Sawbones 573: Measles 2026

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["Medicines" by The Taxpayers plays]

Justin: Hello, everybody, and welcome to Sawbones! A marital tour of misguided medicine. I'm your co-host, Justin McElroy.

Sydnee: And I'm Sydnee McElroy.

Justin: And Sydnee, I think the top story in the world, we can all agree, is new dishwasher day!

Sydnee: Yeah, that's true!

Justin: We have hated our dishwasher the entire time we have had it, and I don't know if you have an appliance like this in your house that you just despise, but our—as a birthday gift to Sydnee, we're finally getting rid of the old dishwasher and putting in a new dishwasher. And the top story in the world, I bet, is new dishwasher day.

Sydnee: Well, I don't know that it's the top story in the world.

Justin: It's a fine day!

Sydnee: I mean, I am very excited about it. Our old dishwasher was sort of a form over function kind of situation.

Justin: It like blends in with the countertop, you can't see it as well, but it's—doesn't have—

Sydnee: It's so small, and the design of it, like where the—

Justin: You can put two plates in, it's like two plates!

Sydnee: It just sucks. You don't want to hear about this—

Justin: Don't get us started—

Sydnee: I just—

Justin: On the Z Line! Because I hate that stupid dishwasher!

Sydnee: I always want something that works better over aesthetics. That's my bias.

Justin: But maybe, okay, maybe it's not the number one most important happening.

Sydnee: No, it's not.

Justin: Thing happening in the world right now.

Sydnee: It's not. One of our listeners, Ben, thank you, Ben, pointed out in an email that it has been over a decade since we talked about measles. And normally we don't just kind of like do an episode over, but it is something that if there's new information or things have changed, we do like to update periodically.

Justin: We're starting to revisit.

Sydnee: And so, I—because measles—

Justin: I feel like if Marvel can reset a cinematic universe like in that time span, then we are certainly within our rights to reset the measles Sawbones universe. [chuckles]

Sydnee: Well, I also will say, over time, our show has changed a lot, and expanded the way that we address topics. And I used to do a lot more kind

of what I think of as almost like survey episodes, where I would like cover—try to quickly cover everything about a topic.

Justin: Mm-hm.

Sydnee: As opposed to honing in on a specific piece of it. But now, I do more—like we do more episodes on the show that are like a chunk of the story. And I think this is relevant here, because when I reviewed, I went back and read the transcript of our entire episode that we did about measles very, very long ago--

And it was more of an ancient look, like a historical look at like the old—what we used to think about measles before we called it measles, before we isolated the virus, before we knew how to prevent it, before all of that. And then some of the kind of like funny treatments that people tried over time, silly approaches to managing it. And I—

Justin: A lot of that's probably still applicable, Syd. I don't even think we need to update a lot of that old stuff.

Sydnee: No.

Justin: That old stuff probably still carries.

Sydnee: We skated over the vaccine development piece of it, how we got the vaccine and what the vaccine is. And so, I thought like delving a little deeper into that. So, this is some new stuff, this isn't a retread of our old episode, this is stuff we didn't really elaborate on.

Justin: Don't turn it off and be like, "This is old garbage, I already listened to it." It's new, all fresh.

Sydnee: And then—and then talking about like why are we talking about measles right now. It is in the news, why?

Justin: It's the top story, even bumping out new dishwasher day.

Sydnee: Yes, it is. And it's interesting, when I read our transcript from 10 years ago, the reason we talked about measles at that moment is because there had just been a huge measles outbreak that started at Disneyland.

Justin: Yes.

Sydnee: And so it was in the news, that there were—there was this huge measles—a bunch of people went to Disneyland, and then it kind of spread from there. And in the episode we make the plea, please get your measles vaccines, because at the time, our six month old, Charlie—

Justin: Wild.

Sydnee: Was too little to have received her measles vaccine.

Justin: Were you still holding her at that point?

Sydnee: Probably, I was probably holding—I'm crying, in the episode, I think I'm crying. Like the transcript—and I didn't listen, I just read, but I think I'm crying, so I probably am holding her and crying and begging you to get vaccinated. So, which I don't know, it might end that way. She's home sick from school today, not with measles, thank goodness.

But maybe I will end hold with—holding her crying, begging you to get vaccinated. It's in the news again for a bad reason, because we're seeing more and more cases of measles. Our numbers, which were dropping for quite a while, have steadily risen since 2008--

And now we are hitting, I would say, kind of a crisis point when it comes to measles and anti-vaccine sentiment generally—and then specifically against the MMR vaccine, which includes measles, is higher than ever. And not just among the public, but I think is being given a voice in the government, and is being codified in a way that we have not seen previously, right?

Justin: Mm-hm.

Sydnee: And so, I want to—first of all, I think it's really helpful, I'm going to talk about the development of the measles vaccine. But before I talk specifically about that history, Justin, do you remember how vaccines work?

Justin: Yes, I know exactly how vaccines work, Sydnee.

