

TPWKY

This is Exactly Right.

Erin Allmann Updyke

Warning for the squeamish, this is about to get graphic.

Erin Welsh

"Inside Tony Love's fingers they found pockets of pus the size of nickels. There was one in the center of his hand, it was the size of a golf ball. Orthopedic surgeons probed Tony's hips and shoulders with a long wide bore needle looking for infection trapped behind the joint's cartilaginous sheaths. His left knee, the one he couldn't bend, was rigid and swollen. When they slid the needle in, pus pushed out under pressure forcing back the base of the syringe. They got out enough to fill a baseball. One of the orthopedic surgeons sliced into Tony's left thigh and eased apart the muscles. There was pus underneath them, creamy and dull. There was too much to evacuate through the small incision they had cut so they kept cutting, looking for the end of the pocket. They laid his thigh open from his knee almost to his hip joint. Wherever they cut, they found a dense deposit of pus wrapped around the bone. They used a tool like a dentist's jet to work it free, rinsing the cavity between bone and muscle with high pressure water and sucking the slurry away. The abscess was so deep that they could not trust they had cleaned out all the infection and so they left the gash open. They wrapped it in dressings that would let the mess drain and rolled him back to the ICU."

TPWKY

(This Podcast Will Kill You intro theme)

Erin Welsh

I'm Erin Welsh.

Erin Allmann Updyke

And I'm Erin Allmann Updyke.

Erin Welsh

And you're listening to This Podcast Will Kill you.

Erin Allmann Updyke

Yep. Ugh.

Erin Welsh

Yeah, yikes.

Erin Allmann Updyke

That's like pretty gnarly even for our standards.

Erin Welsh

Oh absolutely.

Erin Allmann Updyke

Wow.

Erin Welsh

So that was a little excerpt adapted from 'Superbug' by Maryn McKenna.

Erin Allmann Updyke

Shout out Maryn McKenna, making it grodes.

Erin Welsh

Yeah, oh my gosh. So it's part of Tony Love's story who was a 13 year old boy from Chicago who in 2007 became infected with a deadly strain of Staphylococcus aureus, the star of our show today. And this strain was not only Methicillin-resistant but also slightly resistant to vancomycin which is the last resort antibiotic. But we're gonna get all into that so just wait.

Erin Allmann Updyke

Yep.

Erin Welsh

So as you may have guessed, this week we are covering Staphylococcus aureus, specifically MRSA.

Erin Allmann Updyke: MRSA.

Erin Welsh: What is MRSA?

Erin Allmann Updyke: So MRSA is Methicillin-resistant Staphylococcus aureus.

Erin Welsh: Okay.

Erin Allmann Updyke: We'll get into all of that but first there's really important business we need to take care of.

Erin Welsh: Yeah and what is that again?

Erin Allmann Updyke: It's what we're drinking!

Erin Welsh: Oh! This week is a real doozy, I must say.

Erin Allmann Updyke: Yeah.

Erin Welsh: We've outdone ourselves gross-wise.

Erin Allmann Updyke: Even as far as quarantinis go for us, like we've tried some things.

Erin Welsh: Yeah.

Erin Allmann Updyke: And this time is...

Erin Welsh: The visual is striking.

Erin Allmann Updyke: Striking.

Erin Welsh: We encourage you to make this.

Erin Allmann Updyke: Please do.

Erin Welsh: And then please post pictures of it.

Erin Allmann Updyke: Please do.

Erin Welsh: So we are calling it... (laughs) It's hard to say without laughing.

Erin Allmann Updyke: Fruit of the Wound.

Erin Welsh: Fruit of the Wound, ladies and gentlemen. So it is a gorgeous-looking cocktail.

Erin Allmann Updyke: It's truly something spectacular.

Erin Welsh: Basically a gin fizz with-

Erin Allmann Updyke A nice big old scoop of vanilla ice cream on top.

Erin Welsh Yeah so that it slowly oozes down into the blood cavity.

Erin Allmann Updyke And make sure you top it with a cluster of grapes.

Erin Welsh Mm-hmm. Okay I guess we should move past what we're drinking.

Erin Allmann Updyke Yeah.

Erin Welsh And I wanna know what is Staph aureus?

Erin Allmann Updyke Let's talk about it.

TPWKY (transition theme)

Erin Allmann Updyke Okay so the first thing to know about MRSA, which is its colloquial name I suppose, is it's kind of a weird one for us because most of the time when we cover a disease on this show, we're covering something pretty specific, right. Tuberculosis is transmitted in a certain way, it causes a certain set of symptoms, blah blah blah.

Erin Welsh Right and this is the epidemic and this is the whatever.

Erin Allmann Updyke Exactly, right. So MRSA is a little bit different because it's kind of a specific form of a specific pathogen that can cause so many different diseases, as we'll see. So MRSA. We already said it stands for Methicillin-resistant Staphylococcus aureus. So what is Staph aureus? That's the first question that we have to answer, am I right?

Erin Welsh You're totally right.

Erin Allmann Updyke I know. So Staph aureus is a gram-positive cocci which means it's a bacteria that's shaped like a ball.

Erin Welsh Okay.

Erin Allmann Updyke Weirdly usually I can say 'this bacteria is transmitted in this way' like fecal-oral or respiratory droplets, right? These are things that people who have been listening, you know these terms and you're familiar with them, right.

Erin Welsh Right.

Erin Allmann Updyke But I'm not gonna say any of those things right now because the thing about Staph is it's absolutely everywhere. It just exists. So it's probably on your skin, it's in your nose, it's on your food, it's in your butt.

Erin Welsh We're talking Staph aureus not necessarily MRSA.

Erin Allmann Updyke Right, Staph aureus. So I'm gonna focus on Staph aureus for the whole first part of this biology section just so we can get a feeling for what bug we're talking about.

Erin Welsh: Okay. And that would include both strains that are resistant like MRSA but also ones that are completely susceptible to all antibiotics.

Erin Allmann Updyke: Yes, exactly.

Erin Welsh: Just Staph aureus. Okay.

Erin Allmann Updyke: Staph aureus.

Erin Welsh: The bigger umbrella.

Erin Allmann Updyke: The big old SA.

Erin Welsh: Kay.

Erin Allmann Updyke: So yeah it's everywhere. It's probably statistically on at least one person in this house right now. Just living on us.

Erin Welsh: Yeah, 33%.

Erin Allmann Updyke: Yeah there you go. Boom. Way to go. But most of the time it doesn't matter that it's everywhere, it just hangs out. It's just like an organism that lives on you, it doesn't cause you harm, it probably doesn't do much that we know of, it just hangs out and it's fine. It exists as a part of you. But every once in a while it can cause disease. And honestly because we try and keep these episodes in an hour, I can't even talk about all of the different diseases that it can cause, because that's just how many diseases Staphylococcus aureus can cause. It's crazy.

Erin Welsh: And so it causes these diseases, like so many different diseases because where it infects or how it infects or...?

Erin Allmann Updyke: Yeah, both.

Erin Welsh: Okay.

Erin Allmann Updyke: So I'll go through some of the different things you can get from Staph and then we'll talk more specifically about both MRSA and probably what most people think of when they think about a Staph infection. Okay.

Erin Welsh: Okay.

