

## Vaccines and Immunology of COVID-19 Questions and Answers

Thank you everyone for submitting questions. We have answered the questions to the best of our ability. Please remember that we bring in the experts to give you expert advice but the views presented are our views and the views of our guests, and not the views or policies of the University of Notre Dame. The information provided is not intended to serve as, nor should be interpreted as, specific medical advice or a substitute for the advice of an individual's personal health practitioner.

### Questions and Answers

**With masks, gloves, and social distancing already enforced by weapons, how safe do you think the sport of fencing is? Wouldn't épée be the safest of the three weapons? (Arguably sabre is not safe under any circumstance, but that is a debate for another day.)**

All fencers are required to wear face masks under the regular mask... So far, we haven't seen any issues but it is a concern. Compliance (at our club, at least) has been very high

**Many classrooms have seats that are less than 6 feet apart. How does that meet the no close contact described by Dr. Fox?**

Thank you so much for this question and we apologize for the length of the answer. There are several different types of classroom configurations at the University of Notre Dame, including 'flat' rooms with traditional table arm chair desks, classrooms with fixed tables, and traditional theater type auditoriums. For an overview of the classroom configurations please consult the [HERE website](#).

In all the classrooms, faculty are at least 6 feet from students and approximately 70% allow for 6 feet of physical distancing between students. All of the 'flat' rooms have desks that are spaced at least 6 feet apart. In the rooms with the fixed tables, students are required to sit at least 6 feet apart within a row. The rows, however, are less than 6 feet apart, so the distance between students between rows is typically 5 -5 ½ feet. In auditoriums, the students sit every other row and are aligned in columns. The shortest distance between students in auditoriums is 4 ½ feet.

The University consulted both the County Health Department (Dr. Mark Fox) and the CEO/president and chief analytics officer from Rush University medical Center in Chicago, which received national attention for its effective management of COVID-19, on the seating configurations. Both Dr. Fox and the Rush University CEO endorsed the physical distancing configuration in the classrooms.

In addition Dr. Mark McCready assessed the safe occupancy of graduate student office spaces. His work indicates that for a classroom configured with standard 6 feet spacing, if the incidence of infection is below 5.5%, no one would be getting a full exposure in a 50 minute class (the incidence would have to be below 3.5% for a 75 minute class) assuming that students were not wearing masks and a cloth mask removes 90-95% of total particles, reducing the possibility of infection even more. Certainly, for smaller spaces and extended periods of time the possibility of being exposed to a droplet from another person goes up dramatically (Dr. McCready's example of watching the football game in a small apartment without masks).

So far all the contact tracing at the university has not found evidence that there is transmission occurring in classroom settings. While we can't be certain in all cases (e.g. two friends that are in the

same class) that transmission did not happen in the classroom, the more likely scenario is that transmission happened outside of the classroom, during a meal or a social situation.

**Has there been any studies about wearing the mask over the mouth and letting the nose be exposed? If droplets come out from speaking, other than sneezing, how much really comes out from just the nose?**

We could not find any studies that directly tested the amount of respiratory droplets that were emitted from the nose compared to the mouth. However, it is certain that some droplets are emitted from the nose during talking and breathing, the amount will vary depending on the type of vocalizations and whether the person is breathing through their nose. One study indicated that a typical sneeze can expel over 40,000 droplets. Another study assessed the viral load from nasal swabs compared to throat swabs (Wu et al NEJM) from 18 individuals and found that the viral loads were higher in the nose compared to the throat. As virus-infected droplets can be emitted from those nose and the protection it offers the mask wearer, it is recommended that masks cover the nose.

**Do masks protect the wearer as well as those nearby? In particular, N95's.**

Masks offer protection to the wearer and block ~91% of respiratory droplets being expelled from an individual, thus protecting others from potential infection. Surgical masks filter out large particles in the air, so protect the wearer's nose and mouth from contact with droplets, splashes and sprays and are fluid resistant, preventing many droplets to be released. N95 masks are a type of respiratory and offer more protection than a surgical mask because they filter out both large and small particles when the wearer inhales. As the name indicates, these masks are designed to block 95% of small particles. Some N95 masks have valves that release unfiltered air when the wearer exhales so these masks do not prevent the wearer from spreading the virus. Some airlines have banned these masks. Cloth masks are intended to trap droplets that are released from the wearer. Cloth masks can be made from a variety of common materials and thick densely woven cottons work well. In all cases, masks need to be worn correctly to be protective. Importantly, cloth masks should include multiple layers of fabric and not attached too tightly to the nose and mouth. Gaiters made of thin stretch knit fabrics and single layer bandanas are not recommended.

**What are the best materials and design for a mask?**

See answer above.