Sydnee: Would you like to—

Justin: I'm a world-leading expert.

Sydnee: Would you like to explain it? Because I think—while I absolutely believe that many of you listening already understand how vaccines work, I think retreading that ground for anyone who doesn't, and then being able to talk about it in a way that is really easily accessible to others, helps alleviate fears and hesitancy about vaccines.

Justin: Right.

Sydnee: Yes.

Justin: Okay, so, imagine the… imagine that Measles is sort of like a criminal that's gonna—that's been going from town to town, robbing banks. Okay? There are—there's been a string of bank robberies, and these people come to your town and they say,

"Listen, there's this bank robber named Measles, he's been going from bank to bank. We have this picture of him. This is what he looks like. He looks exactly like this." And somebody comes out of the—of the bank back room and they're like, "Oh my god!" Like they're scared of the picture, right? And they're like,

"Don't worry, it's just a picture. This is exactly what he looks like. But when he comes to town, you'll know exactly what he looks like. This is what he is, it's—but listen, calm down. It's just a picture of him." And then they leave, and then that one guy is still like, "Whoa. That was terrifying." So, he's a little shaken up. But it's just a picture. Everybody reminds him, it's just a picture.

Sydnee: It can't hurt you.

Justin: It's just a picture. But remember what he looks like, so when he comes to town, we can call the… that guy and say, "Hey, he's here. We got him."

Sydnee: Right. And we can bring in whatever our protective force in this—I don't know, are these sheriffs, are these police officers? Is this the military?

Justin: They were special investigators, I think.

Sydnee: Okay.

Justin: And they also brought the picture, so we've already met them.

Sydnee: But like, they're gonna call in the troops. They're the defensive. That's the—that's the important part, is when you see the picture, you activate the response system—

Justin: He's like the military police.

Sydnee: Yes, and now—and then—

Justin: You see this, call the police.

Sydnee: The military shows up, and immediately the threat is neutralized.

Justin: I'm trying to avoid sending the police, because like police sentiment is not—I don't—I'm trying to use—

Sydnee: I know, well, I'm—

Justin: Avoid using them as like a—

Sydnee: Well, we're talking about your immune system—

Justin: Stand in for—yeah, right, so…

Sydnee: And we often—I mean, I talk to kids a lot about this. We often describe our immune system as some sort of army, some sort of military force that protects us. I mean, we use that terminology. Should we—should we come up with something better? I guess this is a whole other conversation. But the point is, this is common—this is a common way of explaining how vaccines—

Justin: That's the basic idea, is it teaches the body what the—what the bad thing is.

Sydnee: I mean—

Justin: In a way that doesn't make the body react that way, but in a way the body knows how to react—

Sydnee: Yes, because—

Justin: Knows how to kill it before it finds purchase.

Sydnee: We observed that people, for certain illnesses, you get an illness once, and if you survive it, you'll never get it again. And that's cool. How can we replicate that, except you didn't actually have to get sick and almost die? And that's what vaccines do. In the late 1950s and early 1960s in the US, there was a lot of pro-vaccine sentiment. Like belief and faith and celebration of vaccines was very high because of the success of the polio vaccine.

Justin: The space race.

Sydnee: No, the pol—because of the success of the polio vaccine. So, for decades, people had waited every summer to see which of their children were going to get polio, who was going to end up in an iron lung and who was going to die.

Justin: Terrible time, listen to the—we did an episode on that.

Sydnee: Yes.

Justin: It was terrifying time.

Sydnee: And so, the polio vaccine was a revolution in public health and safety, and especially in, I think, societal faith and parental faith in vaccines. Because all of a sudden, your kid wasn't gonna die of polio. Which was a question you had, I imagine, if you were a parent from that era, pre-polio vaccine, the second you gave birth, "Will I lose this kid to polio?"

Justin: Right.

Sydnee: I don't know. And after the success of the polio vaccine, researchers started looking at what's the next frontier. We did polio, what else could we do? For John Enders, who was one of the people who helped make the polio vaccine, his target was measles.

Measles was an incredibly common childhood disease, one of the most contagious viruses, period. Spreads fast, a lot of people are going to get it. Most are going to get better, some are not. It can kill in weeks. It can cause severe pneumonia, inflammation of the brain.

So, it was a big deal, and it was a virus where, similarly to polio, we had just sort of accepted that, as part of childhood, kids were gonna get measles. And while most of them would just be really sick and get better, some would die. And as a society, we had accepted that, there was nothing we could do. It just was what it was. And when measles came to your town, you, I don't know, pray, cross your fingers, do whatever you do for good luck. Because there was going—there was—there was nothing else to be done. And so, John Enders decided in his lab, "We're going to take on measles next. We're going to stop this."

Justin: Mm-hm.

Sydnee: Okay, so, there was an outbreak of measles in January of 1954, in a school, Fay School, which was a boarding school for boys in Massachusetts.

Justin: Okay.

