**TWiV 1324 Clinical Update**

**Host: Vincent Racaniello**

**Guest: Daniel Griffin**

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

(music)

**VR:** From *MicrobeTV*, this is *TWiV*. *This Week in Virology*, Episode 1324, recorded on May 20, 2026. I'm Vincent Racaniello, and you're listening to the podcast all *a*bout viruses. Joining me today from New York, Daniel Griffin.

**DG:** Hello, everyone.

**VR:** I'm not in New York. I'm in Corvallis, Oregon, where I am visiting--

**DG:** Oh, I know Corvallis.

**VR:** Have you been?

**DG:** I have. What are you doing? What are you doing in Corvallis?

**Vincent:** I'm visiting the Department of Microbiology at Oregon State University. I'm giving a named lectureship and recording a *TWiV* here tomorrow.

**DG:** Surprise, surprise. [laughs]

**VR:** What's the point of going somewhere if I don't record a *TWiV*, right?

**DG:** I was just thinking about how many thousands of hours of you will exist for posterity, right?

**VR:** Is that a bad thing?

**DG:** I don't think so, actually. [laughs]

**VR:** Daniel, I know what's on your tie. It's Ebola virus. I can see the shepherd's crook, and it's very timely.

**Daniel:** Yes. It's very, very timely. Let's jump in. We've got a lot to talk about. At first, I don't know, have you ever read *Arrowsmith*, Vincent?

**VR:** Oh, of course, I have. My mother used to teach it in her English class, and so I read it in high school, and I just loved it.

**DG:** It is. It's a great book. It's propaganda, right? They had the whole commission, and this

is the way doctors are supposed to be. They're not supposed to be just tradespeople. They're supposed to actually have curiosity, and be trained in science, and be adding to information and knowledge.

**VR:** That's you, right?

**DG:** I wish. I'm about as flawed as *Arrowsmith* is, if not more.

**VR:** Humans are all flawed, Daniel. Don't worry about it.

**DG:** We are. Well, along those lines, a quote from Sinclair Lewis's *Arrowsmith*, "God, give me strength not to trust in God."

[laughter]

**VR:** I like that very much. Very good.

**DG:** I like that. All right. Well, just a couple news things that somebody threw in here. They recently issued a charter for the ACIP has been withdrawn. What does ACIP stand for? That's the -

**VR:** Advisory Committee on Immunization Practices.

**DG:** Yes. This was when they decided you didn't actually have to be knowledgeable, or an expert, and they didn't follow the rules. Yes. [crosstalk] If they're going to -

**VR:** What happened was a judge in Massachusetts said, "RFK, you can't do any of this vaccine stuff. This committee is illegal." He came back with a new committee. Now, apparently, he has withdrawn this charter.

**DG:** Yes. All right. Just not since August 2024, has the Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria, big, long, multi-letter acronym, met. This meeting is scheduled for June 16 or so. We'll see what happens there. All right. A couple of things to talk about, hot off the press. Let's discuss hantavirus a little bit. People are really interested in this, and I'm glad. A couple of things. One is, sometimes we talk about articles that are written in the scientific journals. Sometimes we talk about articles that are written in the - What do we call this? Mainstream media articles?

**VR:** That's right. Mainstream media.

**DG:** Mainstream media. We have an article by, say, a friend of ours, Apoorva Mandavilli. The article, “Hantavirus Doesn't Spread Easily, but Officials May Be Downplaying Risks.” I say, that's a good title, because it really captures a lot there. It's an engaging article, and I wanted to share a few of the comments. I'm going to say there is some great input from a number of hantavirus experts in this article.

I'm going to include, and I'm going to go through, and then we'll make our comments as well. They start off with, "Close sustained contact. That, health officials have repeatedly said, is the only way that the Andes hantavirus, which caused an outbreak on a cruise ship, has ripped the world's attention spreads among people." That's it. Close sustained contact. It's the only way.

**VR:** You never should say, "Only."

**DG:** You have to be in close contact with someone who has a lot of symptoms, Dr. Jay Bhattacharya.

**VR:** I don't know where he gets that from. That's just a line.

**DG:** He's getting even more. Not only do you need close contact, but that person has to have a lot of symptoms, more than one, more than two, a lot, says Jay Bhattacharya, acting director of the Center for Disease Control and Prevention, in an interview on *Fox News*. Is *Fox News* mainstream media? I don't know.

