Sawbones 577: Vitamin K

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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: Here we are again, Syd.

Sydnee: That's true, Justin.

Justin: I am panicking because I'm realizing I don't have a drink, and I am going to be stuck here for—I didn't mean it like that. Stuck here podcasting, and I don't have a drink. And I don't normally like it when I don't have a beverage.

Sydnee: I mean, you know that you do not need—like, you can go 30 minutes without consuming liquids, and you'll be fine, like health-wise.

Justin: Yeah, but what if my whistle gets a little…

Sydnee: We've talked about this country's obsession with water and hydration. [chuckles]

Justin: Some kind of refreshment—if I need a refreshment while I'm podcasting, I…

Sydnee: Maybe one of the kids will bring it.

Justin: That would be the first time they've been helpful, except for the other time Charlie brought that drink down to me.

Sydnee: Exactly. Exactly. I bet one of the kids would bring you a drink, or maybe the cat?

Justin: That doesn't seem like it's gonna—

Sydnee: She's not gonna bring you a drink.

Justin: She's not gonna bring me a drink.

Sydnee: No.

Justin: Syd, what do we—what are we talking about this week?

Sydnee: Well, Justin, what I want to talk about this week is vitamin K. It has been in the news a little bit lately… well, are you aware of that?

Justin: Is she the one that did the Friends song? [sings] "As we go on, we rem—" Is that her?

Sydnee: Vitamin C, I believe.

Justin: Vitamin C, okay. No, then I do not know vitamin K. [chuckles]

Sydnee: [titters] We've been doing Sawbones a long time, and I think that it's fair to say that we now—we can—we can state that our approach to science communication in the medical community for many, many years, hundreds of years, from its beginning, perhaps, was not necessarily the best.

Justin: Right.

Sydnee: Our model of medicine was what we used to call paternalistic, meaning that I, the doctor, tell you, the patient, what to do. You don't really

need to ask questions, that's for me to understand. You just do this. Take this pill, eat these foods, don't eat these foods, do these things.

Justin: And crucially, it puts the control of your health in the hands of the physician.

Sydnee: Yes.

Justin: So, rather than being someone who is advocating for your own health, it's the doctor's responsibility.

Sydnee: Yes. It is—it is our job to keep you healthy. And the only way that we fail is—well, I mean, really, we can't fail. You can fail if you don't do what we say.

Justin: Right.

Sydnee: And I guess if we tell you the wrong thing to do. If we tell you the—but if we tell you the right thing to do and you don't do it, that's on you, not—like, we told you what to do. It's really the "because I said so" kind of approach to medicine. "But why, doc?"
"Because I said so." So, that approach, I think, still permeates a lot of our medical conversations today.

And there are a lot of reasons for that, like we're pressured to do things faster. Efficiency leads to more profits in the health care industry in this country, and so the faster I can get you in and out of my office or in and out of my hospital, the more money I can make off of you. And I don't mean that me, the doctor, necessarily is driven by that, but certainly our bosses are.

Justin: Sure.

Sydnee: And so, if I can just tell you, "Hey, your baby really needs to get this shot, okay? Because I said so."

Justin: Mm-hm.

Sydnee: "Okay, but why does my baby need a shot as soon as they're born?"
"Well, do you want him to bleed to death?"

Justin: That's a no.

Sydnee: No. But does that explain to you why you need to give your baby, your brand-new newborn, precious little bundle of joy, a shot?

Justin: No, it doesn't. I would like to know why I need to give my special little guy a shot.

Sydnee: Right. And I think especially in light of the fact that not only has there always been sort of fears and misgivings about things we do to babies, you know, how—the reason that there's so much fertile ground for vaccine hesitancy is because it's scary to give baby shots.

Justin: You're right.

Sydnee: Right? Like it just is. And so, of course, if there's an excuse, you can tell yourself not to do it. And then if you have the entire Department of Health and Human Services and the secretary of HHS, as well as the new incoming surgeon general, all sort of adding to that and saying, "You know, maybe it isn't a good idea. Maybe you should—maybe it should be shared decision making. Maybe not everybody would get the vitamin K shot." It's really easy then to turn around and say, like, "Well, maybe I'll—maybe I'll put it off. Maybe I'll think about it."

Justin: Because you don't have the base of understanding in the populace as to why we're doing it and how—

Sydnee: Yes. Because on a very base level, wouldn't you wonder, well, why does every baby need a—like, did—babies didn't need vitamins before?

