TWiV 1364 Clinical Update

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Guest: Daniel Griffin

Aired 9 October 2026

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 1364, recorded on October 8, 2026. I'm Vincent Racaniello, and you're listening to the podcast all about viruses. With me today, here in Colorado, Daniel Griffin.

Daniel Griffin: Hello. Hello, everyone. Yes, I have to change that. Joining me today in Colorado. We're together up at 11,100 feet at the Mount Hayden Backcountry Lodge. Maybe, if you listen closely, you can hear the crackling of the fire in the background. You hear a little bit of crackling and popping there.

VR: Maybe. You can see we're both together in this - can you call it a backcountry cottage? Not a cottage.

DG: Lodge.

VR: Lodge.

DG: Backcountry lodge.

VR: I have a guitar next to me here-

DG: Just in case. [laughs]

VR: - and a rug to give you the scenic thing. I came out here, and Daniel and I are together on a retreat for Parasites Without Borders.

DG: Chuck Knirsch was with us.

VR: That's right.

DG: Actually, we got a lot done. We had a great meeting yesterday. We went over all our financials and what we're trying to accomplish to make the world a better place.

VR: Now, we are, of course, doing two *TWiV*s. Well, one *TWiV*, and tomorrow a *TWiV*, right?

DG: Yes, tomorrow we'll do a *TWiP*.

VR: No bow tie, right?

DG: No, no bow tie. [laughs] We will start with a John Muir quote.

VR: That's relevant, right?

DG: Very relevant.

VR: He started all the national parks, right?

DG: I would say a lot of responsibility there, right? He really got Teddy Roosevelt on board with it. He's really a charismatic person. A lot of this amazing nature that we all have the opportunity to enjoy is because of the passion of John Muir.

VR: Is Rocky Mountain National Park near here?

DG: Not too far.

VR: That's one of them.

DG: Yes, that's the northeast part up by Fort Collins, just west of Fort Collins.

VR: OK.

DG: All right, let's jump in. "When one tugs at a single thing in nature, he finds it attached to the rest of the world."

VR: It's true, right?

DG: I like that.

VR: One world. We've known that, and I like that very much.

DG: When we're actually speaking, I mean, we mentioned Teddy Roosevelt. Now we're going to mention George Washington. We're going to start with - This is actually the cover. You're like, "wait, what is this on the cover of *Emerging Infectious Diseases*?" You click, and you get, “Smallpox History and Decisive Actions of George Washington.”

VR: This is a painting of George, but it's not done, right?

DG: Do you know why it's not done?

VR: No, I have no idea.

DG: The painter loved it so much that he didn't want to finish it because, as soon as he finished it, he was going to have to give it.

VR: Actually, it's kind of weird, right? Not weird, modern-ish that it's not done, right?

DG: There's a Martha Washington.

VR: Same thing?

DG: Yes, same thing, partially finished. All right, so let's read a little bit of this article. You will notice, right? Hopefully, David will have this up on the screen. YouTube watchers can

look. People will recognize this portrait because the portrait on the cover was the inspiration for George Washington on our currency. You see him with these rosy cheeks and this nice complexion.

VR: Tight-lipped.

DG: Tight-lipped.

VR: Because his spring-loaded fake teeth.

DG: Yes, he had no teeth, so he had these -

VR: He had to keep his mouth-- Otherwise, it would pop open, apparently.

DG: Oh, interesting. I'm learning more. Here's the story. Smallpox, right? In 1751, Lawrence Washington, George's elder half-brother, was suffering from tuberculosis. We're getting it all in here. Had George accompany him to Barbados as a potential refuge. Now, during that stay, the younger Washington contracted smallpox, enduring an illness lasting several weeks with residual minor facial scarring. That was the interesting thing. You don't see the facial scarring in these -

Washington's firsthand familiarity with the progression and consequences of smallpox would later inform his decisions related to the health of the troops demonstrated in several pieces of correspondence cited in this essay. In a set of general orders written in March 1776 in Boston, Washington observed that as the enemy, with a malicious assiduity, is that how that would be?

VR: Sure.

DG: Have spread the infection of the smallpox through all parts of the town. Nothing but the utmost caution on our part can prevent that fatal disease from spreading through the army and country to the infinite detriment of both. As a preventative measure for smallpox, variolation was first promoted in New World by Puritan minister Cotton Mather in 1721.

We've talked a bit about this. As they describe here, the procedure entailed insertion or rubbing of infectious material from pustules of persons infected with smallpox into the skin of persons who had not previously been infected. This process resulted in infection with usually mild symptoms, but also carried the risk of potential spread of infection to others and potential severe disease or death.

Naturally acquired smallpox, it had a mortality of 25% to 30%. When you did the variolation, you actually still had a risk of death. It was about 1.5%. In 1776, as commander-in-chief of the Continental Army, he initially prohibited routine variolation. Why was that? His reasoning was strategic. Some soldiers undergoing variolation would be incapacitated for weeks, potentially leaving the army vulnerable at a critical juncture in the war. He observed the Brits: "Should we inoculate generally, the enemy, the Brits, knowing it would certainly take advantage of our situation." We would never do something like that. We wouldn't attack someone on Christmas night or anything.

VR: [laughs]

DG: Anyway, it's all the Brits. Given the precarious position of the colonial forces, the

temporary loss of short-term operational readiness was a risk. However, smallpox outbreaks threatened losses, and Washington reversed his early policy. In February 1777, he ordered the systematic inoculations of the variolation of Continental troops. "Finding the smallpox to be spreading, I have determined that the troops shall be inoculated. Necessity not only authorizes, but seems to require the measure, for should the disorder infect the army in the natural way, and rage with its usual virulence, we should have more to dread from it than the sword of the enemy."

In correspondence with John Hancock, Washington justified the decision as necessary despite its inherent drawbacks. "I find it impossible to keep it from spreading through the whole army in the natural way. I have therefore determined not only to inoculate all the troops now here that have not had it, but to inoculate the recruits as fast as they come in. New recruits would be inoculated upon arrival, recover while being trained and equipped, and then join the ranks immunized and combat ready."

VR: He realized the risk of the disease, acquiring disease, outweighed the risk of inoculation and perhaps being incapacitated for a while.

DG: Yes.

VR: Sounds familiar, doesn't it?

DG: We've talked about this a lot, and that is the issue. We acknowledge, I think if you look at the posts on YouTube, some, I don't know if they're listeners or bots, you never talk about the risks associated with vaccines. We always do. We talk about it. Is it one in 100,000? Is it one in a million? We talked about issues with myocarditis in the kids. There always is a certain risk. In a perfect world, there's no pathogens. We live this wonderful life. Pathogens out there, you look at things like this. We talk about 20% of these little kids ending up in the hospital with measles, you might have a febrile seizure. We've talked about the issues.

VR: I think George was smart. He was the head of the army, right?

DG: He made a strategic - Now we have, I don't know who's running things, but like, "Oh, you don't need to get vaccinated."

VR: Right. Well, that backfired right away, right?

DG: Yes, it backfired right away. We had deaths, right?

VR: Yes.

DG: I remember there was a military recruit down in Texas. I think it was a young man died of flu, which should not, you know, vaccine preventable illness. All right. *Cyclospora*, right? Anyone still paying attention? You still paying attention?

VR: I think it's out of the news, but I am. I pay attention to it, yes.