**VR:** It's not. It's actually an entertainment channel. If it were a news channel, it would be corrected all the time.

**DG:** They'd have to actually say things that were true. Oh, my gosh, how incredibly frustrating that would be. We've discussed, and this article points out, that this is not a true or honest statement. We discussed on *TWiV* 1322, the largest outbreak characterized so far in Argentina, where Dr. Martinez and her colleagues carefully traced transmission patterns among 34 cases, 11 deaths, between November 2018 and February 2019. This went on for a little while.

The study confirmed that the virus does not spread easily. I like that. It was in the title. None of the 82 healthcare workers who cared for patients became infected, even though many of them did not wear protective gear. The researchers also identified what they called super-spreading events. I think we call them super-spreader, but super-spreading events, in which a single person spread the virus to several others.

The outbreak began after a man who became infected from rodents developed a fever, attended a birthday party with 100 guests. He was there only 90 minutes, because he was feeling ill., Dr. Martinez says.

Within three weeks of the event, five people at the party had become ill. One of those five soon died. His wife most likely passed the virus to another 10 people at his wake. All six of 34 cases in the outbreak had no direct contact with those who were ill. One seems to have become infected after simply saying, "Hello", as they crossed paths.

**VR:** That's pretty close contact, isn't it?

**DG:** It's interesting, I guess, because we think of it as they give this 15 minutes of within six feet. I'm not sure. Crossing paths on the way, he's heading from the bathroom, you're heading to the bathroom, and you maybe said, "Hello", does that count as close contact?

**VR:** No, it doesn't. I think also at this party in the 2019 outbreak, there wasn't close contact. They were in the same room.

**DG:** Yes, I'm going to go through a supplement seating map, which I don't think a lot of people have looked at. Anyway, I'm going to say.

**VR:** Also, what Bhattacharya says the virus doesn't spread unless somebody has active symptoms? There's no data for that whatsoever. He's lying.

**DG:** Yes, multiple symptoms, prolonged contact. As we talked to you, that's not close contact. It's not prolonged contact. One person in the Argentina outbreak became ill after sharing a hospital room with a hantavirus patient, but again, had no physical contact. Dr. Tedros of the WHO said his organization has not referred to the findings about the birthday party spread, because they have not been replicated in other studies. [laughs] Because close contact is the most common way the virus spreads.

Apparently, we know so much about the way the Andes hantavirus spreads. All right. Now, circle back, "The virus doesn't spread unless somebody has active symptoms," Dr. Bhattacharya said. This too is not certain, although some scientists believe people may be more contagious just as they are developing symptoms. As we discussed in *TWiV* 1322, in that outbreak, patient 2, was the most likely source for six infections in other people during the early prodromal phase, because of his, remember, this is the active social life.

This is someone who's just starting to not feel great. They hadn't started to get really sick yet. They didn't have lots of symptoms. Now, Apoorva also highlights how Dr. Bhattacharya, picking on the poor guy, did not have a full command of the facts. I like that. That's a nice way of saying that he just kept talking when he didn't know what he was talking about, but here we go.

**VR:** Good for her. I really appreciate that. Finally, she gets some bravery, and calls people out. I think that's great.

**DG:** Good job, Apoorva. Here we go. In public, some U.S. health officials have shown uncertain command of the facts of the current outbreak. Speaking about the first two people who died from the virus on *Fox News* interview, Dr. Bhattacharya incorrectly said the couple had been in their 80s. They were 70 and 69. It's not in their 80s. Then, added, "People who were very close to them, the roommates, a doctor was caring for them. They're the ones who got symptomatic." "The third person who died, an 80-year-old German woman, was not a roommate of the first two, or even on the same deck, but she may have shared meals, or been in other spaces with them," said Maria Van Kerkhove, the WHO's Director of Epidemic and Pandemic Preparedness.

He was wrong about the details when he says CDC scientists, he says they were on the ship. The CDC scientists were not on the ship to investigate the outbreak, but WHO officials who led the investigation are still working out how other passengers became infected. Andrew Nixon, a spokesman for the Department of Health and Human Services, which oversees the CDC, said, "Federal agencies had been fully engaged from the outset."

In the United States, the CDC did not issue any guidance or statements on the hantavirus outbreak until late on Friday, last Friday, and did not hold a news briefing until Saturday, nearly a month after the first passenger died. Apparently, that's right from the outset, a month later. I like the closing quotation.