Justin: Right. So, what is it that's happening that we need to give babies—

Sydnee: Exactly.

Justin: Something special.

Sydnee: Okay, so let's talk about the history of this. Who came up with—how did we figure this out? Why is it necessary? And why does it have to be a shot I think is always a fair question, because I really believe that if most vaccines and measures like the vitamin K shot were pills, I don't think we would have nearly as much resistance.

Justin: Yeah.

Sydnee: So, back in the 1800s, our understanding of newborn physiology was still developing.

Justin: Right. Are they like regular humans, but small?

Sydnee: No.

Justin: That's basically it.

Sydnee: No, they're not. I mean, that's really important to understand about kids—

Justin: No, that was our understanding.

Sydnee: Yes.

Justin: Small adults.

Sydnee: The initial thought was that babies are just small adults, and so everything works the same, it's just like tiny.

Justin: Yeah.

Sydnee: Right? And what we were—

Justin: And then some guy's like, "I think adults are actually all three kids stacked on top of each other in a trench coat." And the other scientists were

like, "Well, that's pretty easy to disprove." And they were like, "You're right. How did you get in here?"

Sydnee: I mean, you've seen—[chuckles] you've seen pictures of depictions of like the baby in utero from those early, early anatomical drawings. And sometimes it is just like a little man, just like standing there like a little—

Justin: A little guy pie.

Sydnee: Just like a little guy, so you know—

Justin: I love that little beard.

Sydnee: Mm-hm.

Justin: Little flannel shirt.

Sydnee: Like he's just standing in there, all dressed and ready.

Justin: [chuckles] "Ready! Ready for work!"

Sydnee: "Is it time for me to work the fields, papa?"

Justin: "Ready for the office, mother."

Sydnee: [titters] So, we were still figuring out that some of the processes, some of the things that happen in adult human bodies, or even in older children, may not be fully-functioning. They're kind of like ramping up—

Justin: Mm-hm.

Sydnee: When you're first born. You're done, but not completely done.

Justin: Okay, yeah.

Sydnee: Right?

Justin: Sort of like you got the fontanelle at the beginning, still closing over. It's like that on a larger scale. [chuckles]

Sydnee: Well, you know how you take like cookies out of the oven while they're still just a little soft, because they're going to continue, you know?

Justin: Keep baking—

Sydnee: They're going to keep baking a little bit longer. It's like that. We're going to keep baking a little bit longer, and that's fine. But that means that some things aren't quite working yet. And this is true for all babies, by the way. This isn't necessarily like if you were born early or with some other kind of issue. This is everybody.

Justin: Mm-hm.

Sydnee: Not everything's working. One issue that particularly concerned medical professionals was bleeding. Now, we've done a whole show on hemophilia, and there was a pretty decent understanding of hemophilia at this point in history, largely because of the royal family, right? We had—

Justin: Thoroughly studied.

Sydnee: Yes, we had very important, rich, famous people who had hemophilia, and who we could easily branch out their family tree because all of it had to be a matter of record. And so, we knew—

Justin: It's like—it's like that and our gout research. [chuckles] It's like so good [??], "Listen, every time I eat 12 hams, my feet fall off! What's happening?" It's like, okay—

Sydnee: So, the—

Justin: [??]

Sydnee: It's true, that's probably why hemophilia—I mean, there were so many charts to understand hemophilia at that point. But what we knew is that some babies were born with bleeding issues. And at the time, it would

be easy to just toss them in the same bucket. They would call like hemophilias "bleeders—easy bleeders—"

Justin: Gross!

Sydnee: And they would—they—

Justin: [chuckles] I don't think like—

Sydnee: No, not literal—

Justin: That's one of the—

Sydnee: No, I mean—

Justin: That's one of the worst things about the time period, we didn't realize that it would be a problem to store them all in the same bucket. [chuckles] Just all the blood in one big bucket.

Sydnee: Justin! But what we—what we started to realize, this is in 1894, that there were some babies who were born and had bleeding issues, but then maybe didn't continue to have bleeding issues for the rest of their life.

Justin: Mm-hm.

Sydnee: And so, they began to sort of separate out this kind of segment of like, okay, those are the hemophilia patients, they're going to have bleeding issues forever, but what's going on with these babies? And we didn't know yet, but the first description of something that we eventually would figure out how to do with vitamin K is accredited to a Boston physician, Charles Townsend. In 1894, he described—he put together an entire paper with 50 cases of bleeding tendency in neonates. And he didn't know why. I mean, this is kind of—this is the process of figuring out like a new disease process or, you know, pathogen or whatever. You need a bunch of—you kind of come from the top and then get smaller.

