This Week in Virology

TWiV 1146 Clinical Update

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Vincent Racaniello: *This Week in Virology*, the podcast about viruses, the kind that make you sick.

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From *MicrobeTV*, this is *TWiV*, *This Week in Virology*, Episode 1146, recorded on September 5, 2024. I'm Vincent Racaniello, and you're listening to the podcast all about viruses. Joining me today from up in the Northeast, Daniel Griffin.

Daniel Griffin: Hello, everyone, from Maine, from Bar Habor.

VR: Bar Habor, Maine, and you don't have a bow tie. I guess you're on vacation.

DG: I'm sort of on vacation, yes. I'm up here. I'm going to be doing the keynote for the Maine Medical Association on Saturday morning. Here we are recording Thursday evening after a wonderful day of hiking in Acadia.

VR: Dan, are you going to tell them to use Paxlovid?

DG: [laughs] I think that will come up, and I think I will know the answer. All right, let's jump right into it. We've got a lot to cover today. I'm going to try not to keep this. I think our clinical updates are getting a little longer, but we'll work on that. First off, quotation: "Prejudice is a great time saver. You can form opinions without having to get the facts." This is from E.B. White, who actually was a Maine native writer, *Charlotte's Web*, among other great bits of work.

Let's jump right into it. By the way, that's a little bit tongue in cheek. We actually do not want people to use this great time saver. I think our listeners actually would like the facts much like a dragnet. Let's get into flu. The *MMWR,* "Prevention and Control of Seasonal Influenza with Vaccines: Recommendations of the Advisory Committee on Immunization Practices - United States 2024-25 Influenza Season." This is coming up, so people really want to know what are the most up-to-date recommendations. Routine annual influenza vaccination is recommended for all persons aged 6 months and older who do not have contraindications. It's going to be trivalent this year, actually, right? The B is gone.

It's going to be trivalent inactivated influenza vaccines. They're going to basically recommend that for adults aged 65 and over, they're actually going to be preferential recommendations.

Otherwise, everyone else just go ahead. It's fine, whatever's available. If you're 65 and over, they're going to recommend higher dose or adjuvanted influenza vaccines.

VR: Daniel, every year I go and they say, "Sorry, we don't have any high dose."

DG: It is crazy, right? This whole supply issue. You're like, "Well, I'm trying to do what I was told to do." Fortunately, Vincent, if none of these three vaccines is available, then just go ahead and use anything you want. It's very a soft recommendation. This sort of special also applies to solid organ transplant recipients aged 18 through 64. They're supposed to receive a high dose inactivated or adjuvanted inactivated influenza vaccine, if you can get it.

Polio, last time we talked a little bit about this. In Reuters, we can read that the WHO said that it's actually ahead of target for those polio vaccines. We heard this on Tuesday. They had inoculated about a quarter of the children under 10, part of a three-day mass campaign. The campaign was hastened after the discovery of a polio case in a Gazan baby last month. What they get is these daily eight-hour pauses in fighting in specific areas, besieged areas. We hear that so far, more than 161,000 children under 10 in the central area in the first two days of its campaign had been vaccinated compared to a projection of 150,000. A little bit, about 10% above.

Mpox, starting off with some good news. UNICEF announces emergency tender to buy Mpox vaccines. UNICEF and its partners said they're going to work together to facilitate donations from existing stockpiles in high-income countries. The tender, it's sort of a new term for me, will allow UNICEF to set up supply agreements with vaccine makers, paving the way for purchase and shipments once countries and the partners have secured financing, confirmed demand and readiness, and have regulatory requirements in place for accepting the vaccines. UNICEF said the tender is designed to not only secure immediate access, but also to expand production. We heard from Bavarian Nordic that, yes, we'll make the vaccines, but we need to know that this is going to happen so we can invest in ramping up production.

UNICEF estimates agreements up to 12 million doses through 2025 can be put in place. UNICEF, by the way, is the world's biggest vaccine buyer, procuring more than 2 billion doses each year for childhood vaccination and outbreak response across 100 countries. As mentioned, I suspect most of these orders will be filled by Bavarian Nordic, that little company up there in Denmark, maybe not so little. If one wants to help, one can actually donate to UNICEF, I'll leave in a link, or you can donate to GAVI, the Global Vaccine Alliance.

VR: Daniel, this is targeted for UNICEF countries, and who are they going to vaccinate? Do we know?

