TWiV 1330 Clinical Update

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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 1330, recorded on June 11, 2026. I'm Vincent Racaniello, and you're listening to the podcast all *a*bout viruses. Joining me today from New York, Daniel Griffin.

Daniel Griffin: Hello, everyone.

VR: Daniel, I think those are enteroviruses on your tie.

DG: It is polio. It's got the Rotary Club thing on there. I think you know this one well.

VR: I do. Spent many years with polio.

DG: How can you say this and get yourself quoted? All right, let's jump right into it. We got a lot to cover last night. Hopefully, you got some sleep there, Vincent, but not a lot of people in New York City did after some basketball team performed some kind of a miracle. It's not going to be a spoiler, I guess, by the time this drops, but what a comeback. Oh, my gosh. All right, we're going to jump into our quotation. "I've learned that people will forget what you said, people will forget what you did, but people will never forget how you made them feel." Who's that by, Vincent?

VR: It's Maya Angelou. I had tried to quote this last week, and I bungled it, so thank you for putting it there. Daniel, the thing is, how they made you feel, that can go either way, right? It could be good or bad.

DG: No, it really can. If you upset someone, they're just going to remember that and stew on it. If you made someone feel heard, if you made someone feel cared about, they're going to remember that too. It goes both ways. We're going to start off. I was thinking about that quotation after you mentioned it, but it also made me think about that quotation with this topic that we're going to spend a little time on. This is the whole issue of vaccine hesitancy, which I feel like this is the result, in a lot of ways, of a failure to communicate, to quote a great movie, *Cool Hand Luke*.

Maybe this part isn't really as covered as much in this article as it might be, but anyway, let's say. We've got this article, “Childhood Vaccine Hesitancy,” published in *The New England Journal of Medicine.* They start with this statement, "Vaccines are victims of their own success. Childhood vaccines have provided the greatest contribution to improved infant survival during the past 50 years, with 154 million deaths averted." I have to say, Vincent,

you and I have covered this, and I'm not sure this simple explanation captures the complexity here. People do say this, right? There were vaccine opponents before vaccines had this success.

VR: Yes, absolutely. I do think it's part of the problem, right? It's not the whole problem because people say, "Oh, there's no more polio. Why do I need a polio vaccine?" right? I think it is a part, but it doesn't explain the whole thing because there has been vaccine hesitancy since the first smallpox vaccine by Jenner.

DG: It took Elvis to get people on board with another vaccine. Let's go on. Now, some parents fear vaccines more than the diseases they prevent. Clearly, I've run into this. They say, often, because of widely debunked falsehoods. You'd be amazed the amount of vigor and vim. We're talking about the Knicks, right? People get really to the point of irrationally excited. Sometimes you see that same degree of intensity when you start talking about vaccines with some folks that have been immersed in this world of falsehoods.

VR: This is the thing, Daniel. These falsehoods are so infuriating because they are lies. There's no truth to them, and you have to question why people do it. It's not just a couple of people. There's a whole network of anti-vaccine activists who promulgate this nonsense. You've said before it's for them to make money. I think that's a big component, but they're hurting people.

DG: It is tough. We'll go through some of these bullet points of things, how to communicate. One of the things that's tricky, and they've really set themselves up, you could say you know these people out there, and we know who we're talking about, they get paid millions of dollars per month to go out there and promote this stuff and to basically help other people, other people actually do it, to sell vitamin alternatives and all these nutraceuticals. There's a billion, billion-dollar business out there driving the misinformation.

One of the tricky things is when you point that out, then a lot of these people have already been sort of ready to respond with, "Oh, but big pharma, billions of dollars there, you can't trust them either." Then anytime a scientist or a clinician steps in, like, "Oh, another pharmacy shill," right?

VR: This is ridiculous. Our country is a capitalist society. We have companies that make a lot of money on everything. Why pick on the pharma? They have to make money to pay for things that they do, right?

DG: It is interesting, too, because the vaccines are not - if you want to make a lot of money, that's not really where you put your energy as a big pharma company.

VR: No, in fact, a diabetes drug or something else is more lucrative because you take it all the time, but a vaccine you take once or a few times and that's it. That's not a big moneymaker.

DG: It's really interesting. I'm glad we're spending a little time here. It's counter-intuitive if you think about it. How do doctors and big pharma - they make their money off people being sick, right?

VR: Sure.

DG: People end up in the hospital because they're sick, not because they had a vaccine, and now they're not sick. Pharma sells all these antivirals and antibiotics and all these other things, but they don't sell them if you get your vaccine. It's really interesting. It's actually the health insurance companies that really want you to get vaccines because they don't want to pay for that hospitalization. They don't want to pay for that child who ends up with permanent disability from a vaccine-preventable illness, ending up with repeated visits after that.

It's really kind of, they say, "Oh, but they're hurting children, and they have this immunity." It's interesting that they want to actually negatively affect their big bottom line, which is selling all the other drugs when you actually do get the vaccine-preventable illness, right?

VR: It's interesting. If everyone were perfectly healthy, then you wouldn't have a job, Daniel.

DG: That's true. I'd have a different job. I'd still find a job, Vincent. I still would have to work.

VR: You'd have some other job. Maybe you could race sailboats or something.

DG: Yes, or go back to that moving company. I enjoyed that. I really wanted to be a plumber. If it wasn't for all you sick people, I'd be retired now, successful plumber.

VR: They make a lot of money as a plumber.

DG: Yes.

VR: You've had the plumber come to your house and get that bill, right?

DG: Yes. No, it's funny. There's a joke about the guy complains about how much something costs. The guy's like, "I don't even pay my doctor that much." He goes, "Well, next time you have a plumbing issue, call your doctor."

[laughter]

VR: Right? That's good.

DG: All right, so let's keep going. As we were starting to say, you got all this disinformation out there, all these falsehoods. They've been debunked. They've been looked at. They've been studied. Now, the science is abundantly clear, and they point this out. The benefits of vaccines far outweigh the potential risk. Someone says, "Oh, but I'm worried about the development, the neurodevelopment of my child. I want to wait to do this." We've looked at that, and there is no risk. Your child is not going to develop autism from a vaccine. That was made up. Wakefield, finally, they find out he got paid, what, $800,000 by some company to basically falsify, do that. That's a falsehood that's out there. It's propagated, but it's not true.

You risk, as you delay. You risk your child actually getting, as we're now seeing, measles and some of these other things. They're going to go through, and they're going to give us, I'm going to say, six helpful bullet points. I think they are. The first one, I want people to digest a little. They point out that vaccine hesitancy exists on a spectrum. Most parents who are hesitant want to protect their children, but often have safety concerns.