Erin Allmann Updyke: So first of all, there's a range of different diseases you can get from Staph. You can get pneumonia if for example you get a viral infection in your respiratory tract that then maybe causes some damage and leaves you susceptible. Like your immune system becomes compromised, Staph aureus that lives in your nose can sort of travel down into your respiratory tract, infect your lungs, and cause pneumonia. Boom. Number one. Number two, it can cause-

Erin Welsh: Oh god, how long is this list?

Erin Allmann Updyke

It's pretty long. It can cause what's called acute endocarditis. Which 'acute' just means rapid onset which in this case also means more serious, doesn't always. It can cause a rapid onset endocarditis, 'endo' means inside, 'card' means your heart, like cardio, 'itis' is inflammation. So we're talking inflammation on the inside of your heart.

Erin Welsh

Okay that sounds pretty dangerous.

Erin Allmann Updyke

That's pretty bad. And we're not even talking about whether or not it's susceptible to antibiotics, this is just Staph aureus grabbing onto your heart valves, no big deal.

Erin Welsh

No big deal.

Erin Allmann Updyke

Well, big deal actually, that's quite a big deal.

Erin Welsh

Huge deal. (laughs)

Erin Allmann Updyke

(laughs) Yeah so that can happen. It's especially common in IV drug users because Staph can live on your skin so if you inject into your veins through your skin, that bacteria can travel straight to your tricuspid valve and grab hold.

Erin Welsh

Oh. Tricuspid valve is in your heart I assume?

Erin Allmann Updyke

It's in your heart. Yeah, yeah, yeah. It's in your heart. Right side. It's pretty cool.

Erin Welsh

(laughs)

Erin Allmann Updyke

All right, number three disease. It can also cause osteomyelitis.

Erin Welsh

Break that down for me.

Erin Allmann Updyke

Osteo', bone.

Erin Welsh

Okay.

Erin Allmann Updyke

Myel', hmm. I actually don't know about that one. Ignore it. 'Itis', inflammation. Bone inflammation! (laughs)

Erin Welsh

(laughs) I really wanna know what 'myel' is now.

Erin Allmann Updyke

Me too! I mean 'myel' like 'myelin' is sheath, so it must be sheath.

Erin Welsh

Yeah.

Erin Allmann Updyke

Cause I do think it infects the very first layer of your bone, but it is like a bone infection that it can cause. Super common in children, probably what your friend Tony-

Erin Welsh

Tony Love.

Erin Allmann Updyke

Tony Love. Not actually friends, but you know what I mean. Our firsthand account.

Erin Welsh: Our firsthand account.

Erin Allmann Updyke: Tony Love most likely had some form of osteomyelitis based on his symptoms.

Erin Welsh: God, sounds terrifying.

Erin Allmann Updyke: It is, it's super scary especially cause in super young kids you'll just have this crazy joint pain and if you're a parent or whatever, you're like what could possibly be wrong?

Erin Welsh: Right.

Erin Allmann Updyke: You might not have any visible outer issues. Like you had a scrape a couple weeks ago that completely healed and now all of a sudden you can barely walk because your knee's infected with Staph aureus!

Erin Welsh: Kids are scraped all the time, they're rough and tumble.

Erin Allmann Updyke: Literally all the time.

Erin Welsh: I still have gravel embedded in my knee from-

Erin Allmann Updyke: I have some in my head! (laughs)

Erin Welsh: See? (laughs) And so to think like oh well that must be the cause of it.

Erin Allmann Updyke: It's crazy. Yeah. It can also cause various forms of arthritis so if it infects your joint rather than your bone directly, yeah. It's everywhere. Also, not done. Staph aureus produces several toxins, right?

Erin Welsh: Mm-hmm.

Erin Allmann Updyke: So each of those could probably, like we could have a whole episode on all the various toxins that Staph aureus produces but some of them you've probably heard about. So one of them is an exfoliative toxin. Doesn't that sound nice?

Erin Welsh: Yeah.

Erin Allmann Updyke: Exfoliant, great for your skin?

Erin Welsh: Sure.

Erin Allmann Updyke: Nope. It causes like your skin to just slough off.

Erin Welsh: I don't like the word 'slough'. Yeah.

Erin Allmann Updyke: Slough. That's the word I'm gonna use, yeah. It can also cause, have you heard of it? Toxic shock syndrome.

Erin Welsh: Oh yeah.

Erin Allmann Updyke Oh yeah, that's Staph aureus babe. We're not gonna get into supes detail about it because again, it could be a whole episode. But it's basically a toxin called a superantigen cause it basically makes your... It's an antigen which is something that your body reacts to and makes antibodies against and it makes your body make so many antibodies, like it is like, 'All the antibodies, come to me!' And so then your body goes crazy and it goes into shock because you just have so much immune system action that your immune system goes crazy kind of. And that is from Staph aureus.

Erin Welsh Can I ask a stupid question?

Erin Allmann Updyke Of course!

Erin Welsh What is going on biologically with shock?

Erin Allmann Updyke I feel like that's a whole episode.

Erin Welsh I know but give me the...

Erin Allmann Updyke So there's a lot of different forms of shock. There's septic shock which usually is from some kind of bacterial infection, and then there's also things like cardiogenic shock, hypovolemic shock. All of these basically involve a drastic drop in blood pressure, so that's the underlying mechanism that's going to make you end up dying is that your blood pressure essentially plummets and then your organs start to fail because they're not getting blood perfusion to your organs, and then you die.

Erin Welsh Okay.

Erin Allmann Updyke Yeah, cool right?

Erin Welsh So toxic shock syndrome.

Erin Allmann Updyke Toxic shock syndrome.

Erin Welsh Wonderful.

Erin Allmann Updyke So shock induced by a toxin. Not done, by the way.

Erin Welsh Oh god.

Erin Allmann Updyke There's more. There's another toxin that it can produce that causes very rapid onset food poisoning. Drink that drink Erin, drink that drink!

Erin Welsh (gasps)

Erin Allmann Updyke You're probably fine.

Erin Welsh Oh god, as the ice cream curdles.

Erin Allmann Updyke: It does, it is curdling. But yeah, this food poisoning is like super, super rapid onset, like within 1-8 hours because what's basically happening is if you leave out a plate of, let's say spam and eggs cause that's a really good example, or for you Midwesterners, potato salad. Okay? Potato salad, mac salad, anything. Mayonnaise, meat-

Erin Welsh: Anything that's called 'salad' only because it has mayonnaise added to it.

Erin Allmann Updyke: (laughs) Yeah, yeah. Truth.

Erin Welsh: (laughs) Yeah. Chicken salad.

Erin Allmann Updyke: Tuna. Tuna salad.

Erin Welsh: Yep.

Erin Allmann Updyke: You leave that out on the counter, it's covered in Staph aureus, it's everywhere. And that Staph aureus starts producing a toxin and then it just sits there so then you're like, 'Oh I forgot, I'll put this back in the fridge.' It doesn't matter, the toxin's already there and then you're gonna eat that mac salad cause it was so good yesterday and then 8 hours later you're barfing all over the place. And it is preferentially barfing and not diarrhea-ing.

Erin Welsh: That's so interesting, okay.

Erin Allmann Updyke: Yeah.