DG: Well, it takes a little while for all the facts to come in. I think we're at the point now where we've got a good, solid amount of facts. The article, “FDA Found *Cyclospora* During Taylor Farms Inspection in Mexico,” was published in *The New York Times* by Christina Jewett, Alice Callahan, and Caroline Hopkins Legaspi. The FDA said on, this is last Friday, that

it had found two samples of the *Cyclospora* parasite during its investigation of Taylor Farms' facilities in Mexico. Strong new evidence that an outbreak that sickened thousands in the United States this summer came from lettuce produced by the company.

The agency sent inspectors to the company's processing plant in nearby farms in August, about a month after Taylor Farms recalled bags of lettuce sent to retailers and restaurants across the nation. Friday's announcement disclosed the final results of the inquiry. Inspectors discovered *Cyclospora* in water from a tank that held outgoing wastewater from the Taylor Farms de Mexico processing facility, which chopped fresh lettuce. A second positive sample was found in sediment in a drainage ditch at an iceberg lettuce farm that operates as an independent grower for Taylor Farms.

Just to put this, over the course of the summer, the *Cyclospora* outbreak linked to Taylor Farms caused nearly 113,000 illnesses, 570 hospitalizations, and two deaths in 21 states.

VR: They found *Cyclospora* on the farm, but they didn't really show that was the source, did they?

DG: This is the smoking gun, right? We found the smoking gun. It's right here. We've got the *Cyclospora*. It's in the wastewater. We've got it in the drainage ditch.

VR: In my opinion, they should have taken isolates from people and then compared their genomes to the genomes in the water they found in Mexico -

DG: Oh, I like that.

VR: - to show that this led to this because, OK, there's *Cyclospora* on the farm, so that's probably what happened. Maybe it's good enough for the FDA, but for me, I'd love to have that circle closed.

DG: This is the issue with us scientists.

VR: [laughs] That's right.

DG: We want this really high-level. It is. The goal in science is you say, "OK, this sounds right, but I might be wrong. How would I check to see if I might be wrong?" No, that's a great-- You could look at it because if you had a really similar sequence, you'd say, "OK, yes, this really is it."

VR: The wastewater presumably is waste from the workers who use the toilets, right?

DG: Or not using the toilet. Just taking it, and it's ending up in the --

VR: Presumably, that's the source of the *Cyclospora* in the wastewater. It would also be nice to have some scans of people to see if they're affected.

DG: Yes, this outgoing wastewater would be, yes, someone is using their facilities. The stuff in the ditch is someone not using facilities, right?

VR: Anyway, this is probably good enough for food science, but I'm just saying if we could take it as far as possible, that would be the way to go.

DG: Yes. All right, now this next one, this is exciting. Suspected plague incident leaves one dead, 200 under quarantine in Siberia. We read in *CIDRAP*, and we're going to criticize this, we read in *CIDRAP* that a 28-year-old female lab technician at the Irkutsk Antiplague Research Institute of Siberia, Russia, died of pneumonia. Government officials in Russia have not confirmed that the woman died from pneumonic plague, but several media reports suggest she died after an accident involving a broken vial containing a live sample of plague, a deadly bacterial infection. Can I pause there? There was a deadly infection in a vial?

VR: Amazing. Must have had live cells in it.

[laughter]

DG: We're sticklers, and I think we should all be sticklers, and I think maybe our listeners are like, "What do you mean?" They found the bacteria, *Yersinia pestis,* that causes plague. They did not find a deadly infection inside a bottle.

VR: No. I'm surprised for *CIDRAP*, because usually they're pretty good, right?

DG: Yes. Then we read more. The mystery goes on, and this is going to be a mystery.

VR: 200 people are in quarantine now. Let's mark that. That's important.

DG: 200 people are under quarantine. Now, we read in Reuters, right? Story's ongoing. Russia tells WHO there are no plague cases in Siberia City. Russian authorities told the WHO on Tuesday that it has no cases of plague in this unpronounceable city -

VR: Irkutsk.

DG: -in Siberia where a lab worker at a plague research institute died. No case of this dangerous disease has been recorded in the city of -

VR: Irkutsk.

DG: -Russia Federation. Russian authorities said in an official response to a WHO request read out by WHO spokesperson Christian Lindmeier at a Geneva press briefing. They also told the UN agency they have identified the people in contact with the deceased and that test results for dangerous infectious pathogens were negative. We even hear that there might be a second person that died of pneumonia in this area.

VR: Can *Yersinia* cause pneumonia?

DG: There's two types of *Yersinia*, more than two types, but the main two types are bubonic plague and pneumonic plague. The bubonic plague is what we think about. The bubos, they're actually infected lymph nodes. Maybe it starts as a skin inoculation. You end up with swollen lymph nodes. They turn black. Those are your bubonic plague. As it progresses, a person can actually develop a pneumonic. Actually, it can then be spread from the lungs. That's what we worry about. That's when you see all this spread. Actually, cats can get pneumonic plague.

VR: Basically, we have a country who you can't trust anything they say, saying there was no plague, yet somewhere a rumor started that there was plague involved. Where do we end up with here? We don't know what's going on.

DG: Yes. That's where we are right now. We don't know, and we'll keep you apprised when we find something.

VR: If you notice that the video just shook a little, it's because there's a really big dog that just bumped into the tripod.

DG: A Malamute just wandered by, covered in leaves. [laughter] You doing OK, Fenrir? All right. News: now we're in our news section. “Zombified CDC, Hobbled by Cuts, Struggles to Fulfill Scientific Mission.” Zombified in the title was what got me interested. Then I also see that this is an article by Apoorva Mandavilli. "The agency has lost its independence and nearly a third of its staff, as Health Secretary Robert F. Kennedy Jr. and associates have tightened control." They have a really nice figure where it really puts together. They show us March 2025, we've got 9,279 staff. Then we've got May 2026, and we're down to 6,683 staff. They break down.

Well, chronic disease, we're going to protect that because that's important. We have an almost 50% drop in the staff in chronic disease. Just whoever says that that's their new focus, we might want to call liar, liar, pants on fire there. You can look at all the other areas where 28% drop in global health. Other big injury prevention control, like 43% drop. Really, the biggest cut is chronic health. Isn't that crazy?

VR: It is. You cannot believe anything they tell you.

DG: Yes. As we read here, as they point out, some of these areas that were supposedly central to Trump's administration have been gutted despite Mr. Kennedy's reported focus on chronic diseases and autism. The CDC centers that aim to prevent chronic diseases and birth defects are at half their previous size. Beyond staff reductions, there's this described leadership vacuum. Only one of the 11 center directors from March 2025 remains at the agency. Most of the other centers are being run by acting directors, some of whom were elevated from jobs one or two levels below.

I love this quotation. "Imagine losing a third of a city's firefighters and then wondering why downtown is burning," said Jonathan Merriman, who led the agency's Center for HIV and Sexually Transmitted Infections until April 2025.

VR: This is in line with the administration's desire to essentially destroy the CDC.

DG: That really seems to be a target.

VR: They seem to have this view that they weren't trustworthy, they made mistakes, and it's all wrong, but now they want to destroy it. I think people should be very concerned about this because once you destroy it, it will not happen overnight to rebuild it. It will take many years, probably 10 years or so. In the meantime, all these outbreaks that we're seeing, not just in the U.S., but overseas, it's because of the compromised ability of CDC to track outbreaks.