VR: I think that's fine, but when you have safety concerns, don't go online and believe the

wrong person. Talk to your doctor. They're there to help you, right?

DG: I think that's the issue, is you've got to have a conversation. One is don't go online because we know who's out there, who's filling that vacuum. The other is as a clinician, and this could be a nurse, this could be a nurse practitioner, a PA, a DO, an MD, et cetera, any caregiver, you have to listen because the vaccine hesitancy, as they point out, exists on a spectrum. Until you listen, and it's going to take time, until you understand the concerns of the parents or the patient, you don't know where this dialogue needs to go. You got to listen. That's number one.

Now, the other is, and I think it's important that this is out there, repeated from what was said before, "Vaccines included in the routine childhood schedule recommended by the American Academy of Pediatrics have dramatically decreased the incidence of disease and have a strong safety record." I like the way they point out a strong safety record, because as we have covered and we've said, nothing is 100% safe. This is a risk-benefit. You're saying, "If my child gets measles, they end up with a 20% likelihood that they end up in the hospital. They might end up dying. They might end up with permanent brain damage."

We've talked about the fact that they may have a fever and they may have a seizure, which is frightening. These are not innocuous things, and it's important to have the conversation. Strong safety record is really a good way to word this. This is really a call to action. Clinicians do remain the most trusted influence on parental vaccine decisions. A strong, confident recommendation from a trusted clinician is highly associated with vaccine uptake. I know a lot of doctors, they just don't want to have these conversations, "Oh my gosh, another one of these conversations." You got to have them, because this is how you protect our patients, how you protect the children.

VR: What gets me is when the doctor says, "You could have this vaccine if you want." No. You say, "You should get this vaccine because the disease that it prevents does this and can affect you in this way." You got to be firm. Don't be wishy-washy.

DG: That's their next comment, is presumptive vaccine recommendations. You go ahead and you say, "All right, Sarah's due for three vaccines today," and then you follow this by a respectful engagement if concerns arise. You don't say, "Hey, what do you think about vaccinating Sarah today?"

VR: "What do you think about an appendectomy today? What do you think about a kidney removal?" That's ridiculous.

(laughter)

DG: It is odd that we approach it as if this isn't a really important thing and a bad decision to leave your child vulnerable. We got the decision afterwards, "I'm sorry I soft-pedaled that. Your child now has permanent brain damage. Your child now has hearing issues. They've lost their vision because we didn't give them a vaccination." The other, and this is the quotation one, empathy-based, patient-centered communication, including motivational interviewing. Build trust, address misinformation, and support informed decision-making.

VR: If the patient comes to you and says, "Oh, I read online that this vaccine can do this." You can't say, "Well, I don't know about that." You need to be up on it. I'm sorry, you're going to have to do some extra work.

DG: That is a challenge. We'll have to talk about maybe we can do more education. There's a lot of stuff up there. Just to finish this off, and then go down, maintaining rapport matters, even if the vaccination's declined. You want to keep having these conversations. It is tough. I'm not sure that a lot of clinicians are as educated on the talking points as some of the anti-vaccine folks are. They've got their list. What are some of the things they talk about? They talk about placebo-controlled trials. That's a big one. "None of the current vaccines have been in placebo-controlled trials. That's all. I'm just waiting for that," right?

How many doctors actually know, how many pediatricians know, how many of us are aware? Polio, oh my gosh, placebo-controlled trial. Oh my gosh, that they actually did that. People were not happy that they actually did that when they felt so confident in the vaccines. Originally measles, mumps, rubellas, before they put them together and said, "Let's just do this all at once instead of separate placebo-controlled trials." Even these placebo-controlled trials, the standards they talk about with saline, which apparently is what they claim, there's a lot of placebo-controlled trials out there.

What's tough is having that conversation about if you have something that's safe and effective, do you then withhold that from somebody. Do you repeat that because, "Now that we're giving all three, we're going to expose people to measles." They do give a couple tables. Table Number 2. I won't go through all this, but I am going to actually leave in a link and recommend that people do this. They really give like, "These are the steps for speaking. These are the examples. Share your knowledge. Make sure you ask for their concerns. Make sure you point out that these are bad."

We're going to talk about what's going on with measles. Measles is not like a funny *Brady Bunch*, "Oh, we all got measles, and isn't it great?" Back when we had 150,000 cases a year, we had over 100 children dying every year of measles. We had thousands of kids ending up in the hospital. It was not funny. I will leave in a link. Recent poll from Harvard. We read, “One year into new leadership of the U.S. public health system trust in the CDC and other federal health institutions has dropped dramatically. Only 50% of the public say they now trust health recommendations from the CDC compared to 77% in spring 2025."

VR: Are we surprised, Daniel?

DG: No. Now that we realize that, as opposed to professional organizations like the American Academy of Pediatrics or the ID Society of America or some of these others, CDC is under political control, these political appointees.

VR: Unfortunately, there are a lot of good CDC scientists still there, but they're under the control of people who don't know any science. The ACIP, when it existed, was full of non-vaccine-appropriate people.

DG: It's really tough. No, there are tremendous people. Hats off to all the people that are still at the CDC, still doing great work. What a tough dynamic to be sitting in this political quagmire.

Next, we've got, ”Rotavirus Vaccine Coverage and Potential Barriers among U.S. Children Born from 2007 to 2024.” Here, this is the American Academy of Pediatrics. Researchers examined data on children enrolled in the New Vaccine Surveillance Network - got an acronym there- December 2014 to August 2024 to understand the factors that prevented rotavirus vaccination. They discovered several obstacles to vaccination, including premature

birth, admission to the neonatal ICU, the NICU.

Many NICU babies age out of eligibility. These kids are high vulnerability, but they often end up in the NICU during this eligibility period. The study included 24,755 children born on or after January 1, 2007, enrolled in this network. Infants who received the diphtheria, tetanus, and pertussis, the DTaP vaccine, 15 weeks or later after birth, those born soon after the introduction of the rotavirus vaccine, and those in families without health insurance were less likely to be vaccinated against rotavirus.

As they point out, significant damage has been done to trusted vaccinations by the anti-vaccine agenda of the current HHS leadership, with dramatic increases in vaccine-preventable diseases such as measles, pertussis. Rotavirus may not be far behind. Currently, ACIP recommends that infants receive the first dose no later than 14 weeks and 16 days, and after the baby leaves the NICU. You can get it right after the NICU. You're not really aging out. I think they're missing that.