Erin Welsh: Okay so if you ever have food poisoning barf-

Erin Allmann Updyke: Yeah like super right after you ate something where you were like, I probably shouldn't have eaten that. Probably Staph aureus.

Erin Welsh: Oh god, that was my wrap today.

Erin Allmann Updyke: Your wrap today? You're not barfing yet. (laughs)

Erin Welsh: Not yet. It's almost been 8 hours.

Erin Allmann Updyke: So that's a lot.

Erin Welsh: That is a lot.

Erin Allmann Updyke: And there's one more.

Erin Welsh: This is crazy!

Erin Allmann Updyke: Isn't it crazy that all of these different things can be caused by the same bacterium?

Erin Welsh: It's bizarre is what it is.

Erin Allmann Updyke

It is so, so interesting to me. But probably the most common thing that people associate with Staph infections, I know what I used to associate with Staph infections, goes a little something like this. I saw a bump, maybe it was on my butt, maybe it was on my arm, I don't know, I just had a bump. I thought it was a pimple so I tried to pop it, or maybe I thought it was a bug bite but it didn't itch so I was like, that's kind of weird. Huh. But it's just like a bug bite, it's fine. It's gonna go away.

Erin Welsh

Maybe a spider bite.

Erin Allmann Updyke

Maybe definitely a spider bite. But it wasn't. And then it just didn't go away. And then the next day it was kinda bigger and it was kind of leaking and oozing. And then the next day my entire butt was covered in a giant, bloody, pus-y abcess! It was just oozing and it was bleeding.

Erin Welsh

Oh god.

Erin Allmann Updyke

This did not happen to me by the way, I'm saying me but I'm just saying the royal me.

Erin Welsh

It could have.

Erin Allmann Updyke

It could have. Luckily it hasn't.

Erin Welsh

Yet.

Erin Allmann Updyke

As much as I'm willing to say at least.

Erin Welsh

(laughs)

Erin Allmann Updyke

But that's sort of the classic Staph infection and that would be a Staph skin infection.

Erin Welsh

Okay, yeah.

Erin Allmann Updyke

Right so Staph gets into any kind of open wound, super common to happen after shaving where you get like infected hair follicles. Stop shaving your pubes, peeps! Seriously.

Erin Welsh

Seriously.

Erin Allmann Updyke

Seriously. And yeah, and so that's kind of the prototypical Staph infection.

Erin Welsh

Yeah.

Erin Allmann Updyke

And that is skin infection, you end up with this open abscessing wound that kind of just doesn't heal and maybe keeps growing or maybe kinda stays the same size but just doesn't heal. Like you put Neosporin on it and it just doesn't go away. So that's super common. And that's Staph aureus. How crazy it is that Staph can infect so much of your body, right.

Erin Welsh

Yeah!

Erin Allmann Updyke

Like so many different parts.

Erin Welsh

Yeah.

Erin Allmann Updyke: So one of the questions is how on earth can it actually do that, right? Like how can it infect your lungs and give you pneumonia but also give you a skin infection? Like that's weird.

Erin Welsh: It's like the jack of all trades bacterium.

Erin Allmann Updyke: It is, yeah! It really is. So there's a few different ways that it manages to do this and it mostly just centers around evading your immune system full stop.

Erin Welsh: Okay.

Erin Allmann Updyke: It's just kind of really good at that. So one of the things it does is produce exotoxins which we already talked about, right, some of the toxin-mediated diseases like toxic shock syndrome and barfing food poisoning, for example. Okay but it also has another way that it is able to cause disease and that's by this particular surface protein that it has. It's called protein A, which is not creative, but it basically is just a protein that is really good at both evading our immune system, so it's good at hiding from our immune system, and it's really good at invading our epithelial cells. And epithelium are the cells that line basically everything in your body. So your skin is epithelium but also the inside of your lungs, that's epithelium; the inside of your heart, also epithelium; your entire GI tract, also epithelium. So this protein allows it to invade those cells very, very easily.

Erin Welsh: Okay so this bacterium lives on the surface of a lot of our body but it also possesses the key to invade the surface of our body?

Erin Allmann Updyke: Yes.

Erin Welsh: That seems highly sus.

Erin Allmann Updyke: Right? (laughs) It is, it's highly sus.

Erin Welsh: I think I used that incorrectly.

Erin Allmann Updyke: Perfectly. Perfectly correctly.

Erin Welsh: So can we talk for a second about resistance?

Erin Allmann Updyke: Yeah, that's what I think we need to talk about next.

Erin Welsh: Okay.

Erin Allmann Updyke: So yeah, so MRSA is a resistant form of this horrible Staph bacteria that we've been talking about. So antibiotic resistance in general, just for people who might not be aware, just means that when you try and give somebody an antibiotic which normally would help cure an infection of bacteria, it doesn't work.

Erin Welsh: Okay.

Erin Allmann Updyke: MRSA happens to be a strain of Staph aureus that is resistant to what are called beta lactam antibiotics which means like methicillin, penicillin, a bunch of the -cillins, -illins, chillins.

Erin Welsh (laughs)

Erin Allmann Updyke And the way that it does that, it basically just changes a protein so that the antibiotic can't bind to it anymore.

Erin Welsh Okay.

Erin Allmann Updyke That's pretty much it. But I know the question that you wanna know is how on earth can it become resistant, right? Like how does that happen?

Erin Welsh Yeah.

Erin Allmann Updyke I wanna talk for like an hour about this.

Erin Welsh Oh that sounds like a great idea. Should we maybe do a future episode all about antibiotic resistance?

Erin Allmann Updyke I think we should. Yeah, we're going to.

Erin Welsh Or antibiotics.

Erin Allmann Updyke Antibiotics and antibiotic resistance because it is really fascinating like the evolutionary arms race that happens between a bacteria and what you treat it with. Most of the antibiotics that we have actually come from other bacteria or fungi or plants. So these are substances that are produced in nature in order to fight off bacterial infections that invade them. So whether it's a bacteria fighting off another bacteria or a fungus trying to fight off a bacterial infection or what have you. And so bacteria are constantly evolving ways to fight off these defenses and then other bacteria and fungi and plants and people are constantly evolving ways to try and fight off those bacteria. But basically what can happen is that once you get a mutation, for example in the case of MRSA in this single protein essentially, you change this protein just enough that this antibiotic can no longer bind. Once that single bacteria has that protein, anytime you give it penicillin or methicillin it's gonna survive which means it's gonna still hang out in your body.

Erin Welsh And reproduce.

Erin Allmann Updyke And reproduce. So now that the new colony that's in your body now or in your nose is now all of them are resistant. And even if you have other bacteria, like let's say you've got like six different kinds of Staph living on your body, cause that's not insane, Staph is everywhere, right. Once you start hitting those Staph with an antibiotic, if there's one that happens to be resistant, bacteria can do something called conjugation which is kind of like bacteria sex.

Erin Welsh Mm-hmm, yep.

Erin Allmann Updyke Basically they can give each other the ability to also resist penicillin.

Erin Welsh Okay.

Erin Allmann Updyke And so it can spread both by a single bacterium replicating but it can also spread from bacterium to bacterium via conjugation.

Erin Welsh And it becomes a numbers game.

Erin Allmann Updyke

Yeah, absolutely.

Erin Welsh

Where you just have so many bacteria reproducing or replicating that one just by probability is going to evolve that mutation.