Justin: Mm-hm.

Sydnee: We're looking at the actual babies. What is happening? What age does it start? Let's get some demographics. Let's get some information about the birth. You know what I mean? Like put together a portrait of what is this syndrome, what is—what is happening. And then you can start kind of zooming in on what might be causing it. So, hemorrhagic disease of the newborn is what he called it. And he basically said it's not the same as hemophilia. So, "I understand bleeding is bleeding, but this is something different." It usually happens on day two or three, so it's much earlier. Okay?

Justin: It's cuter.

Sydnee: Why would it be cuter?

Justin: I don't know. That's one of the weirdest things about hemorrhagic disease of the newborn. It's somehow cuter. It's hard for me to explain, but it is one of the main signs how you can tell the difference, is that it's kind of an adorable hemorrhagic disease.

Sydnee: I would—it is not.

Justin: Just because it's babies, you know.

Sydnee: That makes it worse.

Justin: Good point.

Sydnee: Yeah, the—

Justin: That's true.

Sydnee: I mean, in my—to my—

Justin: Like…

Sydnee: I think it's worse.

Justin: I think every child's beautiful, Sydney. I'm sorry, I…

Sydnee: Well, no, I—[chuckles]

Justin: I don't know what to tell you.

Sydnee: But I mean, because I think they're beautiful, I don't want them to bleed.

Justin: No, that's true, that's true. You didn't listen to a lot of like Nine Inch Nails in high school, because that's really—[chuckles] you missed the message.

Sydnee: So, he began to talk about these earlier presentations. They didn't have a family history. So like, at this point we kind of knew that hemophilia, we could chart its progress. So like all of a sudden you've got somebody who's having a bleeding issue and nobody in their family did, so this is different.

And then it tended to have a self-limiting time course. So, there was one case in which a nine-day old baby had a hemorrhage and then went on to not have any other issues. Although initially I mean it was very—there was one case where there was a nine-day old infant, it had a hemorrhage.

As you can imagine, this would be very devastating to the parents because, while they understood what hemophilia was better than some other things, they still didn't have good treatments for it, right? So you think, "Oh, no, my baby's been diagnosed with this terrible thing. This is lifelong." And then… there wasn't. The baby didn't continue to have problems.

Justin: Hm?

Sydnee: And—

Justin: They grew out of it?

Sydnee: Well, this is a time-limited issue—

Justin: Mm-hm.

Sydnee: As we're going to see. Whereas hemophilia is with you forever.

Justin: Oh?

Sydnee: Vitamin K related bleeding events are singular.

Justin: Hm.

Sydnee: We'll get into it. We're going to do it. So, and then—he also, by the way, made a link between the fact that this particular mother was unable to breastfeed, and this infant was being supplemented with formula.

Justin: Did the formulas have like deficiencies at that time? Or did we know about that kind of stuff?

Sydnee: There's actually a link between more—you are more likely to bleed if you do breastfeed.

Justin: Oh?

Sydnee: So, the thought was that the reason the kid recovered and didn't have more issues is because he was formula fed.

Justin: Huh.

Sydnee: Anyway, this was probably one of those things where he noted this like connection, and this would have thrown us off completely and we would have gotten it wrong. He is kind of noticing something that's true and we'll play out. But it's interesting because there's something there. He's not—he's not quite hitting it on the head, but there's something there, okay? So, we didn't know what was happening, we had to unlock the mystery. Why is there bleeding happening in these newborn babies? What is the difference? And why is it something that seems, if they can survive that early neonatal period, they go on to not have problems as an adult?

Justin: I feel like if you give me a couple of hints, I will be able to get it. But right now, I am not sure.

Sydnee: Justin, I'm going to be honest with you. This starts with an understanding of the coagulation pathway, or coagulation cascade. And—

Justin: Oh, okay. So, you've stumbled into one of my areas of expertise!

Sydnee: Oh, is it?

Justin: Ah, yes.

Sydnee: Hm, really?

Justin: No. Sorry.

Sydnee: I'm going to tell you that it is not an area of my expertise. I would say that outside of hematologists, we all—I mean, I know what it looks like. And I ki—I mean, I got—[??] I studied it. But if I was going to have to sit down and do some complex like—like if I was going to teach med students about the coagulation cascade, I would have to study it again myself, and have a diagram next to me. [chuckles] Because it's incredibly complex. There's lots of factors—

Justin: It doesn't just dry. A lot of people—

Sydnee: No.