Now, this is another disaster, Vincent. Welcome to disasters. Screwworm. After months of warnings and increased activity in neighboring Mexican states, the New World screwworm, (NWS), has been detected in a three-week-old calf in Zavala County, Texas, near the U.S.-Mexican border. Since 2024, Mexico has documented a rise in both animal and human cases. Mexico has confirmed 27,449 cases of screwworm in animals since November 2024. As many as 2,000 currently active. As of February this year, 141. Now, we have some updates on this. This is one of those constantly evolving. I put some photos in. What do you think of those photos, Vincent?

VR: Pretty creepy.

DG: Right? The fly doesn't look so bad.

VR: The fly is fine, but that worm with those little fangs.

DG: Oh, my gosh.

VR: Daniel, they had almost eradicated screwworm, right? What happened?

DG: In the 1960s, actually, it was considered eliminated from the United States. This took a lot of work. A lot of things were present in the U.S. Malaria was present here. Measles was present here. Screwworm was present here. There was a different world. There really was a tremendous public health effort. Here it was these irradiated mosquitoes. Initially, they got rid of screwworm from the U.S., pushed it to the Mexican border. Then they pushed it all the way south to the Darién Gap. We maintained that. It was a certain amount of money you would invest per month, releasing these irradiated, sterile male flies. Then things started to fall apart.

I feel like we were some of the first people to start discussing cases of screwworm in dogs and animals in Panama, right? We're starting to see that, floating doctors, clinics. Now what's going on? That fell apart. The surveillance wasn't what it needed to be. The mosquito releases weren't what they needed to be. We had animals moving through the Darién Gap because of the migration issues.

Now, from the USDA, we have the internet posts. It's an internet post. "USDA confirms

presence of New World screwworm in the United States. The U.S. Department of Agriculture's Animal and Plant Health Inspection Service confirmed the detection of a New World screwworm in a bovine in Zavala County, Texas." They go on and talk about how the affected animal is a three-week-old calf, and larvae were confirmed in its umbilical area. They say, to date, there have been no other further detections, but don't worry, we're going to give you an update.

Now, all models showed New World screwworm entered the country in 2025. Then-- I love this. "However, thanks to the hard work across the entire Trump administration and our industry, state, and local partners, we are able to buy time for this moment. Protecting our livestock industry is a national security issue of the utmost importance, and USDA is wasting no time in taking action," said Dudley Hoskins, Under Secretary of Marketing and Regulatory Programs. "USDA invested heavily in the tools needed to eliminate New World screwworm ever since cases started increasing in Central America and Mexico. The United States has defeated this pest before and will do it again."

Well, it gets worse and likely will keep getting worse. Welcome back to measles, polio, maybe malaria, and now, yes, screwworm. The USDA confirmed New World in a dog in New Mexico. Texas has had three more detections in a goat and two calves. So far, the U.S. has had six detections just in the past week. We can read a lot about this in *CIDRAP*. I'm going to leave in a link. Two calves, goat, dog. As mentioned, we're up to over 100 folks down in Mexico, 27,449 cases of screwworm. It's back.

VR: Yes, and under this administration, it's not going to be pushed back for a while.

DG: No, but the marketing people said they're doing a great job.

VR: That's what you want to hear, marketing people.

DG: Isn't that crazy? "Let's get a quote from our marketing people." We're going to bounce around a little bit. “Frequency and Persistence of Post-acute Symptoms of Chikungunya, Dengue, Zika, and Malaria in Travelers: A Prospective Multicenter Study.” I threw this in because I think a lot of our listeners are aware about the fact that you don't just get something acute. A lot of times, you have an acute issue, and then you continue to have issues.

This was an observational study that examined the long-term impact of travel-associated vector-borne diseases. It was conducted in sites in Europe, North America, Asia from January 2016 until April 2021. U.S. and European researchers looked at symptoms in patients with confirmed cases of chikungunya, dengue, Zika, and malaria, one, three, six, 12, and 18 months. Now, while most symptoms resolve six months after infection, it's quite a while, of the 273 patients in the study, 13% had chikungunya, 40% dengue, 7% Zika, 40% had falciparum malaria.

A month after a chikungunya infection, 86% of patients still experiencing lingering symptoms, arthritis, joint muscle stiffness. By the sixth month, more than half of these patients said their symptoms improved. By 18 months, all patients had recovered. Following a dengue infection, 71% had persistent fatigue and muscle and bone aches after a month. A year later, 5% of patients experienced symptoms. Symptoms all resolved at 18 months. A month after Zika, 84% of patients still experiencing symptoms such as headaches, joint stiffness. Six months, 37% of participants still with issues. Then, two patients with Zika still

had issues at the end of 18 months.

VR: Long Zika, long chikungunya, long dengue, basically, right?

DG: Yes, it is. What is this? *The Journal of Tropical Medicine*. Where is this published?

VR: Yes, *JTM*.

DG: All right, Ebola. Not good when it comes to Ebola. We've got updates, but as I like to point out, a lot of the concern we have here is how accurate are these updates because a lot of articles about going it alone, we missed the participation of our colleagues from the USA with the testing and the surveillance, and a lot of the other support that used to be provided. DRC, and this was an update as of June 8, 598 confirmed cases in the DRC, 115 confirmed deaths; in Uganda, 19 confirmed cases, two confirmed deaths. I'm going to give folks, in the end, some updates from on the ground from FIMRC in Uganda. What are we thinking is going to happen?

They did some modeling. The CDC *MMWR*, we have modeled scenario projections for the Ebola disease outbreak caused by Bundibugyo virus, 2026. Now, recap for folks. On May 15, 2026, the ministries of health in the DRC and Uganda declared outbreaks of Bundibugyo virus disease, a type of Ebola disease. I'm going to just insert right here. Now, unfortunately, and this goes back to what I was talking about with the U.S. not being involved, they initially started having suspicions actually in mid-April. They sent those samples to a particular lab. That lab had a machine and an assay that could not test for the Bundibugyo virus. It only tests for the Sudan and the Zaire. They finally got those, and they realized that, no, those tests from mid-April were positive.

VR: I interviewed a scientist this past Sunday at ASM in Washington, and he said that's why they would tell these people, "You have Lassa, go home," and they actually had Ebola. It's a big problem.

DG: Yes. If you don't have an accurate test, I mean, the clinicians were thinking like, "Hey, this is concerning. We're having these cases that appear, and then the test comes back negative." Well, yes. OK. Let's keep going. In response to reports of high numbers of suspected cases and deaths in these outbreaks, CDC simulated scenario projections to understand possible future morbidity and mortality. A branching process model was used, and they're basically going to look at three putative-cumulative death counts and projected for four possible intervention scenarios ranging from poor, 20%, to extremely high, 95% levels of isolation and treatment of symptomatic persons.