Erin Allmann Updyke

Exactly, right.

Erin Welsh

Or that mutation will emerge and then it will spread.

Erin Allmann Updyke

Spread in that population. Yeah, yeah, yeah, exactly. So yeah. That's pretty much MRSA in a nutshell. It's not an all bad news game because most MRSA is still susceptible to another antibiotic called vancomycin.

Erin Welsh

Okay.

Erin Allmann Updyke

So it's not like we've run out completely of treatment options. But yeah I mean, it is really scary because if you don't identify an infection as a MRSA infection and you start treating it with penicillin or methicillin, it's not gonna do anything and in some cases it might make it worse because now you're gonna have your resistant populations spreading that gene to susceptible populations within a single individual.

Erin Welsh

Mm-hmm.

Erin Allmann Updyke

So tell me Erin, how did we get to this horrible, horrible place?

Erin Welsh

That's a great question.

TPWKY

(transition theme)

Erin Welsh

Do you remember the first time that you hears about MRSA?

Erin Allmann Updyke

No.

Erin Welsh

I don't remember the first time but I feel like when I was in maybe middle school or high school, it started to be talked about a lot.

Erin Allmann Updyke

Huh. I think I didn't hear about Staph infections until I was in college and I wanted to go to Moorea to do work and my mom was like, 'You'll just get a Staph infection from the coral!' And I was like, 'Okay.'

Erin Welsh

(laughs) Wise mothers. No, I remember hearing it probably on like Channel 1 news or something like that. But I remember all of these scary headlines about locker rooms and gym mats and the pimple that brings death. And I feel like a lot of these headlines focused on individual stories of parents losing a child or someone losing an eye or a leg or something like that. I feel like there was this larger story to it where MRSA seemed to represent the failings of modern medicine. It was this wake up call where suddenly we could no longer rely on the antibiotics that we had taken for granted in some ways over the past 50 or 60 years. It was kind of like we were being sent back in time. Before antibiotics you could easily die from that scratch on your leg that you got walking through some bushes. A little swelling, a little redness, a little fever, a lot of pus and the next thing you know, you could be dead from systemic infection.

Erin Allmann Updyke: Yeah.

Erin Welsh: And if you were unfortunate enough to have surgery in pre-antibiotic days-

Erin Allmann Updyke: Ugh.

Erin Welsh: Forget it, like you're a goner.

Erin Allmann Updyke: You're dead, 100%.

Erin Welsh: You're a goner, I don't know how anyone survived surgery. But infection was such an everyday part of life that we don't really have a written history of something like Staph aureus the way we do for the other big names in infection.

Erin Allmann Updyke: Yeah. That makes sense.

Erin Welsh: So let's go back to around 1880. I know that you're gonna be thrilled with this.

Erin Allmann Updyke: I'm always thrilled.

Erin Welsh: Because you are a Scottish man.

Erin Allmann Updyke: Oh my god.

Erin Welsh: You've been practicing for this.

Erin Allmann Updyke: I have been.

Erin Welsh: With an amazing mustache.

Erin Allmann Updyke: (Scottish accent) Broadchurch.

Erin Welsh: (laughs) You can say the one word that you know how to say.

Erin Allmann Updyke: (laughs) In my Scottish accent.

Erin Welsh: In your Scottish accent. So you are a surgeon and professor at the-

Erin Allmann Updyke: Aye!

Erin Welsh: (laughs) At the University of Aberdeen.

Erin Allmann Updyke: Aye.

Erin Welsh: And your name? Alexander Ogston.

Erin Allmann Updyke: Oh I'm not even gonna try to do that in a Scottish accent. You're welcome, everyone.

Erin Welsh (laughs) Yeah, now I've listened to it it's pretty bad.

Erin Allmann Updyke It's awful.

Erin Welsh It's really bad. Not that I could do better but...

Erin Allmann Updyke But why do I keep trying is the question.

Erin Welsh I don't know.

Erin Allmann Updyke But I will continue.

Erin Welsh Anyway. Okay, so you happen to be one of the surgeons who got into medicine so that you can help people and improve their lives, which is great. But there's one problem. About half of your patients seem to die after you stitch them back up.

Erin Allmann Updyke Aye.

Erin Welsh (laughs) Now as part of your quote "med school training" you have been told that pus production from the incision site is an essential stage in the healing process.

Erin Allmann Updyke Oh.

Erin Welsh But something about that doesn't sit right with you. In your search to try to find out how to quote "do no harm" you come across someone named Joseph Lister.

Erin Allmann Updyke Love him.

Erin Welsh Right? Joseph had this crazy idea that maybe surgical tools and wounds should be cleaned before and after surgery.

Erin Allmann Updyke It's so fun to think of how novel this... I mean it's not even novel, it was revolutionary thought.

Erin Welsh Yeah it was completely... Yeah, yeah. But he also thought that maybe a seeping wound wasn't a good thing, you know?

Erin Allmann Updyke (laughs)

Erin Welsh You decide to try out his approach which was applying carbolic acid to wounds which had been shown to be pretty dang effective and it works for you too. Congratulations.

Erin Allmann Updyke (Scottish accent) Thank ye.

Erin Welsh And you actually become such a fan of the practice that your students make up a song about it.

Erin Allmann Updyke Do I get to sing it?

Erin Welsh Yes.

Erin Allmann Updyke Okay. And so the song goes like this:

Erin Welsh Sing it.

Erin Allmann Updyke (singing) "The spray, the spray, the antiseptic spray. A.O. would shower it morning night and day, for every sort of scratch where others would attach a stinking plaster patch he gave the spray."

Erin Welsh (laughs) I think it was sticking plaster patch, or was it stinky?

Erin Allmann Updyke I don't know, it does say sticking. (laughs)

Erin Welsh (laughs) Good enough.

Erin Allmann Updyke Close enough.

Erin Welsh Good enough.

Erin Allmann Updyke It probably stunk if we're being honest.

Erin Welsh Oh yeah, absolutely. That was amazing.

Erin Allmann Updyke Thank you.

Erin Welsh Okay.

Erin Allmann Updyke That was a beautiful song if I do say so myself.

Erin Welsh It's pretty great.

Erin Allmann Updyke Wonderfully done.

Erin Welsh So yeah. Lister thinks that the wounds are putrefying because of bad air.

Erin Allmann Updyke He's close.

Erin Welsh You on the other hand are a bit more forward thinking and suspect that it's some kind of infection. So one day you take some pus from an abscess on one of your unfortunate patients and smear it on a microscope slide. Under the microscope you see some round clusters of cells that look like grapes. Later you journal about it, quote:

"My delight may be conceived when there were revealed to me beautiful tangles, tufts, and chains of round organisms in great numbers which stood out clear and distinct among the pus cells and debris."

Erin Allmann Updyke I love it.

Erin Welsh: Yeah. The name Staphylococcus is given to the bacteria. 'Staphile' from the Greek meaning bunch of grapes and 'coccus' meaning berry. Later 'aureus' is given to the Staph species that grows yellowy clusters on a plate. Aureus from the Latin 'aurum' meaning gold.

Erin Allmann Updyke: Gorg.

Erin Welsh: There you go. Okay enough etymology though. Clearly you are thrilled about this finding and you figure that the rest of the medical establishment would also be pretty pumped.