Justin: People think that it's just drying.

Sydnee: There are multiple steps in an incredibly complex pathway. There are different ways that it can be initiated. There are all kinds of ways that it can be interfered with; disease processes, toxins, medications, injuries, substances, that can stop it from working. And then all different ways to fix that, depending on what broke the cascade to begin with. It really is a really complex system of dominoes that all have to fall in the right order, in order for you to clot.

Justin: Hm.

Sydnee: So…

Justin: It's easy for that system to get interrupted.

Sydnee: Yes. Yes. And if any of that goes wrong, then you can have bleeding or clotting, depending on where something went wrong.

Justin: So, it would be presenting in the same way, but there's enough different ways that it could happen that it's not necessarily the most like informative symptom.

Sydnee: Yes. Because, I mean, even as we talked about with hemophilia, there are different kinds of hemophilia depending on which clotting factor you don't have enough of. And on the surface, you're bleeding. [titters] Because I can't tell by your bleeding which of these two clotting factors you weren't making, right? You needed both. You didn't have one of 'em.

Justin: Yeah.

Sydnee: So, I mean, it takes a lot of modern understanding and technology to be able to unwind this kind of stuff. So, in the beginning of the 1900s, we barely understood anything. We used the classical model of coagulation at that point. From 1905, it was devised by Paul Morowitz, and it was basically two steps. Which, if you look at a modern clotting cascade, that's—I mean, there's many, many, many more. So, something called prothrombin has to become thrombin, and then that helps fibrinogen become fibrin, clot. Doesn't matter, the point is, this was the—this was our understanding.

Justin: Okay. But that was like basic.

Sydnee: That was very basic.

Justin: Okay, got it.

Sydnee: I'm going to, listen, I'm going to show you a picture.

Justin: This is an audio kind of deal.

Sydnee: Yeah, I know, but I'm just going to show you a picture, because I feel like then you'll understand what I'm talking about.

Justin: Ah… ah, man…

Sydnee: If I show you a picture.

[pause]

Sydnee: None of these are the pictures that I want to show you.

Justin: Is this going to be a picture of scabs?

Sydnee: No. No, no, no.

[pause]

Justin: Clotting cascade.

Sydnee: This is the clotting cascade diagram.

Justin: Okay.

Sydnee: Here, that's probably a pretty good one. These are all the different steps involved.

Justin: It looks like a—

Sydnee: You've got so many different factors; ones and twos and threes, and all the way up to twelves there.

Justin: It looks like a really robust flow chart.

Sydnee: Yes. And it comes in different directions, because it's—did the bleeding start from inside or outside? And then there's a common pathway, and look at all these different places where things can go wrong. Every time you see something that has to become something else, that's a place where stuff can go wrong.

Justin: Yeah.

Sydnee: So—

Justin: A lot of different places.

Sydnee: Right. We didn't understand that yet. This wasn't wrong, it just wasn't complete. And then, this is where we get Danish biochemist, Dr. Carl Peter Henrik Dam. Now, he was not studying clotting.

Justin: Whoa? He just kind of noticed?

Sydnee: He was studying cholesterol.

Justin: Oh?

Sydnee: He was trying to figure out if baby chicks can synthesize their own cholesterol. We knew that dogs and mice and rats could, but we didn't know if baby chicks could. So, he was trying to figure out if they could. Now, I don't—I don't know—I don't—we're just trying to understand everything, okay, Justin? Sometimes—but look, this is why we do science like this.

Justin: Right.

Sydnee: Because he's trying to understand if baby chicks synthesize cholesterol.

Justin: Yeah.

Sydnee: So, he's feeding newborn chicks.

Justin: And they're like, "Why?" And he's like, "I don't know, I just got a feeling, something good. Trust me, hang in there—"

Sydnee: Something's coming.

Justin: "Something's coming. I got a good one cook—" [chuckles]

Sydnee: So, he's got all these little baby chicks and he's feeding them diets from which all the sterols, all the cholesterols, have been removed, to see what would happen. We knew about some vitamins at this point, by the way. So, he's giving them A and D, because he knew that like, "We gotta make sure A and D have to be in there." So, we're giving them that. And we're keeping up the cholesterol. And what we found is that they do synthesize their own cholesterol! Okay!

Justin: Nice. Research ended. Eat 'em.

Sydnee: Now we know that. But then we noticed a strange side effect.

Justin: What?