**VR:** That's engagement, right?

**DG:** [chuckles] "We are learning, and we will continue to learn, I think, for quite some time," Dr. Maria Van Kerkhove, the WHO's Director of Epidemic and Pandemic Preparedness, said. The book is not written." So I like the humility.

**VR:** It is embarrassing, the lack of knowledge of Bhattacharya and his colleagues.

**DG:** It is crazy. I'm going to leave in a link again to that, “Super Spreaders and Person-to-Person Transmission,” published in the *NEJM*. They've got the nice sort of this flow chart. We have index one, then it goes to five other people, and then you've got the one person who spreads it to a whole bunch of other people, who spreads it to a whole bunch of other people.

What I like, is I also pulled from the supplement. There's a whole bunch of supplemental articles. This is this diagram where you see where were the people sitting at this birthday party, and what kind of contact was it. You've got the index patient, and this is the person. They show up. They only stay for 90 minutes, because they don't feel well. There's a patient to their right, and a patient across the table. These are people that end up, about three weeks later get symptomatic.

There's, however, another person who's behind him at another table who gets symptomatic. There's another person over with the back to this guy at a different table. That's 2.5 meters away or something. Then, this is the one that really gets me. This is close contact. The one guy, the index person, not feeling well, goes to the bathroom. They're leaving the bathroom, as this other person at a table on the other side of the room walks past them, may have said, "Hello". That's the extent.

They cross paths on the way to the restroom, but did not make any physical contact. He ends up symptomatic and gets infected. None of this is like, "Oh my gosh. Don't you worry. Needs to be 15 minutes within six feet." Yes.

**VR:** Yes. It's not close contact either. I agree. Close contact will work, but you can be in the same room sitting at close tables. The thing that's important here, I think, is that people are saying it doesn't transmit well. What does that mean? It means you can stop it by infection control procedures. It's very hard to do with COVID, because you have a lot of asymptomatic people. I think that may be the difference, although we still need to do this to work. The book is not yet written.

**DG:** No, I think that's great. We don't know that much about Andes hantavirus. I know they've done some sequencing. They haven't seen any concerning changes that would suggest an adaptation to make it more transmissible than what we've seen in the past. Yes, everyone's not the same. It's that Pareto Principle, where certain people, if they get infected, seem really good at giving it to other people. Most people don't seem so good at giving it to other people.

Yes, this whole idea that you can only get it 100% guaranteed following this six-foot 15-minute rule, that's not true. It's a little humility. All right, there's some hantavirus dashboards out there. I grabbed a few, and then some of them are not getting updated, so I'll leave a link to a couple of them. There's a nice hantavirus live dashboard. There's also really a nice CNN maps hantavirus cruise outbreak. I'll leave a link into that, where you can actually see the ship parts, and where all the different people get off in different places.

I think we do need humility here. We need honesty here. I do not think this is a case where we need to be thinking the sky is falling. I don't think this is going to be the next pandemic or anything.

Speaking of things to be concerned about, Ebola. WHO declares Ebola outbreak public health emergency. It starts off where they talk, and I'll leave a link into this, and we're going

to follow up with this with what's going on right now.

Initially, we have this issue where we have lab-confirmed cases, then we have these unusual clusters of community deaths, significant uncertainty about what's going on, but then we actually get more of an outbreak. I'll leave in a link. You can read more about that. On May 20, we're recording this on May 20, it's going to come out in a few days, so today, earlier today, Dr. Tedros gave these remarks in a media briefing where he declared this is now a public health emergency of international concern, and he made this after consulting with the ministers of health of the DRC in Uganda.

Now, he noted, this is the first time a WHO director general has declared a PHEIC, basically, Public Health Emergency of International Concern, before convening an emergency committee, which was subsequently held. The committee agreed that the situation constitutes this. In the same opening remarks, Dr. Tedros provided updated epidemiological figures stating that there have been 51 confirmed cases in DRC, including in the northern provinces of Ituri and North Kivu.

He added that Uganda has confirmed two imported cases, including one death. These are travelers from the DRC. To bring us up to, as of today, almost to 600 suspected cases, 139 suspected deaths, suggesting the true scale of the outbreak is likely larger than this due to delayed detection, and ongoing transmission prior to recognition of the epidemic. We really got caught here. This has been going on for a while, and it's only now coming to attention.

**VR:** This is a different Ebola virus than we're used to. We're used to either just Zaire or Sudan. This is a different one.