Probably going to end up somewhere in between, but here is the model. The analysis suggested a plausible spillover event. They say in mid to late February 2026, and I think that now is making more sense as we're learning more, with poor isolation levels of patients, this is the 20%. The likelihood of an outbreak that exceeds 20,000 cases within three months is 65%, so most likely. If, however, a high proportion of patients were to enter isolation, this is 70%, only one in 20 chance is projected for an outbreak with greater than 10,000 cases.

I thought it would be helpful to run through these scenarios and the variables. Worst case, right? We're seeing greater than 20,000 cases. The best-case scenario, let's take a look here. They start off with a bunch of variables that they're going to plug in. The first is how many deaths have actually occurred so far, and is it 50, is it 100, is it 200? Well, we already know

that that number is over 100 and confirmed over 100, so the deaths you're going to plug in are going to put us in not a great place. This is open access, so everyone can look at these different things.

Number one is starting off with Bundibugyo virus deaths. The other is how well are we doing at actually detecting these cases and how well are we doing at isolating these folks. You'd see all these different scenarios.

VR: My guest said it could go for another two to three years.

DG: Unfortunately, that's really what this is looking like based on the fact that we already have over 100 confirmed cases, which means the actual number is higher because that means to confirm, you have to get that positive test.

VR: It's probably over 1,000 cases easily.

DG: Yes. I think that's true. Now, I don't know if this is good or bad. If it was more of a risk to the U.S. population, maybe that would get us to motivate more. We're doing this. It's really interesting, and I'm going to get political, warn people here, #political. A lot of people that voted for the current administration had this idea that, oh, all these draconian lockdowns and compromises on personal freedom, you can't have that. Look what we're doing, all these travel restrictions. If you're a U.S. citizen that's in harm's way trying to make a difference, and you get sick, we spent millions of dollars on the state-of-the-art treatment centers. You stay. You stay in Africa. You can't come home and get treated.

VR: Completely inconsistent.

DG: We'll talk about with hantavirus, like, "Oh, you can do whatever you want. You can fly around in your private jet," and then next, we find out, "Oh my gosh, what's actually really going on?" It's people lock and key with troopers outside their front door. *MMWR*, “Assessment of Risk to the U.S. Population from the Ebola Disease Outbreak Caused by Bundibugyo Virus 2026.” I don't think there's a lot of disagreement on this.

The analysis uses standardized risk assessment approach that included epidemiological data from the ongoing outbreak, historical data from previous Ebola outbreaks. The overall risk was determined by taking into account independent assessments of the likelihood of infection, the impact of infection. The assessment found that the overall risk to the U.S. population posed by the current outbreak during the next three months is low. We're not really expecting this to become a problem in the United States.

VR: No. In fact, the last outbreak in Western Africa, 2015, there were no travel restrictions because the likelihood of bringing it elsewhere is very, very low.

DG: In those cases, if you got sick, you were treated in state-of-the-art places. We had people in the U.S. getting treated. We do think the risk to populations outside Africa and the U.S. is low based on several features of this disease. I'm leaving a link to the CDC that gives us a little bit of information. As we've talked about, there's not always much trust, but you can trust this. They talk about transmission. This is from the CDC. "From an initial spillover event, the virus could spread from person to person. A person becomes infected when their broken skin or mucus membranes in the eyes, nose, or mouth come in contact with blood or body fluids from a person-" and I underline this, "-who is sick or has died from Ebola

disease."

We really have not seen this presymptomatic or asymptomatic transmission. The body fluids include urine, saliva, sweat, feces, vomit, breast milk, and amniotic fluid. My daughter, she's a PICU nurse, and she went to donate blood. "Have you been in contact with body fluids including--" she's like, "Oh my gosh, I'm a PICU nurse. How do I answer this?" All right, objects contaminated. In this context, maybe that's not so funny, right? We really need to protect these healthcare workers, right? Because you can actually end up getting urine or other things, particularly the nurses' aides and the people in there trying to take care of these folks.

VR: Well, that's what my guest said. He said, "You have people coming in, they don't know what's wrong with them, they transmit to the healthcare staff, and then they lose healthcare people. They don't have enough to begin with, and you pull them out of circulation. It gets worse."

DG: That actually has been a huge problem. That was a problem in the early days of COVID. That was a huge problem in the last big Ebola outbreak in West Africa, is you lose a lot of healthcare workers because you don't know when the person shows up. They show up, they're sick, they've got a fever, they vomit, next thing you know, it's in your face. Objects contaminated with body fluids from a person who is sick or has died from Ebola, and this could be clothes, bedding, needles, medical equipment, infected animals like bats, primates, or forest antelopes. They can spread from hunting, handling, or eating infected animals. Semen from a person who's recovered from Ebola disease. I think we've talked - this could be transmitted sexually.

Ebola doesn't spread the same as respiratory viruses: flu, COVID-19. Incubation period, it's important to know. It's fortunately a little shorter than that 42-day hantavirus. Symptoms of Ebola may appear two to 21 days after contact. 21 days, you can say, "Clocking out." On average, it's usually eight to 10 days after exposure. These are the symptoms. Maybe this will help folks out there. At first, it's pretty nonspecific. They talk about dry symptoms followed by wet symptoms. What are dry symptoms, what are wet? You think about it, right? Let's think about it, but I'll actually go through.

Dry symptoms would be fever, aches and pains, headache, weakness, fatigue, sore throat, right? Then you get the wet symptoms. They say loss of appetite, but then you get into the real wet ones, unexplained bleeding, nausea with vomiting, diarrhea, abdominal pain. Initially, it could be anything, right? I got a fever, headache, I feel crummy, it could be anything. Unfortunately, even the wet symptoms, I don't feel well, I've got abdominal pain, I got loose stools. It could be a lot of things. You need a test. The only way to sort this out.

Little updates on hantavirus. Not everyone is out of quarantine. There's still folks that are waiting out those 42 days. We have a couple of articles here. First one is in *CNN Health* by Brenda Goodman. “Some Hantavirus-exposed Cruise Ship Passengers Return Home to Finish Quarantine.” Five passengers have been released from the National Quarantine Unit, which is overseen by the University of Nebraska Medical Center. Thirteen others remain in the unit, although some will leave in the coming weeks to complete their monitoring at home.

These people remain symptom-free, have met the criteria established by public health officials to safely continue monitoring at home. Sixth passenger was supposed to leave the quarantine unit on Monday, but their state had not agreed to the federal government's

requirements, so they're staying there. Maybe that's been updated by now.

