# How Has Delta Changed the Game?

## A look at the new variant and how banks can mitigate new COVID risks

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***About Paul Benda***

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There are two main ways that the Delta variant has apparently changed the game:

- Potentially increased infectiousness
- Increased viral loading and duration

### Potentially Increased Infectiousness

Delta has overtaken all other coronavirus variants to become the dominant strain worldwide. As an engineer and not a virologist, I cannot fully explain the mechanisms behind it, but it's clear that Delta is outcompeting the other strains and appears to be much more infectious. Part of this may be explained by the P681R spike mutation. A pre-print in bioRxiv shows that this mutation "plays a key role in the Alpha-to-Delta variant replacement" and outlines "the importance of Delta spike in enhancing viral replication."

The primary point here is that Delta replicates faster and more efficiently in the human body, likely making it more infectious.

### Increased Viral Loading and Duration

There have been multiple studies that show that the Delta variant can create 1,000 times higher viral loading than the original coronavirus strain, that its incubation period can be up to 1.5 days shorter, and we now know that the coronavirus is airborne in fine particles that can stay aloft for a significant period of time.

All of these elements make Delta much more infectious than any previous version and help clarify which protective measures make sense and which ones don't. Additionally, it appears the protective capability of both vaccines and recovered immunity from prior infection wane over time. Some studies show that Pfizer protection against infection can drop approximately 6% every two months, so that vaccine effectiveness may be in the low 80% range after six months—and there's some data from Israel that shows the effectiveness may be significantly lower. Additionally, one study from the UK shows that you are 50% more likely to be reinfected with Delta versus Alpha six months after initial infection, and a CDC study shows that those with recovered immunity were 2.34 times more likely to be reinfected than those who were vaccinated.

The short answer is that vaccines are still extremely effective at preventing severe COVID and hospitalizations, but do not appear to retain the same level of protection against infection as they have in the past. Those factors, combined with the longer window of transmissibility of Delta and its higher viral loading, means that many more people are exhaling larger amounts of infectious particles. We also know that the more infectious particles you inhale, the more likely you are to be infected. It also appears, based on a CDC study from the Provincetown cluster, that even those who are vaccinated can have their immune defenses overwhelmed if they stay in an enclosed environment with Delta positive individuals with no mitigations other than vaccination.

## How do you mitigate the threat from COVID in an indoor office-type environment?

There are three main ways to mitigate the threat:

- **Vaccines.** Vaccinations reduce the chances of having infected individuals enter the space, either by requiring vaccinations or conducting health screenings. Unfortunately, we know of asymptomatic cases that can also cause infection, so health screening on its own is unlikely to be significantly effective. Vaccinations, even with waning protections, are still likely to prevent infection in the majority of people (>50%) and thus significantly reduce the risk of an infected individual entering a space. Vaccinations also reduce the window infectiousness. According to a study in Singapore, between day five and seven of infection, those who are vaccinated have 20 to 30 times lower viral loading than those who are unvaccinated.

- **Masks.** In general, looser cloth and surgical masks do a better job protecting others than yourself, as they are better at capturing particles you exhale versus filtering out those you might inhale, as the particles can come in through the gaps/folds between the mask and your face. Masks, unless they are tight-fitting respirator type masks, such as N95s, are more about protecting others versus protecting yourself. They capture the particles so they don't become airborne and significantly reduce the overall infectious particle loading in a space.

  To protect yourself, wear a tight fitting N95, KN95 or KF94 type mask. These masks do a good job of preventing you from aerosolizing infectious particles but they have a high filtration efficiency and when properly worn, their tight fit provides a high level of protection.

- **Filter the air.** It is not enough to mask and social distance in an indoor environment. We know that masks aren't perfect and with the higher viral loading Delta causes, over time in an enclosed space, someone could eventually have enough infectious particles get through their mask to infect others. Additionally, we know social distancing, especially in a masked indoor environment, is—for all practicable—purposes completely useless. We now know that COVID is airborne. Now, think about a smoker. If a smoker is in the same conference room as you but 25 feet away and smoking for two hours, everyone in that room is exposed to the smoke.

  The Journal of Clinical Infectious Diseases article that was referenced earlier showed that 85% of the viral particles exhaled by COVID positive individuals were fine particles (<5 microns) which means that they'll float on air. In an enclosed space, that means you can either wear a mask so that the particles are caught in the mask before becoming airborne, and having other people wear tight fitting masks so they filter out the particles they might inhale. The second is having high levels of filtration in the room to remove the particles or bring in clean air through the HVAC system to dilute the particles. Filtering is much better as it removes them, but open windows and more outside air has proven to be effective as well, just not as effective as HEPA filters (link).