Sydnee: The baby chicks that were on this sterol-free diet began to develop bleeding issues.

Justin: Hm, like all of 'em?

Sydnee: Not all of them, but quite a few did. They would have bruising and bleeding under the skin. When they would draw their blood for the testing, it wouldn't clot, it would just keep bleeding.

Justin: Yeah.

Sydnee: So, what is going on? This doesn't have—he knew enough about cholesterol to know this isn't a cholesterol problem. So, what's going on?

Justin: I'll tell you what's going on. Wholesalers are getting pretty mad about all this inferior product, they're getting all this bruised chicken—

Sydnee: [chuckles]

Justin: They're receiving in the box. They wanna know what's going on.

Sydnee: Yeah, why are all these chicks bruised?

Justin: "These chicks are all bruised. I paid for primo chicks."

Sydnee: All right, so think on, Justin, what might be missing from these baby chick diets, while we go to the Billing Department.

Justin: Let's go!

[theme music plays]

[ad reads]

Justin: Is it vitamin K?

Sydnee: Well, spoiler.

Justin: No, I mean, you said at the beginning! It's about vitamin K. I mean, I don't think… if I haven't picked it up by this point, it would be pretty bad if it was like, the answer was compression socks. [chuckles]

Sydnee: So, as—and I—it's interesting, because if you read like Henrik Dam, as he is studying this, he's also like doing other things. Like, I was reading like his description of how he figured all this out, like the paper he published. And he notes that like he was busy with some other stuff for a few years--

So, there were like some other researchers who are trying to figure this out, too. And I also kind of throw shade at him because the thought was, okay, so, it can't be cholesterol, we know that vitamin A and D are in there. They tried different things, adding different things to the diet to see if it fixed it, and they noticed cabbage fixed it.

Like if you fed the chicks cabbage, they didn't have bleeding. And so, the initial assumption was vitamin C, because that's in cabbage. And if you think about our understanding of like scurvy, which we already knew about at the time, you might think like, "Oh, well, like your gums bleed, so that makes sense.

Maybe it's a vitamin C deficiency thing?" However, as Henrik Dam pointed out in his kind of—he had like a kind of like shady statement in his, he was like, "But like we knew that wasn't right, because they already had research that said newborn chicks don't really need that much vitamin C." And then he gave 'em lemon juice and he was like, "See? Didn't fix it."

Justin: [chuckles]

Sydnee: So, eventually he got back around—[chuckles] It's really weird—

Justin: I love the—

Sydnee: Because like he found this initial thing, and a bunch of people were like trying to figure out. And he's like, "I'm busy over here for like three **years** doing some other stuff, but I'll get back to this—"

Justin: I love—yeah—

Sydnee: "And I'm gonna crack it."

Justin: I love that he's like, "I don't know, I'm doing a really important stuff with chicks right now and how they—I have to finish my important chick work. And then—"

Sydnee: I mean, he did!

Justin: "I'll get back to the humans."

Sydnee: He did. He had to finish his important chick cholesterol work. [chuckles] And then he finally got back. And what helped is when he got like reinterested, I guess, in this problem, we had an easy like vitamin C supplement. And he was like,

"So, I was going to blow this one out of the water, because I just started injecting these chicks with vitamin C and they were still bleeding. And I was like, told you so."

So, they started just basically trying to isolate what substances or what foods do we feed the chicks and it gets better. And they found that like leafy greens help. Fish, not so much. Hog liver, super helps. And it's interesting because they're actually like—

Justin: Also, they seem weirded out by that one. We gave 'em hog liver and they were like, "Eh, okay! This seems like a lot for chicks!"

Sydnee: But as they're doing it, they don't—they don't know what the substance is, they just know some foods have it and some don't. And they're even like talking about the amounts of whatever this new mystery substance is in this—in the foods, by how much you have to give the chicks for the bleeding to stop.

Justin: Crazy.

Sydnee: Like that was the like unit of measurement for this new substance in the—in the various foods.

Justin: Hm.

Sydnee: Isn't that cool?

Justin: That's really wild, Syd.

Sydnee: I thought that was—yeah.

Justin: Yeah.

Sydnee: Anyway, by 1935, they had isolated a new compound. And at the time, according to his paper, what he said is, "We called it vitamin K because it was the first one in the alphabet that had not been used for another vitamin at this point."

Justin: So we did—so—oh, wow! So, they're—

Sydnee: Yes!

Justin: So, they're like discovering vitamin K this way.