Sydnee: Okay? And John Enders saw this outbreak, which, again, wasn't—this would not have been rare or uncommon. There were outbreaks constantly of measles at this period in history, so, you know. But this outbreak was an opportunity for him to try to get the virus. So, in order to make a vaccine, you first have to isolate the thing you want to make the vaccine against, right?

Justin: Mm-hm.

Sydnee: You have to have the virus. I mean, you're not literally holding it in your hand, but you know, if that—it's a—that's a helpful way of thinking about it.

Justin: Sure.

Sydnee: You have to have the virus or bacteria, or whatever it is, you gotta have it, and you gotta be able to look at all the pieces of it. And you got to be able to know which piece of this is going to make your immune system react, but not make you sick.

Justin: So, he sees this school and he's like, "Yes, this is like a lab. This is the perfect setting for me to go study."

Sydnee: Yes. And this is, at this point in history, measles was infecting around 500,000 Americans a year, killing about 500. There were epidemics other places, this was not just an American problem. In outbreaks in West Africa, 25% of infected children were dying at this point.

So, this is a huge deal. So, he sees this and he's like, "Okay, we're going to isolate the virus from this boy's school." So, he sends Thomas Peebles, brand-new physician, straight out of med school. He had seen polio outbreaks growing up, he wanted to fight infectious diseases, just like his heroes, like John Enders had done.

So, he's working in his lab, Enders hands him a bunch of swabs and says, "Go to this school and swab every one of those infected boys. We're gonna get a sample of this virus, and then we can start to build a vaccine."

Justin: "One of these boys is going to give me my virus! Open up, son, I'm looking for measles!"

Sydnee: Yes. So, he went and asked them all, in the name of science, to help us out.

Justin: "I'll give you—everybody gets four Pokémon cards. If you—boys, for every one of you boys' throats I swab, you get five Pokéman cards!"

Sydnee: Do you want to—I mean, this is literally what he said to them.

Justin: "Young man," he said, turning to each sick boy in turn, "You are standing on the frontiers of science."

Sydnee: Do you think that would have—do you think that inspired them? Or do you think they were just like—the headmaster was just like standing—"No, just open your mouth. I don't care if you want to or not."

Justin: If after that he was like, "The thing about the Pokéman cards still stands!" They would be like, "Hurray!" And then they would do it.

Sydnee: [chuckles] So, they took samples from all these boys at the school, and they took them back to the lab, and they started working on—like, they're trying to basically culture them in human kidney cells. They're trying to grow the virus, like replicate the virus. Put the virus in there and watch it replicate, and find it in other cells. Okay?

Justin: Yeah.

Sydnee: And it took a while, it took—they're growing this virus, and they're trying, and there were some failures. And then finally, one of the samples—which, the way this is worded, by the way, it's "13 year old Fay pupil, David Edmondston," When I say Fay—[chuckles]

Justin: She doesn't mean he has elfin ears and bat wings, and is bound by his word, and can smell arousal. It's not like that!

Sydnee: [chuckles] No, no. What I mean is, David Edmondston attended Fay School, for boys.

Justin: He learned—

Sydnee: F-A-Y—

Justin: He was learning—

Sydnee: Fay—

Justin: How to smell arousal.

Sydnee: [chuckles]

Justin: He had not at this point.

Sydnee: I get—every—I—the first time I—

Justin: It's Fay School! He's learning!

Sydnee: Every time I read these, because the—he's referred to, there's a lot of different accounts of this, and he's often referred to as "Fay pupil, David Edmonston." And it's like, well not faye, not faye. Just the school was the—that was the school. Anyway, so this 13 year old David, for whatever reason—I mean, you know, this happens, right?

We can isolate a cell line, a bacteria, a virus, from a specific person, for whatever reason we do. And this becomes—the Edmonston strain of measles becomes the virus that we can start working with and build everything that comes, like the measles vaccines that come after that.

So, Dr. Peebles in Dr. Enders' lab is able to isolate the Edmonston strain. They're very excited. They have the virus now. And so then, I mean, the first thing you do is try to make sure that it is the measles virus, so you've got to, unfortunately, give some monkeys measles. You give the monkeys measles…

Justin: Can't make an omelet…

Sydnee: And you give them the—you inject them with what you think is the virus, they get sick with what looks like measles, and now you know you've got the virus. So, that was step one.

Justin: Okay.

Sydnee: We have the virus, it's David Edmondston's, Fay pupil.

Justin: Yeah.

Sydnee: Now we're gonna make a vaccine against it.

Justin: Okay.

Sydnee: Okay?

Justin: All right.

Sydnee: And Dr. Sam Katz is who's helping out in this effort. But before I tell you about the vaccine, we gotta go to the Billing Department.

Justin: Let's go!

[theme music plays]

[ad break]

Justin: Okay, you were withholding development of the measles vaccine until you got your money, Dr. McElroy. Very capitalist of you.

Sydnee: [chuckles] It was.

Justin: Now you can finally reveal to us—[chuckles]

Sydnee: It was very American healthcare system.