DG: Yes, very much true. We keep talking about this. Just along the same lines, I don't know if there's been an update here, but I saw this. San Diego State football hit by mumps outbreak and 14 confirmed cases ahead of Pac-12 opener. We've talked a little bit about that vaccine, the MMR: the mumps, measles, and rubella. Actually, this is one of the things that maybe we'll get into at one point, but also going to a second dose of the MMR. Not

only did it improve our measles coverage, but it also significantly improved our mumps protection.

What happens if you don't get vaccinated? Well, as San Diego State prepared for it to open its Pac-12 play against Texas State on Saturday, it was dealing with a mumps outbreak among more than a dozen players. The university confirmed three cases of mumps on one of its athletic teams. A more recent update from the university increased the number up to 14. As the school monitors the outbreak, it will work with the San Diego Public Health Services. Here's the big challenge. Mumps symptoms can develop 12 to 25 days after exposure. This is going to be going on for a while before we really understand the fallout.

VR: Do they know one of these consequences of mumps infection, these young men?

DG: I wonder if they know. You can get sterile.

VR: Yes.

DG: Yes, you could be sterile. No grandkids. Any of the parents who -

VR: This is very interesting. This is like George Washington. Here, the football coach decided it wasn't important to protect his troops.

DG: Yes, I like that.

VR: The consequence is the football team has now got a big problem because these guys can't play.

DG: Yes, and they also might end up being sterile. That's another thing for parents to think about. They're like, "Oh, I don't know about the MMR. I'm not sure how I feel." When you can't have grandkids because your boy now is sterile -

VR: That's the way to put it. Do you want to have grandkids? That's it.

DG: That's what vaccines cause. They cause grandchildren. Maybe they don't want grandchildren. This is a little bit upsetting. This is *New York Times*. “Texas Pediatricians Face Paxton Investigations for Vaccinating Children.” Now, they actually give like a first-person. “Dr. Rachel” had planned to continue her practice for years to come, but this year she has begun to reconsider amid the stress and legal costs of defending herself in a statewide investigation by Ken Paxton, the Attorney General of Texas and Republican candidate for the U.S. Senate, who accused doctors, drug companies, and insurers of conspiring to push parents into vaccinating children.

In December 2025, Dr. Rachel received a letter from the Attorney General's Consumer Protection Division demanding her vaccine purchase records over the past 10 years. "The division believes that you are in possession, custody, or control of material involving potential misleading or deceptive acts regarding incentives associated with the administration of childhood vaccines." It said, adding that such acts would be in violation of the state's deceptive trade practices law.

I'll leave a link into this, but this is really scare tactics.

VR: Of course.

DG: We have this quotation. "I will ensure that big pharma and big insurance don't bribe medical providers to pressure parents to jab their kids with vaccines they feel aren't safe or necessary," Mr. Paxton said.

VR: Well, that's the error. They are safe, and they are necessary, so he's lying again.

DG: Yes.

VR: He thinks this will get him elected in Texas. That's why he's doing it.

DG: This is all political. This is all political.

VR: I hope that the Texas voters, any of you listening, please do not vote for him because this is a - what was the word that Paul Offit used to describe all of this going on? A bumbling, something like that. This is a tomfoolery type of thing.

DG: Yes, it is tomfoolery, but it's tomfoolery with consequence. We have children that have died because of this. It's misinformation. It's one thing if a parent has all the information, accurate information, people are being honest to them, and they make a decision. It's quite a bit different when somebody lies to them for political gain, and then they make an ill-informed decision.

VR: It seems to me that this has no legal basis. I'm not a lawyer, but physicians are allowed to give vaccines. That's part of their job. How can you sue them to do that?

DG: It's, again, a scare tactic. You drag them through these legal channels.

VR: That's the problem. You drag them through, and you destroy their careers and their lives. That's the problem.

DG: Instead of focusing on taking care of our children and babies, now they're dealing with these legal issues. Montana health officials are reporting the death of a pediatric patient who died in September from complications of an invasive *Haemophilus influenzae* type B infection. Now, *Haemophilus influenzae*, this is very confusing, the name. People never understand. Why do we call it?

Now, the reason *Haemophilus influenzae* - it's not a virus; it's not influenza. This is a bacteria. The silly name is because this was Pfeiffer's bacilli. Back 100-plus years ago, during the 1918 big Spanish flu, Dr. Pfeiffer believed that this was what was causing the influenza outbreak. They had no vaccines back then. They didn't really understand viruses back then. It still has this remnant. H. flu, *Haemophilus influenzae*, this is a bacteria. This is a vaccine-preventable infection. Here we read that Department of Public Health and Human Services said the child's death was linked to complications from the *Haemophilus influenzae* type B infection. We don't have much other details.

Now, this bacteria, when you get infected with this, there's a range of things. You can get a mild infection, you can get ear infections, but you also can get invasive infections. It can end up in the blood. You can end up with pneumonia. You can end up with meningitis. I've seen little children where they've lost all their fingers from the sepsis that comes with this. This is vaccine-preventable. Vaccination protects against the most common, the type B *Haemophilus influenzae*. This patient had not received the vaccine.

VR: Wait till you hear the next story. [chuckles]

DG: All right. Florida, which has become basically like you've got to speak to your travel health person before you go there. "Florida Announces October 8 Hearing on Plan to End Rules for Four Vaccines."

VR: Today.

DG: This is today. Yes, today, as we record. The day we're recording, Florida is going to hold these hearings to discuss the state's plan to remove requirements for four vaccines at schools and daycares. The state wants to make four shots optional. Those that prevent chickenpox, those that prevent hepatitis B, the pneumococcal conjugate vaccine, and, as we just discussed, the *Haemophilus influenzae* type B vaccine.

Other vaccines required for schools and daycares, such as measles and polio, remain in effect and can be only changed by legislation. The State Department of Health oversees rules that require the four in question. The effort is part of Surgeon General Dr. Joseph Ladapo's initiative, which he announced last year, to increase medical freedom and parental choice and end vaccine mandates, which he likened to slavery.

VR: This is so misguided. What should guide vaccination requirements are the need to prevent disease, not medical freedom, not parental choice. I'm sorry, parents. You have to do this. Otherwise, you will have outbreaks.

DG: Now we're going to move on to *Legionella*. I actually got called about a person living in this complex, so hitting close to home. I'm talking to them on the phone as I'm heading out here to Colorado. In our local News 2, this is Long Island, two confirmed cases of Legionnaires' disease at Queens apartment complex prompt NYC Health Department probe. It's really interesting where I live. I live on Long Island in Nassau County, but it's really three miles from Queens, right at the edge.

The New York City Department of Health is investigating an apartment building in Queens, four miles from where I live, after two confirmed cases of Legionnaires' disease among the residents. Officials said they are checking out the hot water system inside of North Shore Towers on Grand Central Parkway, but they confirmed the situation is not a community cluster investigation, and *Legionella* has not been confirmed present at the complex. It's not the cooling towers. They're actually looking in the hot water.

All right, Ebola. I'm going to be curious to see how this all plays out. In *The New York Times*, we read Kenya records Ebola case for first time. Authorities said that the virus had been diagnosed in a man arriving from the DRC, and that they were taking measures to prevent any spread. Here's the story. This man had traveled by road to Uganda from the DRC, and then he takes a flight to Nairobi, the Kenyan capital. They say he flew from Kampala, but Entebbe is where the airport is, just outside of the capital.

He flies. He passes through health and immigration controls at the airport. I wonder if he was completely honest. The man was driven directly by a relative and friend in a private vehicle to a hospital in Nairobi, where he was quickly isolated in a separate room. They identified the symptoms. They found he was positive for -

VR: Bundibugyo virus.