DG: If you look at the number of doses, 12 million doses, we're really talking about pretty extensive vaccination. The DRC is going to probably be the most in need. It can be pretty broad. We continue. I peeked at the emails ahead of time, it's going to come up because we're still vaccinating here in the U.S. and many parts of Europe.

All right, COVID, right into it. I've got the map up, Vincent. What is that state in yellow? Kentucky. Yes, what's happening in Kentucky? In Kentucky, 4% to 6% of all the deaths right now are due to COVID.

VR: It's higher than anywhere else, right?

DG: It really is. It really stands out. Things settled down in Puerto Rico, a little bit better in New York, we're back down to less than 2%. Really Kentucky is standing out. It's interesting. I listened to the deep dive and there's this idea that COVID, SARS-CoV-2 is just settling in. It's just another common coronavirus, but I don't know how you can look at a map and see 4% to 6% of the deaths in Kentucky due to a common coronavirus.

VR: It's premature. We need another 10 to 20 years before that happens. Yes, for sure.

DG: Yes. This is with vaccinations. This is with boosters. This is with effective antivirals. This is not so common a coronavirus. Maybe things are a little better looking at wastewater. Things look a little bit better out West, still on the rise in some other parts of the country. A lot of us are a little concerned as I'll touch on later is everyone's going back to school. We saw this a little bit, maybe in the past where you get a little bump. The surge was starting to get better. We'll see in the coming weeks if we get a little bump before we finally get a small break before the fall.

VR: I'm going to make a bold prediction, Daniel.

DG: Go for it. Go for it, Vincent.

VR: We're not going to have a winter bump. This is going to be it.

DG: Oh, this is it. It's over. This is the final wave, and it's going to go down.

VR: There'll be another one next year. I'm just predicting there's so much population immunity now we're not going to have another wave.

DG: Oh, this is interesting. We're - so our emailers, we should form a poll. I'm going to predict a lot of cases and hospitalizations and a nice rise in January. Nice in a bad way. I'm going to predict the rise, and Vincent's going to predict. As Yogi Berra once told us, what's the hardest thing to predict? The future.

All right, the next is let's discuss the open access article, “The Effect of Semaglutide on Mortality and COVID-19 Related Deaths: An Analysis from the SELECT Trial,” published in the *Journal of the American College of Cardiology*. Now we've shared before the data that patients with obesity are at an increased risk of death from multiple causes, including cardiovascular death and COVID-19.

This study, it's a really interesting study. They sought to assess the effect of semaglutide, and it says full dose 2.4 milligrams once a week, on all cause death, cardiovascular death, and non-cardiovascular death, including subcategories of death and what I particularly care about, death from COVID-19. What is semaglutide? This is Ozempic. This is sold by Novo Nordisk. It's part of this class of medications known as glucagon-like peptide 1, or GLP-1 receptor agonist. The whole idea is that it mimics the GLP-1 hormone that's released in the GI tract in response to eating, and GLP prompts the body to produce insulin, it can reduce blood sugar.

It also, we get to these higher amounts, it interacts with parts of the brain that impact appetite and that signal of, “I feel full.” This SELECT trial, and I think they'll get points from Sarah Dong, Semaglutide Effects on Cardiovascular Outcomes in Patients with Overweight or Obesity, SELECT, randomized 17,604 participants, greater than or equal to 45, with a BMI of 27 or higher, established cardiovascular disease, but no diabetes. This is really using it for obese people with cardiovascular disease. They're going to get a once weekly shot, or a placebo, and they followed them 3.3 years. This is an investment of time.

You end up with 833 deaths, majority, 58% were cardiovascular deaths, 42% were non-cardiovascular deaths, and the participants assigned to the Ozempic versus placebo had lower rates of all-cause death, about a 19% reduction. There was a 15% reduction in cardiovascular deaths, and a 23% reduction in non-cardiovascular deaths. It really focuses, as we hear, infection was the most common cause of non-cardiovascular death and occurred at a lower rate in the Ozempic versus the placebo group, 29% reduction. Really interesting. Ozempic did not reduce the chance of getting COVID-19, but if you got COVID-19, there was a reduction in related serious adverse events. Looking just at COVID, we saw a 34% reduction in COVID-19 mortality. Interesting, right?

VR: Is this because the Ozempic is treating the obesity, which is an underlying risk factor?

DG: I really wanted to know that.

VR: We don't want people to take Ozempic for COVID now, right?