**DG:** This is a different one. That's actually really important, because we break down Ebola into different types of Ebola, but in a lot of ways, we're looking at Ebola that's not - There's Ebola Zaire, Ebola Sudan, and then there's the others. When I say by the others, I mean ones for which we do not have effective, or proven effective vaccines. We don't have those monoclonal antibodies. We don't have any therapeutics, or vaccines for this particular type of Ebola.

**VR:** Right. That's the problem here because if it were Zaire, we could use the vaccine.

**DG:** Yes. I think that's a huge issue. I was doing a talk today and saying that normally when we deal with a case like this of Ebola, there'll be the ring vaccination, right?

**VR:** Right.

**DG:** Here we have the Bundibugyo. I don't know if people can say that quickly, but the Bundibugyo virus is actually - It's different, and because of that, we're not going to be able to just jump in with our usual measures.

**VR:** Daniel, did you see that the U.S. is not allowing any Americans who are in that area to come back into the U.S?

**DG:** There was some weird fine print. It was like, "We didn't want people from these areas coming to the U.S.," but then the fine print was, "If you're a U..S citizen, you're exempted." I was like, "Well, wait." It's very confusing.

**VR:** One U.S. doctor who was there and got infected, they sent him to Germany.

**DG:** Yes.

**VR:** Also, one thing going back to the hanta case, did you hear some of the people in Nebraska, they decided they should stay longer?

**DG:** It was strange actually, because we talked initially about, they had this whole idea that you could hang out if you want at home, but if you're going to travel, please don't, but if you are.

[laughter]

Now, it sounds like people are like, "All right, I'm done with this," and like, "No, you're not." It sounds like what we're hearing publicly might be a little bit different than what's actually going on. Maybe they're taking it a little more seriously.

**VR:** The thing is with public health now, in this era, you don't know what's real and what's not anymore, because these administration officials lie.

**DG:** It is really tough, right? It's amazing.

**VR:** I think in the past, we had good transparency. People made mistakes, but there was transparency. Now, I can't trust anything that anyone says, except Daniel Griffin, of course.

**DG:** That's very kind. All right, let's talk about measles. Moving on to measles. We keep talking about the climbing number of measles. I was reading something today about how there's this issue of malaria becoming endemic in the U.S. again. Oh my gosh, right? Was measles the first? Now, we have a country with measles, with malaria. Oh my gosh. I saw this first number. I'm like, "Wait, is that the year, or is that really over 2,000 cases?"

According to John Hopkins, U.S. measles tracker, we're up to over 2,000 cases so far this year, so crazy. Basically, about another 40 cases, and we keep seeing that number climb. They're saying actually 51 new cases per the CDC just in this last May 7 to May 14.

**VR:** Last year there were 2,242, so we're going to surpass that for sure.

**DG:** We're blowing right by that at this current rate. We'll be past that by the end of the summer.

**VR:** Part of the reason is, I mean, this is a continuing outbreak, but the CDC has not made any effort to encourage people to get vaccinated. Not just encourage them, but to bring vaccinating teams into the areas, and actively vaccinate people. They've done none of that, and that is their fault that this outbreak is continuing.

**DG:** It's off the radar, right? People aren't even really talking about it.

**VR:** Yes. It's off the radar. They're trying to do that, so people don't know about this.

**DG:** I think, yes. No. It's horrible. I think if people aren't knowing about it, they aren't thinking about it, there isn't going to be that level of concern.

Let's look at COVID-19, Vincent. I'm going to have to paste this in for you in real time. Is it going to be good news, or bad news? What do you think? I've got it in front of me, so I

already know.

**VR:** I think it's good news.

**DG:** I think it's good news.

**VR:** It's only May. It's not July yet. [chuckles]

**DG:** True. True. Basically, we're at very low levels. This'll probably be up on the screen already for folks that are watching us on YouTube. I'm going to paste it right in here for you, Vincent. It's going to be like Christmas morning for you.

**VR:** I'm waiting.

**DG:** Look at that.

**VR:** I'm excited.

**DG:** Super low.

**VR:** Yes. Very low. It's lovely.

**DG:** I think we're going to get a nice break here, a nice spring break. Then, we'll have to see what happens end of summer. That tends for a while to be pretty characteristic of what we're seeing. All right. We have an interesting paper in transmission. Here we are years later. I'm glad we're still talking about transmission. I would love if we actually - I felt like we were going to update the way we talked about transmission. Never understood it.