DG: The man ends up in an isolation unit, and then he dies.

VR: I presume he told them he came from DRC, and that's why they did this.

DG: Once he got to the hospital in Kenya.

VR: I don't know if he was showing symptoms at that point. We don't know.

DG: I think he was.

VR: He probably was?

DG: Yes. What we're hearing is that he may have already been not feeling well for a while in the DRC. There may have been some issues. That's one of the problems when you ask people, like, "Hey, how are you doing? Do you have a temperature?" You take some ibuprofen. You take some Tylenol. You say, "I'm fine," because you're worried and you want to get through.

“No Help: Aid Arrived Too Late as Ebola Spread in a Congolese Town.” On a hilltop town in eastern Congo, work has started on a new Ebola center. When completed, it will anchor an effort to contain the virus in the town and its surrounding villages. Local health officials here say the center is too late. "Many lives could have been saved," the health workers say, "had a sustained effort to combat the virus started in the town of Mangala in June."

In other towns in Ituri Province, the epicenter of the outbreak, Ebola treatment centers were set up weeks after the WHO declared a health emergency in May. In Mangala, the Ebola response only started ramping up in August. Now, privately, however, some international health workers said that Mangala was simply overlooked. Dr. Wessam Mankoula, head of emergencies at Africa CDC, acknowledged the concern in Mangala and said it was difficult to establish treatment centers in every health zone affected by the virus. Really tragic.

VR: Maybe if the U.S. were helping, it wouldn't be so difficult.

DG: That's a huge issue. Yes, we've really stepped back. This whole we're going to step back from the world. You do that and people die. You now have, as we'll see here, this continuing, really rapid rise in cases. We're up to now 8,625 total cases, 4,151 total confirmed deaths.

VR: Just for the record, I do not approve of us withdrawing from the world stage in the sense of helping other people. We were able to do it. We should be doing it as a very wealthy nation. It is characterized by our president as being taken advantage of, but it is not. We are doing it willingly because we can, and it's the human thing to do.

DG: I think historically, this was part of our identity as the United States. This is part of our identity as the country that cared about the country that wanted to make a difference in the world. I think we, as Americans, we took pride in that. It's very hard now to take pride in all we care about is money and America first. We're basically seeing a lot of these are just little kids that are dying.

VR: Many Americans say, "Well, why should we help other countries? Why don't we help ourselves?" Health care is pretty good here. There are problems, but it's way better than

DRC, for example. We should be helping them.

DG: We can do both.

VR: Yes, we can do both.

DG: I have three children, and we feed them all.

[laughter]

VR: That's right.

DG: Not just the oldest.

VR: We should be doing both. We did it for years. The shortcomings in our own systems have nothing to do with us helping other countries. It's a fallacy that is propagated by people who lie all the time.

DG: Yes. I'm very curious to see if this is going to affect travel. Right now, let's say you went to the DRC to help. You would then, and this is the travel restrictions, this is what was on the CDC website when I checked, all U.S. and U.S. nationals who have been in DRC should plan to remain outside of DRC for 21 days before entering the United States.

VR: That's right.

DG: You go somewhere else for three weeks, and then you can come to the U.S. Now that there's a case in Kenya, now that this guy passed through Uganda.

VR: The U.S., after the last big outbreak, we built Ebola treatment centers throughout the U.S. We spent hundreds of millions of dollars because we can take care of these patients, and we're not using them because of this incredible hubris.

DG: The mortality is quite different. I was in Uganda during the last big Ebola outbreak there. I was talking to some of the Doctors Without Borders. Early on, you have these 80%, 90% Ebola case fatality rates, but then as time goes by and they get proper care, it drops to 20%. These treatment centers, they know what they're doing. We can save lives. Back home to measles. This is governor, they just say Hochul, but those of us in New York know, Governor Kathy Hochul declared a statewide health emergency in New York State on Monday.

VR: That word you can pronounce because you use it a lot, I guess.

DG: Yes. I have mixed feelings about Kathy Hochul, but I think I mispronounce it enough in the home that my wife likes me.

VR: [laughs]

DG: As of Saturday, 108 measles cases. This is last Saturday when people are hearing this. This is the most since 2019, when New York was the epicenter of a national outbreak. Most of the cases are in rural areas concentrated in the Finger Lakes region. I underline this next section because this is an article from *The New York Times*. They say Mrs. Hochul's declaration will relax rules about who could administer vaccines to make it easier for

midwives, pharmacists, and other healthcare workers to give shots to prevent measles. When you make this declaration, when you acknowledge that there's a health emergency, it gives you a little bit of flexibility to respond. It makes you a little faster on your feet.

VR: Normally, a pharmacy doesn't give MMR, and they only do certain vaccines? Is that how it works?

DG: It's interesting. They can right now. You could go in and get it, but I think they're really extending it, like midwives now. It is, as they say, midwives, pharmacists, other healthcare workers. Pharmacists have been doing this. I'm not really sure that's the most descriptive. Now, in *Emerging Infectious Diseases*, we have the article "Pediatric Deaths During Measles Outbreak, Jerusalem, Israel, 2025–2026." Just the highlights here.

Of 1,289 measles case patients during this April 2025 through March 2026 in Jerusalem, Israel, 11 children died. This is a measles-specific mortality rate of 1.1 deaths per 100,000. The measles-specific mortality rate among children less than 5 was 7.7 times higher, so 7.7 deaths per 100,000. 80.1 per 100,000 in six neighborhoods populated by ultra-Orthodox Jews, a 47% measles-attributed death fraction. A lot of these deaths were concentrated in specific areas. I'll leave a link because you can read a little bit more about what does that mean.

VR: Isn't that a little bit low, that death rate, one in 100,000? It's usually one in 1,000, isn't it?

DG: Yes. All right. It's interesting the way they do the math. We'll do the math ourselves. You say, "OK, you get 1,289 measles case patients, and you've got 11 children who died." That's giving me about one in 100 when I do that.

VR: Yes.

DG: Right? I think they're looking at a population impact when they give us the per 100,000.

VR: Oh, it's a population, not infected.

DG: Yes.

VR: That's a difference, yes. Measles is not mild.

DG: Well, when you die, unless you consider that a mild death, that's always that horrific thing. Then, "Oh, but these kids, they were going to die anyway." Well, yes, they were going to die anyway, but hopefully after they had lived for 80 years and had full lives, right? These were not kids that were just about to die. Then, we've got a lot of stuff today, so I'm actually having to pick and choose what we're going to talk about. I'm going to jump ahead to a, "Measles Outbreak in Amish Country Forces Some to Rethink Vaccines."

This is a good article. This is actually the Amish country of northeastern Ohio. There's a bit of a stereotype that the Amish are anti-vaccine. That's not really true. There are a lot of reasons why the Amish might reject vaccination. There's a lot of nuance here. If you read in this article, like most other Americans, many have never seen a case of measles before. They're not aware of how dangerous the virus can be. They're not aware it can lead to deafness, brain swelling, and even death.

A lot of these people, and this is based upon this health practitioner traveling through pastoral Amish country, many of them thought that measles would not be an issue. The contagion officially declared vanquished by vaccination, though, ripped through this family, the Miller family, over the summer, sickening six of the seven children and their mother. The Amish, as we read, are sometimes depicted as objecting to vaccination on religious grounds. Getting vaccinated was a matter of personal preference, family said again and again. Often it came down to a matter of family practice or tradition. If their parents or grandparents had been vaccinated, they probably would be too.

