

## Common Foodborne Illnesses: History, Prevention, and Treatment Part 2

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### Guest

**Kirk Ornstein MSM, MS, RN, NCSN, CNL**

Kirk Ornstein is a dedicated healthcare professional with a Master's degree in nursing, a Clinical Nurse Leader (CNL) certification, and a Nationally Certified School Nurse (NCSN). His extensive experience includes private duty, medical ICU step-down, pediatric nursing, camp nursing, school nursing, and field triage. He has also contributed to epidemiologic fieldwork focusing on foodborne illnesses and was a contact tracer for the NYS Dept. of Health. Kirk's expertise extends to nursing artificial intelligence in pediatrics, and he has a background in the pharmaceutical industry, developing medical education programs and offering insights into FDA regulatory approval processes.

### Host

**Leana D. McGuire, BS, RN**

Leana Delle McGuire is an RN with 30 years in healthcare, including critical care, heart transplantation and management. She has been teaching for 12 of those years with extensive experience in leadership development and executive coaching. Leana also has a background in content development, visual performance, speaking (including on the TEDx stage) and podcast hosting - both personal podcasts and corporate productions for various organizations. A novelist in her spare time, she also dabbles in music and painting.

# Transcript

## Episode 1 – Unraveling the Culprits: Botulism, Norovirus, Salmonella, & Staph

LEANA MCGUIRE, Host: Hello and welcome. I'm Liana McGuire, your host for this informative podcast on managing food borne illness brought to you by Elite Learning by Colibri Healthcare. Our subject matter expert today is Kirk Ornstein. He's an RN, MSN and clinical nurse leader and a guy who's obviously really good at research. Welcome, Kirk. How are you?

KIRK ORNSTEIN, Guest: Thank you. Good, good. It's good to be here.

MCGUIRE: Let's talk about specific foodborne illnesses, Botulism. Let's go to botulism. What can you tell us about botulism in general? We'll get into some details in a few minutes.

ORNSTEIN: It's a little funny. Botulism is a little bit of a I don't want to say, but like my favorite pathogens, because it's just so bizarre. It is. It's a life-threatening paralytic pathogen. It is considered by some the most toxic pathogen on this planet, one 1/1000000 of a gram of the toxin it produces can kill somebody.

MCGUIRE: Wow.

ORNSTEIN: Right. A pint of this toxin can kill every person on this planet. So, it's an amazing sort of thing to think about. And luckily, it's very rare.

Only about 110 people a year get it. But all of them, not all of it. The majority of them are going to need medical care. They're going to need what they have is an antitoxin to not die. The hospitalization rate for Botulism is 83%. Fatality rate is a little under 20%. And even with the antitoxin, the fatality rate is somewhere between five and 10%.

So, and 70% of these cases are pediatric or infant. So that's you know, so that's such a sort of amazing numbers to talk about. And the other amazing things about it is that it can take a spore form. So, this spore forms a protective covering that allows it to survive in environments that it can't reproduce or grow in.

But these spores can survive for decades. So, they don't go anywhere. And now and they're looking for an environment to grow in. And one of the interesting things about is that it likes an anaerobic environment. So, an environment without oxygen, which is not your common characteristic of these type of pathogens. Which leads it to a different way that you get infected.

It goes back to sort of the can issue that that is an anaerobic environment, and it likes to grow there. So, it takes these sorts of in these conditions to grow. Improper canning that people do now because everyone's into, you know, being self-reliant and self-sufficient. But canning is a perfect opportunity for botulism to grow. For infants, a lot of them get it from honey or honey flavored pacifiers because it will spore in the honey and just sit there waiting for an environment.

The honey itself becomes a low oxygen environment. And so, it can grow and be passed on to an infant that way.

MCGUIRE: Interesting.

ORNSTEIN: Yeah. So, it's really interesting. Very bizarre. But at the same time, there aren't many cases which are good.

McGUIRE: Yes. Thank goodness for that. I knew that children shouldn't have, honey, but I wasn't clear that that was the reason why. So that's really interesting. Now it attacks. How does it attack? You said it's a paralytic. Correct.

ORNSTEIN: Right. So, it's a neurotoxin that will attack, obviously, the nervous system. And it presents in a symmetrical way, meaning it's working from the top down. So, you'll see symptoms first in the head, the face, and work its way down to the body. So droopy eyes, difficult swallowing things like that will be the first signs as it works the way down, paralyzing different parts of the body.

Obviously, quickly, what happens is that you're on a ventilator because you can't breathe. And that's usually what you see is that they're in the hospital on a vent and basically doing very supportive measures on top of the antitoxin. But that's how it sort of progresses. Children show it a little differently. You know, they will initially be constipated and then have what's called a flat expression.

So, when you talk to them to look at them, they don't respond with an expression. It's just flat neutral kind of work. And that's how they start. But it works its way through the system and paralyzing different systems from the top down.

McGUIRE: Wow. So, with the antitoxin, does it reverse? And the same from bottom to top or.

ORNSTEIN: No, it's just as I understand it, it's binding with the toxin itself. So, it's really more of a systemic approach.

McGUIRE: Gotcha.

ORNSTEIN: That's so you're looking so, you know, it's not kind of you wouldn't expect it to fix this this system first in that system, you're really stuck with waiting for that antitoxin to work. And they're still on ventilators and all the other supportive care. And like I said, there's still a high fatality rate even after the antitoxins are administered.

McGUIRE: That's intense. I'm assuming different cultures would have more incidences of it than others.

ORNSTEIN: Yeah, they do. But it has more to do with the foods they eat and how they sort of processed food. Because botulism is endemic in the society in the world. It's just they're waiting for an opportunity. So, there's no special place. It's rather creating these low oxygen environments for it to grow. So, if you're doing that, that's where you'll see it.

McGUIRE: Okay. So poor canning, I think of a lot of my grandmother. Everybody I have, you know, we all have people in our family that still do canning at home, so. Wow. That's really important. Go ahead. You were going to say something.

ORNSTEIN: Yeah, there's an interesting one. So, we're looking at all the different ways it could grow. One of the ones that kind of surprised me. So, it starts with these low acid foods. Lots of them, like these low oxygen environments. Low acid. So, vegetables are a possible place for them to grow. You won't really see it with fruits where they're more acidic.

You'll see it with vegetables. One of the ones that came up was a baked potato. So, if you have a baked potato and you wrap a tightly in tinfoil, it is the perfect environment for botulism.

McGUIRE: Really.

ORNSTEIN: So yes. So, which is really interesting because as I'm looking at this, I'm like, what's in my refrigerator? And lo and behold, there are some baked potatoes wrapped tightly in the tinfoil because that's how you cook, and you just put them in there. If you don't use them.

McGUIRE: Uh, so.

ORNSTEIN: That was yeah, so it was an interesting sort of sidebar to the whole thing, but.

McGUIRE: Man, you're saving us all from potential disaster here.

ORNSTEIN: Super rare. Super rare.

McGUIRE: That's good to know. Good to know. I'm glad. Any other interesting sources that that you know of?

ORNSTEIN: Well, obviously, you have the food foodborne. You have the infant, but you also have the Botox or Jeuveau, which is basically getting botulism shots for wrinkles.

McGUIRE: Oh, right.

ORNSTEIN: Right. So, we forgot about that for like, oh.

McGUIRE: My goodness.

ORNSTEIN: But yeah, you're injecting botulism in there. And if not done right, you can get infected from that. So, yeah, it's you don't think about it, but if you're dealing with botulism when you're doing that.

McGUIRE: Yeah, that's right. Interesting. All right. Goodness. Well, stay away from baked potatoes and Botox. No, I just kidding. I'm being silly.