**VR:** Never happened, did it?

**DG:** No. People lost interest, "Ah, let's go back to the old. It's not true, but it's - Let's not let the truth stand in the way." It reminds me of that. You remember what Mary Poppins, right?

**VR:** Yes.

**DG:** What is it? Confusing the issue with facts? [laughs] We're just going to stick with our droplet versus aerosol.

**VR:** Well, Daniel, the book has not been written on transmission.

**DG:** Yes. One day they're going to actually get up to speed on this. Anyway, the article, “Potential Airborne Transmission of SARS-CoV-2 through Bathroom Ventilation Ducts Associated with an Outbreak in a Residential Building in Santander, Spain, 2020,” published in *PLOS One*. I don't know if I've ever been to Santander, Spain, but here they're describing an outbreak in a multifamily residential building during a period of low community transmission. I think that helps, right?

Because there's so much going on in the community, it's hard to figure out what's going on. Here, low community transmission, and they actually reveal they saw vertical clustering of 15 cases in four homes. Now, the building's design included single interior bathrooms without windows in each home, ventilated by a shared vertical bathroom duct system.

My wife would never live here, right? She's like, "Bathrooms have to have outdoor

windows," or she's gone. Field measurements, computational fluid dynamics simulations, and multi-zone airflow modeling were performed to evaluate vertical disease transmission potential in this building. Epidemiological and genetic data combined with the field-collected data and modeling indicated that the most plausible transmission route was the bathroom vertical ventilation duct system, which facilitated movement of infectious aerosols between vertically connected homes.

There's 20 figures, there's sequencing data, there's all kinds of airflow analysis. I think, basically, at the end of the day, it's pretty clear that this was a pretty well-documented example of airborne transmission. Airborne is classically, as we talk about it with measles or TB, people who are clearly more than the six feet away. It being basically brought through the air, and then someone else is breathing it in.

**VR:** The story here is that these people lived on different floors, right? Six, five, four, three, et cetera. They got infected on different floors, and the pipes go from floor-to-floor. I think they all went to a party and they're not telling you.

**DG:** That's true. They may have lied, right? [laughs]

**VR:** How do you know that the people are not lying? That's the thing.

**DG:** That's the problem.

**VR:** Did the sequencing show that these are all common source?

**DG:** That was actually, yes. That was important, too, in this. It looked like, first off, we have this context. We have low community transmission. Not a lot of people getting it. Just these cluster, 15 cases in these four homes. Then, you do the sequencing, you say, "Yes, really pretty similar, not a lot of variation." It really looks like it was the same virus transmitted.

**VR:** I'll tell you another scenario. We have Floor 6, we have a person, and that person went to Floor 4, and had an affair with the wife. Then, the wife on Floor 4 went to Floor 3 and had an affair with the husband. That's how the virus spread. You see, they're not going to talk about that when they're asked about it. [crosstalk]

**DG:** The active social life. This is the active social life.

**VR:** That's the thing. This looks very nice, but I don't trust people to tell the truth, especially when it's all about having affairs with multiple spouses and so forth.

**DG:** Interesting. All right. OK

[laughter]

All right. Let's move on to another article. “Recent COVID-19 Vaccination and Risk of SARS-CoV-2 Transmission,” published in *JAMA Network Open*. These are the results of a prospective case ascertained household transmission study performed in New York, Tennessee, and Washington, in which the first household member with confirmed SARS-CoV-2 infections, you have a primary case participant, was identified through outpatient settings and enrolled with their household contacts from January 1, 2024 to January 31, 2025.

Participants provided demographic information, their vaccination history. After enrollment, participants were instructed to collect daily nasal swabs for 10 days regardless of symptoms. Then, they're going to do the PCR there. Now, COVID-19 vaccination history in primary case participants, and household contacts categorized as from the time of most recent vaccination, to COVID-19 in the primary case participant.

We're going to be looking at less than six months, seven to 12, greater than 12. Then, we're going to have unvaccinated as a reference group. Now, household contacts were considered infected. We've got these primary folks. We're going to talk about whether, or not they were vaccinated or not, try to figure out if that affects whether or not the household folks are going to get infected.

Household contacts were considered infected if they had at least one swab that tested positive for SARS-CoV-2. Secondary infection risk was calculated as the number of infected contacts divided by the total number of contacts. They're going to do this adjusted relative risk. Vaccine effectiveness was calculated as one minus the adjusted relative risk. This analysis includes 362 primary case participants, and we get some demographic information about them, and 763 household contacts.