Vaccinations are also low because Amish do not have commercial health insurance or credit cards. They pay for medical appointments in cash. In an emergency, they turn to a mutual aid fund. The memory of the vaccination coming in and immediately dropping the death count across the country is, for some people, two to three generations ago. Should we talk about elimination and eradication and their difference here? I've got a note on this.

VR: Yes, and I disagree with one of the definitions, so let's do that.

DG: Let's do that. Vincent, let's talk about it. We talk about elimination. We talk about eradication. What's the difference?

VR: Well, eradication is you get rid of the pathogen. Zero smallpox virus, except in a few labs. There's no more virus; it does not transmit. It doesn't cause smallpox any longer. That's eradication.

DG: No more vaccines. It's been eradicated. You're good to go.

VR: Exactly. That's the only human virus that we have done that with. Very hard to do. Elimination, I would say, is elimination of the disease. That can be with or without virus circulation.

DG: Maybe polio would be an example, right?

VR: Polio, in the U.S., for a while, we had eliminated poliomyelitis until the case in New York State some years ago. The virus was still circulating. Yet, because we were immunized above a certain level, we had no disease. That is elimination. This is why we had eliminated measles in the U.S., but the virus was still circulating. It didn't cause measles because there was such a high population coverage.

DG: People would come from a foreign country with measles, but everyone was vaccinated.

VR: Exactly. Now that we have low vaccine coverage, especially in pockets, we have outbreak, as we've talked about for months, and it is no longer eliminated in the U.S.

DG: On that note, yes, we now are up to 4,020 cases of measles in the U.S. If you look at the map, we've got a bunch of areas where we have some pretty significant clusters. That's more than 200 in just a week. If we look at Pennsylvania, about half of them were right there, right? The last seven days. We're now up to 1,004 total cases in Pennsylvania, over 100 in just the last seven days. New York State - we have our dashboard here—over 100 cases now in New York State. We talked about that emergency.

What about flu? That time of year. Yes, in *Nature* we read, "Flu Season Could Kick Off Incredibly Early — What Scientists are Watching." I always like when they say what scientists

are worried about, and I'm like, "Am I worried?" Data show that flu season in the northern hemisphere might be off to an early start, prompting a rethink about when people should get their annual vaccines against the influenza virus.

The percentage of positive tests is unusually high for this time of year in places such as the UK and on the west coast of the U.S. In Japan, outbreaks in August and early September forced some schools to close just as they were trying to get back to school. It was an incredibly early season for the U.S. if the cases researchers are seeing on the West Coast continues to rise at their current rate. We're hearing that from Scott Hensley, a virologist at the University of Pennsylvania in Philadelphia.

The influenza subtype responsible for most of the U.S. cases so far is H1N1. Last year, H3N2 was the dominant. Then they say, "Sequencing data from these early cases point to an emerging mutation in H1N1 that is causing concern among specialists." "This year, the H1N1 mutation that is worrying researchers is G155E," Alex Greninger, a virologist at the University of Washington in Seattle, says.

Then they go, and they mention this preprint, which, hey, I got to go to the preprint. We got to talk about the preprint. You can see, and we'll go to this in some of our others, but surprising start. We have this nice figure. Hopefully, you on YouTube can see this. Normally, it's going to be about mid-October when we just start to see a rise. We're actually starting to see this rise already. They mentioned this special change in the virus. I went and looked at the preprint.

"Near real-time data on the human neutralizing antibody landscape to influenza virus in summer of 2026 shows antigenic advance of H3N2 subclade K region D mutants and H1N1 D.3.1.1 Sa mutants" posted, not published, but posted on bioRxiv. Here, these investigators looked at 52,268 titers representing neutralization of 148 viral strains by 355 human sera collected between April and August of 2026.

They saw that the new H3N2 subclade K strains mutations in antigenic region D, and new H1N1 subclade D.3.1.1 strains with mutations in antigenic region Sa, such as G155E—here's the pudding—reduced neutralization by human sera. There was a lot that I didn't really get here. I would have loved post-vaccination sera from the current vaccines that we're using and look at that. Are our current vaccines a good match, et cetera?

VR: You may have reduced antibody reactivity as a consequence of this amino acid change. By the way, it's not a mutation.

DG: Yes. [laughs]

VR: Is it clinically relevant? That's the key.

DG: We keep hammering on this, but it's important to use the language properly. At the genetic level, at the DNA level, you get changes.

VR: RNA.

DG: At the RNA level, you'll get changes. Those, if they're non-synonymous, if they change, you might end up with an amino acid change.

VR: Correct.

DG: Nice. The mutations are at the genetic level. These are amino acid changes.

VR: They say, this year, the H1N1 mutation is G155E. G155E is an amino acid change.

DG: Amino acid, yes.

VR: That's what they should call it.

DG: It's a G turning to an E at location 155. Now we'll know if you listen to *TWiV*, if you're annoying at that dinner party when you say, "Oh, you mean an amino acid change, not mutation."

VR: I always insist on the proper terminology. You cannot criticize me for that. I'm sorry. If you don't say the right word, how do you know people understand what you're talking about?

DG: I think that's important. Our map of the country, it's mostly still pretty green. It's early, but we're worried that we might be seeing this upward deflection. When we follow our curves, there's a little bit. I've got this nice thing here. Right here. You can see it's this blue. COVID, we'll talk about maybe it's coming down. Not much RSV activity, but we're actually starting to see a rise in our flu activity.

VR: It's not unprecedented. There can be earlier flu seasons in some years. It happens. The sky is not falling.

DG: Get your flu shot. Go out there, get your flu shot.

VR: Normally, we tell people October, which is when we are in.

DG: It's October. Go and get your flu shots.

VR: Go and get your flu shots. OK. Go get them.

DG: Yes, go get them. It's interesting. We're seeing the rise in our little kids. Most of the cases, if you break down these influenza-like illness visits by age, it's really the zero to 4 that are seeing.

VR: Is that because they're going to preschool?

DG: That's probably what it is. A lot of it is epid - No, no. It's because the virus has mutated and targeting the children. No, it's an environmental. I was joking. Now, talking about children and the flu, because we care a lot about this, last year, almost 200 children, 193 children died from the flu last 2025/2026 winter. Remember, 90% of these kids were not vaccinated. The majority of them were completely healthy before they got sick with the flu and died. These were not, oh, sick kids that were going to die anyway.

We have the article, "Vaccine-Preventable Infectious Disease Mortality Among Children in the Post-vaccine Era: Persistent Burden and Emerging Temporal Trends." This is published in *Cureus*. The study evaluated temporal trends, disease-specific mortality patterns, and demographic disparities in childhood mortality due to vaccine-preventable infectious diseases over 25 years. A total of 5,520 deaths due to vaccine-preventable infectious diseases were identified, corresponding to a particular crude mortality. Mortality declined

initially but subsequently fluctuated without a sustained downward trend.

Influenza accounted for 60.7% of all deaths, of all vaccine-preventable deaths. It was the only disease demonstrating a significant increase in mortality over time. You could see, actually, if you look at the different diseases, you could really see influenza. 3,352 of those deaths were due to influenza, 783 from meningococcal, 646 from pneumococcal, 338 from whooping cough.

VR: Hey, look, measles, it says suppressed because we don't know how many people died, right?

DG: Yes, because they're not talking about that.

VR: This is very sad. Very sad.

DG: You could also see there are particular populations. There's inequity here. If you look at American Indian, Alaska Native, 2.4 times higher than other groups, the adjusted mortality groups.