## What are the risks in an outdoor environment?

The outdoors are always less risky when it comes to COVID transmission. Outdoors is also where social distancing is very valuable. Again, think of the smoker. If you and the smoker are outside, you may catch a whiff every now and then, but the smoke quickly blows away and dilutes. I've personally always thought masking outside was foolish and a waste of effort, but since Delta has come about, I have changed my tune about wearing masks outside. If you're standing in close quarters watching your child's soccer game next to the same people over the course of an hour, or sitting in the stands watching a football game for an extended time, it probably does make sense to wear a mask.

Frankly, it's random luck that matters most. We know that about 10 to20% of people are superspreaders from previous studies—people who exhale way more virus than other people. (This was also validated in the Journal of Clinical Infectious Diseases article referenced above.) If you happen to be next to someone for extended period of time who is infected and is a superspreader, and who might also be yelling or cheering, there's a pretty good chance you will get a significant dose of the virus and have a reasonable potential of becoming infected. The problem is, we have no way to know who is a superspreader. That's what so frustrating about this virus: the risk can just be random.

## How do you filter the air in an office environment?

For an office environment, you would use MERV-rated filter panels to upgrade your offices' HVAC filters. The CDC recommends using MERV-13 or higher. If your system can handle it, MERV-14 is a very good option, as it filters out more of the finer particles that can carry the virus. MERV-rated filters can be bought at Home Depot (these are generally Honeywell filters and labeled as FPR 10). MERV-14 and higher are generally only available from commercial filter stores.

If you are looking for portable filtering units that you plugin and spread around the office, you'll want to buy portable HEPA units. In terms of units to buy, the most important thing is to have a true HEPA filter, which should be 99.97% effective. I wouldn't put too much emphasis on ones that have ionizers or UV neutralizers or carbon filters—those extra features can provide some additional protection against COVID and probably help, but I'm not sure they're worth the cost. A good, solid HEPA filter is most important. Now, a lot of the units for sale these days include those extra features, including the ones I personally bought. My HEPA filter has a carbon filter in it, but I actually pulled it out, as it's only used for odors. It has an ionizer too, but I don't really care about that. The biggest thing is to make sure any of the ones you buy don't put out ozone. Of the brands I've seen, the most common are Levoit, Winix and Medify Air. I don't really have a preference, as long as they use real HEPA filters.

Here's the Winix unit I personally bought—on setting three of four, it's pretty quiet.

I also bought a Levoit personal unit for my wife's desk, as she currently has to go into the office. This won't clean all the air in her office suite, but it does reduce the risk in her immediate area. Some banks are buying them for their teller stations for more localized protection and it provides a visible protective capability that staff like.

## What size portable HEPA filter should I buy?

The key for knowing what level of filtration and airflow you want is how many air changes per hour (ACH) in a given space. Basically, how many times do you filter all the air every hour? For COVID, the recommendation is to filter all the air four times per hour. Filtering more times does provide better overall protection, so a good target is four to six ACH.

First, estimate the room volume:
If you have a 30'x15'6' conference room with 8' ceilings, the volume is 30 x 15.5 x 8=3,720 cubic feet.

Portable air filters use a metric called Clean Air Delivery Rate, which is basically how many cubic feet of air they clean per minute (CFM). Unfortunately, the CADR you see advertised is for the highest fan setting, which can be very loud. My filters have a very nice low-level hum on setting three out of four, but if I turn it to four, or turbo mode, it has a pretty loud fan noise. This can make it hard to figure out how much air you're filtering if you use a setting other than the highest one, which most people probably will, except for certain instances because it's much noisier.

Calculate the CFM you need to filter all the air every hour:
If you want to filter all the air in the conference room one time every hour 3720 cf / 60min = 62 CADR or CFM. So, if you want to do it four or six times an hour, just multiply by 62 to get the required CADR.

4 ACH = 62 x 4 = 248 CADR
6 ACH = 62 x6 = 372 CADR

Unfortunately, those CADR rates only apply to the highest fan setting, which is usually pretty loud and may be too loud for an office environment. I run the unit I purchased at 75% of maximum, but this reduces the airflow by half, reducing its advertised CADR by half. So, when you're looking at buying units, if you can't find the actual CFM rates, I would take the advertised CADR with a grain of salt and probably assume that when you operate the unit the CADR will be 25-50% lower than what is advertised and use that reduced number in your calculations.

## Where should I put my portable HEPA filters?

For office environments, you generally want them spread throughout the common areas to augment any centralized HVAC filtration you have. Put them in break rooms, bathrooms, focus on areas where people congregate and areas that your central HVAC may not filter as effectively.

For a bank branch, it's very similar. It'd be good to have a larger unit in the lobby area where customers wait, have some in the break room, bathrooms and consider placing one in your safety deposit box area. For teller stations, many banks now have plexiglass in place and if its installed countertop to ceiling plexiglass it's best to have the HEPAs on the teller side of the window. If it's just partial glass the placement doesn't matter as much. Another option would be to have small personal units at each station, and I'd have them on the teller side of the glass very near their workstation.