SARS-CoV-2 infection was detected in 476 household contacts during follow-up, for a secondary infection rate of 62%. Really, most of the contacts are going to get sick, if you're in the same household with someone. Household contacts of primary case participants who had been vaccinated six months or less before onset. Think about this. This is the primary case. You've got COVID, but you've gone ahead and got yourself a vaccine. That person is less likely to spread it to household members. That's an adjusted relative risk of 0.57.

You're about 43% less likely. You're about half. You're about half as likely to spread it to others if you got a vaccine. I really like this because early on, people were saying, "You've got to get vaccinated, because you've got to protect other people. If you're vaccinated, then you're going to protect other people. It's not about you. It's about the public health." We always were trying to connect the dots, but here it's very black and white, "If you get vaccinated, you're protecting others."

**VR:** I think we've been saying this is likely for a long time, but we didn't have the data to show it. I think this is a good start. It makes sense that it reduces shedding. It doesn't eliminate it. It reduces it. If you get below a certain amount of shedding, then you're going to be inefficient at transmission. I think it makes a lot of sense. There's still people these days that say there's no evidence that COVID vaccination protects others, well, now we have it, right?

**DG:** Yes, and very black and white, but the interesting thing, so there's a figure, a Figure 3 that I put in, and this is a forest plot of the COVID-19 vaccine effectiveness. Again, it looks like this benefit is a six-month deal. If it's more than six months since that vaccine, then you're not able to demonstrate a statistically significant protection for others. Now, it may just be that it's starting to go down, and we need more numbers to show it, right?

**VR:** Right.

**DG:** Yes. That's probably what's happening here. Within six months, about a 40% reduction, get out to like eight to 12 months, maybe a 20%, but really clear that if you get a vaccine every six months, you are reducing the risk of spreading it to others by about half.

**VR:** Yes, I think the decline is good with time, because we know antibodies are mediating this effect most likely, and they decline, and so that makes perfect sense.

**DG:** Yes, so it's very consistent, and it's nice to have this data instead of having to connect the dots.

All right, moving on to late phase, Long COVID. In *CIDRAP*, we read, a pair of new observational studies by the same research group links early oral antiviral drug use to both a 14% lower risk of Long COVID in non-hospitalized patients with Omicron infections, and better patient-reported and functional outcomes after infection.

Let's go to the articles, shall we? The first article, "Early Phase Oral Antiviral Use in Post-COVID-19 Condition in Outpatients," was published in *JAMA Network Open.* This is this question, we've been talking about if you get antivirals, does it protect you from Long COVID? I think one of the issues with a lot of these studies is, we would think you need to really get them early. Here they're actually going to look at that.

What if you do it, you actually get it in early? Early treatment, here we have results of a prospective nationwide multi-center register-based cohort study conducted at 51 acute care hospitals across Japan during the predominance of Omicron sublineages JN.1 and KP.3. Outpatients aged 12 years or older with lab-confirmed COVID-19, symptom onset of five days or less before enrollment, and no recent anti-SARS-CoV-2 treatment were enrolled between February and October 2024 with follow-up through February 2025.

Primary outcome was PCC, post-COVID conditions, defined as persistence of one or more of five pre-specified symptoms. Exploratory outcomes included failure to return to usual health by day 84. 7,699 participants, 28.3% received antiviral drugs that was either ensitrelvir, molnupiravir, or nirmatrelvir/ritonavir. 98.7% had mild infections. 89.6% had received at least two COVID-19 vaccine doses.

Among these folks, 2,181 receiving antivirals, and they give us a breakdown of the demographics, and they give us a breakdown, as mentioned, of the vaccine doses. Participants receiving antivirals were older, and had more comorbidities. Oh, no, this isn't going to go well for us. Other baseline characteristics were similar. Lo and behold, after pre-specified adjustment, antiviral use was associated with a lower risk of post-COVID conditions, and that's an adjusted risk ratio of 0.86. That 14% reduction, and they even start to break down.

Folks that get ensitrelvir, which is used quite a bit, we see the 0.86. Molnupiravir, 0.81. We don't have a lot of folks that actually ended up with Paxlovid in Japan, so we don't get a breakdown there that is statistically significant.

Then, they also look, as mentioned, failure to return to usual health by day 84. Even better there, we're actually seeing an adjusted relative risk of 0.77. I think the big thing is that if the antivirals are going to help with post-COVID, you got to start them within the first five days. You got to start them, I think, during the time they're recommended, so early antivirals.