VR: This is probably failure to be vaccinated coupled with other health problems?

DG: Yes, other health disparities and inequities. You can get the shot. Does it work? It works, by the way, but another article. How good is it? Not as good as I would like, but we have the article: "Adjuvanted and High-dose Influenza Vaccines Had Comparable Effectiveness Against Test-confirmed Influenza Outcomes Including Hospitalizations in Overall and High-risk Older Adults in the 2022/2023 and 2023/2024 seasons." This was published in the *International Journal of Infectious Diseases*. They have a pretty nice graphical abstract.

What about the adjuvanted quadrivalent influenza vaccine? Little aQIV, adjuvanted quadrivalent versus high-dose HD quadrivalent. These are results of a retrospective test-negative design study that included U.S. adults ages 65 years or older vaccinated with one or the other. Comparable protection in the prevention. This is prevention of test-confirmed influenza among older adults in any ED hospitalization settings and for hospitalizations overall.

VR: I don't need to get the high dose?

DG: The adjuvanted is another one of the senior options.

VR: Oh, aQIV versus high-dose HDQIV?

DG: You get adjuvanted, yes.

VR: OK.

DG: What did you end up getting?

VR: I don't know.

[laughter]

VR: I said, "Is that high dose?" and she said, "Yes," but who knows? [laughs]

DG: No, nobody lies.

VR: I should go look on the website. I could find out.

DG: Yes, find out what you got. I actually have to get some documentation of my flu shot. I got the cell-based, the Flucelvax. OK. The article, "Influenza Vaccine Effectiveness Against Influenza A–Associated Hospitalization and Severe In-Hospital Outcomes Among Adults in the United States, 2024–2025." This is published in *CID*. The U.S. 2024-2025 influenza season was characterized by sustained elevated activity from November 2024 through April 2025, with circulation of both influenza A(H1N1) and influenza A(H3N2), the latter of which included some antigenically drifted viruses.

Now, from October to April, a multistate respiratory virus surveillance network enrolled adults hospitalized with acute respiratory illness in 26 U.S. medical centers. The influenza vaccine effectiveness against influenza-associated hospitalization and severe in-hospital outcomes was estimated using a test-negative study. The seasonal influenza vaccine was effective against influenza-associated hospitalization. Only 40%. 40% there.

This is consistent across age group and influenza type. Influenza vaccination also reduced the overall risk of all severe in-hospital outcomes evaluated, including standard oxygen therapy, VE of 41%, noninvasive respiratory support, VE of 38%, invasive organ support, 58%, ICU admission, 58%, and most importantly, death, 52%. They were not as good as I would like. Things are still quiet on the RSV parts.

VR: I looked up my vaccine record.

DG: Let's see. I'm looking at it.

VR: I got Fluzone high-dose.

DG: OK. Good stuff.

VR: Made by Sanofi. Look, it tells you the lot, the route, and the site of injection. At the same time, I got - All right. That's last year, so these are -

DG: This is CVS. This is great, the CVS, I assume.

VR: These are all my flu vaccines, and then you can go and look at COVID. Let's take a look at COVID.

DG: Oh, this is so great.

VR: This year, I got mNEXSPIKE.

DG: Oh, wow.

VR: Which one is that?

DG: The Moderna has two, right?

VR: Yes.

DG: This is the second generation of the Moderna.

VR: Oh, it's just the RBD?

DG: It's 25% more efficacious at the outcomes compared to -

VR: Look, they tell you it's only for 12 years and up. I didn't know that. All she said was mRNA, right?

DG: Yes.

VR: [chuckles] Good. CVS does a good job, that they have the whole record there. All the details is very good.

DG: That's great.

VR: And you can download it and save it. Good.

DG: All right. Our COVID update. Don't forget the bluewashing, and don't forget the notice. We got a notice right at the top. This is, can we trust this? CDC competitively awarded a new wastewater testing contract to Verify?

VR: Verily.

DG: Verily. Verily Health Incorporated. On September 28, there will be a brief gap in wastewater data affecting about 200 sites as sampling, testing, and reporting are restarted.

VR: Let's see who owns shares of Verily, or who owns the company.

DG: Can you check that for me?

[laughter]

VR: Look, I would say COVID is going down.

DG: It's really, yes.

VR: This is our full peak, right?

DG: Yes, we've peaked. We're past the peak. It's really on the way down. That's really a drop.

VR: Now, folks, it doesn't mean there's zero cases. It's just dropping, all right?

DG: It's also regional. It's very regional, right? Texas is -

VR: True.

DG: - still gangbusters. We still have a lot going up in Washington.

VR: Let's sue the pediatricians for giving vaccines.

DG: There's still high activity in Massachusetts, Connecticut, so it's really interesting. Like some areas where we're seeing moderate activity in Florida, but a lot of places: New York, Pennsylvania, Maine, New Hampshire, Vermont. All right.

VR: Our lights are blinking. What is that?

DG: Look at that. I don't know. Interesting.

VR: This is what you get by living in the back country.

DG: It's all solar. It's all solar-based electricity. We'll see how that works out.

VR: It's running on batteries.

DG: Yes, at this point. I don't know why that's flickering. Interesting. Now, this actually should impact our recommendations because if you have a seizure, I'll let you know from the flashing.

VR: People are going to see it, and that's why, because the lights are flashing. Sorry.

DG: Sorry about the flashing lights. Would it be better to turn them off?

VR: Where's the switch? Is it here?

DG: I think it's right around the corner there.

VR: Over there?

DG: Yes, just right around the corner there. Let's stop the flashing.

VR: We have a different color now, but it's OK because it's not flashing. That's going to annoy people, and we don't want to annoy you, folks.

DG: All right. We've turned off the lights. We're slightly different. We're having a little bit of a flashing. I don't know why that was happening. We're up at this backcountry lodge, and it's all off-grid. All electricity comes from solar. We get a little bit of hydro, about 200 watts coming from that.

VR: The water is also from -

DG: From the spring.

VR: -the spring.

DG: Let's see where we are. Now, I would say this article should help with our recommendations, because I don't know if people remember, but people would ask, "Oh, I'm on these biologics that are impacting my immune system. I'm thinking about getting a shot." Our recommendation was, "Why don't you stop for a couple weeks?" The idea that maybe that was going to help boost your response, but that was not without potential risk. You stopped the medications, and maybe people are going to-- now they're going to have a flare. Maybe their disease was under control.

We do this study, and this is great. We have the article, "Temporary Cessation of DMARD Therapy," that's stopping dose, things like Remicade and Enbrel, and the like, "and COVID-19 Supplemental Dose Vaccine Immunogenicity in Patients With Inflammatory Arthritis: The COVER Randomized Clinical Trial." Basically, I'm just going to cut to the chase on this. There's a couple things they did. You've got the two groups. You've got the group where

they continue, and you've got the other group where they hold the therapy for two weeks.

These could be different; we'll say, immunomodulatory therapy, where they're using anti-tumor necrosis factor, maybe an anti-interleukin-17, Abatacept, Janus kinase inhibitor, and then they're going to either hold or not, and they're going to get their COVID-19 shot. The primary outcome was going to be change in IgG levels. As we read, they're going to look at baseline to six-week follow-up, expressed as the geometric mean fold rise. I realize we've been talking about geometric means for years. I don't think I've ever really done a little bit of a primer on what are the different means. We've got an arithmetic mean. We've got a geometric mean.