Erin Allmann Updyke: Right?

Erin Welsh: No, they're not. Not at all. They're skeptical and resistant to any challenge to the long held view that infection was just a natural part of wound healing.

Erin Allmann Updyke: Typical.

Erin Welsh: So you have to perform a public presentation of your research to prove that you covered all your bases and went through all of the postulates. And finally they accept that you might be on to something and you get all the praise and blah, blah, blah, blah, blah. Okay so at this point it's 1881 and microbiology is an exciting new field to be in. New bacteria and parasites and viruses are constantly being described and vaccines are in the works and being released and so on. In the first half of the 20th century is also where we see some really amazing medical developments that seem like magic for both patients and doctors. In 1941 penicillin, which is an episode in its own right, begins to be used to treat infections of all kinds. At first just soldiers in WWII, just restricted to them, but a few years later it begins to be widely distributed to the public. And it was viewed as this wonder drug, which it really was.

Erin Allmann Updyke: In the 40s!

Erin Welsh: 1944 I think was when it was distributed to the public.

Erin Allmann Updyke: That is insanely recent.

Erin Welsh: Yep. Very recent. So before penicillin, 80-90% of people who had Staph aureus bacteremia, infection of the blood, died. 80-90%.

Erin Allmann Updyke: Jesus H.

Erin Welsh: And I don't have exact numbers for the number of people every year because again like I said, it was a common thing but it didn't happen in outbreaks and clusters and so you didn't write it down.

Erin Allmann Updyke: Right. Yeah and it also wasn't a single disease, right? It was like people were dying from Staph aureus but from so many versions of Staph aureus.

Erin Welsh: Yeah.

Erin Allmann Updyke: Yeah.

Erin Welsh: So it was really hard to keep track of.

Erin Allmann Updyke

Yeah.

Erin Welsh

But anyway, after the introduction of penicillin, those deaths due to any version of Staph aureus dropped hugely in addition to a lot of other bacterial infections. Penicillin became the default treatment for many infections and was handed out like candy at Halloween. You could get penicillin in the grocery store without a prescription, without any information or instructions on how long you should take the pills, how many each day.

Erin Allmann Updyke

Oh my gosh.

Erin Welsh

Mm-hmm, mm-hmm. And its early effectiveness led to some hygienic practices falling by the wayside.

Erin Allmann Updyke

Oh no.

Erin Welsh

So basically now that you could cure these common infections, focus shifted away from prevention and more towards treatment, not consciously necessarily but just because prevention was no longer as crucial as it once was.

Erin Allmann Updyke

Wow.

Erin Welsh

And as you could guess, the overuse and misuse of penicillin even in these early days led to resistant strains of Staph aureus popping up and spreading almost immediately after penicillin was introduced. Like really almost immediately.

Erin Allmann Updyke

Yeah I mean even currently it only takes like a matter a months to a couple of years for resistance to develop to new antibiotics. It's insane.

Erin Welsh

Yeah. It's insane. Within 5 years of penicillin being introduced, 50% of Staph aureus strains that were isolated were resistant. And that number would just continue to climb.

Erin Allmann Updyke

Oh my god.

Erin Welsh

So sitting here now, 70 years later, it's easy to go well yeah duh, of course antibiotic resistance evolved. Look at how you dosed people, look at how irresponsible, I can't believe the lack of foresight.

Erin Allmann Updyke

(laughs) You did everything wrong.

Erin Welsh

Right but I think it's really worth noting that the threat of resistance had been recognized almost immediately by many people.

Erin Allmann Updyke

Really?

Erin Welsh

Oh yeah, including Alexander Fleming who was the dude who discovered the mold that made penicillin.

Erin Allmann Updyke

Wow.

Erin Welsh: So in 1945 in his Nobel Prize acceptance speech, he said quote: "There is the danger that the ignorant man may easily under-dose himself and by exposing his microbes to nonlethal quantities of the drug, make them resistant."

Erin Allmann Updyke: Whoa.

Erin Welsh: Yeah so right after.

Erin Allmann Updyke: Like literally right out of the gate.

Erin Welsh: He had already been thinking about this clearly for years.

Erin Allmann Updyke: He's like, 'Guys listen, seriously I know this is great and all but we can't mess it up.' And then people were like, 'Yeah, cool, great, bye, take your prize, peace.'

Erin Welsh: Right. Yeah so despite this warning, by the mid 1950s penicillin-resistant Staph had become a public health crisis around the globe. In Australia women who had just given birth were showing back up at the hospital with their severely sick newborn covered in broken blisters or blue with pneumonia. And the mothers were often sick themselves with open weeping abscesses on their breasts often.

Erin Allmann Updyke: Oh no.

Erin Welsh: Yeah. And the strain of Staph causing these infections proved to be both extremely infectious and extremely resistant, not just to penicillin but to many of the other antibiotics that had been developed at that point.

Erin Allmann Updyke: Oh no.

Erin Welsh: And it didn't take long for these outbreaks to appear in the U.S. And the thousands of cases and dozens of deaths prompted an emergency meeting of the American Medical Association. Something had to give. Better hygienic practices, better drugs, and definitely better record keeping cause it wasn't a reportable disease.

Erin Allmann Updyke: Yeah.

Erin Welsh: Staph infection was normal. This was something of a rude awakening to hospital physicians everywhere. Especially those who had joked that infectious disease doctors would soon be made obsolete by antibiotics.

Erin Allmann Updyke: Never.

Erin Welsh: No, really, never.

Erin Allmann Updyke: I'm counting on that for a job, quite honestly.

Erin Welsh: (laughs) Many hospitals instituted practices and appointed committees specifically to control the spread of this resistant Staph aureus. Newborns were placed into infected or uninfected rooms based on whether they showed any signs of infection.

Erin Allmann Updyke: Whoa.

Erin Welsh: But it wasn't working.

Erin Allmann Updyke: No.

Erin Welsh: Cases were still on the rise and babies that had no apparent contact with an infected person were still becoming infected. This infection was such a problem for newborns because newborns are so fresh and new.

Erin Allmann Updyke: I thought you were gonna say so fresh and so clean, clean.

Erin Welsh: Fresh and so clean, clean. So when they're born, their skin and mucous membranes are immediately colonized with bacteria from their mom's vaginal canal, from breast milk, and from the surfaces they encounter after birth. And this goes towards building the microbiome of this tiny human. But there's still a lot of open territory for other potentially harmful bacteria to colonize. And this resistant Staph aureus strain was so infectious and such a fast grower that it pushed out all the other bacteria and basically became the microbiome.

Erin Allmann Updyke: Whoa.

Erin Welsh: So what on earth do you do about a bacterial strain that wipes out all competition instantly and is untreatable by the drugs you have.

Erin Allmann Updyke: You come up with new ones, bra.

Erin Welsh: Well-

Erin Allmann Updyke: Or you die.

Erin Welsh: There's a third option.

Erin Allmann Updyke: Okay. (laughs)

Erin Welsh: So it does seem pretty hopeless. But one doctor had an idea. This guy was named Heinz Eichenwald and he remembered an old practice that was used to get rid of diphtheria infections from carriers of the disease in days before the vaccine.

Erin Allmann Updyke: I love this.

Erin Welsh: it was called bacterial interference.