DG: We don't, actually. It is crazy. We got all these people jumped on the metformin bandwagon after one study where there was one subgroup, and the placebo subgroup had a really disparate mortality than any of the other subgroups. We don't know in the study, is there some impact upon the cytokine storm? Is this an anti-inflammatory effect? Is this an obesity effect? Is there any way to tease that out? What's really interesting is over time it's really the last year that we're really seeing this pretty significant separation.

VR: I wonder why they did this study to begin with. I'm not clear. it's interesting. People who are on Ozempic obviously get the benefit, but I don't know why they would do it in the first place.

DG: I actually think it's a suspicion that this impacts the cytokine storm because we started to see a lot of folks on Ozempic, Wegovy, what's the other thing? I don't know, Zepbound, on these drugs if they had rheumatoid arthritis. Now they're like, hey, my rheumatoid arthritis is getting better. We're starting to see people with inflammatory process, hey, as we keep pointing out over and over again, it's that second week, that inflammatory cytokine storm that gets people into trouble. Let's tease this out. It's curious. I'm interested. It was pretty robust data with a nice confidence interval. Let's get a little more into the mechanism.

All right, and this is really just to answer a lot of questions. People love to send emails to, what, *MicrobeTV TWiV* or something, instead of Daniel@Microbe.com, and they also send them right to me with, can you give us some guidance? I'm just going to give some guidance here, sort of pulling it together. What about vaccines, school's starting? What about socializing? It's 2024. Dr. Griffin, I'm confused. What should I do? The easiest part here, as far as the advice goes, is getting a COVID-19 vaccine. The simple math is that getting a vaccine is

better than getting COVID-19 without the protection offered by that vaccine. There's lots of SARS-CoV-2 out there.

As we keep pointing out, vaccines don't always keep you from getting infected. That's not really what vaccines are about. They keep you from getting seriously ill. They reduce how sick you get. They reduce the complications if you get infected. Just like we talked about the flu vaccines, the most recent recommendations for COVID-19 vaccines, everyone ages 6 months and older should get a COVID-19 vaccine. I'm going to say, I'm going to just admit, not everyone is going to choose to get a vaccine for themselves or their children. It depends a little bit, the calculus.

If you're older or have health problems, then you might choose to get the COVID-19 vaccine as it helps protect you personally from getting sick, missing out on life in a short and big way as you recover from acute disease, severe disease, hospitalization, death, or even Long COVID. Many, without age or medical problems, might choose to get the vaccine as it protects them or you from getting as sick and missing out on life as you recover from acute disease, developing Long COVID, or in some cases, getting COVID and spreading it to those you spend time with. Children, this is a tough one. When it comes to children, one might just say they're going to get it anyway.

There's such an exposure. They're going to attend school. They're going to participate in sports. They're going to spend time with friends. Here, the motivation is that you might reduce how sick they end up feeling. You might reduce how much they miss out on as they recover from acute disease. We do see Long COVID in children. We might have some ability to prevent longer bad out term. The vaccine might also decrease the chances that they get COVID, spread it to their parents, their grandparents. The nice thing, I think, when it comes to these choices is we have choices. We've got the Moderna and Pfizer. They're approved for kids all the way down to 6 months.

The Novavax, which many view as a more traditional protein-based vaccine, it's approved down to 12 years of age and older. The good or bad, the vaccines may not have the durability we had hoped for, or perhaps it's the virus that keeps changing. It does seem that there is a benefit to getting a boost this fall. The advice, though, if you were recently infected in the last three months, then, wait that three months. When everyone returns to school, we'll see what happens, Vincent. Are we going to see a little bit of a bump? Are we just on the way down and this is it with COVID? We can stop doing our clinical update. What about socializing?

This is really a tough one because there's a real downside to all the isolation I've seen, particularly in our elder individuals. Avoiding social events is a way to decrease one's chance of getting COVID, but it also carries this risk of social isolation, which certainly can have very negative impacts on the same people that are most worried about COVID. While each person needs to weigh the risks, there certainly are safe ways to get out, or safer ways to get out and enjoy social activities. If there's an option for sitting or dining outdoors, this could be a safer option. One might also choose to arrive at the beginning of an event and then depart earlier, limiting one's exposure.

Then this is just a call to everyone. Think about inviting your older friends and family to venues where outdoor options, better ventilation, less crowded, and bring along an extra jacket or sweater. Let's all look out for each other here.

All right, passive vaccination, PEMGARDA. That's the prophylactic monoclonal antibody. Early phase, really nothing has changed here as per guidelines. Number one, Paxlovid. Number two, remdesivir. Number three, molnupiravir. Some cases, convalescent plasma. Then our isolation guidance.