We're all probably familiar with the arithmetic mean. This is like you got a bunch of numbers, you add them all together, and then you divide by the number of numbers. Geometric means is interesting. You actually multiply the values, and then you take the root, and the root based on how many. This is the classic example. Let's say you've got two and eight. Now, the geometric mean is going to be 2 X 8 is 16, and then we take the second root, which would be the square root, and that gives us a 4. If you did the arithmetic mean, you're going to say 2 + 8 is 10, divide that by 2, and you actually get 5. You get different numbers. Sorry to interrupt this program for that educational message.

VR: Which number do you pay attention to?

DG: Why do we do that? For linear data, you use the arithmetic-

VR: I see.

DG: -mean, but things that have growth rates or things that have investment returns or things like more of an exponential rise, you capture it better by doing the geometric.

VR: A virus growth should be-

DG: Should all be geometric.

VR: -geometric. OK. Infection outbreaks should be geometric?

DG: Geometric, Yes.

VR: I got a good grade.

DG: You did. You picked that right up. You picked that right up. Should we take that two-week break from medications? The answer turns out, no. Among 840 randomized participants, the continued group, 76% ladies, standard deviation, a little bit there, substantial, they did see increases in the SARS-CoV-2 spike immunoglobulin levels, but what was that difference? It was 0.96 with this wide confidence interval. It was not significant as far as the difference, but there was a significant difference in the disease flare.

Really, more than twofold likelihood that you're going to get a flare of your disease. You're not really getting much advantage, but you are getting a downside. I think in the future, when people ask, "Hey, I'm thinking about getting my vaccine. I'm on this disease-modifying drug. Should I hold it for a couple of weeks?" the answer is no. The answer is, "Go ahead, get your vaccine." You're not going to get much more, and you risk a flare.

We're getting to the end of my articles. This one is near to dear because I sat on the ASH Anticoagulation Committee for COVID through all of the pandemic, pretty much from early on. We were always talking about, "Should you anticoagulate people? Are they at risk? What dose? Should it be just preventative, or should it be full therapeutic dose?"

We have the results of "Prophylactic vs Therapeutic Anticoagulation in Hospitalized Patients With COVID-19 a Randomized Clinical Trial," published in *JAMA Network Open*. These are the results of that prospective assessor-blinded multicenter parallel group one-to-one placebo-controlled superiority randomized controlled trial, the HERO-19. They did everything. They assessed patients with a confirmed diagnosis of COVID-19. Basically, they're going to ask: should they be on therapeutic, or should they be on just the prophylactic dose?

The primary outcome was time to first occurrence of all-cause mortality and/or venous thromboembolism or arterial thromboembolism. Getting a clot in the vein, getting a clot in the artery, dying within 42 days. This occurred in 14 of 67 patients. 21% of those assigned to the therapeutic and 29% assigned to the prophylactic. Quite common, actually. A hazard ratio of 0.74 and 0.66 in the different ways you assess this. There is a little bit of a difference.

VR: Yes, there is, but it's not as much as you would like, right?

DG: Also, there's the issue that there was a little bit of bleeding difference. Seven bleeding events in the higher, six in the preventative group. At least we have the information. You do see a significant number of people having these complications. There is a little bit of ability to reduce it, but you have to be aware of the potential increase in bleeding risks.

That is going to bring us to the end, as we say. I don't know if we like to say this, but as we point out after each week, no one is safe until everyone is safe. We live in a community. You pull on one thread, we're all connected. Right now, we're in the middle of our American Society of Tropical Medicine and Hygiene fundraiser. We're doubling your donations. We're trying to get up to a pretty high number this month because we're going to be supporting the Dickson Despommier's One Health Memorial Lecture Series. Dickson was one of the founders of Parasites Without Borders, so it's a little sad to be doing our retreat without Dickson with us. Go to parasiteswithoutborders.com and click on that "donate" button.

VR: It's time for your questions for Daniel. You can send yours to daniel@microbe.tv. Julie writes, "What is the likelihood of acquiring an infection from A, flushing of toilets, B, high-speed hand dryers, or C, elevators?

DG: I like this. Is this like a multiple-choice? Let's go through. This is fun, actually. This is the kind of stuff. Are we going to play Bananagram or Scrabble, or are we going to talk about this stuff? Flushing of toilets, you guys covered a really good study on a *TWiV* deep dive a few years back. When you flush the toilet, there's this plume that forms. It does. It forms a plume, and it fills that whole stall area. There's a bunch of different ideas about, so there are microbes in that plume.

VR: Sure.

DG: We would think, "Oh, I'll put the toilet down," but it actually didn't really reduce it because the plume still comes out.

VR: Yes, toilet down doesn't help.

DG: Yes, toilet down doesn't help. There was this idea that you're like half out the door, and somehow you kick it with your foot and run at high speed. There is a plume that forms with the flushing of toilets. The high-speed hand dryers -

VR: Wait, before you leave plumes.

DG: Yes, let's talk about plumes.

VR: We don't really know that it does anything. That's the problem.

DG: We don't.

VR: We have fecally-transmitted organisms, so noroviruses and rotaviruses. Theoretically, they could be transmitted.

DG: *E. coli*, bacteria, things like that, right?

VR: Do we have any evidence that they are? We don't, really.

DG: Yes. That was the great thing about that episode. You can do that part. You can say you flush it. There's no way to prevent the plume from forming. The second part, I guess you got to have ferrets in there or something.

VR: You would have to, because all the experiments they do are with phages, and they show that the phages get everywhere in the room. Really, in theory, yes, it should transmit. I don't know if you remember, in SARS-1, there was an outbreak of SARS in an apartment complex traced to a guy who had very severe SARS-related diarrhea, flushing the toilet, and it went through the plumbing and infected a lot of people.

DG: Yes, I remember that study. Something gardens or something.

VR: What would you do? You're going to wear a mask every time you go in a public toilet? No.

DG: We don't recommend kicking the thing and running because it's one of the, like, hold till I swallow. It's like**,** you want to make the story that stuff is out of there because you don't want other people - and you don't want to come into a toilet with--

VR: Basically, what we can say is, aside from this SARS-1, I don't know of any epidemiologically confirmed toilet-driven outbreak. I think it's pretty low.

DG: The same actual science surrounds the high-speed hairdryers, right?

VR: Yes, and hand dryers. [laughs]

DG: The hand dryers in the bathrooms, right?

VR: Yes.

DG: We do see that, like, oh, you go, and you can culture all this stuff, but do we ever see an outbreak of some disease-related, or do we ever document that?

VR: There are two kinds. There are ones where you put your hands in it and-

DG: The Dyson ones, right?

VR: -the air basically is blowing in your face, and the others that go down. I try and use them to save paper. Again, I don't think epidemiologically we've ever traced anything to that. Like Taylor Farms, we traced an outbreak to Taylor Farms. We have never traced an outbreak to hand dryers or toilets.

DG: That's correct. Elevators.

VR: Elevators. Have we ever traced an outbreak to elevators?

DG: It's always like those anecdotes. What Chuck Knirsch said the other day, he said, as Dickson would say, "This is anecdotally true." [laughs]

VR: That's right. It's anecdotally true. In an elevator, you could touch a button, and those are high-traffic things, right?

DG: Yes.

VR: Also, there are other people in the elevator, but I don't know if you're in it long enough for them to transmit something to you. Again, I think they're all anecdotal, but I wouldn't change your lifestyle. Don't walk up 100 floors because that's probably more detrimental to you.