Erin Allmann Updyke: (gasps)

Erin Welsh: Yep, you're pretty thrilled.

Erin Allmann Updyke: I'm shaking with excitement.

Erin Welsh: So the idea was that you expose these people to a different, harmless bacterium that's a better competitor than the one causing the problem. This new bacterium then takes over and pushes out the harmful one and voila, infection gone.

Erin Allmann Updyke: I love it. Clean, classy.

Erin Welsh: It's really innovative.

Erin Allmann Updyke: Yeah.

Erin Welsh: And very much in line with some technologies and treatments that are becoming popular nowadays which is why I spent so much time talking about this.

Erin Allmann Updyke: But also what year is this again, this guy came up with this?

Erin Welsh: This is in the late 1950s.

Erin Allmann Updyke: Okay wow so this is like still super early on, like even antibiotics are pretty brand new.

Erin Welsh: Yeah well and I think it's really fascinating that bacterial interference was developed in the early 1900s, like 19-teens.

Erin Allmann Updyke: Wow.

Erin Welsh: I think before the diphtheria vaccine was invented in 1920.

Erin Allmann Updyke: Yeah. Cool.

Erin Welsh: So yeah, it seems very forward thinking which is, yeah, very cool.

Erin Allmann Updyke: Yeah.

Erin Welsh: People stopped using bacterial interference in the 1920s when the diphtheria vaccine was released. But Eichenwald hadn't forgotten about it fortunately. So he set out to find a strain of Staph that was more infectious than the drug-resistant Staph strain but not harmful. And once he found it he set to exposing these newborns to the new strain. It was a pretty revolutionary idea for the time but people were desperate to try anything.

Erin Allmann Updyke: Yeah.

Erin Welsh: Lives had been really ruined by this persistent infection showing up. Children who were infected weren't allowed to go to school, at least one couple had divorced over it.

Erin Allmann Updyke: Whoa.

Erin Welsh: Yeah. But Eichenwald's strain worked. The deadly infection was eliminated. It was miraculous.

Erin Allmann Updyke: Wow.

Erin Welsh: And for the next few years it was used occasionally to treat stubborn infections.

Erin Allmann Updyke: That's pretty cool.

Erin Welsh: Yeah. But bacterial interference once again slipped out of practice in the late 1950s when a new antibiotic was released. Here we are, 1959, well into the history of Staph aureus and I haven't yet introduced you to who was in many ways the star of the show. Methicillin. Methicillin-resistant Staph aureus. The new antibiotic that I just mentioned was methicillin and when it was released it was advertised as quote "effective against all resistant Staphylococci, resistance unlikely to develop".

Erin Allmann Updyke: Oh dear.

Erin Welsh: Within a year of its release, resistance to methicillin had already been found. And by the 1970s MRSA was widespread in hospitals in the U.K. and making its way to the rest of the world. And cases weren't appearing as one-offs, it was more like a wave of infection. It would start off slowly with just a few people infected and then it would rapidly jump across hospital units, affecting the most vulnerable patients like those just out of surgery or with severe burns. Deaths from MRSA were becoming more common and the periods between MRSA outbreaks were becoming shorter and shorter. And while MRSA may have popped up a bit later in the U. S. than some parts of the globe, it made up for lost time. In 1975 in U.S. hospitals, 2.4% of strains were methicillin-resistant.

Erin Allmann Updyke: Oof.

Erin Welsh: In 1991, 38%.

Erin Allmann Updyke: Oh!

Erin Welsh: And jumping ahead of it in 2003, 64.4% in ICUs, intensive care units.

Erin Allmann Updyke: Oh just like when they swab the equipment that's in there or...?

Erin Welsh: Yeah I think it's like of all isolates from laboratory isolates from hospitals.

Erin Allmann Updyke: Okay. Yeah.

Erin Welsh: MRSA was becoming the new norm and its spread and persistence was helped along by the hospital setting itself. In a hospital, nurses and doctors are constantly on the move between rooms, between floors, different units, and while hygienic practices like handwashing and isolation work to a certain degree, MRSA is also carried really easily on the surfaces that we don't really think about as much.

Erin Allmann Updyke: Like your nose.

Erin Welsh: Well yeah, a doctor's coat.

Erin Allmann Updyke: Yeah.

Erin Welsh: A pen that a nurse or doctor carries from room to room.

Erin Allmann Updyke Ties, bra.

Erin Welsh A tie.

Erin Allmann Updyke Ties.

Erin Welsh Ties are found to be like one of the most germ ridden.

Erin Allmann Updyke They're very controversial right now in medicine. (laughs)

Erin Welsh Well that's funny, even bed curtains were found to be ridden with Staph, MRSA. So these people were unknowingly spreading the infection around the hospital between hospitals and so on and because hospitals are filled with people in poor health, vulnerable to infection, the bacteria found easy marks. Thousands of people every year suffered MRSA infections that they had picked up at a hospital or nursing home and many died. And I don't use the word 'suffered' lightly. Because for many people this was at least a life-altering and often a life-ruining infection.

Erin Allmann Updyke Yeah.

Erin Welsh Recurrent MRSA infections are really common and you can go from seemingly healthy one day and on death's door in what seems like a matter of hours.

Erin Allmann Updyke Yeah.

Erin Welsh Without a whole lot of warning or whole lot of like oh, obvious risk factors, whatever. So I do wanna mention that several countries such as Denmark, the Netherlands, some Nordic countries enforced really strict hygienic practices that greatly reduced MRSA infection incidence compared to other parts of the world including the U.S. Yeah, so they were like very-

Erin Allmann Updyke We're gonna nip this thing in the bud. Wash your hands, no we're serious.

Erin Welsh Yeah, yeah. Really. And it really reduced disease incidence. But in the other places, MRSA infections in hospitals became so frequent that it was basically second nature to look for signs of infection and jump on treatment right away, often relying on vancomycin which is the antibiotic that MRSA was still susceptible to, which sometimes worked and sometimes didn't.

Erin Allmann Updyke Yep.

Erin Welsh But being in a hospital meant that you were simultaneously in the worst place you could be because MRSA was everywhere but also the best place for rapid diagnosis and treatment. Because MRSA was a hospital infection, right?

Erin Allmann Updyke Right?

Erin Welsh Right?

Erin Allmann Updyke Right?

Erin Welsh I mean yeah, sure. For a while it was.

Erin Allmann Updyke

Uh oh.

Erin Welsh

Until it started popping up in the 1980s in a few people here and there who had no history of being in a hospital or nursing home or similar setting. But when these people showed up at the E.R. with an extremely painful pimple or rash or something else, MRSA wasn't at the top of the list of possible causes. And so people were often misdiagnosed and sent home without the immediate medical care and abscess cleaning that they needed. And it took a while for MRSA to be recognized as something that you could pick up outside a hospital setting but eventually MRSA infections became grouped into either hospital-acquired MRSA or community-acquired MRSA. And these labels existed not just for patient history but also because the strains were noticeably different. Hospital strains were all very similar to one another and were resistant to many different antibiotics. Community strains on the other hand tended to be much more diverse, resistant to only a couple antibiotics, but extremely virulent and infectious.

Erin Allmann Updyke

Whoa, interesting.

Erin Welsh

Yeah!

Erin Allmann Updyke

And logical, actually.