In that second week, the early inflammatory week, just remind people repeatedly, this is the bad week. This is when people feel rotten. They get the hypoxemia that drives hospitalizations and death. Steroids, at the right time, in the right patient, at the right dose. Anticoagulation guidance, pulmonary support. Remdesivir, still in the first 10 days. Immune modulation.

As promised, most of the time today, we will spend on the late phase, PASC, or Long COVID. Two articles before we get to, I'm going to say, our article. The first article, “Effectiveness of COVID-19 Vaccines to Prevent Long COVID: Data from Norway.” This was recently published in *The Lancet Respiratory Medicine*. I have to say, this builds now on a growing number of studies. I saw one study so far that did not show this.

Here we read that this recent study used data from more than 20 million participants, showing that COVID-19 vaccines consistently prevented Long COVID symptoms in adults. The analysis was conducted against three European countries, Estonia, Spain, and the UK, and here they show further reproducibility and report results from applying the same analysis to the Norwegian limited health registries at University of Oslo covering the entire Norwegian population of approximately 5.4 million inhabitants. We have 2,364,651 vaccinated, 1,532,935 unvaccinated in Norway, interesting percent there, and they found that vaccination with any vaccine reduced the risk of Long COVID symptoms across all study cohorts, about a 36% decrease in Long COVID.

We also have the article, “Fibrin Drives Thromboinflammation and Neuropathology in COVID-19,” published in *Nature.* Life-threatening thrombotic events and neurological symptoms are prevalent in COVID-19 and are persistent in patients with Long COVID experiencing PASC. Here these investigators show that fibrin binds to the SARS-CoV-2 spike protein, forming proinflammatory blood clots that drive systemic thromboinflammation and neuropathology in COVID-19. Fibrin apparently promotes this neural inflammation and neuronal loss after infection as well as innate immune activation in the brain and lungs independently of active infection. I think that's an important point here.

This is not during that first week. This is later. Here's what I think really fascinating. This is not, go out and just grab something off the shelf and think you can make sense of this. A monoclonal antibody targeting the inflammatory fibrin domain actually provided protection from microglial activation and neuronal injury as well as from thromboinflammation in the lung after infection. Really interesting. They're suggesting that since fibrin drives inflammation and neuropathology in SARS-CoV-2 infection and fibrin targeting immunotherapy has this impact, this may represent a therapeutic intervention for patients with acute COVID-19 and maybe even Long COVID.

VR: Daniel, when does the thromboinflammation show up? In the second phase?

DG: In the second phase. This is not first week. This is not first seven days. This is after the fact.

VR: It's readily, so you can tell what it is and then that would make it amenable to treatment. Is that correct?

DG: Exactly, yes. What I think a lot of people are, like, give people aspirin, give people different anticoagulants. That's not what this is saying. This is not suggesting that. This is actually pretty exciting insight into the pathology. All right, as promised, the article, "Post-Acute Sequelae of COVID: PASC or Long COVID: An Evidence-Based Approach," published in *Open Form Infectious Diseases*. First off, the methods. I've got to read the methods. Vincent, your name's in there, you're famous.

VR: I see that.

DG: In early 2020, the director, staff, and contributors at Parasites Without Borders and *MicrobeTV,* two New York-based nonprofits, started following the clinical presentations and literature surrounding COVID-19. These observations and discussions, the literature, were initially shared on the podcast, *This Week in Virology*, and posted to the Parasites Without Borders website with links to the articles discussed. The articles for consideration on the podcast and website, and included in this review, were selected by the directors of Parasites Without Borders, Daniel Griffin, Dickson Despommier, Charles Knirsch, Vincent Racaniello, and Peter Hotez, and the directors of *MicrobeTV*, Vincent Racaniello, Daniel Griffin, Kathy Spindler, and Amy Rosenfeld. Listeners also suggested articles which are included, if the directors found them appropriate.

Little kudos to all our listeners that emailed in. Let's go through. There's a table, there's a few figures that I want to talk about. This is open access, so everyone can read this. Really, this is what I'm going to be talking about here at the Maine Medical Association. This is really geared to the clinician, really geared to the patient. I do start off with Table 1, or we start off with Table 1, Possible Mechanisms Driving Long COVID. This is all reference. We talk about the ongoing immune activation, the remnant SARS-CoV-2 RNA and protein, the dysbiosis, the endothelial dysfunction and dysfunction of the clotting system, the neuroinflammation that we just discussed, and the neural dysfunction, as well as mitochondrial dysfunction, residual damage.