ORNSTEIN: No, learn how to can, right?

McGUIRE: Yes. Yeah. Really just be educated and aware. This is so helpful on such a large scale. Okay, so there are different kinds. Are there different kinds of botulism or is it just one and done?

ORNSTEIN: It's really just the one and done. I mean, it is present in different environments, but it can get in in different ways. But it's really the same pathogen, the difference is how you're getting it, how it's being presented to you.

McGUIRE: Sure. So, could you get it in? I'm thinking about the wrapped baked potato. So, say you had a wound with a wound vac or something to that effect where it's anaerobic to a sense. Can it get introduced in that way or is it fully. But we're actually we're concentrating on the foodborne piece. But I'm just thinking about that whole closed in environment.

ORNSTEIN: Yeah. There are a couple that we're going to discuss that have that issue related to wounds. How they can get in.

McGUIRE: Okay. Okay. All right. And you talked about the neurologic effects and the first signs for infants. But let's get into treatment. You talked about the anti-toxin as well. But what else is included in that process of diagnosis and treatment?

ORNSTEIN: Right. Well, you know, the first thing is the mechanical ventilators, they are going to be on that. But on top of that, it's going to be these different systems. So, you're going to be looking at urine input output as sort of a function of kidneys. You're going to be looking at the neurological assessments. So, you're going to be looking at all these different systems to assess their ability to function and possible damage to these different systems.

And so that's what you're thinking about. You're going to be doing EEGs to look at brain activity and you're monitoring them all the way through because this can be a very slow process. It could be days, it could be weeks as they are just in the hospital and you are trying to keep all the systems, you know, running as best they can, and people can come out with damage to these different systems because of it.

So, the earlier it's recognized, the earlier you can get the antitoxin, the better the outcome.

McGUIRE: Okay. And do they use neurological testing as well?

ORNSTEIN: Yep. Yep. These are Tensilon tests, so they're always looking at those things, but it can mimic some like Guillain-Barré disease because it's neurological. Myasthenia gravis another one neurological. And so, the trick is to make sure that you don't get misdiagnosed because it has these very overt neurological symptoms that they could be looking at for other things.

Given it is so rare, the diagnosis will go to those other more common things.

McGUIRE: Got it.

ORNSTEIN: And so that's the big fear is that they get early misdiagnosis and then treatment is delayed and then health outcomes are affected.

McGUIRE: Right. That's interesting about the Guillain-Barré. Which is what inspired my question earlier about it reversing in the same way that it affects you neurologically, because that's right away where my brain went, which that's very interesting that it mimics that. Oh, that's interesting. So, all of these different ways to diagnose it and you talk in the hospital.

So, you're assessing all symptoms, basically. But what are the key ones that you want to be watching for?

ORNSTEIN: Again, it's really going back to sort of respiratory functions, neurological functions, cardiac functions. You know that that's what you're really looking for is those who are going to be those all the lifesaving systems that obviously, if not maintained, you're looking at severe disability afterwards.

McGUIRE: Correct. And the other thing I was wondering about is with the antitoxin. First of all, do we have mass availability to that? Because every facility hospital have, I wouldn't think, given the incidence, that they would have a lot on hand for me.

ORNSTEIN: No, they don't. As I understand, they actually have to request it from the CDC. It's not something that, you know, is in your med cart. Yeah.

McGUIRE: Right.

ORNSTEIN: It's not there.

McGUIRE: Okay.

ORNSTEIN: Yeah. So, you're going to have to go out to the Local health department request it there. The CDC requested it there. But, you know, it's there. But you got to go get it.

McGUIRE: Okay. And is there a possibility of anaphylaxis with the with the antitoxin?

ORNSTEIN: Well, I think that's a concern with any sort of medication. You know, and with an individual in that state, you know, there's going to be a risk. But clearly, the risk of anaphylaxis is much less than the risk of not administering it.

McGUIRE: Okay.

ORNSTEIN: So that doesn't really come into play. And unlike a bee sting, where all right. Got a bee sting. I know. I'm allergic. There's no prior history to just sort of assess whether they would have a reaction.

McGUIRE: Right. Yeah, that's a good point.

ORNSTEIN: And honestly, they're already monitoring the issues that would come up if you had a reaction. Already monitoring breathing and all the other conditions that anaphylaxis would cause if it happened and they're already on a ventilator. Well, it's a bad place. You know, you had some issues there, but, you know, you're in the best place if it does happen.

McGUIRE: Right. Yeah, that's exactly it. So, when we can do our own stuff. I know I keep thinking back to my grandmother. She would just put it on a shelf somewhere. But probably the fridge is the best place if you are doing that. It might. Would I be correct in that assumption?

ORNSTEIN: Well, canning. Canning is an interesting thing. So, there are a couple of things with it. One obviously is a heat element to it, but there is another one which is the pressure element because the heat's not going to get rid of it. It's the heat and pressure that does it.

Interesting. In 2018, three people in New York City got botulism because of poor canning. Yeah. It was an interesting little story. So, an individual's refrigerator broke, and they had some vegetables, and didn't want them to spoil. So, they had a recipe for canning peaches and peaches are more acidic. But instead, they used it to can vegetables. And so, they tended to can the vegetables.

They cooked them the way they're supposed to. They sealed them where they were supposed to. After that, the individual looked at the seals on the jars. Two were fine. One was not. So, the individual put the third one into the refrigerator, thinking refrigeration is good and ended up serving that mixed into a salad. So, three people got botulism.

All three ended up in hospital on ventilators. So, again, it's rare, but it happens. And it's a little mistake. If it had been heated and pressured in the canning process and the seal was good, it probably would have been okay. But, you know, it doesn't work out that way sometimes.

McGUIRE: Yeah. And that was just four years ago. So, anything like homemade oils, anything like that really could. Right. Okay. Wow.

ORNSTEIN: Yeah. Anything that kind of creates this low oxygen environment is susceptible to the growth of botulism.

McGUIRE: What about meats?

ORNSTEIN: You know, again, it's not as common in meats, but it doesn't mean it can't be there. It really has to do with that environment. So, another incident actually in 2021, this is in Ukraine, but bring it up because it was related to dried meats.

McGUIRE: Oh, okay.

ORNSTEIN: Ninety-eight people were sick. Ten died and 79 got the anti-toxin. They traced it back to dried and salted freshwater fish. So that doesn't sound like your classic environment, but that's where it grew.

McGUIRE: Wow. That 98 people. That's incredible.

ORNSTEIN: Yeah. For botulism. That's a big outbreak.

McGUIRE: Yeah, it's huge.

Okay norovirus. Not that. I don't even know if I'm ready to move on yet, but I'm really intrigued by this topic. It's fascinating. And I've learned a lot already. But let's go to norovirus. What can you tell us about that?

ORNSTEIN: All right. So, norovirus is your most common foodborne disease. It's endemic everywhere. It is an oral fecal transmission. It is what they call when someone talks about the stomach flu. That's generally what they're talking about. It can be transmitted through aerosolized particles from both diarrhea and vomiting. It can live on the surface for days.

So, the ability to transmit this virus is easy. And that's why you always hear about these stories that when there is, especially on the cruise ships. You get an enclosed environment like that, it spreads everywhere. And so, it's easy for someone to pick it up. You touch something, put it near your eyes, mouth, you've got it. And so, this is very easy to transmit.

It can survive in the environment for a long time, and it gets out there and once it's going, you know, without proper sanitation and the protective measures, it's going to keep spreading.

McGUIRE: Yeah. Wow. Those floating buffets. Danger zones. Yeah. And I would again, I'm assuming. But there's obviously more cases of this on an annual basis than there would be botulism. I mean, it's not right. It happens a lot.