Now, two passengers return to New York. Apparently, they're right there by The Incubator, Vincent. I'm joking. They agreed to full-time monitoring. One passenger who asked not to be named for fear his family might be harassed told CNN that he was taken home in a chartered plane with two pilots, three medical staff, and he said he was told that a state trooper was posted outside his residence in an unmarked vehicle.

VR: Crazy stuff.

DG: Another sort of treatment article, “Use of Tocilizumab,” toci, “for Severe Hantavirus Pulmonary Syndrome: A MEURI Case Series with Contextual Comparisons.” That's M-E-U-R-I. This is really a descriptive case series from Argentina, folks with lab-confirmed hantavirus. This is the right one. This is the South American Andes virus. Ten met eligibility criteria for getting toci. Five got toci. Five did not. In the five eligible non-treated patients, two were diagnosed when they're already in refractory shock, precluding timely administration.

Three did not receive toci because the drug was unavailable. Four of the five toci-treated patients survived to ICU discharge. The fifth treated patient died after rapid progression to refractory shock. All five eligible non-treated patients died. There's a lot of the whole we call immortality or bias where they didn't get it because they were already on their way to dying. Just sort of an interesting, but I'm not sure I know much from this about the impact.

All right. Measles, not good, Vincent. The number keeps going up. We're up to 2,132 from 2,077 last week if you look at the Hopkins tracker. You could also see, we got that big thing going on in South Carolina, North Carolina, but we got a lot of activity in Utah. Continue to see, even if you look at the CDC, over 2,000 by the CDC. In Canada, another 11 new cases. We're up to 1,063. There's an article because things do seem to be getting bad out there in Utah. This is, unfortunately, behind a paywall, so you got to subscribe. The article, “Anguished Parents, Crying Doctors: Life Amid Utah's Measles Outbreak” in *WIRED*. There's even an audio. You could listen to it, give some human perspective on this.

Not only is the article really good, there's really a lot of anger in the comment section, really regarding the impact on people with babies too young to get vaccinated or those with immune issues who are upset that now they're not safe in this country anymore. People are upset.

VR: Should be.

DG: They really should be.

VR: It should be preventable.

DG: It's really interesting. The anti-vax community can be really angry, but now we're starting to see the other side getting really angry, basically being like, "My children are not safe. My friends, my family, they're not safe. You're making this country unsafe." Here's one that I think is really critical. Maybe these are numbers for people that just have at the top of their mind when they have these vaccine discussions, when someone's like, "Oh, I don't know, I want to wait before I vaccinate my child," and saying, "If you wait, you're taking a really big risk, basically based on some fear that someone put out there falsely."

What happens when, here it is, 2026, 2025, United States, current world, what happens if your child get measles? That whole myth like, "Oh, people used to have problems. That's because they're in sub-Saharan Africa. They didn't have a good diet. They weren't healthy. What happens when a healthy kid in the U.S. gets measles?"

Here we have, from the *MMWR*, "Characteristics of Patients Hospitalized with Measles During an Outbreak - West Texas, January through March 2025," well, familiar with this. During January 20 through March 18, 2025, a total of 325 confirmed measles cases were reported. 18.5%, so about that 20% ended up in the hospital. The majority, so over 90%, were less than 18 years of age. You ready for this? 89% had no underlying medical conditions. These are perfectly healthy little kids get measles, 20% end up in the hospital. None of these had documented vaccination with the MMR, none. None of these kids were fully vaccinated.

Over 70% ended up with pneumonia, 46% ended up with dehydration, 2% with hepatitis, 2% with febrile seizures. I talked about the fact that "Oh, you get the MMR, you might have a febrile seizure." Well, this is a much higher incidence. 70% of these kids could not breathe and required supplemental oxygen. 7% ended up in the ICU. 4% required intubation and mechanical ventilation, and 2% mortality.

VR: It's a serious disease, right?

DG: Maybe it was a different conversation 10 years ago when measles was not in this country. You could say, "All right, well, measles really isn't here." Maybe there was an argument here, but that's also why it's back, because people decided not to get vaccinated. It's back, so time to get vaccinated. Time to vaccinate your kids before - Oh, my gosh, those kids who died, that's permanent. All these kids who ended up in the hospital and all these other issues. We haven't even seen it. We know that the risk of death is going to go up for the next year, for the next two years, for the next three years. Then, even six years from now, you could end up having neurological issues.

Most of our respiratory stuff is a little bit quiet, but we're going to talk a little bit about another article on RSV. I have to say, maybe this was just a matter of time. The article, "Real-world Emergence of Nirsevimab Resistance in Breakthrough Infections with Respiratory Syncytial Virus-B: A Multicentre Observational Study in France," published in *The Lancet Microbe*. Here we've got a multi-center national observational study conducted in hospital (inpatients and outpatients) across France, 2024-2025 RSV season. Among 1,023 RSV-infected infants, 84% had full-length RSV genome sequences, 48.8% from nirsevimab-treated breakthrough infections. They break that down 50.6% RSV-A, 49.4% RSV-B, 51% from nirsevimab-naïve infants. Then they break that down as well.

Resistance-associated substitutions (RASs) were identified in two of 195 RSV breakthrough infections and 23 of 184 RSV-B breakthrough infections. 1% for the A, 12.5% for the RSV-B. Then they actually go into the actual, the FK-209E, and the intermediate resistance. Then, a lot of diversity in the RSV-B resistance. They go through all the alphabet soup our listeners are probably familiar with, right?

VR: Yes.

DG: Unfortunately, as they point out, as we're seeing here, resistance to nirsevimab in RSV can emerge in real-world settings, affecting around 12% of breakthrough infections. They

didn't see any of these in the nirsevimab-naïve infants. What are your thoughts there, Vincent?

VR: I don't know. I'm wondering if these are propagating in the population and going to cause a problem. You see it in the recipients, right? Does it have a clinical impact?

DG: Yes, I think that that's a big thing, right?

VR: Yes.

DG: Is this just going to be a background thing, like you have this pressure, these are the ones that make you sick, let's say, but are you getting onward transmission? That's really a big thing because this might not be a problem because there's not 100% these monoclonal antibodies. We expect that there might be this selective pressure. Like we saw with baloxavir, you get these resistance things, but you don't get onward transmission, so it's really not a problem. I think that's a really important distinction to make.

VR: I think if you start seeing similar mutations in different infants, then you'd start to get concerned, right?

DG: Or if you saw them in the nirsevimab-naïve, right?

VR: Yes, that's right.