This is all reference. This is all not just, these are ideas that people have, this is all the evidence. We then actually move it. Here's where we get into what can we do for clinicians? This really is, and it was really a push a little bit from *Open Forum Infectious Disease* and the reviewers. Thank you, reviewers. Let's make this accessible to clinicians, make it accessible to patients. Table 2 is Biochemical and Immunological Abnormalities. It's broken down into available for routine testing by clinicians, as well as available in research settings. We have the elevated serologies for EBV, CMV, and VZB.

We have that low serum AM cortisol without the compensatory ACTH stimulation, the anemia, the low serum iron, the lymphopenia, thrombocytopenia, the diminished serum serotonin we've talked about, the abnormal coagulation studies, low albumin levels, and a

number of others. Then we also mentioned some of the available in research setting ones. Also is a Table 3, where we, not only do we go through the physiological abnormalities and the different tests, but actually how to perform or order each one of these tests. How to perform that NASA lean test, how to do that sudomotor assessment, how to look for that exaggerated orthostatic blood pressure, and a number of others.

We then have a table where we talk about the different Long COVID clinical phenotypes. I guess, most important, perhaps, once we go through that, we talk about what can we do. Table 5, Prevention of Long COVID, talked about ways to avoid infection, talked about the importance of vaccination, some of the mixed results on Paxlovid, maybe, in certain contexts, early treatment with Paxlovid can reduce the incidence of some of the post-acute sequelae. Really solid reduction in congestive heart failure, AFib, coronary artery disease. When I see a study that says we didn't see it, a lot of times they're using softer subjective surveys.

Convalescent plasma, corticosteroids, again, not during that first week, but in the right patient at the right time. Then, individual potential therapeutics for Long COVID. These are really broken down, consider for all patients or a particular phenotype, a particular manifestation. Consider for all patients, vaccination after infection. A number of references where we actually have data showing that this can reduce symptoms, increase well-being, down-regulate systemic markers and inflammation. Melatonin for folks with sleep disturbances, ongoing inflammation. Talked several times about folks with fatigue, memory loss, impaired concentration, GI symptoms, the role of bifidobacteria-containing probiotics.

Patients without post-exertional malaise, that's where we can do cautious exercise adoption. Again, we continue to caution against pushing folks into that post-exertional malaise. Patients that might benefit from active cycle breathing, such as box breathing. Then, another list of some of the other options we might consider. Just to wrap that up, I will say, this is open access. Everyone can follow the link that we'll leave in. You can look through this.

PASC is a defined syndrome with ongoing relapsing or new conditions after documented or diagnosed infection with SARS-CoV-2 with a recognized disease code, U09.9. There are several recognized biochemical and physiological abnormalities. This is not just a diagnosis of exclusion. There are defined risk factors that increase or decrease an individual's risk. Most importantly, there are interventions that can improve this condition.

VR: Congratulations, Daniel.

DG: Nice to see that finally impressed. It's a huge work. They normally limit papers to 3,000 words. This is over 8,000. They made an exception for my verbosity. Hopefully, it's going to make a difference. I'd say thank you to all of us. This was a collective undertaking. As I've been saying, as we've been saying, no one is safe until everyone is safe. Pause the recording right here. Go to ParasitesWithoutBorders.com. Click Donate.

We are doing our Floating Doctors fundraiser, August, September, October. We're going to get up to a potential maximum donation of $20,000. I was just communicating with Ben earlier this week, Ben LaBrot, the founder of Floating Doctors, and it looks like March we're going to get our continuing medical education up and running again, so you go to the website, you can actually sign up and attend our CME down in Panama.

VR: All right, time for your questions for Daniel. You can send yours to daniel@microbe.tv. Elena writes, "I'm an internist in New York City, an avid listener. Where can I send my patients to get mpox vaccine? I've tried calling the clinics listed on the CDC site and none have the vaccine."

DG: OK, there is an mpox vaccine locator. We can leave in a link. Interesting enough is this may be the same one that you went to, where it's cdc.gov, poxvirus, mpox, vaccines, and then vaccine recommendations. The other, and this is maybe a little uncomfortable for some, but not for us in the ID community, I'll say the MSM community has been really good about spreading the word and letting people know. Reach out to one of your ID colleagues, we can reach out to some of our colleagues, and you're in New York City, so this should not be a hard thing. If you follow this link and you have problems, just send another email directly to, what is it, daniel@microbe.tv, still having trouble, we'll directly connect, and I'll help you get your patients connected to the mpox vaccine.