Sydnee: This is how they discovered vitamin K.

Justin: It's like the deficiency of it is what makes you realize—that's like realizing you're a tee—you're lonely when you're a teenager all of a sudden. It's like, "Hey, wait a minute, I'm lonely! What's happening?"

Sydnee: [chuckles] That's how they—and that—so, they said vitamin K, and then they also thought it was very convenient. Now, I mean, according to Henrik Dam, he said—and I mean—in his paper, it was the first letter that hadn't been used yet. Now, that led me to wonder, and I haven't researched this like, vitamin…

Justin: J?

Sydnee: G and H and…

Justin: I mean, I'm assuming there must be, right?

Sydnee: Yeah.

Justin: He's probably not lying about vitamins.

Sydnee: I mean, where are these vitamins—

Justin: What's the—which ones do you know? Do you know any G through Is?

Sydnee: No. I know A, B, C, D, E. And K.

Justin: F, G, H, I, J—

Sydnee: There are lots of Bs. Now, I don't know if all the Bs initially got their own letters before they got lumped in—

Justin: I think that's when everybody got fed up with the whole thing.

Sydnee: This is a—

Justin: It's when we started numbering the Bs, I think that's when everybody was like, "Never mind, I quit."

Sydnee: "This is ridiculous." This could—

Justin: "I'm not doing it with you guys."

Sydnee: This could maybe be another episode, too. I'm sure that this is a truth that I just don't know yet. That this is a historical—

Justin: The hidden—the banned vitamins.

Sydnee: The banned vitamins. [chuckles] Or they weren't vitamins. Like, we might have named other things vitamins and then it was like, "Oops, sorry."

Justin: "Turns out one of 'em was just pocket lint. Ah, geez."

Sydnee: That was something else.

Justin: "Ah, geez. Doug had a junior mint—fell on this dang slide."

Sydnee: [chuckles]

Justin: "It's nothing."

Sydnee: "That's not a vitamin." He also—he also noted that a lot of people liked it because the Scandinavian and German spellings of "coagulation" are K. "Coagulation," they start with a K. And so, since it helped your blood clot or coagulate—

Justin: Mm-hm.

Sydnee: Vitamin K.

Justin: It also is easy because you can take the kid out the aisle, but you can't take the aisle out the BK. So, it's a good reminder, if you're a fan of the Dissidents franchise, it's easy to keep up with this.

Sydnee: The VK.

Justin: Yeah.

Sydnee: So, he won a Nobel Prize for this. And then he—then a bunch of researchers were like—he was kind of done, he was like, "Good, there you go. Vitamin K. Have fun—"

Justin: He got a Nobel Prize.

Sydnee: "Have fun with that."

Justin: You should stop there, because what if you do some bad science and people are like, "Actually, this guy's not really that smart." [chuckles]

Sydnee: I think he—I mean, he definitely did other science. But I think that his most notable achievement, I would bet, is that he discovered vitamin K!

Justin: Pretty good.

Sydnee: Which was super important, because the question then became—I mean, you can see where researchers put this together pretty quickly. So, if newborn chicks don't have vitamin K, they bleed. Well, all these newborn babies who are having these mysterious bleeding episodes, do they need vitamin K?

Justin: I don't know? We just invented vitamin K.

Sydnee: So, the first—well, we didn't invent it, we just sort of found it.

Justin: Well, and then we came up with a name for it?

Sydnee: Yeah.

Justin: Okay.

Sydnee: That's kind of what we do.

Justin: So we invented it.

Sydnee: We find things that already exist, and then we name them. [chuckles] And say—

Justin: We named it. Well, that was our charge from the lord, Sydnee. [chuckles] He told us to name everything. We're just doing our job.

Sydnee: I thought only Adam was supposed to do that?

Justin: Yeah, but he didn't know about everything. Like he didn't know about giraffes, probably. Or like… ATVs. [chuckles] Like he couldn't have come up with that.

Sydnee: Well, no, he definitely couldn't have named ATVs. So, in 1944, Jörgen Lehmann, a Swedish researcher, did a study where 13,000 infants were given 0.5 milligrams of vitamin K. This was either a pill or an injection at this point. We didn't know which one—we didn't know what would work—on the first day of life. And the published research showed that infants who got vitamin K had a five-fold reduction in the risk of bleeding to death during the first week of life. From that study, they estimated that for every 100,000 full-term infants, vitamin K would save the lives of 160 infants per year. This was in 1944.

Justin: Please remember that number. [titters] All right.