DG: Then you'd start, yes, because if you saw that signal, then you're like, "Oh, that's a change."

VR: Yes.

DG: Or if that keeps going up, or we start to have more failure with the monoclonal. COVID, look at that. Look at our multicolored- I'm happy, Vincent.

VR: Still going down, yes, it's good.

DG: Still going down, and we're in June.

VR: We're in June. We're coming up on July. Look, last year, Daniel, June 29, we had rising levels. In the next two weeks, we'll see.

DG: Yes, fingers - There is that sort of, if you get below a certain threshold, maybe. I don't know. Well, we'll see. We talked about this before. We actually talked about the study, but now we've got the FDA-approved, oral antiviral agent, ensitrelvir (Xocova) to prevent COVID-19 onward transmission. You're in the house. Someone else has got it. Now there's this product. This was based on, as we talked about, the SCORPIO-PEP trial, where basically you drop your risk in half of getting COVID from that person in the home who's got COVID, who's coughing and sneezing and breathing and singing on you.

We have a rule, right? No choir singing if you've got COVID in the house.

VR: [chuckles] It's good.

DG: We also have the open-access study. This is interesting. “SARS-CoV-2 Viral Shedding and Vaccination-modified Effects of Oral Antivirals in Older COVID-19 Patients: A Retrospective

Cohort Study in Hong Kong," in the *International Journal of Infectious Diseases*. Here, these investigators report that they analyzed viral burden using cycle threshold values from patients admitted between May 23, 2022, and January 23, 2023, when Omicron subvariants predominated.

We're going to talk about, "Is a CT value really a viral load, or is it really just a nucleic acid amplification level?" I was doing a podcast yesterday with Ben LaBrot. In HIV, for decades now, we've talked about viral loads. I was pointing out that they're really nucleic acid amplification units, because if you're like, "Oh my gosh, look, I've got this level, and it's 1,000," I'm like, "Yes, but that's not 1,000 replication-competent infectious viruses." Probably most of that is junk, right?

VR: Yes, it's unfortunate that we don't measure infectivity. It really is.

DG: It's hard. It is hard. We don't have those commercially available assays, but actually, it would really help with communication if we were really measuring. In fact, we had assay for infectious virus that was part of the normal.

Let's go through. Our listeners are familiar with that little rabbit hole we just went down. Viral trajectories were modeled with log polynomial random effects framework to estimate daily CT values and duration of potentially infectious shedding. Time to CT greater than or equal to 30, right? Waiting for it to take more than 30 cycles to get a signal. They then examined how antiviral timing and vaccination history modified these virological outcomes. Among 3,759 symptomatic COVID-19 patients included, 1,318 received molnupiravir, 1,613 received nirmatrelvir-ritonavir

Compared with no treatment, nirmatrelvir-ritonavir was associated with shorter shedding. This is a mean difference of about two and a half days, especially with earlier initiation, while molnupiravir had a smaller effect. The virological effect of nirmatrelvir-ritonavir (Paxlovid), was greater in unvaccinated than vaccinated patients, while the effect of molnupiravir didn't seem to differ.

Let's look at these figures. They're pretty nice figures, actually. Maybe for the people on YouTube, you can actually look. It's nice the way they do this figure because you can actually see the curves and the CT values days since onset. Then, at the very bottom, they actually have this nice - basically, it looks like a forest plot, but it's not. You've got, what if you're treated on Day Zero, like right away with molnupiravir, or, "Oh my gosh, wow, look at how impressive it is if you start on Day Zero with Paxlovid." You're talking about three to four days of earlier shutdown, and a really nice linear with Paxlovid there.

You can look at unvaccinated, boosted, just being boosted about two days earlier, before you're getting where you need to go. Basically, putting all this together, early antiviral treatment, getting those regular boosted vaccinations, really making a difference in, we think, translating into onward transmission, really reducing that.

Never stop educating people on how vaccines work. We've got the article, "SARS-CoV-2 Vaccination and Attenuation of Breakthrough Infection Severity: A Systematic Global Review and Meta-analysis*,"* published in *CID*. Results of a systematic selection and meta-analysis of studies identified from a living systematic review of global observational studies reporting vaccine effectiveness against symptomatic infection and hospitalization. They computed the relative vaccine effectiveness; a total of 184 vaccine effectiveness pairs from 37 studies

were included. The pooled relative vaccine effectiveness. It's hard that they've got VE because it could be effectiveness, efficacy, it could be whatever you want. It's confusing.

51% for broadly defined symptomatic infection, 19% for medically attended symptomatic infection, indicating significant attenuation. Variant patterns differed by endpoint definition. Variant patterns differed by endpoint definition: attenuation was weaker for Omicron subvariants when broadly defined symptomatic infection was the comparator. No significant differences were observed between vaccine platforms. Interesting stuff.

VR: This is a good question. Someone asked me on the stream last night: "How come in the first vaccine trials way back in the beginning, the efficacy was 90%, and now it's 50%? Why is that?"

DG: I think there's a couple of things. One is the background has changed. This is almost the issue with the flu shots. If you're looking at a completely naïve population, they've never seen it, there's been no selective pressure, it was a 90% reduction. Now, people have been infected before, they've been vaccinated before, there's a preexisting immunity. Now you're studying your booster or your vaccine against that comparator arm. It is a no-vaccination, no immunity versus an immune shot.

VR: Quite a bit, yes.

DG: Yes. It's boosting above a background of some immunity. That would be my interpretation.

VR: I think that must be it.

DG: All right. I'm going with that, Vincent. We're getting here to the end. We're almost to our emails and our discussion about on the ground, what's going on. A lot of buzz around metformin to prevent Long COVID. We have the article, “Metformin on the Presence of COVID-19 Symptoms Six Months after Infection: The ACTIV-6 Randomized Clinical Trial,” published in *CID*. These are the ACTIV-6 results. The quadruple-blinded randomized placebo-controlled of metformin for treating acute SARS-CoV-2 to prevent Long COVID. They have a nice table where you can see here what they did. A little bit of a trend in the right direction. Leave this up for people to take a look at.

VR: We talked about metformin before, and it's got a modest effect, right, basically?

DG: Yes. It might have this tiny impact. No one is safe until everyone is safe. I've got to say that right up front. Not fear-mongering. I'm just maybe being compassionate. I reached out. I've been in communication with my colleagues in Uganda. Brian Park. When I first went to Uganda many years back, Brian was on the ground as the manager of the clinic there. He and I have kept in touch. Now, Brian Park, Director of Development and Strategic Advisor for FIMRIC, Foundation for International Medical Relief of Children, shared the following update with us. "The Project Baduda team had been hearing about the Ebola outbreak in the news for some time, since the first confirmations from Ituri in DRC.