VR: Theodore writes, "I'm a 46-year-old under biologics, Cosentyx for plaque psoriasis. I had my monthly injection two days ago. Today I woke up with fever and body aches. The biologic is on full effect as I was boosted the day before. COVID test negative for the time being. If I get a positive result in the next five days, and taking into account that I had my immunosuppressive biologic administered recently, should I start Paxlovid? Your Athenian friend, Theodore."

DG: Yes, I think this is very straightforward. You're immunocompromised. That would qualify as high risk. I think we talked about a study last time where if you just look at high-risk people, about 5%-6% end up in the hospital. That's high enough that you really want to step in. There's no drug-drug interactions with Cosentyx. Go ahead, don't just take Paxlovid. If you test positive, then, yes, that would be completely appropriate.

VR: Clark writes, "With rapid antigen tests for SARS-CoV-2 also being used just before indoor social gatherings to reduce risk of transmission from asymptomatic carriers, are you aware of any objective data regarding the control stripes fading in intensity over time, especially given that so many originally assigned dates of expiration of the tests have been arbitrarily extended? Is there a point at which a potentially fading control stripe should encourage us to use a fresher, more recently released rapid test?"

DG: Yes, and yes, unfortunately, as we've seen over time, and I think people have probably heard shared experience on this, is those tests don't last forever. Yes, the control strip, it's a control strip to let you know that you're getting a proper reaction, you're getting that proper control line. If it is faded and you really want to know the answer here, then yes, you're going to want to use a non-expired and more up-to-date test.

VR: Laurie writes, "I'm a pediatrician at a large Bay Area practice. We have flu vaccine. We are getting COVID vaccine, but we have not heard much about RSV vaccine and RSV season is upon us soon. We have heard via our pregnant moms that the OBs want to know what we, the PDs, want to do, vaccinate the mom or wait for the baby and give Beyfortus. I think that this should not be my decision, despite my faithful attention to all things *TWiV*. We are getting lots of questions. Any updates?"

DG: All right, this is a great question. There's two ways to do this. One, is mom gets vaccinated during the last trimester. What is the data we have there? The data, this was published in *JAMA*, that the RSV vaccine given in that last trimester, 32, 37 weeks of gestation, we saw about a 60% reduction in RSV-associated lower respiratory tract illness, 82% risk of medically attended severe. What about Beyfortus? How about getting that passive? According to the CDC, that was actually about 90% effective. The first thing to say, I ran the numbers. It sounds like Beyfortus is better. This is actually going to be: have a discussion.

You do want to have a discussion with the OBs. If you can tell me, and so this is great, you're the pediatrician, that you're going to have good supply, if there's a sense in your community that the parents, and it really was good uptake to the point that we had a shortage last summer, that the parents are going to go ahead and get that option for the children, then that's great. Unfortunately, you can't go back. Certain individuals may say, hey, I'm OK getting a vaccine, but I don't want to do something for my child. That tends not to be the mainstream. What most people are doing, they're very happy to give the Beyfortus to the child.

Maybe a little hesitance from the OBs and the moms, but those are the numbers. Mom can get it in the last trimester, and you're going to have that really good reduction in severe lower respiratory disease in the little kids. Communication is important here, because you don't necessarily want to do both. I think why not? I understand a lot of folks have decided, and the recommendation is really, are you going to do one or the other?

VR: On a separate note, T-cell immunity made it to *The New York Times* crossword today, 65 across. I don't think Brianne would be happy with the clue, however.

DG: I'll have to check that out.

VR: Abdur writes, "Lots of cases of atypical mostly mycoplasma pneumonia across the world after an outbreak in France. Would love to hear your take."

DG: This is interesting. I popped in a link there, Vincent, because there was an *MMWR* back in February where mycoplasma pneumonia really was not being seen much during the early years of the pandemic, so 2020, 2021, 2022. Then we really had it come back. Interesting, it came back, and it didn't necessarily rise above pre-pandemic levels here in the U.S., but it was something we had forgotten about, and now it has come back. A lot of it has, I think, to do with transmission and a lot of the different changes in behavior. We're still seeing mycoplasm. It is back. For some context, it's a very common form of pneumonia that really, I think, is underdiagnosed.

VR: That's *TWIV* weekly clinical update with Dr. Daniel Griffin. Thank you, Daniel.

DG: Oh, thank you, and, everyone, be safe.

[00:37:51] [END OF AUDIO]