Sydnee: And I think… I think like with a lot of things that we talk about in the under-two age group, there are so many medical advances that—like the specifically why people live longer is because so many more babies make it out of their first year or two of life.

Justin: Right.

Sydnee: And the reason—

Justin: It's a math thing. It's skewing the average.

Sydnee: It's a math thing. And the reason, one, we're very vulnerable then. Two, we make these medical advancements and we take this so seriously, because if you think about, I think, the moral weight of the loss of those years weighs heavier on our souls. And so—you know what I mean?

Justin: Mm-hm.

Sydnee: So, one is too many.

Justin: Yeah.

Sydnee: So, 160 out of 100,000, maybe that math doesn't sound impressive to you—

Justin: But it's like—

Sydnee: But one is too many. So anyway, they began to, of course, isolate a number of different foods where vitamin K could be found, and how much—and like I said, the original—all of our international units—you know, vitamins are measured in international units often.

Justin: Mm-hm.

Sydnee: And it's like, what is that? What is the—you know, it's not a gram, it's not a… you know, I mean, what is an international unit? It's just like a standardized measurement system that we've come up with. And it was based on how much was needed to prevent bleeding in baby chicks.

Justin: Huh.

Sydnee: Yeah. We also discovered that vitamin K is made by our gut bacteria, once we have established that. And so, that was part of why we began to figure out, as we studied this further, why is this specifically an issue in babies?

Justin: Because they haven't had time to develop the gut bacteria.

Sydnee: Yes. So, one, our—when we are first born, our microbiome, like our natural gut flora, the stuff, the good bacteria that you want living in your gut, hasn't formed yet. And it takes a while, so it's not making vitamin K. The other thing we understand is that—and through the '70s, we really began to understand clotting and clotting factors.

And our livers make all of these different—and that's what we call them, clotting factors, and they're numbered—that are involved in the coagulation cascade and the pathway that gets us to forming a clot. Vitamin K helps our livers make multiple clotting factors and proteins that we use for clotting.

Justin: Okay.

Sydnee: So, since you don't have all the clotting factors you need when you're born, our livers are still ramping up, right?

Justin: Right.

Sydnee: That's why you sometimes get like jaundice. You know how some babies get a little jaundice when they're first born?

Justin: Yeah. Because they're still—

Sydnee: Their livers are still kind of like coming online. [titters] Their livers are still booting up.

Justin: Okay.

Sydnee: So, you're not making enough clotting factors, you don't have much vitamin K. Vitamin K does not cross the placenta readily.

Justin: So, it's—

Sydnee: So, no matter how much you eat—

Justin: Even if the parent's like taking a bunch of vitamin K in.

Sydnee: You can, yeah, you can smash leafy greens all day long, but it's not going to get from the person who's pregnant to the baby. They don't have the gut flora, they don't have the clotting factors, so they are at higher risk for bleeding. We also found breast milk has less vitamin K than formula. So, breastfed infants specifically were at higher risk than formula-fed infants. Feeding formula wasn't enough to control for that risk still, but you are more likely to see these bleeding events in breastfed babies over formula-fed babies. So, the logical conclusion from all this research was, "Well, hey, vitamin K is, I mean, pretty much risk-free. Why don't we just give it to babies at birth?"

Justin: Yeah.

Sydnee: And—

Justin: Seems smart to me.

Sydnee: Yes. And so that if we give them on the first—immediately within 24 hours of birth, if we give them some vitamin K, we can prevent all the different forms of vitamin K deficient bleeding, VKDB, vitamin K deficient bleeding, in newborns. That's what we would call it now. We don't call it the hemorrhagic disease of the… any of that.

We know what it is, they don't have vitamin K. Early occurs in one in 60 to one in 250 newborns. Late is more rare, occurring in one in 14,000 to one in 25,000 infants. Early is within the first 24 hours. And there are some specific risks, like maybe some medications that the pregnant person could have been taking or certain conditions that may have been happening during the pregnancy.

Justin: Right.

Sydnee: And then it presents in one to seven days, there's bruising, bleeding from the umbilical cord, maybe the circumcision is bleeding. And the late can occur in two to 12 weeks, it's rare, and that can present as some more severe bleeding episodes.

Justin: Mm-hm.

Sydnee: Infants who do not receive a vitamin K shot at birth are 81 times more likely to develop vitamin K deficient bleeding.

Justin: 81 times.

Sydnee: Yes.

Justin: Wow.