**This has been excellent and SO informative. Each panelist could do a whole session themselves! Thank you ALL for the work you are doing. Please make sure this session is shared far and wide.**

Thank you so much!! Please pass on the information to others. The taped sessions and associated materials will be maintained on the ThinkND website so that late registrants can access the information.

**My daughter is a Senior Mechanical Engineering major with hearing loss and wears hearing aids, so masks pose a communication issue for her in and out of the classroom, lab, etc. so a mask that is clear is ideal for her and those with hearing issues. The clear mask that David Leighton demonstrated was interesting to me. What else is being developed or is an option?**

There are a number of clear mask options I've seen in online searches, some of which have a better filtration than the foam we tested. It's the face shields that don't work (alas).

**Hello, Thank you for this insightful discussion! I have a question around the efficiency and accuracy of the PCR Test. Thank you in advance.**

The efficiency and accuracy of Polymerase Chain Reaction tests will vary depending on many factors, including what part of the virus genome is being amplified, the type of PCR test (how the amplification is measured), the type amplification (amplification from RNA or reverse transcription to DNA), the type of sample (swab versus saliva), how the sample was stored, and the technical capability of the laboratory (equipment, technicians, etc..). So it depends. That being said PCR is, in general, more sensitive than the typical antigen tests. PCR can detect viral RNA in samples from disrupted cells even when there is not intact, infectious virus. For more information, please tune in to our session on Nov. 23<sup>rd</sup> that will be all about testing.

**Has our college population impacted the incidence of COVID in SJ County?**

This is a difficult question to assess because there are many contributing factors. In August, when ND experienced an outbreak that caused us to shut down and resort to online learning, the county's metrics were upended because ND's data was now being included in the county's data. Since that time, ND has stepped up testing for on- and off-campus students, faculty and staff as well as contact tracing and efforts to prevent transmission. Per ND's dashboard, new COVID cases have been relatively low while St. Joseph County (SJC)'s new COVID cases have been steadily increasing since early September. There is little evidence to suggest that ND is having a direct impact on SJC's new cases. At the same time, other communities in the US are experiencing the gown-to-town transmission thus we should not become complacent and must remain vigilant to prevent community transmission.

**Has anyone taken the time to determine the correlation between the population density at the University and the rate of spread of COVID over the first semester??? My concern is that the second semester will be worse with the cold weather and more indoor activities...**

Population density can certainly influence the spread of infectious diseases, particularly those that are spread through respiratory droplets. There has not been sufficient evidence to indicate that there has been transmission in classroom settings. The majority of cases occurred through social settings or in the community (staff). In the winter months, it will certainly be more difficult to maintain social distancing standards because more time will be spent in doors. It will be imperative that students and staff are vigilant and maintain good public health practices (wearing masks, hand washing, and social distancing).

**What is your forecast for positive cases as the virus increase accelerates? Is our health system prepared.**

We are not particularly optimistic given the increasing trajectory of new COVID cases. Just last week, the local hospital systems were reporting to be near or at capacity. One system reported that ambulances had to be diverted for a few hours. This is very concerning. However, the hospitals have reported they are more prepared than in the early months in the pandemic. They have a greater understanding about the virus itself and effective treatments and care.

The take-home message is this: we must all work together to reduce the transmission of this virus. Practice prevention: wear your mask; wash your hands; be socially distant and avoid crowded spaces and places.

**Will the development of a COVID-19 vaccine translate into a public policy requirement to have the vaccine if in a public / crowded venue? at least for a "determined" time frame?** It is doubtful that a 'vaccine law' will be passed. There currently is not law that mandates vaccines and it is doubtful that this will occur for COVID-19. The Federal Government has limited powers to mandate that its citizenry get a vaccine. It can create ways that encourage vaccination, like imposing vaccination as a condition to get a passport. States, on the other hand, have the authority to regulate public health and have mandated vaccines in the past (e.g. smallpox). Cities too have powers to mandate vaccines.

Currently, few communities have enforceable laws for mask wearing, so it is doubtful that they would pass laws making a COVID-19 vaccine compulsory. It is possible that some school systems or Universities may require COVID-19 vaccination as they do for other vaccinations. In these circumstances, individuals can obtain exemptions for a variety of reasons (medical conditions and sometimes religion). As long as anti-discrimination laws are not violated, employers and businesses can require vaccination (e.g. "No Shirt, No Shoes, No Service").

**What "cleaning" guidelines for masks are recommended?**

Please see the [CDC website](#) for guidelines for cleaning masks.

**Why is the University inviting the same population density back to the campus during the Second Semester knowing that the current population density promotes a positive COVID spread???**

The same reasons for reopening in the fall are still relevant for the spring semester, particularly the mental health issues that are more prevalent in ages 20-29 upon isolation. There have been some outbreaks within the campus community; however, the levels are lower on campus than in the greater St. Joseph County. In addition, we have been able to control the outbreaks.

