and fit vary greatly, and they are not likely to be effective enough to be safely used during events. And avoid DIY-branding NIOSH-approved masks – that would void [NIOSH approval](#) because it can damage the material's filtration ability.
- And please, for the love of all things holy, the virus is concentrated in the nose, so masks have to sit over the [mouth and nose](#). Put up branded signage reminding everyone to wear masks correctly and to keep them on in restrooms, and assign staff to monitor and gently remind attendees.
- And the more planners who ask venues and vendors if their staff will be properly masked, the better!

MYTH #5: It's safe to take off your mask indoors to eat and drink because COVID magically doesn't transmit while dining.

FACTS:

- There is no getting around the fact that there is [NO SAFE DISTANCE](#) for mask removal in an under-ventilated indoor space.
- COVID does NOT make exceptions to accommodate dining.
- Let's acknowledge that this is a very difficult food service issue to talk about and to deal with.

ACTIONS:

- Good VENTILATION/FILTRATION is key, combined with other layers of protection:
- Require proof of vaccination/booster.
- Plan the layout to allow social distancing, which helps in the short run.
- Serve in shifts to reduce occupancy, and allow time for a full air exchange between shifts.
- Avoid buffet service.
- Transition dining and refreshments outdoors whenever possible - again, with open-sided tents, not with closed units which are just like being indoors.

MYTH #6: Screening will prevent infected people from attending an event.

FACTS:

- Symptom/contact screening has a [greater than 50% miss rate](#), and this is because people are contagious before they develop symptoms, and that is when most infections are spread.
- Temperature screening [can be affected](#) by activity, the environment, and whether they've taken a fever-reducer, and it won't pick up contagious asymptomatic cases.

ACTIONS:

- Symptom/contact screening should be included, but don't rely on it alone.
- If you are going to screen onsite, consult health professionals to put a safety plan in place for what to do if someone screens positive that won't expose others.

MYTH #7: COVID testing will prevent infected people from attending an event.

FACTS: Well...

- That did not work out real well at the 2020 [Rose Garden SUPERSPREADER](#) event.
- Testing is complicated. It can screen out some people, but the problems are that:
 - It can take a few days after exposure for Covid to show up on a test.
 - The [false negative rate](#) can be up to 1/3 overall, and [not all tests](#) accurately identify Omicron.
 - If you're tested very shortly after exposure, the false negative rate is [100%](#).
 - However, the amount of virus in an exposed person can [increase from a non-detectable to a detectable level](#) in a matter of hours.
 - And consider that people can get exposed between the test and the event.

ACTIONS:

- While proof of a negative test **in addition** to proof of vaccination/booster can further reduce the risk of an infected person attending, a plan that permits proof of a recent negative test as an acceptable **alternative** to proof of vaccination/booster is full of holes.
- Don't rely on testing alone.
- The closer to the event that a test is done, the better, but if you're going to take on the responsibility of performing medical tests-to-enter, bring professionals on site to put a safety plan in place that will not expose others.

ONE MORE TIP:

- Look at [community transmission](#) and use [this tool](#) to estimate the probability, by county and gathering size, that someone who is infected with Covid would be attending the event.

So, to summarize: While we cannot afford to tell ourselves that there is no risk in holding live events, best practices for improved COVID safety for those which choose to go forward at this time include:

- Communicate your policies to attendees, venues, and vendors in advance.
- Look at community transmission to help estimate risks.
- Limit event size.
- Require very good ventilation and filtration.
- Require that well-fitted, high-filtration masks be worn correctly at all times indoors and in crowded outdoor settings.
- Move activities outdoors where feasible, particularly dining and refreshments.
- Social distance.
- Keep the music turned down.
- Require proof of vaccination and boosters.
- Don't rely on screening or testing alone.
- Keep high-touch surfaces clean and have hand sanitizer available.

And please keep in mind that:

- COVID IS AIRBORNE.
- COVID remains an active threat to public health worldwide.
- And by understanding the science and using [multiple layers of protection](#), we'll keep safer, together.

RESOURCES:

EVENT SAFETY

[Covid Event Safety: Follow the Science video](#)

[EventBrite's COVID-19 Safety Playbook for Events](#)

[Georgia Tech Researchers' County-Level Calculator to Estimate Risk of Covid-19](#)

[Exposure at U.S. Events](#) *(Tool may be slow to load.)*

CLEAN THE AIR

[FAQ's on Protecting Yourself from Aerosol Transmission of COVID-19](#)

[Air Cleaners, HVAC Filters, and COVID-19](#)

[Dangers of Electronic \(non-HEPA\) Air Cleaning Devices](#)

MASKS

About Masks

[Mask Nerd](#) *(this guy is great!)*

[EPA Researchers Test Effectiveness of Face Masks](#)

[Facemask Fit Modifications](#)

Sources

[ProjectN95](#)

[Fix The Mask](#)

[Envo Mask](#)

[Armbrust](#)

[MORE RESOURCES](#) *(including schools, holiday safety)*

GET INVOLVED

[World Health Network](#)

[COVID Action Group](#)

[End CoronaVirus](#)