Erin Welsh

Yeah exactly. And so by the early 2000s, which was when I was in high school, a large proportion of all MRSA cases were community-acquired and epidemiologists had traced the source of many community outbreaks to places where Staph thrives. Warm, moist, full of people. So places like gyms and locker rooms, right? So young athletes showing up to the hospital complaining of a sore ankle and within a few hours lying on operating table while a surgeon scrapes away infected tissue and washing pus off leg bones. You know, those kinds of places. That's what happened. Once this pattern of MRSA showing up in athletes was apparent, many schools and gyms and professional athletic organizations took steps to prevent infection. No more sharing towels or razors.

Erin Allmann Updyke

Ew!

Erin Welsh

Gross on both counts anyway.

Erin Allmann Updyke

Wait who shares razors? Nasty.

Erin Welsh

I don't know but apparently it was a problem.

Erin Allmann Updyke

Grode.

Erin Welsh

Don't do it if you do it. No judge, but don't do it.

Erin Allmann Updyke

Nasty. Judge. I'm judging.

Erin Welsh

(laughs) Also regularly cleaning surfaces with antibacterial soap, handwashing soap available. You know, just basic hygiene stuff. And this really did help decrease cases of MRSA in these places. But the thing is is that not all school districts or gym facilities or other high-risk places like prisons can afford to maintain these practices.

Erin Allmann Updyke

Yeah.

Erin Welsh

And so we see again these health disparities arise which are then reinforced by the fact that poor people are at higher risk for infection so they have to spend more money on treatment which in the U.S. is often very expensive and then the cycle just sort of continues, it's this positive feedback loop. For a while the distinction between hospital-acquired and community-acquired MRSA was very important for treatment and for predicting the severity of the infection and where it might go. And doctors and researchers began to worry about the rise in community-acquired MRSA cases. Not just because it caused deadly, horrific infections that were difficult to treat, but also because they were worried about what would happen if, to quote the Spice Girls, "two become one".

Erin Allmann Updyke

(laughs)

Erin Welsh

(laughs) So if hospital-acquired MRSA and community-acquired MRSA met and exchanged genes.

Erin Allmann Updyke

Ooh, ooh.

Erin Welsh

Yeah. So if the hospital strain transferred some of the super resistance to the community strain or if the community strain kicked over a few genes for toxin production.

Erin Allmann Updyke

Yeah.

Erin Welsh

Yeah, problematic.

Erin Allmann Updyke

Very.

Erin Welsh

Well as you can probably guess, it was just a matter of time.

Erin Allmann Updyke

Yep.

Erin Welsh

Two did indeed become one and the distinction between hospital or community-acquired became less important. Rather worrying about whether we can actually treat this thing became the primary focus. Because a few cases of MRSA earned a new name: VISA or VRSA.

Erin Allmann Updyke

Uh oh.

Erin Welsh

And those mean either Vancomycin-intermediate or Vancomycin-resistant Staph aureus. Basically distinguishing between the different levels of resistance for this level of Staph aureus against vancomycin which had been used as the last resort antibiotic.

Erin Allmann Updyke

Right so whether like using vancomycin could kill it at all or whether you just have to, intermediate would be you'd have to use a really high dose of vancomycin.

Erin Welsh

Right.

Erin Allmann Updyke

Right.

Erin Welsh

And because MRSA is still treatable with antibiotics.

Erin Allmann Updyke

Right, yeah.

Erin Welsh

Mostly vancomycin. But VRSA and VISA, no. So yeah these infections were truly terrifyingly untreatable. Staph aureus had come full circle. So earlier when I was researching this episode, I kept telling you that this is probably the first time that I have been genuinely freaked out by one of these infections.

Erin Allmann Updyke

Yeah.

Erin Welsh

And there's definitely plenty to be scared about with these other diseases that we've talked about but there's something different about this one, I don't know what it is exactly.

Erin Allmann Updyke

It's everywhere, I think that's what it is.

Erin Welsh

I think a big part was Maryn McKenna's really eloquent descriptions of pus-filled cavities and oozing sutures and horrible, very tragic stories and people's lives being hugely impacted. But also that yeah, Staph is everywhere.

Erin Allmann Updyke

Yeah.

Erin Welsh

And so far our medical relationship with it has gone in one direction.

Erin Allmann Updyke

Yep.

Erin Welsh

We're running just to keep up.

Erin Allmann Updyke

Mm-hmm.

Erin Welsh

We've maybe had one foot ahead for the briefest amount of time.

Erin Allmann Updyke

Right and then it catches right up with us.

Erin Welsh

Yeah.

Erin Allmann Updyke

Yeah.

Erin Welsh

But so the question is now what comes after? How do we fight MRSA or VISA or VRSA without antibiotics? And so that is where I'll hand it off to you.

TPWKY

(transition theme)

Erin Allmann Updyke

Yeah unfortunately I don't have great news.

Erin Welsh

Cool.

Erin Allmann Updyke

So let's talk about the news that I have.

Erin Welsh

All right.

Erin Allmann Updyke

So the CDC has this monitoring program, it's active in a few different states, California, Georgia, Minnesota, New York, and Tennessee. Not the entirety of those states but several counties in each of those states. That basically means that they are actively surveilling about 14.5 million people. And they haven't compiled all the numbers from the last couple of years so the most recent numbers that you can get are from 2015 and they're not extrapolated out to the whole U.S.

Erin Welsh

Okay.

Erin Allmann Updyke

But I did the math for you because I'm a mather. I'm not a mather.

Erin Welsh

Oh! You had math modeling in your dissertation.

Erin Allmann Updyke

Yeah, yeah, yeah. Yeah. I did math. So in 2015 which is the most recent numbers I could find, in those 14.5 million people that they actively surveilled, there were 2600 cases. So I heard that and I was like oh, MRSA's not even a big deal, chill out guys, everyone relax.

Erin Welsh

I dunno it seems like a lot of cases, but...

Erin Allmann Updyke

And then there were only 332 deaths in that population.

Erin Welsh

Only.

Erin Allmann Updyke

I mean like on the scheme of things, I was like that's not so bad. Then I was like also I'm heartless and...

Erin Welsh

Yeah.

Erin Allmann Updyke

Maybe I have lost my humanity. (laughs) But I wanted more numbers because that made me feel like I was a bad person for thinking that wasn't a lot of people. So if you extrapolate out those numbers, if we assume that that population that they're surveilling is representative of the whole country which is kind of the point of surveillance, so let's hope they did a good job. Then that would mean that in the U.S. in 2015, there were over 53,000 MRSA infections, 42,000 of those would be hospital-acquired and 11,000 community-acquired.

Erin Welsh

Wow.

Erin Allmann Updyke

And over 6600 deaths.

Erin Welsh

Yeah I mean it's a lot.

Erin Allmann Updyke

And those numbers that I just calculated on my own are similar and in line with what the CDC's estimates from 2014 were which were a total of 61,000 cases and 9000 deaths. But overall about 1 in 3 people are carriers of some form of Staph aureus. Like they're just walking around with Staph growing on them. And it's estimated that about 2 in every 100 people, so 2% of the global population are carriers for some kind of MRSA.

Erin Welsh

And carriers meaning they-

Erin Allmann Updyke

They're growing it, they're breathing it, they're licking it, they're touching it onto their doorknobs.