Justin: [chuckles]

Sydnee: So, if you think about it, now you've got the virus, and you want to—I want to put it in—I want to put something in your body that's going to make you immune to this virus. Okay, we'll start—it's like a thought experiment. Well, if I put this virus in you—

Justin: You get sick.

Sydnee: Yes. But you will generate an immune response.

Justin: Huge.

Sydnee: But you get sick.

Justin: Yeah.

Sydnee: Okay, so we don't want that. What we need to do is change this virus in some way. Either we need a piece of it or we're going to kill it. And so, that's initially what a lot of what we tried to do, was just like, if we kill the virus and then inject it into you, will that still work?

And so, that's what they start trying to do. Dr. Sam Katz, working with Dr. Thomas Peebles and all these others in Enders' lab, they start making these sort of like killed versions of the virus. Initially, you're usually working with monkeys, and then eventually you go on to work in human testing, right?

And so, this is where—and I think this is really important to recognize. So, in 1958, they took their first version of this attenuated virus vaccine, meaning we have—we have killed the virus in some way, and we're going to give it to some people and see what happens.

Justin: Mm-hm.

Sydnee: And they were working in schools for the developmentally delayed and disabled children. This is what these schools were called. In and around Boston. They vaccinated 11 children with this vaccine. They did develop an immune response, so it worked in that sense, but they also got a rash.

Justin: Hm.

Sydnee: They didn't get full-blown measles, nobody had any of the rare complications, but they did get sick. And that is not what we want from a vaccine, right?

Justin: Right.

Sydnee: We've gotta walk that line. It has to be strong enough to elicit an immune response, but it can't make you sick. It didn't meet that criteria, so they had to try again. And I think it's really important, because that story that I just told you is not every—I read multiple different versions of the development of the vaccine.

That piece of it isn't always mentioned. Because what is often mentioned instead is that a couple years later, in 1960, they went to a different school for, again, it was a school for children with neurological and central nervous system problems.

Justin: It was a werewolf school.

Sydnee: [chuckles] No.

Justin: No.

Sydnee: No.

Justin: They hated the faye school, they were mortal enemies.

Sydnee: [chuckles] There were 20 children living there. They asked for the parents' permission, which they did receive, and they gave them the next virus—or the next version of the vaccine. In this case, everybody generated antibodies, so it worked. Nobody got sick, so it was safe. And there was an outbreak of measles sometime later at the institution, and none of these children got measles.

Justin: Wow.

Sydnee: So, it was challenged in real time. What I think is important—and that story, by the way, is touted, because it worked. And the kids who participated in this trial were all protected from measles. So that's a happy ending to that story. However, I think it is fair to say that there are ethical concerns with everything I just told you.

Justin: I was sitting here thinking like, whoa, that's quite a study! That's quite an experiment! [chuckles]

Sydnee: It is. And I mean, I think—they always highlight that they got parental permission, and I'm not doubting that, but to say that we fully understood the implications of this at the time…

Justin: Mm-hm.

Sydnee: And there is a long history of us using schools as sort of experimental grounds for collecting like viruses, like we talked about, and trying out vaccines. This is not new, but specifically, these are two cases where we use children who were especially vulnerable. A population of patients who were more vulnerable, because of their developmental conditions.

Justin: Yeah, I'm gonna say, I—you may not agree with this, but I personally, I don't know why—we attach this talismanic power to parental approval. And it's like, these 20 sets of parents approving this, like they don't know what they're approve—like they don't know if it's a good idea or a bad idea.

In much the same way that we shouldn't be expecting parents now, who are laymen, to be deciding if it's a good idea or a bad idea for their kids to get shots. Like, why is this onus on the parents in either condition? You know what I mean? In either extreme. Why are parents asked to make this decision?

Sydnee: Well, and I think we ask you as an adult, what decision—like, we give you the information and let you make your own decisions. And so, parents serve as a stand-in for their children. But it's not perfect, because it

is more complex. You are going to err on the side of protecting your child and minimizing risk, absolutely, to the—to the most you can. And if you do not understand where the risk is coming from, it could lead you to make the opposite of the best decision.

Justin: Mm-hm.

Sydnee: But I think this also speaks to why, when a public health official or a celebrity or somebody with a podcast calls into question science, the history of medicine development, the history of the way certain populations of patients were treated in medicine, doctors' real motivations, the healthcare industry or pharmaceutical companies' motivations, when any of that is questioned, of course there's fertile ground for that to take hold in people's minds.

Justin: That's the—yeah.

Sydnee: We did this stuff!

Justin: Yeah.

Sydnee: We can't run away—we can't hide this. This would never path an ethics—pass an ethics board today.

Justin: Sure.

Sydnee: This would never meet IRB approval today. We wouldn't do this, okay? And I'm not sitting here saying thank goodness we did back then though, because we shouldn't have done it then. It worked out, for the most part. But does that make it okay? No, of course it doesn't. And so, I think it's really important that, in the science community, we have to be honest and reckon with these moments where we were wrong. And maybe we got a Nobel Prize winning result, but we were still wrong for doing what we did.