Then, on May 15, received official word from the Ministry of Health in Uganda about the first two confirmed cases of Ebola Bundibugyo within Uganda. Due to its previous experience with VHFs (viral hemorrhagic fevers), Uganda's Ministry of Health is generally very vigilant about such outbreaks, but faces the ongoing challenge of limited resources

combined with porous borders, enabling substantial cross-border travel and commerce via unofficial routes."

We got this update about five days ago. As of 6/6, the situation in Uganda. They got this nice photo. I don't know if I've probably shared photos, but it's nice for me to see the clinic which I've spent a lot of time at. You can see in the background of this photo. Maybe there, you see this thing, and what's that thing in red? That's the motorcycle ambulance attachment. It basically attaches to the end of the motorcycle, and the person lies down in there. That's how you get really sick people on these crazy roads to the nearby hospital. This is this outdoor education center. When I'm there every evening after we've seen 100 people a day, we do a debrief and an education session, and that's what they're doing here.

19 total confirmed cases, 13 currently admitted for treatment in health centers. 14 of 19 of the confirmed cases are patients from the DRC, five are Ugandans. Of the Ugandan patients, one was a driver who transported the first, now deceased, confirmed case. One healthcare worker exposed while treating the first confirmed case. Two are healthcare workers in Kampala. While most of the confirmed cases in Uganda are from the western region in Kampala, there actually is a confirmed case in the Tororo District, which is right next door to Project Baduda in the eastern region.

Now Uganda has closed the border with the DRC. Rapid response and surveillance teams have been deployed. Anyone entering Uganda from the DRC is subject to a 21-day supervised quarantine. We get a little more information. What is FIMRIC doing to help? They're refreshing staff training. They're doing a lot of education about all the different standard practices, safety measures. They're getting training from specialized teams from Baduda's District Ministry of Health, and they're carrying out all this health education, not just among healthcare personnel but also among the patients waiting to be seen. They're doing outreach into the community as well.

I want to point out, here they are on the ground. Pause what you're doing, click on parasiteswithoutborders.com, click on the Donate button. Every small amount will help. We're going to continue to double your donations. We're hoping to get up to a $10,000 donation to FIMRIC to help them continue to do this great work.

VR: It's time for your questions for Daniel. You can send yours to daniel@microbe.tv. Here's a question from the livestream last night from Wendy: "Why does COVID have a summer resurgence but influenza and RSV do not?"

DG: I like that it says "According to Google." Wendy checked Google. What did Google have to say?

VR: "The virus is constantly circulating at a high baseline and mutates rapidly to evade immunity, whereas flu and RSV have near-zero baselines in the summer. Also, there's more fragmented immunity, versus flu and RSV, which have been around a long time, and so you get more--" I don't buy any of that, frankly. What do you think?

DG: It is interesting because flu may get to a low level in our hemisphere, but it's that it's in the southern hemisphere, and it goes back and forth. I don't think we fully explained this. I don't think we expected. Did anyone ever predict that we're going to have these double waves going on for years and years?

VR: No. No, not at all.

DG: We expected it to be a winter respiratory virus. I think we still have a lot to learn.

VR: Someone suggested last night that, in our summer, it's winter down below in the Southern Hemisphere, and so maybe people are traveling and bringing viruses north, and maybe since our immunity is fragmented or short-lived, we get - I don't know. I don't think that could account for the big spike we get in the summer.

DG: No.

VR: It's a mystery. I said, "Why don't you ask Daniel? Let's see what he has to say."

DG: Yes. What is the thing that's really important to say is I don't think we know, and I think we need to keep trying to understand this and funding science so we can figure this out.

VR: Yes. Ellen writes: "Just listened to the latest update from 30 May. It's exciting that AABs were finally identified, so a CAR-T cell target might be found for Long COVID. You mentioned rituximab. It hasn't been trialed in Long COVID, but it was an ME a few years back, and there's a link to a six-year follow-up below. Now we have Akiko Iwasaki on board. I have more hope subgroups can be identified before precious trials are invested in. Carmen Scheibenbogen in Germany seems to be making similar inroads, too.

It's been a frustration for years that we've seen a small set of ME patients sometimes have miraculous improvements in trials. This was shown on reanalysis of Ampligen Stage 3 trial, for instance, where the responders improved well beyond anything seen in the placebo arm. But because the studies are so small, if you also have patients who have adverse reactions, pretty common in any off-label ME med, where some people can be worse in the long term, and either no one with the stats knows to detect subgroups in the data, or just not enough participants to do that with any confidence, we fail by design before it's even begun.

Of course, this isn't helped by ME being a pretty noisy illness, as it's so easy to worsen through bad luck or unavoidable exertion and to have seasonal shifts that aren't consistent between patients. Like winter makes my pain way worse and my baseline drops, I can feel already my pain worsening from writing this as I'm in chilly Canberra, but summer makes many orthostatic intolerances worse, so it's easier to overexert and crash. It's very messy biology and absolutely fascinating. Anyway, I look forward to a day where trials and treatment aren't a complete roll of the roulette wheel. Thanks for keeping up with COVID, Long COVID, and ME for years, and Vincent, too."

DG: Thank you. No, it's nice to actually have a science underpinning the trials that you're thinking of. It's great to see that they're still making progress.

VR: John writes: "In case you're wondering, as I was, about the demographics of Buckingham County, Virginia, where most of the measles cases seem to be located, while it's halfway to the mountains due west from Richmond, it's sparsely populated, population 17,000, with no towns that I'd ever heard of. I grew up in Northern Virginia and spent one and a half years in Richmond. I learned that there are a lot of Amish there."

DG: Interesting. Yes, that can affect vaccine behavior.

VR: Kip writes: "Dear Vincent and Daniel, thank you for another clinical update. After being

a hospital pharmacist, (PharmD), for over 45 years, you know I must have some nicknames for you. For rectal administration, it's a suppository, AKA Rectal Rocket or Butt Bullet. Furthermore, no, we normally do not use the rectal route for systemic medications because the durability of the rectal mucosa is nowhere near that seen by the oral route.

Without a doubt, never put anything as acidic as aspirin up there as it could burn a sinus tract. However, a particular medication is taken per rectum—PR, for a systemic effect—the absorbed med will not be routed through the portal venous system as with most PO meds, and therefore avoid the hepatic first-pass effect and reduction in bioavailability.