Erin Welsh: But not necessarily-

Erin Allmann Updyke: Probably never getting, maybe getting infected with it right if they get a cut and then that MRSA that's on their skin gets into them, but maybe they never ever ever see an infection from it but they give it to their brother and their cousin and their neighbor and their barista.

Erin Welsh: Yeah. (laughs) The most important people in a person's life.

Erin Allmann Updyke: (laughs) Those are my favorite people. Yeah. And so that 2% is just in the general population. There are some populations where the situation is even worse like hospitals, right, like you said hospitals are just... If you're gonna get Staph in a hospital it's probably gonna be MRSA. But also places like correctional facilities. You can imagine that many correctional facilities aren't exactly sanitary places and many inmates in correctional facilities have various situations that would make them immunocompromised.

Erin Welsh: Right.

Erin Allmann Updyke: So MRSA is described as hyperendemic.

Erin Welsh: Ugh that does not sound good.

Erin Allmann Updyke: It is not good. I had never heard that word before but I can guess what it means and that is like super, it's everywhere!

Erin Welsh: Super prevalent.

Erin Allmann Updyke: It's not even just like, 'Yeah we have this disease.' It's like no, it's everywhere. There are some estimates that between 4.5-17% of inmates were carriers for MRSA.

Erin Welsh: That's crazy. It's so high!

Erin Allmann Updyke: It's insane.

Erin Welsh: Yeah.

Erin Allmann Updyke: I mean it's at least twice as high as the general population if not 9 times as high, you know? It's insane.

Erin Welsh: Right, in order of magnitude. Mm-hmm.

Erin Allmann Updyke: The question now becomes what do we do and how do we move forward from this? And I...

Erin Welsh: That's what I wanna know.

Erin Allmann Updyke: I don't have a great answer for ya.

Erin Welsh: Okay, okay.

Erin Allmann Updyke

Yeah. I don't. I don't have a great answer for you. I mean like you can find things that say 'the number of infections is decreasing,' you know, and 'we're doing a great job'. But I don't know how to believe any of it because I don't know where they're even getting these numbers from.

Erin Welsh

Right.

Erin Allmann Updyke

But the real issue is with new treatments, right. We're talking about now VRSA and what's the other one called? VISA. Right, Vancomycin-resistant-

Erin Welsh

VISA, whatever.

Erin Allmann Updyke

Oh, VISA, whatever. It's bad news! Right?

Erin Welsh

It's bad news.

Erin Allmann Updyke

Any way you slice it, the fact that we are now seeing resistance to vancomycin is very, very bad news.

Erin Welsh

Mm-hmm.

Erin Allmann Updyke

And so the thing is I found an article that was basically talking about new novel ways to find antibiotics, right, they were using sequencing to find different compounds that could then be used as antibiotics. It was very cool, I'll link to the paper. There's another group out of Brown who's getting a lot of PopSci articles right now written about them because they're doing a lot of research on all these novel compounds and they've found a few that seem promising. And that's awesome and it's necessary and it's great, but it doesn't solve the problem that is the fact that these bacteria will inevitably evolve resistance to those antibiotics.

Erin Welsh

Right. You're just playing the same game that we have been playing that we are losing at.

Erin Allmann Updyke

Right, yeah.

Erin Welsh

And have never won at.

Erin Allmann Updyke

So I was really hoping when I started researching this that I was gonna find phage therapy and immunoglobulins.

Erin Welsh

Yeah, yeah.

Erin Allmann Updyke

I found nothing.

Erin Welsh

You didn't find any phage therapy?

Erin Allmann Updyke

I found that it exists but I found no details on what the state of the research actually is.

Erin Welsh

Okay. What about bacterial interference?

Erin Allmann Updyke

I found nothing on bacterial interference.

Erin Welsh

Come on! Wow.

Erin Allmann Updyke

Yeah so it doesn't mean it's not out there, it just means it's maybe not the first steps that people are working on.

Erin Welsh

Yeah.

Erin Allmann Updyke

Which is kind of a bummer but also maybe I'm just totally wrong and was looking in the wrong places and someone listening is gonna tell us that they're working on a new phage and bacterial interference and-

Erin Welsh

Biofilm treatment, yeah.

Erin Allmann Updyke

Something, you know, because it has to be happening right? I would hope. Unless it's just that for some reason there's no money in it but it seems like if we're gonna put money anywhere, it should be in finding alternatives to antibiotics because we're gonna need them for so different many infections.

Erin Welsh

Yeah, it's a good place to put some money.

Erin Allmann Updyke

Yeah. But I don't have a great answer, I don't have like, 'Here's the newest thing and it's gonna solve all of our problems! GOOP.'

Erin Welsh

Yeah.

Erin Allmann Updyke

So that's MRSA.

Erin Welsh

How scared should we be of MRSA?

Erin Allmann Updyke

I mean I don't wanna tell you like don't interact with other humans or something. Like not that level.

Erin Welsh

That ship has sailed.

Erin Allmann Updyke

Yeah well that's just for different reasons. No I think MRSA is a really scary one, I think maybe it's up there with... Maybe not up there with flu but it's up there.

Erin Welsh

Yeah. I feel like they're all scary in there-

Erin Allmann Updyke

It's a different scary I think.

Erin Welsh

Yeah.

Erin Allmann Updyke

It's not as much like we're gonna have this giant outbreak, it's more just like this thing already exists everywhere and we're kind of running out of options to treat it.

Erin Welsh

Ugh, yeah. It freaked me out. Don't look up videos.

Erin Allmann Updyke

Do look up videos.

Erin Welsh

Yep, well.

Erin Allmann Updyke (laughs) Devil/angel, devil/angel.

Erin Welsh I don't know who's who, but...

Erin Allmann Updyke I do. (laughs)

Erin Welsh (laughs)

Erin Allmann Updyke Do you have any sources that you'd like to cite?

Erin Welsh I do, yes. So I got most of my information from 'Superbug' by Maryn McKenna which is where I got the firsthand account and it's a really great overview of the history of drug-resistant Staph aureus, not just MRSA but in general. And she's an amazing writer and so it's very fun to read.

Erin Allmann Updyke I don't have any real sources, I'll post a couple of articles that were interesting about MRSA antibiotics, new antibiotics. Oh we should also say thank you to Bloodmobile for the music as always. Thank you for listening. We love you.

Erin Welsh Oh yeah, oh yeah. Thank you so much for listening.

Erin Allmann Updyke And if you don't already follow us on all the social medias, Facebook, Instagram, Twitter, we're there posting gross videos, probably a bunch of pimple poppers for this one, no lie. I will, she won't, I will, so check the Twitter. (laughs)

Erin Welsh (laughs) We have a Goodreads book list.

Erin Allmann Updyke All of our sources are available on our website thispodcastwillkillyou.com, you can find every single episode with all of our sources listed, we keep it legit.

Erin Welsh That's it.

Erin Allmann Updyke Yeah I think really the only thing that we can say for this episode is-

Erin Welsh Really do, please wash your hands.

Erin Allmann Updyke You're filthy animals! We're filthy, all of us. (laughs)

Erin Welsh Yeah, yeah.

Erin Allmann Updyke I'm gonna go wash my hands.

Erin Welsh Yeah let's go do that.