Sydnee: And it absolutely can be catastrophic. So, vitamin K deficient bleeding could manifest as, like we talked about, you're bleeding from the site of where they cut the umbilical cord or from the circumcision more than you would expect. And maybe it takes a little bit longer to achieve hemostasis. Right?

Justin: Mm-hm.

Sydnee: And so, scary, but… not devastating. Bleeding can occur in the brain, and that can lead to severe disability and death.

Justin: Right.

Sydnee: And so, it is absolutely something that can be fa—can and has been fatal to newborns. There is no—there have been some concerns through the years about specific side effects of the vitamin K shot—okay, well, but somebody once tried to link it to a certain kind of leukemia. There is absolutely no correlation between that anywhere, any research that's been done. There has been one case of an allergic reaction—

Justin: Geez.

Sydnee: To a vitamin K shot.

Justin: That's it.

Sydnee: That we have documented. One case. And there is a preservative-free formulation. So, if you want one without preservatives, which have been found to be safe, but you still don't like them, they have that. They recommend that, you know, if it—it is a shot, probably the newborn will cry.

Justin: Yeah.

Sydnee: So, use measures to ease pain; cuddling and comfort and—

Justin: Just ask them not to—

Sydnee: [chuckles] You can have some redness or irritation at the injection site. And again, eating more vitamin K during pregnancy will not alleviate this, we've done studies that back it up. While we find more vitamin K in the pregnant person, it isn't getting effectively—

Justin: Couldn't get through.

Sydnee: To the baby. They also did a study to look at oral route of administration. So like, since so many people don't like shots, what if we did instead of a single shot given at birth, could we do a three dose, two milligram oral regimen? And what they found is that it does lower the chance—it does still work.

Justin: Mm-hm.

Sydnee: But the problem is it, one, it still is not quite as effective as the injection. And two, it's over the course of three weeks. So—

Justin: Oh, it's tough to keep track of.

Sydnee: Well, you give 'em that first dose when they're in the hospital, but then what you're trusting is that they're going to remember those next two doses outside the hospital.

Justin: Right.

Sydnee: And that… it may or may not happen. So, the safer route is a single vitamin K injection given at birth, will dramatically reduce the risk that your baby has a catastrophic bleeding event. And the risk of the injection, I mean, I… you can't ever—to be a good scientist, I can never sit here and say the risk is absolutely zero. But the risk is as close to zero as one would comfortably feel saying, knowing the limitations of human understanding. Does that make sense?

Justin: Yes.

Sydnee: So, I hope that untangling all this, because I do think especially newborns—I had the same thought when it was recommended to me, because I was breastfeeding, that I should supplement with vitamin D. The first time that I heard that I was like, surely, my body makes? [chuckles] Surely, right? Like, nature made me to make this for this little person. And like, isn't that how—shouldn't that be enough? No, no, it's not. And we have science to tell us it's enough—it's not enough. And we also had a lot of kids with rickets for a lot of years, and with vitamin D deficiency for a lot of years. And so like, we know that just because something seems like, well, I mean, shouldn't that be enough? Shouldn't that make sense? No, sometimes it's not. And science shows us that.

Justin: We also have lots of medications that right size the chemical comings and goings of our bodies. I don't think that that's such a surprise that we could find something that would benefit us early in our life, if there's things that later on in life we would benefit from taking.

Sydnee: Mm-hm. It really is, I would urge you. Because I mean specifically I have heard the new surgeon general calling the vitamin K shot and its necessity into question. And as a person who never practiced medicine, I'm not sure why she feels that she's qualified to call it into question.

And the devastation of something so small being parents forgoing it out of fear that has been created by public health officials, and then something happening to your newborn, I mean, it's just, it's horrific. So, this is how we untangle it, though. This is how we got here. This is why we know it works. We don't just say, "Do what I say because you don't want your baby to bleed to death." Nobody wants their baby to bleed to death.

Justin: [Agreed??].

Sydnee: Everybody's trying to do the right thing for their baby.

Justin: Yes.

Sydnee: So, let's help them make that decision.

Justin: But now you know about vitamin K. Go tell some folks about vitamin K this week.

Sydnee: Yes.

Justin: That's your homework. I've never given you homework. Why would I start now? Thanks for listening to our podcast! And thanks to The Taxpayers for the use of their song "Medicines" as the intro and outro of our program. We really, really appreciate it. If you want to send us a message, you can email sawbones@maximumfun.org. You can send your weird medical questions there, or what have you. That's going to do it for us for this week. Until next time, 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]