ORNSTEIN: Yeah, now there are estimated more than 5 million cases per year. 14,000 end up in the hospital and you get, you know, more than 100 deaths a year. So, you know, because of the number, a large number of people get sick, and it translates into a large number of people being hospitalized. So, it's a tough one. I mean, it's you know, that the onset is quick.

You're Yeah, you're throwing up. You're having diarrhea.

McGUIRE: Yeah.

ORNSTEIN: And you're giving it to everyone in your family.

McGUIRE: Right. And, you know, I'm not picking on cruise ships because it can happen anywhere. I just want to put that out there. Obviously, it can happen anywhere. Do we have any statistics on a global scale for this?

ORNSTEIN: So, the WHO suggests or estimates that there's 125 million total cases, with 35,000 deaths associated with it.

McGUIRE: Really? That's staggering. That is something else.

ORNSTEIN: Well, you know, it becomes a numbers game. You know, the more people get it the higher the number of people who are going to get severe cases and end up in hospital. It's one of the things that's a little bit problematic with the numbers when you look at them, because it makes it seem like it's very virulent and you're going to die from it because so many people go to hospital.

But like I said, it's really a numbers game. If you get enough people infected with it, you're going to get these huge numbers of hospitalizations and deaths. But regardless of that, you know, huge numbers of people are actually getting it and getting very sick.

McGUIRE: Right. And the vulnerable populations that we discussed related to botulism are more vulnerable here as well. Right.

ORNSTEIN: Yep. Yeah, that is the theme across all of these that we talk about these deaths. We're really talking about these vulnerable populations that make up the majority of them. And so, as we talk about how different these different pathogens are, you really come to realize how similar they really are, the precautions that go into it, you know, that that you need to have in place.

McGUIRE: Yeah. And the immune system compromised. I mean, that obviously includes transplant patients. I think sometimes we forget that because they can't, I don't know, maybe that gets missed sometimes, but that's a huge piece of it as well. And is it water as well or is it just food?

ORNSTEIN: It's anything it gets contaminated. So, because. Right. Because you know, you can cough it up, vomit it up, you know, diarrhea. You get into the water; it's going to spread. You know, any sort of aquatic environment that gets this into it can spread it to anyone who's bathing in it, drinking it, using it to cook. Again, cooking is a little different because if you get it to a certain temperature, you are all right.

McGUIRE: Right.

ORNSTEIN: But again, it goes back to those appropriate temperatures for different foods. They need to get to that correct temperature to kill the different organisms.

McGUIRE: Right. Right. And where you lose a lot of fluid and electrolytes through this process, again, same kind of thing, right? So, is it more small intestines or large where is most of the effective of this?

ORNSTEIN: Generally, when you're talking about. Generally, when we're talking about diarrhea, talking about the large intestine, because that's the place where you're going to be reabsorbing the water, putting it back into the system after you digest your food. When you get these pathogens and we talk about watery diarrhea, it's all coming from that large intestine; the colon that should be reabsorbing it.

But instead, either your body's dumping it out or your body's actually putting more fluid into the colon to dump out, depending on how it is. But that yeah. You should be reabsorbing that.

McGUIRE: Yeah. Okay. What about can you talk to us about the incubation period? How long after or how does that process work when you're exposed to when you start having symptoms?

ORNSTEIN: Right. So generally, the symptoms there are one to two days, that's the incubation period, 1 to 2 days. It's relatively quick as far as the onset, although there are others that we can talk about, they're much

quicker and it lasts 2 to 3 days may last a little longer with kids. For the most part, it's just the best supportive measures.

You just try to stay hydrated, and it will pass. and basic keeping of your environment clean so you're not passing it on to anyone else. So, for the most part it goes unrecognized because in that timeframe of a couple of days, most people aren't going to seek medical attention. They're going to stay in bed, try and drink their Gatorade or Pedialyte and just rest.

And by the time a couple of days have passed, they're starting to feel better. They're not going to go see a doctor. And again, that's the case with most of these, as all these conditions go under reported because of that dynamic. So, they just get through a couple of days, mostly going to recover.

McGUIRE: Right. Right. So, this goes back and speaks very, very highly of handwashing. Those employees must wash their hands if food prep has got to be a vulnerable place for this to happen.

ORNSTEIN: Right. And, you know, it's interesting that first and foremost is that hand hygiene. You keep them clean, and a lot of the stuff will not be transmitted. But there's another issue with these sort of foods. Is that how many times you actually touch them?

McGUIRE: Hmm.

ORNSTEIN: And so, we think about just handwashing, but in some cases, it's more than just that. It's the number of times you touch the food. So, when we think about food prep, a lot of times you want to think like, let's do all the food prep at one time together to minimize the number of times you're touching it.

It's certain things like staph aureus, where it's on our bodies, it lives on our body. And so, the number of times we touch something are increasing the number of times something that lives on us can get onto the food. And so, you're looking at that too. Staph Aureus is a little weird in that sense that it sort of lives on us.

It's one of the few ones where we're not going out and getting it from the environment. It's already here.

McGUIRE: Wow. We just carry it around just in case. Have there been have there been any. Just have that in my back pocket. Any specific cases or outbreaks that you can tell us about related to this? Like you mentioned, you had a couple, but earlier with botulism.

ORNSTEIN: Had two. You mean for Norovirus?

McGUIRE: Yeah.

ORNSTEIN: Yeah. So, you know, it's funny, there was this year (2022) an outbreak of norovirus related to oysters that were distributed from British Columbia.

McGUIRE: Oh, wow.

ORNSTEIN: Yeah. So, it's an extreme one because normally we're going to talk about a different pathogen that affects oysters. But this was a case where these oysters were distributed to 13 states. 192 people got sick from it. There was no recall issued. And when you hear that, what that really means is that by the time they figured out what was going on, the product was already sold and gone.

McGUIRE: Oh, yeah.

ORNSTEIN: So, it. So, this thing gets tracked back and by the time they figure it out, there's no more of these oysters. And everyone who got sick has gotten sick and they're all gone. But it takes time, like I said, takes time to track this stuff back. There are a couple of different ways they do it, whether it's epidemiological data or the track back by like lot numbers and distribution centers.

But it just takes time. But that was one of the most recent ones.

McGUIRE: So, does anything happen for example, the people who had the oysters and sold them to all of these states, do they have any is there any kind of repercussion for them or it's just I'm sorry, those are all gone now. Oh, okay.

ORNSTEIN: Right. Yeah, it depends. You know, if there's an issue with the processing, if there's an issue with some sort of hygiene, if there's issue with distribution, let's say that the truck taking the product somewhere wasn't refrigerated, that there can be penalties based on that. And so, but it really depends on the source or the environment that the contaminated food was shipped.

McGUIRE: Okay. You know.

ORNSTEIN: There are certain cases where they're testing their food, but at the same time, you can test something and it's negative for whatever your tests are. But right next to it is something that's positive because they're not testing every piece of food or they're doing some sort of sampling. And even that is pretty rare. The idea that you're doing sort of onsite farm surveillance doesn't really exist.

McGUIRE: Okay.

ORNSTEIN: And that becomes it becomes a problem later on when we talk about how the world is evolving. It's easy to miss stuff because we're not at the source.

McGUIRE: Right. Right.

ORNSTEIN: We're always playing catch up.

McGUIRE: Yeah. So, it's not just okay, it's gone. There is some level of investigation afterwards, just as a preventative measure so it doesn't happen again. We would. We would hope on some level. Good to know.

ORNSTEIN: They are always doing. They're always doing analysis afterwards. A post analysis to see at what point this could have been fixed? Where was the gap? So that's occurring regardless of whether the outbreak resulted in a recall or an alert, they're still looking at those gaps because if it happened here, it's going to happen somewhere else.