Also, we have the Anchor 2 results, the article, "Impact of Early Oral Antiviral Use for Outpatients with COVID-19 on Healthcare Utilization and Recovery (Anchor 2)" published in the *International Journal of Infectious Diseases.* Results from a nationwide multi-

institutional. Again, 51 acute care hospitals in Japan. Sound familiar? Here, they're going to look at participants, compare between those with, or without oral antiviral use at enrollment, ensitrelvir, nirmatrelvir, molnupiravir.

Again, they're going to look at medical re-consultation, failure to return to usual health, and work productivity, and activity impairment through day 28. Baseline characteristics were pretty comparable between the groups. They're looking at basically people who go for a re-consultation. This was lower, tended to be lower in the antiviral group, but it was not statistically significant, so adjusted risk ratio of 0.93. Antiviral use was associated with lower rates of failure to return to usual health, and that's 0.76. About 24% less likely to have issues getting back to work.

All right. Well, I will wrap us up before our emails with no one is safe until everyone is safe. We're doing our FIMRC Foundation International Medical Resource for Children fundraiser. They're in Uganda, so they're right there where the Ebola outbreak is going on, so they're doing just tremendous work. If you'll donate, we're going to double those donations, get up to a maximum donation of $10,000. Really help FIMRC do the fantastic work that they do.

**VR:** It's time for your questions for Daniel. You can send yours to Daniel@microbe.tv. Axel writes, "Due to the hantavirus outbreak onboard the MV Hondius, I got a bit interested in knowing which infection control measures that do take place in order to avoid outbreaks of infectious diseases in a healthcare setting. I'm particularly interested at times when the diagnosis is unknown, maybe even unknown if the cause is an infectious disease, like a typical *TWiP* case. It could, for instance, be a case where the patient presents with flu-like symptoms severe enough that they would seek healthcare." What do you do in the hospital, Daniel?

**DG:** Axel, this is a huge challenge. It really starts right at triage, right? It's the nurses at triage. A person comes in, I'm here, and there are certain things, "Oh, I've got a fever and a rash," right? People start thinking about, "Oh, fever and rash." Measles was always the thing we worry about. Fever and a rash, we're thinking a lot of times transmissible viral illnesses.

There are certain things where right up front that patient might be taken from a triage area, which is not a great person to have someone who's contagious, some place to have someone who's contagious. They might be moved into an isolation room. People might wear gowns and masks, and do all the rest until they clarify.

I might even get the call, "Hey, we've got the patient in the ER here. Can you come and take a look? N95 and everything while we go through that. When I was setting up the triage in an area in Uganda for FIMRC, actually, the Uganda-Kenya border area, a lot of tuberculosis. There was this triage that we tried to have happen while the person was still, again, right in the waiting area before they got into a closed space.

Weight loss, cough for more than two weeks, we would triage, get them tested for TB before we'd allow them to be. A lot of that's happening right in triage. Ideally, you're preventing them from spreading it to the other patients that are showing up for care, and trying to protect the healthcare workers.

**VR:** If someone came in without rash, but respiratory symptoms, you would do the same thing?

**DG:** It depends, actually. During the early COVID period, we were trying to do a lot of that, and everyone was wearing N95s the whole time. A little different during different times, but again, trying to take those people and not expose everyone else.

**VR:** What's the current policy in your hospital? Do the workers have to wear masks?

**DG:** Right now, we're below a level where you don't, but then when we start to see it rise above a certain threshold, and we have colors. Columbia and other hospitals have green, yellow, red. Red, everyone wears a mask, no choice. There's a yellow in certain inpatient clinical things, but not everywhere. Then, the green, which is where we are now when things get really low, and then optional.

**VR:** All right. Marshall writes, "I am a PhD virologist and an avid listener and supporter of *TWiV* since before 2020. My family has an Arctic cruise. Hopefully, hanta-free planned for the summer. We will be doing some hiking in northern Norway, and have started our tick-borne encephalitis vaccine series to be on the safe side. Unfortunately, I was late to the game on this, and we will only be able to complete two doses of the recommended three.

My question is whether you would recommend completing the third dose on schedule after we return from the trip. We're doing a third dose later if we ever return to an endemic region. Some part of me says that a longer interval between prime boost, or boost-boost is better, but I would value the input of an actual expert. Imagine that.