**It's funny to hear about groups of 5 when that only accounts for one point in time, when over the course of one day, many students may be involved in many groups of 5, so the overall population density is more important because it addresses the overall group behavior, which is more relevant for managing disease within a population. How is the University going to manage an accelerated rate of growth during the colder weather???**

Certainly, it will be more difficult to maintain social distancing within the winter months. The University is planning on keeping the Library Lawn open through the winter months and is working diligently to find other innovative ways to foster students to socialize out of doors in the winter months. The decision to not start the spring semester until Feb. 3<sup>rd</sup> was partly influenced by considering the weather.

**Why all the softball questions here???** Kind of weak...

Our audience is quite diverse so what might seem like a 'softball' question to you may be informative for someone else. A major goal of this series is science literacy and to correct any misconceptions that might be circulating. We are attempting to answer any question that is submitted to the best of our

ability and in consultation when necessary. There just isn't enough time on the show to answer everything live. If you submit a question, we will attempt to answer it or if you would include your contact information, we can communicate off line.

**Thanks All! David, hope you are still fencing epee.**

**I understand that wearing a mask will prevent the spread from each mask wearer to others and this alone justifies the use of masks. But Doctor Redford has opined that a mask is better than the vaccine. So what scientific evidence is there to support that or to support the theory that wearing a mask protects the wearer from others who may have corona virus?**

Masks offer protection to the wearer but because they can block ~91% of respiratory droplets being expelled from an individual, masks are most effective as a public health measure to protect the population. Surgical masks filter out large particles in the air, so protect the wearer's nose and mouth from contact with droplets, splashes and sprays. N95 masks are a type of respiratory and offer more protection than a surgical mask because they filter out both large and small particles when the wearer inhales. As the name indicates, these masks are designed to block 95% of small particles. Cloth masks are intended to trap droplets that are released from the wearer but also provide a barrier to large droplets like surgical masks. In all cases, masks need to be worn correctly to be protective. Gaiters made of thin stretch knit fabrics and single layer bandanas are not recommended.

**Also, I see people wearing a mask while driving alone in their car or while walking alone in a park. Is there any justification for such use of masks?**

It is not necessary to wear a mask while driving alone in your car. Some people may wear them so they do not forget to put their mask on when they exit the car. When alone outside it also is not necessary to wear a mask but because you may encounter another person and not be able to social distance, it is important to pull up your mask. It is important to not touch your mask if your hand may have been in contact with an infected surface.

**Just a comment for your "In the News" segment. Did you hear about the 8th grade girl (How exciting is that?) that won a science expo for her breakthrough on the COVID-19 virus. Have you looked at her research? Is it actually a viable cure?**

Thank you so much for alerting us to this inspirational story! For others that may not be aware, a Texas teen, Anika Chebrolu, won the 3M Young Scientist Challenge and \$25,000 for identifying a potential drug for COVID-19. To read more, check out this [article](#). The student performed what is called *in silico* modeling, she created a 'virtual' model of the structure of the SARS-CoV-2 SPIKE protein and then screened 682 million 'virtual' compounds to identify ones that could block the site on the protein that interacts with the ACE-2 Receptor. Blocking this interaction can block infection and is what neutralizing antibodies and the Regeneron monoclonal antibodies do, but importantly evidence is showing that drugs/antibodies that block this interaction will likely only be effective early after infection (within 7 days after exposure). In most cases *in silico* modeling is a first step and the identified compounds have to be tested in the laboratory to see if they actually block infection in culture, then the potential drugs are tested for toxicity against human cells, then proceed to testing in animal models. During drug development most potential drugs drop out of the pipeline due to problems with pharmacokinetic (PK) characteristics. PK is basically what happens to the drug in the body after the person is administered the drug. It has to be determined if the drug can get to where it needs to be (respiratory tract) and how the drug needs to be administered (oral, intravenous, intramuscular, inhalation, etc..). In addition to getting where it needs to go, the drug can't be metabolized too quickly and removed from the body too quickly. So, while Anika

Cebroly's discovery is fantastic and difficult to do, the drug is still a long way off from being developed into an effective drug.

**I greatly appreciate your taking the time to discuss masks. Any time I post a comment advocating wearing masks, I can count on getting slammed online. The posts pile up with loads of supposedly scientific studies being referenced. For example, here is one such web page cited: <https://www.rcreader.com/commentary/masks-dont-work-covid-a-review-of-science-relevant-to-covide-19-social-policy>**

**Thank you for sharing this commentary. As mentioned above, masks can only be effective if worn correctly. We did not review all of the articles discussed in the commentary, but a brief look indicates the following:**