Other mucus membranes can do well with local drug administration - hormones, corticosteroids, anesthetics, lozenges, pastes, some antifungals, et cetera. One interesting dosage form is the troche, which is "wheel" in Greek. This troche, nearly the size of an Alka-Seltzer, can be dissolved in the mouth for oral thrush or the vagina to treat vaginal yeast infections."

DG: I've been pronouncing that wrong for eternity. I always called it troche, T-R-O-C-H-E, but "TROH-kee." OK, thank you. [chuckles] This is great.

VR: Diana writes: "Am I right in thinking you didn't say nobody is safe until everybody is safe on today's clinical update? If so, I just want to say that I'm sorry and that the person who found this phrase threatening or whatever the term was is a troll, not someone responding in good faith and in an honest attempt to further dialogue. I say this as an ex-editor who had to field many reader letters arguing for creationism or against the reality of climate change.

I think this closing phrase has never been more apt than it is today because we are failing as a social species. Unless we recognize we live or die as a society, not as individuals, we will be unable to address not just infectious disease outbreaks, but also extreme wealth disparities, the immiseration of the Global South, and climate change.

I don't argue that you reinstate the closing. I just want to express my solidarity with you and thank you for your compassion, which I value as much as your knowledge. As it happens, I am reading Ursula Le Guin's *The Dispossessed*, a book published in 1974, where she tries to envision a non-capitalist society that doesn't revolve around establishing dominance hierarchies. Her alternative is an ambiguous utopia that seeks to foster acting for the common good. As you can imagine, this is a really tough assignment, but Le Guin does this kind of thing better than anyone else I can think of. You might find the book interesting if you have time. All the best, and watch out for trolls." Diana is in Madison, Wisconsin.

DG: All right, Diana. I am a huge fan of Ursula K. Le Guin. I probably have read just about everything that she's written. I think there's only one book that I just had trouble getting through. It was one of her last ones. Oh, no, T*he Dispossessed*, *The Left Hand of Darkness*. She's got some great books out there.

VR: Bill writes: "A year or so after my final Bexsero vaccine, my CRP went from 0.3 to 16.97. Is this transient rise in CRP indicative of any cardiac damage or inflammation? Is this the same for COVID mRNA vaccines? I was surprised to see my result after Bexsero, early '0s. Thanks in advance."

DG: I would not be concerned. You're thinking of CRP, and you're thinking of highly sensitive CRP, and this is used as a marker for cardiac inflammation. No, I think this is just C-reactive

protein. This is just you got a vaccine, your immune system's turned on, it's studying for the test. I would not be concerned.

VR: "Another question, if time. I got sepsis from an upper GI where the gastro tore my throat. The bacteria were S*taphylococcus anginosus*. Left me with major disabilities, barely able to walk and use my arms, and severe spine pain. Several doctors have no idea what to do. Six months post-sepsis, eight weeks IV antibiotic, no sign of infection in blood."

DG: I would go see an infectious disease specialist. I think it was like 80% of the counties don't have one of us, so you may have to drive. This would be something that an infectious disease doctor should feel very comfortable guiding you through.

VR: Robert writes, "First off, thank you for the work you do. I've been watching and listening to *TWiV* since 2020. I especially enjoy the clinical updates with Daniel. I am 84 this year. I have seen a lot in my life, including having a friend get polio in the late 40s. I majored in economics in college, San Francisco State. After college, I spent two years in the Peace Corps in India. I watched smallpox tear through our crowded neighborhood every year despite massive vaccination efforts on the part of healthcare workers. To this day, I still remember the faces of pox-marked f4- and 5-year-old children who survived. I cannot unsee that.

Applying my old econ degree to the vaccination problem we are experiencing today has me thinking that economic incentives may be useful in this situation, not by paying people to get vaccinated, but telling the parents who refuse vaccinations for their children that their health insurance will not pay any of the costs that come about should their child have a vaccine-preventable illness.

The parents should then be given a list of likely expenses for several illnesses, for example, measles, simple case: doctor visits, meds, cost of isolation, et cetera, a sample of what five days in the hospital will cost, and so on. Exposing your family to financial ruin is processed in a different part of the brain, and a free vaccination to prevent the possibility of financial ruin may make more sense since a free vaccination would then be a form of cheap insurance."

DG: It is a form of cheap insurance, but it's not cheap insurance against financial ruin; it's cheap insurance against something that's even worse, the ruin of your child.

VR: It's an interesting idea of the insurance company is not paying for damages if you don't get vaccinated.

DG: There were some employers, and I don't know the legality of this, that basically-- it was this thing during COVID. If you got COVID, then you were off for so many days, and it was this concept of paid time off. If you didn't get vaccinated, then you weren't eligible for paid time off if you got COVID. I'm not sure that was so great because then people would come to work with COVID, give it to everyone else. Some of this stuff can be tough. I see the logic. Yes, because it is really expensive to take care of all these unvaccinated children. Who's paying the bill because these families don't have that?

It's increasing the cost for us as a country. It's increasing our premiums. We're now with the loss of the subsidies to the American Affordable Care Act. We have a lot of people that can't afford it. Part of why people can't afford it is it's becoming more and more expensive, and contributing to the bottom line here is the expense of taking care of folks with vaccine-preventable illnesses.

VR: "My second question concerns pregnant mothers passing on antibodies to their unborn child. Has this been tried with measles? Would it be safe in the last trimester, like COVID? If it was safe and antibodies were passed on for the first few months of a child's life, it could be a big help since it looks like measles will be with us for a while. Just a thought. Keep up the good work." Bob is in Marin County.

DG: I like this. The idea of doing a trial, maybe of having the beginning of the last trimester, you get an MMR because we have this period of time before the child can get that first vaccine. Now we're living in a world where how do we protect these little kids. I think that not only would this be a reasonable trial, but I think now they're actually looking at measles antivirals. All these anti-vaxxers are driving the need for more research.

VR: It's interesting. Currently, the kid gets the vaccine about a year, right?

DG: Yes.

VR: That's because of the maternal antibodies that could potentially interfere with the vaccine if you gave it earlier, so I don't know-

DG: It's not really interfering anymore, right?

VR: We did a study on *TWiV* a long time ago, which said 12 months is really the best time given maternal antibodies. If you gave the mother more antibodies, I don't know if it would go longer- [crosstalk]

DG: That's interesting. Then you have to wait. Yes, would it impact that one year? Huh.

VR: Yes. That's *TWiV* clinical update**.** Wait a minute. It's weekly. I forgot the weekly. That's *TWiV* weekly clinical update with Dr. Daniel Griffin. Thank you, Daniel.

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

[music]

[01:11:20] [END OF AUDIO]