McGUIRE: Right. The old root cause. Root cause analysis. Gotcha. Okay. Any specific treatments in severe cases of this? Anything you can do? Rehydration, obviously.

ORNSTEIN: Yeah. Basically, that's what you're doing. One of the things with a lot of these is that, you know, treatment beyond rehydration, beyond sort of the support they would do with this. Treatment is going to get a little tricky because sometimes if you give antibiotics that can cause the actual problem to become worse, antibiotics can address the infection, but at the same time, it can clear out the natural gut flora, allowing whatever you're trying to get rid of to grow, you know, so it doesn't have anything to compete against.

Or it could be that you give antibiotics, kills the bacteria, but then the bacteria release all the toxins, making it worse. So, in most cases, they're actually not treated with any sort of therapeutic other than, say, rehydration, I.V. fluids. And that would be the extent of it. In only the most severe cases, they start to try to address it through some sort of medical intervention, like an antibiotic or, you know, antitoxin kind of thing.

McGUIRE: Is it a good idea if someone in your household is in the midst of this norovirus that they isolate a little bit with their own bathroom and if it's possible, keep them in their own space?

ORNSTEIN: You know, it's funny you mentioned that a couple of years ago no one would ever talk that way. The idea of isolating yourself in your house, who does that? Why would you do that? But, you know, now it's like, hmm, that's a really good idea. And so, yes, you know, it is good because the more you interact with other people, the more likely you are to contaminate their surfaces environments, you know, so.

So, yes, it's always good with any sort of one of these pathogens that can be transmitted through, say, aerosolized, you know, vomit, fecal matter, stuff like that. A bunch of these don't work that way. So, you don't have to worry about it. But something like norovirus. Yeah. That would be

A totally appropriate thing to do.

McGUIRE: And that person should not be making lunch for the kids or.

ORNSTEIN: Right. Well, you know, that's also sort of funny that that idea ends up on the list of stuff like precautions. And you want to think that's common sense, right?

McGUIRE: Oh, yeah, I'm sick.

ORNSTEIN: I really shouldn't be preparing food because I'm throwing up and I'm having diarrhea. But people don't necessarily think that way. So that idea ends up on this list for nurses to teach, you know, families about what they should do if somebody's sick.

McGUIRE: Right. Well, it's amazing. Yeah, you're right. They don't think about it. So, food prep, maybe isolate, if possible. Wash your hands. Wash your hands and wash your hands, basically. And clean surfaces, I would assume. Right. You have to clean those surfaces.

ORNSTEIN: Yeah. Clean surfaces are really important because a lot of these pathogens can be like, you know, we know about chicken and salmonella, things like that, a drop of that on a table. And if you don't notice it, easily contaminate the next thing you put down. So that idea of clean utensils trying to separate your meats from your vegetables becomes very important.

And most people don't really take it to heart how important that is that when you're preparing meat, chicken, something like that, that environment that you just worked on needs to be cleaned before you put down salad or any vegetable are going to be cooking. And people don't take that into consideration as much as they should.

McGUIRE: Right. Clorox wipes best or.

ORNSTEIN: It depends on what you're looking at. But pretty much anything's going to work, you know, Windex will work. Clorox will work. You know, it's just it's just trying to keep that surface clean.

McGUIRE: Kirk, let's go to salmonella. I know that that got mentioned a little earlier on our first podcast, Part one of this series. And it was related to chicken.

But we're going to we're going to dig into this topic so it can cause it can cause a foodborne illness, Correct? Or is it a foodborne illness, or it causes a foodborne illness? or both?

ORNSTEIN: It causes a foodborne illness.

McGUIRE: Okay. All right. Perfect. And what can you tell us about it, specifically, Salmonella?

ORNSTEIN: Well, in the initial introduction, we talked about Alexander the Great, and he died of typhoid. So that is one type of salmonella. But it is really rare here in the United States. So, we don't really need to talk about that. Okay, good. Yeah, the salmonella that we all are familiar with causes almost a million cases a year. There are 19,000 hospitalizations and there's 378 deaths.

McGUIRE: Really?

ORNSTEIN: Again, these are estimates. But that is. Yes. So, it is very prevalent. And obviously a high number of deaths associated with it. Yeah.

McGUIRE: I know. We hear about it more frequently than we do most others. It seems to me. But that is pretty amazing. And is it so it's common, but is it considered to be one of the most common or where would you place it?

ORNSTEIN: Yeah, it's definitely one of the most common foodborne illnesses. And, you know, it comes from I think we all know it's coming from uncooked meats and eggs, egg products. And so, it's easy to come in contact with. It's very prevalent in the environment and people get sick. One of the nice things or one of the good things, it's not.

ORNSTEIN: The fatality rate is low.

McGUIRE: Oh, good.

ORNSTEIN: So. So, although the numbers we talk about are 378 deaths, which is a huge number for food borne illnesses that actually rate the fatality rates very low. Good. But, you know, but if you get enough people sick, you're going to get these deaths regardless. And so, so you see these numbers. They you know, every year.

McGUIRE: Right. And I know.

ORNSTEIN: One of the things that we talk about, as I was just talking about eggs and egg products, we're seeing more and more of these atypical sources. So, what's happening is that we're seeing many more infections from fruits and vegetables that you normally wouldn't see or hadn't seen in the past. Part of that is due to cross-contamination. And so basically, when foods are being processed close to each other, they will; they can cross contaminate each other.

We have situations where it can come from the animals so they can contaminate the fruits and vegetables. And so, we're seeing a lot more of that sort of atypical source.

McGUIRE: That's really interesting. So, if you're preparing the chicken next to the vegetables, even if they're cooked, there's still potential.

ORNSTEIN: Which is cooked?

McGUIRE: The vegetables or say that, say the salmonella is from the chicken and you handle the vegetables and then you put them in the oven for example.

ORNSTEIN: You well, cooking will kill it. So obviously I want to cook it to the right temperature. But to that point, if let's say that somehow the chicken contaminates the vegetable, that that's what needs to be taken to the same temperature that the chicken would, that may not happen. You know, so we're not taking our vegetables to 165 degrees and so we know to do that for the chicken but if somehow that chicken juice gets on the vegetables, I don't know who was cooking it to that level.

McGUIRE: Right exactly.

ORNSTEIN: And even if the vegetables were contaminated from water, water with some sort of animal fecal matter, you know you're going to have the same problem.

McGUIRE: Food for thought pun intended. We all go. All right. So that's salmonella. Is it just food. It's the only place, right, that we get this from. I know, foodborne.

ORNSTEIN: It's going to be the same. So, the same way it's fecal oral. And so essentially you could communicate it to someone else with poor hygiene. But it doesn't have that that happens. But that's not the main route. You know, one of the interesting things about that is that as your symptoms pass, you can still shed the same salmonella organism through your feces for weeks afterwards.

So, there's always that potential of contamination with this because it sticks around, even though, you know the onset is rapid, like as quick as a couple hours, 6 hours to a couple of days. And the duration is short. So, you look like you're healthy. You can still shed these organisms for weeks on end.

McGUIRE: Wow. All right. And again, I mentioned this in the first part one of this series is the vulnerable populations who are more susceptible. Right. So, infants, people over 65 immunosuppressed, etc., correct?

ORNSTEIN: Yeah, that that is just a common theme throughout this.

McGUIRE: Gotcha.

ORNSTEIN: And, you know, it's one of the problems that you just don't it's hard to keep your guard up all the time. These guys especially these vulnerable populations. And it's a tough thing to do. And, you know if we could, we would see less deaths. But for someone who's immunocompromised or pregnant, the list is endless of foods you need to consider and processes that you need to implement to stay safe.