Justin: Yeah.

Sydnee: And I think it's—I think the more that we can own that and then talk about why that wouldn't happen today and what safeguards are in place

to protect people today, the more trust we can build with people that we're trying to get vaccinated. Okay, so, we have a vaccine that seems to work.

Justin: Yes.

Sydnee: Or at least we kind of understand how to make one. And that's what—you gotta understand, like the process of vaccines at that point would be, there are scientists in a lab who are figuring out how to do it. But then we have to get it picked up by a commercial lab, a pharmaceutical company, somebody who can then mass produce it, right?

Like, here's the science, now we gotta hand those instructions over to the companies to make it. Somebody's gotta make this thing. And you can't make it without money. So, there you go. At that point, there was a big concern in research around vaccines and the development of vaccines, we used chickens a lot.

And there was a virus that caused leukemia in chickens, and we were really worried that we would accidentally infect people with that virus in the process of using chickens to make vaccines. Does that make sense?

Justin: Yeah.

Sydnee: I will say that we eventually figured out that this virus does not cause cancer in humans, so even if it did get in humans—

Justin: No problem.

Sydnee: It wouldn't have mattered. But again, we're trying to hold things to the utmost standard of safety. And so, there was this hold up while we had to figure out how can we detect this leukemia virus in chickens. A virologist named Harry Rubin figured that out in 1961, and then we could start breeding leukemia virus-free chickens to use in research labs to make these vaccines.

Justin: Wow, that's wild.

Sydnee: So, that was a big—I know, it feels weird to be like why we're—why is this chicken farm such a big part of the story?

Justin: Yeah.

Sydnee: But…

Justin: The wild thing is they found out by making them leukemia-free, they're also extra delicious. So it's like, whoa! What are the odds? This is a great—well, all around. This is extra tender?! You're brining it?! How did you brine it? With a—with—this is incredible! It's brined already!

Sydnee: We're gonna grow vaccines in them, so I don't think we're—or not vaccines, we're gonna grow a virus in 'em to make vaccines, so I don't know that we're gonna…

Justin: You telling me there's a perfectly succulent chicken that will also inoculate me against measles?

Sydnee: It would be great if it worked that way.

Justin: Thank you, science!

Sydnee: Eat this chicken and you won't get measles.

Justin: Eat this—eat this vaccine chicken!

Sydnee: Man, if that's all it was. Imagine, RFK Jr. would immediately be pro-vax if I made a steak that also protected you against measles. Eat this steak and you won't get measles.

Justin: Yeah, it's called baccine, it's bacon, but it's a back—it's a vaccine. It's baccine.

Sydnee: Can you eat it all?

Justin: Sure.

Sydnee: Sure, Robert.

Justin: I mean, sure!

Sydnee: Eat it raw. I don't care.

Justin: Spit it out, buddy.

Sydnee: Do it. So, enter our friend, Maurice Hilleman. We love—

Justin: Hey, Maurice.

Sydnee: Maurice Hilleman on this show. Responsible for the majority of childhood vaccines that you receive, probably, or that your children are receiving, or children you know are receiving. Really, the number—the people I've mentioned, the number of lives that have been saved by these individuals, I mean… unknowable. Unknowable!

And continue to be saved. Anyway, so, he's trying to get a bunch of chickens so he can get this information from the Enders lab and make, you know, a super cool vaccine. Because that's what he was good at doing, making really great vaccines for Merck. Okay?

Justin: Okay.

Sydnee: So, he goes to a farm where they are breeding all of these leukemia-free chickens, Kimber Farms in California. And he gets there and the director of poultry research is like, "I'm not gonna sell you all of our chickens? Are you kidding me? No, you can't, Maurice, you can't have all of our chickens."

Justin: Maurice.

Sydnee: And so they argue about it for a while—

Justin: Then he came back with a fake mustache and he was like, "You don't understand! I'm very hungry! I need all of these chickens!"

Sydnee: No, they—

Justin: "I'm a different guy from before!"

Sydnee: The story goes that they realized they were both from Montana, and when they realized they were both from Montana, he was like, "Okay, well then I'll hook you up with all the chickens."

Justin: Oh, that's great.

Sydnee: And he sold 'em for a buck a chicken.

Justin: I wish I had been a chicken overhearing that conversational turn like, "Uh-oh. Oh… Uh-oh. Oh, no! I thought we were—guys?"

Sydnee: "They're both from Montana!"

Justin: "Guys, they're both from Montana!"

Sydnee: I didn't know that—I don't understand that the—I've never been to Montana, I don't know the bond.

Justin: It's the—ask the Green brothers, they get—it's a—it's a—

Sydnee: It's Montana thing? Well, now listen, I understand this, if somebody was from West Virginia and that same thing happened?

Justin: You'd sell them the chicken.