1. One study that assessed colds in health care workers in a tertiary care hospital was not statistically valid. They randomized the health care workers into 2 groups, one that wore face masks and one that did not. Participants self-reported cold symptoms daily for 77 consecutive days. Thirty-two health care workers completed the study and only 2 colds were recorded during the time period, one in each group. The only statistically significant result was that the mask-wearing group was more likely to experience a headache and the likelihood of having high cold severity scores were with subjects living with children.
2. Another study reviewed English-language articles that evaluated the use of masks to block influenza infection. The authors concluded "There is some evidence to support the wearing of masks or respirators during illness to protect others, and public health emphasis on mask wearing during illness may help to reduce influenza virus transmission. There are fewer data to support the use of masks or respirators to prevent becoming infected. Further studies in controlled settings and studies of natural infections in healthcare and community settings are required to better define the effectiveness of face masks and respirators in preventing influenza virus transmission."
3. The third article assessed N95 masks versus surgical masks and conclude "Although N95 respirators appeared to have a protective advantage over surgical masks in laboratory settings, our meta-analysis showed that there were insufficient data to determine definitively whether N95 respirators are superior to surgical masks in protecting health care workers against transmissible acute respiratory infections in clinical settings."

This [study](#) in the LANCET, assess masks and transmission specifically for coronaviruses. The found that "Face mask use could result in a large reduction in risk of infection (n=2647; aOR 0.15, 95% CI 0.07 to 0.34, RD -14.3%, -15.9 to -10.7; low certainty), with stronger associations with N95 or similar respirators compared with disposable surgical masks or similar".

**Those advocating the use of masks need to compile a significant, easily referenced site, compiling and organizing the scientific literature. Perhaps there is one such site and I have not found it yet? If you know of such, please share it with us.**

We are sorry, we are not aware of such a website. The LANCET study referenced above is the best we have found specific to corona viruses. There are several studies that assess the utility of masks for blocking droplet emission and one can extrapolate the effectiveness of blocking infectious droplets. These studies can be complicated because emitted droplet sizes range from 0.6 $\mu$ m to 1000 $\mu$ m and different masks can block different sized droplets and different sized droplets stay in the air longer and can travel different distances (please review video about droplets versus aerosols).

**Despite the rise in COVID cases, the anti-mask push back is so strong that I fear that mask wearing will drop significantly unless the medical community can better articulate the case for mask usage.**

We agree that we need to find a way to stress the importance of mask wearing. We have fairly robust evidence demonstrating how masks prevent the transmission of COVID. On the show, Drs. McCready and Leighton conducted demonstrations to show how particulates travel while we speak with and without a mask. The results were very telling. The masks stop the vast majority of particulates. From a public health standpoint, masks are one of the MOST important prevention tools we have. Please encourage the businesses, schools, and other places you frequent to post signage that encourages (and even requires) masks. We have seen signs about town that say "No Mask, No Shirt, No Services". It is important for all of us to spread accurate information.

**I have been watching the posts you have shared with us about the Metrics with great alarm. We have been in the red zone for both the number of cases per day and also active cases per day for a long time now. This was supposed to be a guide to educators to recommend more virtual learning when we are in the red zone, and yet South Bend schools have just returned this week to in-person school, and the other school districts in our county have done the same. Notre Dame is also doing in class learning, although they have the advantage of having their own testing system. What use is this metric system if it is disregarded for the purpose for which it was created?**

**I know it is hard to decide what to close and what to allow to remain open, but right now we are not changing much and our cases are going up significantly. Isn't it time to start sending more people home to keep them from mingling? Other countries are now doing hard resets to try to bring cases down, and other countries that did longer lockdowns and far more testing are now open for business and travel. Why are we not trying that yet, especially as our hospitals are becoming too full and deaths are increasing? Why are we not testing more people who do not have symptoms? It is hard to get recommended for a test in our county even if you have been exposed to someone who tested positive.**

**I and my family are sheltering due to pre-existing conditions that make getting this disease dangerous to us, and we would like to be able to leave our homes again someday without fearing for our lives. Thank you for honestly addressing my questions.**

Your thoughts and questions are exactly at the heart of the debate. How do we effectively manage COVID (prevent transmission) while trying to maintain some semblance of normalcy? This is such a difficult time because there is little agreement about what should be done. Unfortunately, because the United States does not have a national plan, the states were forced to individually develop their own plans which in turn pushed much of the responsibilities to the county jurisdictions. As such, there is a tremendous amount of variability between the various jurisdictions.

In SJC, we have a Unified Command that is led by Robert, Einterz, Health Officer of the SJC Department of Health. Other members include Mark Fox, Deputy Health Officer, government officials, the CEOs and Medical Directors of both hospital systems. This group has been meeting multiple times a week for over 7 months. They are monitoring the data, testing sites, hospital utilization, PPE and many other metrics and situations. If you have concerns or questions, I encourage you to contact the Department of Health at <http://www.sjcindiana.com/302/Health-Department>. There is a lot of information and resources regarding COVID. We hope this information is helpful.