McGUIRE: Right. Right. And developing countries, would they be more vulnerable than we are to this, just given the nature of it?

ORNSTEIN: It's an interesting question. You would think that might be the case, but in fact, there is a lot of data that suggest because they have higher exposures, they tolerated better than, say, a more developed country. So potentially people who are in a more developed country have less exposure. So, then their exposure is much worse than someone who's had it a couple of times.

McGUIRE: Okay. So yeah. That makes perfect sense. So, the symptoms resolve when you say how you can have symptoms, for how long did you say? One to two days?

ORNSTEIN: Yeah. So, the whole onset and resolution of symptoms occurs pretty quickly. But this has this lingering attribute that most people don't think about. And for the most part, it doesn't really matter. I mean, as long as you wash your hands when you go to the bathroom, that's not really an issue. Yeah. But it's something you don't really think about.

And this is also that situation where you can't treat it with antibiotics because you potentially make the situation worse by clearing out the gut flora, leaving it open for additional growth of salmonella.

McGUIRE: Right. And nausea and vomiting and diarrhea. Are there any other symptoms that may be present with this?

ORNSTEIN: You can also get cramping, fevers, headaches.

McGUIRE: Okay.

ORNSTEIN: And those are some of the ones that you would see, but you wouldn't see those without the you know, the nausea, vomiting, diarrhea situation.

McGUIRE: Is it just GI or can it affect other systems?

ORNSTEIN: Right. So, it can if it can get outside the intestinal GI tract, it can create things like osteomyelitis, can get septic and meningitis. And that's the case with a lot of these that you'll see that if they can get outside the gut and they can cause some real damage.

McGUIRE: Okay.

ORNSTEIN: So, as we talk about these situations and symptoms and severity, you pretty much uniformly, if they get outside of that system, they're going to cause some real damage beyond just nausea.

McGUIRE: Got it.

ORNSTEIN: Or vomiting and diarrhea.

McGUIRE: And some ways that it might get outside of that system.

ORNSTEIN: Well, you know, you can talk about a perforation, can get outside of that. Or as we talked about it, you can get it into a wound.

McGUIRE: Mm hmm.

ORNSTEIN: Give it keep it. Put it in through different areas that wouldn't be in the system. You know, so there are different ways you can get it potentially into the urinary tract and so we can. So, you know, if you can find a different entry point it can start to wreak havoc on different systems.

McGUIRE: Okay. And the treatment, we said antibiotics not generally used, but otherwise what is?

ORNSTEIN: It's basically fluid replacement.

McGUIRE: Got it.

ORNSTEIN: That's what you are again, looking at to try and just manage symptoms and keeping that from getting severe to the point that you need medical attention.

McGUIRE: Yeah. And the preparation of food, I don't know why I'm surprised at eggs, but I'm surprised at eggs. So, if someone orders their eggs, you know, sunny side up or is that are they more at risk than a hard-boiled egg, for example?

ORNSTEIN: Yeah. If that yolk is soft in any way, there's a potential for an infection there.

McGUIRE: Wow. Okay, I'm going to have to order my eggs different ways. Now, I just decided on that. Any outbreaks that you can share with us? I don't know why I go to these horror stories, but I know you had a couple with the others.

ORNSTEIN: Yeah, well, I've got one for each one. And so, this year (2022) they had Jif peanut butter.

McGUIRE: Jif peanut butter. Wow.

ORNSTEIN: 12 states, 16 cases, two hospitalizations. A recall was issued. Yeah. So, it got into the processing of that of that peanut butter.

McGUIRE: Wow. And again, probably figured it out after people had gotten sick. That that's been a real eye opener for me on that. Wow. Huh? Change my peanut butter. No, I'm just kidding.

ORNSTEIN: Well, but, you know, that could be anywhere because it's in the processing of that product. So, it wasn't any sort of environmental issue. It got in there at the time that that was being made. And so that sort of speaks to the issue about processing. How do you keep those environments clean from these different pathogens?

McGUIRE: Yeah. I'm glad you mentioned it. So, we're you know, we don't want to we don't want to draw attention to Jif peanut butter or cruise ships like we did in the last episode because to your point, it literally can happen anywhere. It's just it's just a bad, bad situation. So that's interesting. Anything else you want to share about salmonella?

Before we move on to something that I think the next one is the one we carry around all the time.

Yeah, it would be staph.

ORNSTEIN: Yeah. Well, you know, I wanted to say this, that the cookie dough.

McGUIRE: Cookie dough.

ORNSTEIN: Cookie dough don't eat it. It's raw. It's potentially a source of salmonella.

McGUIRE: That makes sense. Yeah.

ORNSTEIN: Now, the eggs in it, we all love their cookie dough, but reality is, it's raw.

McGUIRE: Wow. Yeah. Yeah. So, you can get cookie dough ice cream and get the same effect and not hopefully have that have that.

ORNSTEIN: But, you know, I wonder about that. You'd have to sort of look at that because they say it's cookie dough. But is it really or is it some sort of concoction that mimics cookie dough? I can't imagine that the FDA would allow ice cream companies to sell a product that has raw egg in it.

McGUIRE: Right. No, I can't imagine that either. Yeah, that's right. That's true. Yeah. Wow. It's amazing. We survived, survived our childhood. I'm still thinking about my grandmother's canning and now licking the spoon when she made cookies. It's just all pretty scary. We're lucky.

ORNSTEIN: I think about all that stuff when you're a kid. Like, oh, that wasn't smart. Oh, that wasn't smart.

McGUIRE: Yeah, exactly. This is very educational for sure. Let's talk about Staph now, okay? Because this is the one that you told us. We carried around with us all the time. So, what can you tell us about that?

ORNSTEIN: Right. So Staph is an organism. Organism that lives on our skin, lives in our nose. 25% of all people have it on them. For the most part, it doesn't affect anyone. It's just with us and isn't much of a problem. But it still can cause these foodborne illnesses. And it also has the added issue of since it's on your skin. It can enter your body through a wound.

McGUIRE: Oh, sure.

ORNSTEIN: So not only can you get it through sort of a handling of food, but you can get it into your body through a wound. And this is also that case I was talking about for like the number of times you touch something because it exists on our body, that the number of times you touch something becomes a risk that isn't quite the same as the other pathogens. With the other pathogens,

You wash your hands, and you are just, and you can assume it's gone where staph is not like that. It's on us. It stays on us. You know, you clean your hands, and you reduce the number. But to say that you have sort of sterilized your hands and not there at all sorts of is an oversimplification of what's really going on.

McGUIRE: Oh, interesting. So, I know that in some of the foods, I think botulism was one where you had to be conscious of odor. Like if you open something and it smells bad, you know those times when you open, some say, I don't know. You think it's good? Probably good to always air on the side of caution. But with this, is it the same thing?

ORNSTEIN: Right. So, in general if you smell something that's not right, just you get rid of it. But with this, there is no associated smell that you could

Identify with or suggest there's something wrong here. So, it's it doesn't have that ability to identify that we like that as humans. We want it doesn't look good; it doesn't smell good. You know, you get rid of it. This is something you wouldn't be able to identify.

McGUIRE: Wow. Okay. So, you're just taking a chance. What are some of the most common foods, all foods, or are there some that more common than others?

ORNSTEIN: You know, it's so it's foods that are being handled a lot. So, you can talk about like meats. They talk about pastries. They really talk about, and I won't say meat size, like deli meats. What we're talking about.

McGUIRE: About.