Sydnee: Same thing, I'd sell them the chickens.

Justin: Yeah, take all the chickens.

Sydnee: "Oh? Where are you—oh, you're from West Virginia? Okay, okay. All right."

Justin: Like the good old boy network!

Sydnee: We understand.

Justin: Yeah, we get it!

Sydnee: And I don't that's true everywhere— I think that's true when you're from places like Montana and West Virginia.

Justin: Yeah.

Sydnee: Right? We gotta stick together.

Justin: I guarantee there's—

Sydnee: There's not that many of us.

Justin: Part of that conversation's like, "Okay, well, but listen, one of these days I might need a bunch of vaccines, and if that's the case, I'll come to you, and you gotta promise you're gonna hook me up, right? You'll give me—"

Sydnee: Yeah, "Give us a bunch of vaccines." That same flock of chickens, by the way, is still being used at Merck to make vaccines, like descendants. [chuckles]

Justin: Dude, let 'em die!

Sydnee: [chuckles] Descendants of these chickens.

Justin: Whoa, that's a good drug, by the way. We accidentally made these chickens immortal.

Sydnee: [laughs] We made chicken immortal chickens, and no measles.

Justin: "No—"
"Oh, we should give it to everybody!"
"No, it sucks. They like learned to talk actually in the—over the ages, and they're like really smart. They got their own government and stuff. It's so annoying."

Sydnee: [chuckles] So, Hilleman starts working using the material from the Enders lab and these fancy chickens. In 1962, he made a virus vaccine that was safe but did not evoke an immune the immune response that was needed, which is the balance in vaccines. And this is the balance in all of medicines!

This is the—in every medicine you take, somebody had to do science to figure out, "Now, if I give you this much, it works. But also, there's a ton of side effects. If I give you this much, no side effects what—side effects whatsoever, but it also doesn't work." So, there's the—there's that magic balance that we had to hit with vaccines. And in 1968, Hilleman figured it out.

Merck developed an improved vaccine using the Enders—the strain that they got from the boy's school forever ago. Now, eventually they would fix it, and they—the strain they use now is called the Moraten strain, which stands for "more attenuated Enders" strain. So, it's even more attenuated than the original one.

Justin: Okay.

Sydnee: Because initially, the vaccines that they were using, you actually had to get a dose of like immunoglobulin with it to like boost the immune response at the same time.

Justin: What's immunoglobulin?

Sydnee: Like antibodies to protect you.

Justin: Mm-hm.

Sydnee: Like you had to get a boost of this to activate the immune system at the same time you got a vaccine, that's not a—that's not an efficient thing, right? So, they eventually develop a better—the Moraten strain, the more attenuated strain, it's more—it's weaker than before, won't make you sick, and also will get you an immune response.

And they started licensing it. In 1971 they combined it, because Hilleman, as I said, was working on all these other vaccines. He had made a mumps vaccine and a rubella vaccine, and they combined them all in 1971 and made the MMR, measles, mumps, rubella combo vaccine.

Which, of course, we are still using today. And they showed that—that vaccine, by the way, induces immunity to measles in 96% of people who get it, mumps 95, and rubella 94. So, an incredibly effective combo vaccine, right?

Justin: Right.

Sydnee: And you see this time period from 1989 to 1991 where measles outbreaks are dropping.

Justin: Mm-hm.

Sydnee: Deaths are dropping. Everything is heading in a really positive direction. You still see outbreaks, but not, you know, we're definitely heading in a better direction than we were before, right? And if you look at statistics from that time period, people who died, 90% of them did not get vaccinated.

So, clearly, we're seeing the impact of the MMR vaccine. So much so that in the year 2000, measles was declared eliminated from the US. Although we still had outbreaks sporadically, we were not having ongoing transmission. That's what you have to do, is break the chain of ongoing transmission.

Justin: That's gonna do it for us on Sawbones. Thank you all so much for listening. We hope you have enjoyed this week's episode. We did it. There's a big mission accomplished banner that has just fallen from the ceiling—

Sydnee: That would be appropriate here—

Justin: Behind us. [chuckles] And that is our episode for this week!

Sydnee: In our—in our culture understanding—

Justin: Keep it locked! Sawbones—baby, it's the outro, babe, can I finish the outro?

Sydnee: No, you can't.

Justin: Keep it locked, Sawbones Nation! We'll see you next time!

Sydnee: In our cultural understanding of mission accomplished, that is very appropriate.

Justin: [chuckles]

Sydnee: Mission was indeed accomplished, just as it was—anyway. The anti-vax movement, as we've talked about on the show, is as old as vaccines. From the first smallpox vaccine, there were people screaming about government putting things in our bodies when we don't want them to. So, this has always been an issue. In 1998, Andrew Wakefield published his fake study, his false study, which was—

Justin: Made up, pretend, garbo study.

Sydnee: Yes, which was a garbage study, which has been retracted. He has been—we all know he was lying and wrong. But he linked—

Justin: Maybe one of the worst people to ever live!