DG: I think that might be good for you.

VR: That'd probably be good for you. Al writes, "Thank you always for your hard work informing the public about recent developments and how to best protect ourselves and others. Thanks to data you have shared over the years. I've convinced several friends and family members to look into and often get vaccines and boosters they thought they didn't need or didn't qualify for. The podcast is still making a real difference in changing minds and raising awareness.

Now, a vaccine inquiry. As background, I received one MMR shot as a child, and several decades later, I'm hearing that it might be good to get boosted, especially as I will be traveling in a few months to a place that has had some measles outbreaks. However, in my non-U.S. country, the MMR vaccine for adults is not subsidized and can be quite pricey, whereas a measles-only vaccine is more affordable. My question is, should I also be making sure to get some extra protection against mumps and rubella, or is it really measles that is the most important? I'm willing to pay the difference if that's the medical recommendation, but I'm wondering if my one childhood vaccine was sufficient for those diseases."

DG: This is a good one. We've talked a lot about, so late 1980s is when they realized, like, "Hey, we're doing OK with the one MMR with regard to measles, but then we went to the second, and we did even better." People quote 90% up to 97%. What people don't talk about is mumps. What about the benefit of the second? The one-shot mumps is not so great. You get a really nice kick with that second shot.

Getting another MMR, because you're trying to decide, "Should I bother?" you're really going to bump your mumps protection even higher. I've seen cases of mumps. I've seen

outbreaks. There was an outbreak on a particular airline where a number of the stewards had mumps, and then there was a big outbreak. We won't mention the name of that airline. No. I'm going to say it's a small price to pay for that protection, and you will get protection for measles. You're also going to get even more protection for mumps.

VR: Isn't it unfortunate that we have to make decisions based on money that we pay for vaccines?

DG: It is. It is.

VR: It should be for everyone in the world.

DG: This is one of those tough things; the idea of a certain level of health and access to healthcare should be something that everyone has access to. Mumps is miserable. Most of the time, we're seeing it might start unilateral, but it becomes a bilateral inflammation of the parotid glands. Swallow, it's just incredibly painful. You look like a chipmunk. You go out in public with the big -

VR: It may cause infertility.

DG: I'm thinking this guy might be past that, so I wasn't going to mention it. Then you might spread it to someone, and then they can't have kids.

VR: Chirag writes, "Hello, Dr. Griffin and Dr. Racaniello. (I don't know whether to say professor or doctor, as you have also completed a PhD.)" In Germany, you'd be Herr Doctor Professor.

DG: I make my kids call me Dr. Doctor. When I was coaching soccer, it was, Dr. Dr. Coach Griffin? [laughs]

VR: Oh, great. "I've been listening to *TWiV* since Dr. Griffin was giving the updates by the stairs and found it informative. I want to thank you both and the rest of the *TWiV* team with these Saturday episodes as well. I have learned so much about viruses and vaccines. In *TWiV*'s 1360, there was a question on mumps vaccine. As the CDC stated before the current one, but the information on this remains unchanged, one dose of MMR is 72% effective against mumps, and two doses 86% effective against mumps." There's a link there.

DG: That's good.

VR: Very good.

DG: That's what we talked about.

VR: "In addition, either due to not as immunogenic strain, but with no risk of aseptic meningitis used in MMR, or that the MMR mumps strain is genotype A, and the strains that cause breakthrough are other genotypes, there is a higher chance of breakthrough infection. This is typically after 10 or more years after the second shot of MMR. See this article."

DG: This is great.

VR: "Now, a third dose of MMR may be used during mumps outbreaks. When the U.S.

moved to two doses for MMR, it also reduced mumps cases substantially too. Based on all of this, I do think at least two doses are necessary for protection against mumps instead of one."

DG: Oh, this is great.

VR: Ted writes, "I've been listening to *TWiV* since early 2020, and I very much appreciate the great work you have been doing. I have just now been listening to *TWiV 1360*, in which you talk about vaccine reactivity. You mentioned the idea that if you have a lot of side effects and symptoms, this is good because it means your system is especially well-primed to fight off the virus if it shows up, and then mentioned that the flip side, that is if you have a symptom-free vaccination, this is bad news and you might have less protection. Doesn't get discussed much.

Of course, it might not even be true, and I can see that there may be social value in telling people they should welcome the aches and fatigue of a vaccine reaction because that mindset will increase the take-up rate. Anyway, I listened to this with particular interest because I, a 74-year-old man who has been taking every recommended COVID and flu dose since spring 2021, am precisely that guy.

I got this year's COVID and flu jabs four days ago, and I've had no reactivity at all, so should I worry, or more precisely, what actually are the findings regarding vaccine reactivity versus infection rates and infection severity? I would think somebody must have studied this in the last five years." What a good question. I never have reactivity, and I don't worry, Daniel.

DG: I think this was triggered by our discussion of that article "Baseline Interferon Signaling in Monocytes and Antibody-mediated Immune Activation Associated with Reactogenicity to mRNA Vaccines." Basically, they were just looking at serum antibody levels. I remember saying, "Oh, so now you say, 'Oh, if you had a really bad reaction, that means your immune system is really revved up and learning, and that's great.'" I'm like, "Yes, but what do we tell people I didn't have a bad reaction?" I think the thing is we know the vaccines work. If you get reactogenicity, you might be getting a little bit higher antibody levels. I hope that makes it a little bit easier for you to suffer through that. No, if you don't get reactogenicity, you're good.

VR: Our last one is from Jay. "Writing here to share a success, one that you helped inspire. Details slightly altered to maintain confidentiality. I'm an ID physician. I was curbsided last week about a 65-year-old man living with HIV, stage 4 CKD, pulmonary HTN on sildenafil, and a-fib on renally-dosed apixaban. He had mild flu-like symptoms, had just tested positive for COVID. The question was, what do we do for him? I suggested remdesivir. We got it for him via home health within a day. I'm delighted we were able to get remdesivir to him quickly. He's the poster child for it.

I wish all medical providers had access to it for their patients who need it. It's still too difficult. I gave this man a call to check in with him this weekend, and unfortunately, his 90-year-old father with diabetes and stage 3 CKD who lives with him was also now symptomatic and positive for COVID. He took his father to urgent care. His father was prescribed benzonatate and ipratropium." I can't pronounce things either.

DG: That's OK.

VR: "The urgent care note read, 'outside of Paxlovid guidelines.' I did a quick telemedicine consult with the father, called in renally dosed Paxlovid. How do we combat this lack of knowledge that stands in the way of people getting safe medications with proven efficacy? How do we inspire more home health agencies to provide remdesivir? I think the answer is through the work you and Vincent and the rest of the *MicrobeTV* and you, too, listeners, are doing. You are leading us in this enjoyable and educational conversation with each other. You bring joy to this work that, at its heart, should be joyful. With gratitude and solidarity, Jay."

DG: Now, thanks for sharing this, Jay. I'm glad you jumped in. That's just what a cop-out, "outside of Paxlovid guidelines." This is the high-risk 90-year-old. This is a person who has a really high risk of ending up in the hospital. Early antiviral therapy can dramatically reduce that.

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

DG: Thank you. Everyone, be safe.

[music]

VR: Just looking out the window at this view, Daniel. The mountains, spectacular.

DG: It is amazing. You've got just the sun. It's lighting the-

VR: Beautiful.

DG: -mountains over there.

[01:14:18] [**END OF AUDIO]**

[01:14:21] [END OF AUDIO]