ORNSTEIN: Things that have already been processed are now fully cooked, ready to be served. It's this type of products or foods that are more likely to get infected with staph, you know, because staph can be killed by cooking.

McGUIRE: Okay.

ORNSTEIN: So, if you're cooking your food, wouldn't expect to get that. It's more the handling of food by someone who has it and then given to somebody who potentially is at risk.

McGUIRE: Okay.

ORNSTEIN: So that's what you'll see. Okay.

McGUIRE: An example. It was a horror story. I shouldn't say horror story. That's a bad way to put it. But a real-life scenario.

ORNSTEIN: I got to this is an interesting one. And so, in California, Coachella, the Coachella event, a hundred bus drivers got sick from, a catered event.

McGUIRE: Oh, no.

ORNSTEIN: So yeah, so that the handling of the food served to this sort of a closed group. It was just this group that was there, and they all got served it. They got sick with it. But again, like, no one's really dying from this one, but they're getting sick from it. The interesting thing, not interesting, but something to recognize is that as we talked about the CDC in these outbreaks, this is something that wouldn't register with the CDC because it occurred in one state, even though it was massive, it was one state.

It doesn't reach that level of multistate sort of outbreak. So, it still would have been dealt with as a foodborne outbreak, but it would have been dealt with by the state health department and they would have done the investigation and the identification of the source.

McGUIRE: Good to know. Good to know. So, someone could be in one place and be handling something. Pick it up and then go to work in a restaurant, for example. And here we go. Or a catering event.

ORNSTEIN: Yeah. In this particular situation, it's very much about the handling of the food. You know, cooking is great, but it's really the post cook in the post processing is when that's going to show up where that transmission is going to occur.

McGUIRE: Okay. And signs and signs and symptoms of staff, foodborne illness as opposed to that, they differ from the others we've spoken about so far. Mostly GI, I'm assuming.

ORNSTEIN: Yeah, it's mostly GI. Right. So, the signs and symptoms. So, this is one of the ones where they had the rapid onset. It can range from 30 minutes to 8 hours, but it's going to come quick. And this is, again, severe vomiting, nausea, abdominal cramps, you know, that's going to seem like they like to say that the symptoms are powerful, but it's going to resolve quickly.

So, you're going to get really sick and feel better very quick as well.

McGUIRE: Okay. Your body is just going to get it out.

ORNSTEIN: Yeah. And we said before, it's not contagious. You're not going to give it to someone else that way. And again, it gets for this it goes back to fluid loss. But because of the short duration, that generally isn't a problem with some of the others that can go on for days where you see this, you know, this huge loss of fluid and prevention.

McGUIRE: I know that a lot of things will apply similar to the other foodborne illnesses, but what are some things specific to staph that we can do for prevention?

ORNSTEIN: Well, the big things start with cross-contamination. And so, the handling of different foods, you're getting a lot of things contaminated with that. So, you know, in these cases, that's where we're wearing our gloves. Doing hand hygiene, you know, So it's proper sort of handling procedures. And then, you know, it's really about cooking. So, you can kill this with cooking.

And keep in mind that it can live through, it can survive and reproduce in a broad range of temperatures from 40 to 140, that becomes our sort of temperature danger zone. And so that 40 to 140 is the area where this can grow and multiply. So, and this is generally the case with most things, the only couple where this doesn't work, but if you're taking the food to above 140 or storing it below 40 degrees, you are generally safe. There are some pathogens where that's not the case.

But in this case, it's proper handling of food and proper cooking temperatures. And then there's not an issue. Okay.

McGUIRE: I've heard something about shallow containers. Is that right?

ORNSTEIN: Right?

McGUIRE: So, you.

ORNSTEIN: No. it's an interesting thing. So that the salad so if you have a very deep container the temperature in the middle of that container is going to be very different than the temperature at the outside of the container. And so, if you're putting things in a shallow container, there's going to be a uniformity to that temperature. And so that you can expect that all of that food has been added appropriate temperature the whole time as refrigerated, whereas a, you know, big bowl of something that middle temperature could be elevated for hours and hours until it finally cools down.

And so, they talk about in some of these they talk about that as a specific strategy, but reality that a good strategy for pretty much anything you're refrigerating when it comes to preventing pathogens or organism growth in the refrigerator.

McGUIRE: Great. Okay. Thank you so much, Kirk. I can't thank you enough. I have enjoyed this conversation and like I said some of this I knew and some of it was a big surprise. And I know that's probably the case for a lot of our listeners. So, thank you for your expertise.

ORNSTEIN: Very welcome. Thank you for having me.

McGUIRE: And thank you for listening to our podcast series on Managing foodborne illness. We encourage you to explore all of the main courses available on elitelearning.com as you move forward throughout your career. This is Leana McGuire for Elite Learning by Colibri Healthcare.

## **Episode 2 – Unraveling the Culprits: Campylobacteriosis, Listeria, Clostridium, E. coli, & Vibriosis**

McGUIRE: Hello and welcome. I'm Leana McGuire your host for this informative podcast on managing foodborne illness brought to you by Elite Learning by Colibri Healthcare. Our subject matter expert today is Kirk Ornstein. He's RN, MSN, and clinical nurse leader and a guy who's obviously really good at research. Welcome Kirk. How are you.

ORNSTEIN: Thank you. Good. Good. It's good to be here.

McGUIRE: Now we're going to move on to Campylobacteriosis. I hope I did not slaughter that like I thought I was going to.

ORNSTEIN: That was good.

McGuire: Not bad. That was good. All right. Talk to us about that one.

ORNSTEIN: So. So, there are 845,000 cases a year. So, it's very prevalent. Yeah, it's out there. 8400 hospitalizations, 76 deaths. It has this unique feature that it only requires a small number of organisms to get you sick. So, they say 500 organisms can make you sick. So basically, a single drop of fluid containing it; juice from a chicken can make you sick.

ORNSTEIN: But the other side is that you don't get very sick. So, the symptoms are much more mild than some of the other things we've talked about. You know, that's why you see that the 845,000 cases, but only 76 deaths. So, although it's very prevalent symptoms are much more mild and that leads to obviously a lot of underreporting.

McGuire: Oh, okay, sure. Yeah, that would make sense. And where is this organism found?

ORNSTEIN: Primarily, it's we're still talking about birds. So, fowl, chicken, things like that, it's going to be there. And that's where you'll find it.

McGuire: Okay. So cooking, does it apply in this case? You know, Oh.

ORNSTEIN: Right, with cooking. There's only a couple where you're looking at sort of extreme temperature issues with some of these pathogens. But again, like if you're cooking the food, this is going to take care of this pathogen as well.

McGuire: Okay. And is it primarily ingested. Is that how you get this or.

ORNSTEIN: Yeah, that's right. It's the oral fecal, oral. And so, for the most part, you are you're eating it that's been contaminated from, you know, whether it's the juice from the chicken or the feces from bird, it gets in the system, it's going to make you sick. That's generally how you're getting it. Potentially. You could communicate this to someone else through a sort of oral fecal transmission.

But again, because the symptoms are mild, that's not as likely as, say, norovirus, where, you know, the symptoms are much more violent, where you're throwing up. Projecting these, you know, the pathogens into the air. That's not the case with this. You don't really see that.

McGuire: In our consistent, vulnerable population of pregnant, young, elderly, or immunosuppressed, obviously are affected, I shouldn't say obviously, but we've already talked how that's consistent across. But would their symptoms or how would their symptoms be different or would they?

ORNSTEIN: Well for the immunocompromised it's a little bit of an issue here that it can allow the pathogen to enter the bloodstream.

McGuire: Okay.