Sydnee: He linked autism to the MMR vaccine. Said that there was that—that you were increasing the likelihood that your child was autistic if you gave them the MMR vaccine. And we started to see some concerns, some hesitancy.

And then by 2008, I think there was so much conversation, backlash, public opposition. That's when we start to see outbreaks climb as measles vaccination rates drop. That's really, 2008 was kind of the turning point. It's sad, it's not that long from, "We have this amazing vaccine, we're saving lives," to, "Wait, don't get it."

By 2014, we were seeing record numbers again. 2015 is when the Disneyland outbreak—it was right at the very end of December, beginning of January, 2015, when that happened and we did our last episode. And we were seeing a slow drop in vaccination rates since then. 2020 is when things really fell apart.

Justin: Yeah.

Sydnee: And you know, yes, it was covid, it was the reluctance to go out and get vaccines, period. But then it was all of the fear and distrust in the government, in doctors, in the healthcare system. And we have seen also alongside that a weakening and weakening of vaccine mandates, state by state.

So, it's easier than ever to send an unvaccinated child to a public school, which spreads measles. And then a year ago, we saw the first two pediatric measles deaths in the US since 2003 happened last year in West Texas.

And then I think that if you add to that RFK Jr, who clearly is a… vaccine questioner, I don't want to say denier, he doesn't outright deny that you should—but obviously he has undermined public confidence in vaccines. The panel of not experts, of anti-vax advocates and that he appointed to approve new vaccines, who have weakened vaccine recommendations. And the potential Surgeon General, Casey Means, who during her, you know, congressional… whatevers, trials this week, refused to say that she would encourage a mother to vaccinate her child against measles.

Justin: Right.

Sydnee: She refused to make that statement. She wants to be America's top doctor, but she would not recommend a standard childhood vaccination to a mother—

Justin: It's a good reminder that these people know they work. I mean, Casey Means knows they work, she—there's just an ideological line that she is being forced to tow if she wants to participate in this fraudulent regime they got going on.

Sydnee: No, I don't think that's—I think she is also a vaccine…

Justin: I don't think—

Sydnee: I don't—I don't— "denier" is the wrong word, I think she—

Justin: No, no, no—no, I refuse to—

Sydnee: No, because she sells products—

Justin: I refuse to believe—

Sydnee: In the wellness space.

Justin: No, no, no, the reason—

Sydnee: She's invested in you not listening to science, but listening to her.

Justin: It is impossible to know the content of peoples' hearts, but I—the case for the efficacy of vaccines is so clear that the people who would sow fear and uncertainty and doubt, considering the cost, they are not true believers. They're unscrupulous. They are charlatans. They are phonies and fakes.

But they know, you look at the data, anybody with half a brain knows the truth, but they're willing to seed that ground, that moral ground, in pursuit of power. That's my—this is my opinion. You can't know the content of people's heart. That's my—that's my take.

Sydnee: I don't know—I mean, I don't—children are and will die. Children are dying and will die. I don't know… I don't know what pressure is on you that that would make that acceptable, unless you are a true believer.

Justin: Because you don't—because she's not saying don't do it.

Sydnee: She's just saying she wouldn't tell you to do it.

Justin: It's not—she's not—by standing—she's not saying don't, right? So this is how she—I don't know. I don't know how these people sleep at night. I don't—I don't want to say that, I'm just saying, it—deep down—

Sydnee: In med beds, honey, and infrared saunas. [chuckles]

Justin: Yeah.

Sydnee: So, she—okay, so here's the important update. On April 13th, 2026, in a month and a half-ish, the Pan American Health Organization Regional Monitoring and Re-Verification Commission for Measles, Rubella and Congenital Rubella Syndrome, it's a big title, is going to meet—

Justin: Trying to get an acronym going. [titters]

Sydnee: Yes. Is going to meet with the US and Mexico to review our measles elimination status. In order to say that something has been eliminated, you cannot have endemic transmission. And endemic transmission means that a chain—

We have had a chain of measles virus transmission of the same genotype and lineage that continues uninterrupted for 12 months or more within a defined geographical area. The current thought here is that we do, we do indeed have that. We do have that.

And so, we are going to lose, probably, our measles elimination status in April of this year. Probably. Who knows what will happen, but that is—that is the current thought. And we see—I see no move in the other direction, because fewer and fewer people are getting vaccinated, which is going to lead to more and more cases.

And it's important to remember, one of the most contagious viruses, the—are not—meaning, if I have measles, how many people am I likely to spread measles to, is between 12 and 18. That's huge. I am going to give measles to a lot of people if I have measles.

Justin: Covid was like, what?

Sydnee: Like one to two.

Justin: One to two, I mean, at its… yeah.

Sydnee: Yeah, depending on which wave, but yes. So no, it is—it is incredibly contagious. And herd immunity, meaning how many people in a given population need to be vaccinated in order to protect people who aren't, whether that's because of choice, age, immunosuppression, whatever, herd immunity is super high for measles. It's like 90 to 95% of that population have to be vaccinated to protect everybody else.