## Can a bank inquire about vaccination status?

Yes. The Equal Employment Opportunity Commission has stated that simply requesting proof of receipt of a COVID-19 vaccine is permissible under the ADA (Q&A K.3). However, asking why an employee did not receive a vaccination may elicit information about the employee's disability, which triggers a deeper inquiry under the ADA. Please see ABA's staff analysis on vaccination policies for more details.

## Can a bank require vaccinations for employees?

It appears so, even while the vaccine is under Emergency Use Authorization. Multiple legal challenges have been filed against organizations that have required the vaccine, but none have been successful. Students from Indiana University that were challenging the University's vaccine mandate were denied in federal appeals court and the Supreme Court rejected the case, leaving the lower court ruling in place. Additionally, the EEOC has stated in its Q&A document that mandatory vaccination policies are permitted under the Americans with Disabilities Act (see Q&A K.2). Please see ABA's staff analysis for more details.

## Can I reuse my mask and for how long?

In non-healthcare settings it appears perfectly fine to reuse your mask, regardless of type. The challenge healthcare workers have is that their masks commonly get contaminated with COVID and have to be decontaminated on a daily basis. There are multiple ways to do that, but many of those processes degrade the masks, causing issues with long term reuse.

For all types of masks, you should stop reusing them if they become significantly soiled, have noticeable wear or no longer create a tight fit. It does not appear that the age of a mask changes the filtration efficacy. In fact, there is a Journal of American Medical Association article that tested nine and eleven-year-old N95-type masks and saw no significant decrease in filtration ability. Additionally, the CDC states that "At this time, there is not known a maximum number of uses (donnings) the same facemask could be reused."

If you have cloth masks, the CDC recommends you wash them on a regular basis and those can be reused as long as they maintain their structural integrity. Even surgical-type masks appear to be able to reused multiple times as long, as they are well cared for, since time does not appear to degrade filtration efficiency. Finally, non-woven type masks (surgical, N95, KN95, KF94, etc.) can be used for a long time as long as they maintain a tight fit, but washing them is not recommended as it could significantly degrade their filtration efficiency. One note from the JAMA article: N95 masks generally provide 98% filtration while surgical masks with ear loops are only at 39.7% for men and 26.5% for women. At this point with the Delta variant, please do not rely on cheap surgical masks for protection.

## What about children? Are they safe returning to school?

In general, it appears children are less likely to infect others with the virus, although the data from Delta shows that this risk has very likely increased. In my opinion, with the increased infectiousness of Delta and higher viral loading present in people, it is essential that children and staff wear masks in schools to help mitigate the spread.  Without masks, it is very likely that a school will have extremely high chances of multiple outbreaks and spread.

If your school is not requiring masks, and even if they are, what I would suggest you do is to ensure that your child has a tight-fitting mask that they wear. As stated earlier, looser cloth and surgical masks do a better job protecting others than yourself, as they are better at capturing particles you exhale versus filtering out those you might inhale. Part of the reason is that the particles can go around the mask in the gaps/folds between the mask and your face more easily when you inhale than when you exhale. My nine-year-old wore cloth masks to school last year that weren't really tight fitting. This year, I'm sending her with an upgraded mask. The Lutema mask I've chosen appears to have good test data to support it, but unfortunately, neither the FDA nor National Institute for Occupational Safety and Health evaluate masks for children.

There are other options I'm exploring in case she doesn't like the Lutema on a regular basis. The main reason I like this cloth mask is the reinforcing wire around the nose that allows a tight fit and there are studies that show that filter inserts can improve overall effectiveness.

Lastly, I'm considering this mask for activities. (Although I haven't been able to find any data on how well neoprene filters, so I'm not sure about it.)

### If I'm a vaccinated parent of two unvaccinated children under age 12 who will be going to school, what is safe for me to do? How tightly should I manage my other activities, considering the risks involved of sending my children to school? Should I reduce my other risks/ exposures as much as possible?

I am a vaccinated parent of an unvaccinated nine-year-old. I've basically returned to pre-vaccine protective measures. Anytime I go indoors, I wear my N95 and I no longer eat inside restaurants. I'm counting the days until the vaccine is available for kids, which will hopefully be sometime in October, but may slide to November. I've seen too much data that vaccine efficacy against infection isn't as robust as we'd hoped. Some studies show as low as 50%, but my guess is that it's somewhere between 60% and 80%, which is still good, but not as good as it was. I also know that my healthy nine-year-old is more likely to need to go the hospital from a car crash than if she got COVID, but I'm still mitigating the risks where I can.