ORNSTEIN: Yeah. So that doesn't have the same protection. And this can lead to septicemia. So. Right, so with this one, although again, we're talking about a mild pathogen, we get these special populations, and you can get unique symptoms of development and septicemia as we know that that goes South very quickly.

McGuire: It sure does. And is it more common in one sex than the other? It seems to me. I remember hearing that one is more vulnerable.

ORNSTEIN: Yeah, it's interesting. It's more likely to occur in males and females. But the reasoning is unknown. There's you know, there's some ideas about it. But again, you see these differences in men and women and a lot of times they don't know why. If you remove things like pregnancy and things like that, if it's just if everyone is equal, if you matched them all and everything, then it becomes why, and they don't really know a lot of that.

McGuire: Okay. Yeah. And those same signs and symptoms you've already talked about mostly diarrhea, would you say is that the primary with this one or can you go into a little bit more about that?

ORNSTEIN: Watery diarrhea is like everything else common, but you can see bloody diarrhea with this and that's partly the reason why it can get into the bloodstream for the immunocompromised. But unlike some situations where you see bloody diarrhea as an emergency with this particular pathogen that occurs, but it doesn't mean that you're dealing with a severe situation that needs medical attention.

But at the same time, when you're at home and you're having all this diarrhea and all of a sudden it turns bloody, you have to think that it's more significant because we can't do the diagnosis at home and that is one of those flags to seek additional medical attention. And so, you come back like, oh, you're fine.

It's this pathogen, not that one, but it does have this characteristic of bloody diarrhea that isn't the emergency situation that it might suggest.

McGuire: Okay. And can you get a fever with this?

ORNSTEIN: Yes. You get you can get a fever with it again. It leads it's similar to the bloody diarrhea. You know, we see a fever. We get concerned. And in this case, you can get a fever anywhere from 100. They say 100.4. But what that really 100.4 to 104. And so, anything above 102, you're looking at a real problem.

So that's the point at which you're seeking medical attention. And so, again, if someone had temperature of 104, I would tell them right away, you need to see somebody need to get medical attention. It comes back, oh, you know, it's fine. This is just part of the natural symptomology of this pathogen. But you wouldn't know. You have to go check it out.

McGuire: Yeah.

ORNSTEIN: And this is a point to make. When they say 100.4, that's your medical definition of a fever. Anything less than that is not considered a fever. And so that's how they came up with that number. It's that definition of a fever.

McGuire: Okay, perfect. Thank you. Is this another one where we're maybe more susceptible in a more developed country than those who have been exposed to it more often. Would it be similar?

ORNSTEIN: So, this is. Yeah, this is one that's come out of the epidemic. Epidemiological research indicated other countries have more exposure to it. And so, their symptoms are not severe as we say, what we see here.

McGuire: Okay. And are there any other maybe severe symptoms that may occur in less frequency or low frequency?

ORNSTEIN: They can. That's right, it's a lot less. But you can see bacterial endocarditis, reactive arthritis, meningitis. So, a number of things can occur. Clearly, those conditions warrant medical attention, but it's not a common occurrence. But it can occur.

McGuire: Okay. And stool samples are most often the way they diagnose, is that correct?

ORNSTEIN: Right. Yeah, again that's always pretty much one of the first steps when you're trying to identify foodborne illness, you're taking stool samples. This is one of those cases where antibiotics can harm.

McGuire: Okay. Okay. But in most cases, they do. It does resolve on its own.

ORNSTEIN: Right.

McGuire: Okay. And do you have a real-life example of this one?

ORNSTEIN: There are two interesting ones. So, there's a place called Kennedy Creek Outbreak. So, this is Montana. It's a campground and people were drinking from a stream. It wasn't a spring, just a regular stream, I can't imagine why they were drinking from a stream, but they were. And yeah, you got a number of people who got sick from that.

There was recently in New York City an outbreak in Brooklyn, and they believe it was related to exposure to raw chicken. And so, 50 people got sick there. But that that was this year (2022).

McGuire: Since it resolves so quickly, I wouldn't imagine that all cases get reported either.

ORNSTEIN: No exactly. You see this with all of these conditions, when they have a short duration, they're not going to get reported. And it's kind of interesting, I think, that you could have these very severe symptoms. You think, oh, you got to go get checked out. But the reality is you're so sick, you're not going anywhere.

And so, you've got this sort of thing where, you know, it could be severe and you're not going to go because you're too sick or it's too short. You're not going to go because it's so short. And so, these become some of those barriers to getting medical care that you just think it goes by so quickly you can't get there or, you know, you're too sick or too short that it all ends up underreporting.

There is not a single thing that we talk about that isn't under report underreported except for maybe botulism.

McGuire: Got it.

ORNSTEIN: Because that's not you're not going to have mild symptoms.

McGuire: Right?

ORNSTEIN: It's the only one that's consistently severe.

McGuire: Okay. The next one on my list that I wanted to discuss was listeria.

ORNSTEIN: Since that's not.

McGuire: Serious? Not Serious?

ORNSTEIN: That's a serious one. That is a third leading cause of death. Well, yeah, it's it has this.

McGuire: From food poisoning.

ORNSTEIN: Well, it's from food poisoning. But the issue really is that it can survive. It can thrive at 32 degrees. It can survive as low as zero Fahrenheit. So, it has the capacity to live inside of a refrigerator and multiply inside of a refrigerator. So. Right. So, this is one of those ones where when you're talking about temperature below 40 degrees, it's not going to matter.

And, you know, it can also survive for years. There was a report that said that they found this organism 11 years later in a food processing plant now. Right. So, because it can live in these environments, these temperatures that you normally think this is fine, we don't have to worry about pathogens. It's, you know, freezing temperature.

So why would there be an issue here?

McGuire: Yeah.

ORNSTEIN: But, but it's yeah, so it's a problem. And again, this is one of the ones very specific to vulnerable populations. You see it a lot of times in deli meats because it can live at these temperatures, it ends up in these meats and the meats end up being obviously sold to individuals and they get it from that.

But it can be deadly to pregnant women and their babies their fetuses.

McGuire: Wow.

ORNSTEIN: Absolutely. Their estimates of for pregnant women, risk of death, ten, 10 to 20 times higher than for other people.

McGuire: Wow.

ORNSTEIN: Yeah. It's very deadly. Was it trying to remember how many cases there are? I think there's like 1600 cases a year but it's one of the leading causes of death. So yeah, it's a problem.

McGuire: Do we know why pregnant women are more susceptible than even the others who are vulnerable?

ORNSTEIN: Well, you know, they look at it as just and again, this is at epidemiological research or data that the changes in their immune system allow the pathogen to travel through the placenta into, say, the baby. Now as far as what exactly is going on there, they're not so sure about that. But they end up with something called invasive listeriosis, which is different than your regular sort of food poisoning.

So, where listeria, you know, its symptoms are going to arise pretty quickly within a couple of days, invasive listeriosis can take weeks to months to show symptoms. And so, for pregnant women, there is that issue that they could be incubating this pathogen during long stretches of their pregnancy.

McGuire: Right.

ORNSTEIN: They're most vulnerable in the third trimester. And so, if someone starts to show symptoms, they will be tested and treated for it. And in this case, you're getting treated with intravenous antibiotics, but it can be devastating for pregnancies, pregnant women.

McGuire: Right. So vulnerable, the pregnancy itself, they could they lose the baby and survive themselves and. Wow, that's devastating. All right. Wow. That's crazy. So, symptoms related to this, you talked about initial symptoms and then potential symptoms later. So, what would we watch for?

ORNSTEIN: Well, you know, in the noninvasive form, you're looking at the same sort of GI issues that you saw before.

McGuire: Okay.

ORNSTEIN: And so, you know, you're looking at the same symptoms you're dealing with the same way, not much changes, but with the invasive, you're looking at different things. You're looking at fever.