Justin: Mm-hm.

Sydnee: We're below that. We're below that. And so, we are ripe for outbreaks. And one in five people who get measles will be hospitalized. One in 20 will get pneumonia, which is the number one cause of death from measles.

One in 1000 will get inflammation of the brain, encephalitis. About one to three in 1000 will die. It will be worse among the youngest and oldest, especially the youngest who are unvaccinated, because they can't yet, because they haven't received their series yet.

Obviously, if you have any other chronic conditions that would lead to anything being worse, you are also more vulnerable—people who are immunosuppressed or on medications that might suppress their immune system, like chemo.

And it can lead to long-term disability, brain damage, long-term immunosuppression, meaning that you are not protected from a lot of viruses for a long time afterwards, blindness, and obviously death.

Justin: Mm-hm.

Sydnee: So, I think it's important to distinguish between people like Casey Means or RFK Jr, or these other—these other advocates who have all of the means to know. They have all of the access they need, to know the science, to know the data, to know the safest thing to advise you, and aren't.

Justin: Mm-hm.

Sydnee: Right?

Justin: Right.

Sydnee: There's no—there's no working with those individuals. They've made a choice, and the choice is not your safety or your children's safety. And then there are all the people who are caught in the middle. They're not you and me, Justin.

Justin: Mm-hm.

Sydnee: We know how—we know what we know. We know the facts, we know the truth, we know the science, and we're going to make this choice. There are a lot of people who are scared, who hear a lot of different things from their friends, from their family, from news, from Facebook groups, from other moms, whatever, and they don't know what's right.

Justin: Mm-hm.

Sydnee: And leveraging anger and hate will not help us with those individuals.

Justin: Right.

Sydnee: As angry as it makes me to think about a child getting measles because they're six months old and they can't get vaccinated yet, and someone else chose not to vaccinate their child and send them out into the world, as angry as that makes me, it is not that child's fault, and it is not that parents' fault.

Justin: Yeah.

Sydnee: Just like we made the decision to vaccinate our children because we wanted to do the absolute safest thing for them, the parent who chooses

not to vaccinate is making the same decision. They just have bad information.

Justin: Mm-hm. And they're trying to do the best that they can.

Sydnee: Approaching those people with compassion and empathy and understanding, and being willing to listen and have hard conversations and not lecture, is the only way forward. And I think it's work that we each individually have to do. I don't think it's work that we can ask—I mean, certainly the government's not going to do it for us now.

We can't rely on the CDC to do it for us anymore. We can't even reliably expect every physician to do it for us, unfortunately. While the vast majority of physicians are pro-vaccine, you're going to have a Casey Means out there whose, you know, values are on the table.

Justin: You know, one thing that you can do locally I think that would—that might be helpful, we're—I've started receiving calls, political calls for fundraising. There's a lot of candidates that are going to be asking for your support here in the next year, like, raise these questions.

Get people on the record, on every side, ask the question like, "I want you to say in a public space on the record that vaccines are safe and effect 'em and—safe and effective, and that you recommend them without hesitation. I mean, get—say it. You know like, clarify where you are at."

Because I think that like the more people that are saying that and explaining it and having the conversation, I think it is vital to making some progress. And you can force people to talk about it. Because in this time period, people are sort of like beholden to your constituents and what have you.

Sydnee: Yeah. And absolutely, and communicate—like I know for me, if a political candidate is asking me for their—for my support, and they waffle it all on vaccines, they don't get it. For me, that is a—I mean, that's—I'm done. No compromise there. And if that issue is the same for you, you should communicate that. I also, though, believe that while we need to hold people in power accountable, the only real change is going to come from each other.

Justin: Mm-hm.

Sydnee: It's gonna come from when that friend in the Facebook mom group starts spreading some hesitancy among the other moms. I'm not—and I don't mean to say about moms, but like I meant Facebook moms, mom groups, like they exist. I'm sure there are dad groups, I don't know. Are you in those?

Justin: I wouldn't know.

Sydnee: Anyway. It's okay to approach those conversations yourself and say, "Hey, I actually made a different decision. I'd love to talk about why. I'd love to share some thoughts I have." I understand you want to do the best thing for your kid. That's all we want to do.

Justin: And anger is easy. I think we've fallen in that trap on this show a lot.

Sydnee: Yes.

Justin: It's easy to get angry, but you're not going to make the changes that you need to with that. Hey, thanks so much for listening to the program! Hope you are going to have a good week, hope you're going to try to stay busy, you know, try to enjoy—if you got nice weather, maybe get out and enjoy some nice weather. Take a break! You know? Relax a little bit. And we'll be back with you next week, until then, my name is Justin McElroy.

Sydnee: I'm Sydnee McElroy.

Justin: And as always, don't drill a hole in your head.

["Medicines" by The Taxpayers plays]