**DG:** [chuckles] What you're going to be able to decide, I was thinking about this, is you're going to go to Norway, and you're going to love it, and then you're going to want to go back, so you might as well finish off that vaccine schedule. They've been studied with these schedules, and I would follow the schedule. We know certain efficacy based on that, so come back from your trip, get that third dose. I guess even if you don't like Norway so much, maybe your mind will change in the future. I would still say, go ahead and complete your vaccine series, but I suspect you're going to love Norway.

**VR:** You don't want TBE.

**DG:** Yes, tick-borne. I saw that three-letter acronym. You just, boom, tick-borne encephalitis rolled right off.

**VR:** This is Marshall from Beverly, Massachusetts, "16C and overcast, where we are currently celebrating 400 years since the founding of the city that was the site of the First Naval Battle of the Revolutionary War."

**DG:** Oh, that's exciting.

**VR:** Jessica writes, "Thank you for all you do. I depend on your podcast to help keep me and my family informed and safe. I have a measles question. I've learned that I don't develop a protective antibody response from measles vaccination. I'm not sure if I'm using the correct terminology. I don't have this problem with other vaccines. Short medical history, I was born in 1986 in Canada.

I received only one dose of MMR. I received another in 2012 when moving to the U.S. for school. I needed proof of vaccination, and a blood test showed I had insufficient antibodies, and another in 2022, when blood work showed the same. At that time, I'd forgotten about

the 2012 dose, and we weren't in such a precarious measles situation. I thought nothing of it.

Our national measles nightmare," and I like the way she says that. It is a measles nightmare, "refreshed my memory, and I recently asked my provider to test me again, showing again insufficient antibodies. I received the fourth dose., will get blood worked on, but my provider couldn't tell me much about what protection I can expect, even short-lived, what kind of precautions I should take, and how this is possible. Can you help me understand any of this?"

**DG:** These are tough questions. There's a certain percent of people, and hey, you seem to be one of these people where we give them multiple MMRs, and the antibodies don't get into this zone which we consider above a certain threshold to be associated with protection. We're only looking at antibodies. We're not looking at the cellular protection. I think that you probably are getting some degree of protection. You're just not seeing the antibody responses.

This is what we tend to do. It's really - You give the fourth shot. If you don't see antibodies, just say, "OK, you're just one of these folks." People who like renal transplants, other folks, certain vaccines will even do one more than that. In your case, you got your fourth dose. I'm hoping you're getting some degree of protection from the cellular, but that's not an easy assay to access.

**VR:** There's some people who just do not respond, and we don't understand why. Ruth writes, "A coworker found this article." This is from *SF Gate.* 'Age-old Disease Hits 12-year-high in California.' " That's tuberculosis. "I haven't seen any HAN reports from the CDC, not even in the pandemic tracker from Brown University. Is TB growing in other places in the U.S.? I find this concerning, and this article doesn't have much information. Was it brought in from foreign-born individuals? This doesn't sound like the normal high-risk population, but again, not a lot of information in the article. Maybe you can find more info. I really appreciate all your dedication. You are my go-to for public health info."

**DG:** Yes. There have been a couple TB outbreaks. I think we discussed one that was in the Midwest, and there's this one out there in California. No, there have been a few of these outbreaks. Again, we're living at this time when this stuff's going on, and it's just not being discussed. They're too busy talking about the Epstein stuff and other things going on.

**VR:** Lisa writes, [chuckles] "Hello, doctors. Thank you for all you do and say. When I have friends or family ask me about vaccines, or say, for instance, that they don't want to take a medication for the rest of my life for diabetes, high blood pressure, high cholesterol, et cetera, this is what I tell them, 'If you want to go back to medieval medicine, then you must also embrace medieval morbidity and mortality. Medieval medicine, herbs, poultices, tinctures, spices, no vaccines, no pharmaceuticals, et cetera. Medieval morbidity, living with frequent birth defects, childhood fevers and illnesses, strokes, heart failure, palsies, gangrene, et cetera. Medieval mortality, high infant mortality, significant childhood mortality, much shorter lifespans.' I think idiots like RFK Jr. and his ilk have zero appreciation for modern medicine, and take so much for granted. In celebration of living now, Lisa."

**DG:** Wow. [laughs] Well put. Well put, Lisa.

**VR:** I thought that was a good way to end this one. That's *TWiV* weekly clinical update with

Dr. Daniel Griffin. Thank you, Daniel.

**DG:** Oh, thank you. Everyone, be safe.

[music]

**[00:46:05] [END OF AUDIO]**