For the invasive, you're really looking at a fever on top of the GI. But the GI symptoms in the invasive cases aren't really the issue because there's that incubation period of weeks to months. And so, it's hard to distinguish between a pregnant woman gets a fever. What does that mean? You know, how do you link it back to eating deli meats?

And so that adds to the issue of inability to treat. Because you can't make that connection. And then as these progresses, obviously, the danger to the mother and the fetus just becomes exponential. And yeah, it can be a really difficult situation.

McGuire: Possibility of septicemia at that point.

ORNSTEIN: Yeah, well you know that's the whole thing once it's inside. So, it's invasive. Again, it goes back to the idea of once it gets out of the GI tract, you got septicemia, you could have all these other sorts of deadly, deadly conditions that, you know, just you're just going to die from.

McGuire: Right.

ORNSTEIN: It's yeah, that was one of the bad ones.

McGuire: So, is this one related to chicken again? Is that our main concern or now?

ORNSTEIN: Not so much chicken? It becomes like I said, that like deli meats.

McGuire: Meats.

ORNSTEIN: It becomes these processed foods that are refrigerated. But because of the nature of its ability to withstand cold temperatures, it just stays there. One Of the problems with this is the issue of cross-contamination, because it can survive for such long periods of time. It can contaminate everything in the environment or the surrounding environment. So, when you're talking about a deli meat, anything in that sort of refrigerator can become contaminated because there's nothing there to kill it.

It's sitting there for days, weeks, months, years. And so that's the big issue with that. And it's interesting that it's deli meats because it's not something you really think about. But the reality is that it's one of the main sources. And so, one of the interesting things about this is that one of the protective measures is to heat any food you get from a deli to 165 degrees.

McGuire: Wow.

ORNSTEIN: Especially for women. I compromised vulnerable groups, but that also includes like cheeses. So, I want to ask myself what does cheese look like when you heat it to 165 degrees. So yeah, that's one of the things where we're I'm thinking like, well, you got to take all these precautions. But then some of them just become a little weird. I mean, yeah, you got to do it.

But then what are you doing? You know, so that's when you're like, just don't eat it. Just don't go to the deli. Don't eat deli meat.

McGuire: Yeah, yeah, yeah.

ORNSTEIN: So, but, but right. So, it's a tough situation but there are outbreaks all the time. There's actually one going on right now (2022). Really. Yeah. It's actually going on right now six states, 16 people, 13 hospitalized and one death. And the one death was a pregnant woman.

McGuire: Oh, so we're breaking it.

ORNSTEIN: Yeah. So that was an outbreak that occurred from, I guess, April of 2021 to September 2022.

McGuire: Wow.

ORNSTEIN: And they still can't identify the source because of this issue of cross-contamination. So many things get contaminated by this, that the source itself gets lost.

McGuire: Oh, wow. That's devastating. And treatment and prevention. Just quickly, obviously what you're saying, don't go to the deli. That applies, obviously. Or maybe it's not so obvious to those who are more vulnerable.

ORNSTEIN: Right. Well, this one is very particular as far as it's that the vulnerable population and the virulence is really specific to those populations. But at the same time, you know, if people can still get sick from it. And so, so I you know, I often look at the deli and, well, should I really get something here, you know, but do you have the thing which not a lot of people get it even though it's you know, can be deadly.

So, you're kind of taking these chances. But it's sort of the case with all this stuff, you sort of balancing that risk reward kind of thing. But that is one that CDC and local health departments are always on the lookout for because it's so deadly.

McGuire: And the meat that you ask them to slice at the deli. And then there's the packaged deli meat that comes from whoever that's on a or in a freezer or in a cold area do they have the same issue?

ORNSTEIN: Yeah, same issue slightly different. So, in that the sort of packaged meats that you get that are already prepackaged right from the processing. So, they're not real. They're not going to there's not the issue of cross-contamination. So, it's inside the package. Once it's opened, you can have that cross-contamination, whereas the meats in deli that they're slicing, that environment itself is contaminated.

So even if that meat initially comes in as free of any sort of pathogen, put it inside that deli refrigerator and all of a sudden, it can be contaminated.

McGuire: Okay, Got it. Got it. Wow. That's interesting stuff. So, another one that I'll probably not say this correctly, *Clostridium perfringens*, is that right?

ORNSTEIN: *Clostridium perfringens*.

McGuire: Okay, Between the two of us, we've got it. Yeah. Another bacterium. So, there's foodborne illness related with this too?

ORNSTEIN: Yeah. So. All right, so this is one of the leading causes of gastroenteritis. A little less than a million cases a year. You know, you've got more than 400 hospitalizations and more than 70 deaths. And so, this one is it's a rapid onset, short duration type of pathogen. Watery diarrhea but rarely is hospitalization needed. Again, we're looking at, you know, dehydration, as your main concern is also one of these that has high temperature range tolerance.

McGuire: Okay.

ORNSTEIN: So, it is very comfortable in that 40-to-140-degree range. So, so it's so it can withstand these temperatures. Now, one of the things that is unique about this is that it replicates very quickly.

McGuire: Okay.

ORNSTEIN: So, one of the implications of that is that you will see it in large gatherings. So, this is the one when everyone goes to a community cookout and they all get sick, this is the one.

McGuire: Okay.

ORNSTEIN: So, you know, so for this very much about maintaining proper temperatures for foods that you're serving, but it is the one that will be the like the community gathering where there everyone's getting sick from it because it does replicate so quickly that even though you think the food has been cooled or hasn't been out that long, it doesn't take that much time because it does replicate so quick.

McGuire: Okay, So the guy who orders his steak rare at the cookout, is that more vulnerable than.

ORNSTEIN: Well, that's interesting. Steaks are different. So, when you're talking about a steak, you can actually cook it at a much lower temperature.

McGuire: Okay.

ORNSTEIN: It was 145. What this is, is that it's when foods are mixed together. So, it's going to be in salads. It's going to be in those types of foods. A steak itself is often. Well meats are often associated with E coli. And so that's in the gut when you have ground beef. And we're a little off topic right now, but when you have ground beef that's getting ground up with all the other sort of material and that sort of material inside the GI tract will get into this meat and contaminated.

McGuire: Got it.

ORNSTEIN: Whereas a steak, you can get that sort of pathogen on the steak, but it's not in the steak.

McGuire: Okay.

ORNSTEIN: And so, you can cook the surface of it, which will kill off any of those pathogens, but generally there is not something in the steak. So, steaks can be generally cooked at a lower temperature. So that that I don't know if super rare is going to do it. But, you know, having a medium rare steak isn't the problem that say a medium rare hamburger has.

McGuire: Okay, I got it. Perfect. That explains it really well. Thank you for that. Treatment and prevention.

ORNSTEIN: Yeah. You know, as the other ones, this is just like supportive care. So, it's fluid loss and again, this is one of those ones where antibiotics shouldn't be given because it can create environments that allow for the growth.

McGuire: Okay.

ORNSTEIN: So, but it continues to be that same process. It's also because of the way it is. It's highly underreported and so the true extent of the number of people who get sick could be much higher. And there's no way to really know.

McGuire: So, you mentioned E coli. How about we go there next?

ORNSTEIN: Oh, there we are.

McGuire: And we all have this, right? This is another thing that we carry with us.

ORNSTEIN: Right, A very common part of our natural flora and tied inside our system so that our body generally never causes the problem. But, you know, it's caused by certain strains because there are numerous strains of E coli, certain strains can cause illnesses. Generally, this is when we think about traveling. This is the one they think of traveler's diarrhea.

McGuire: Okay.

ORNSTEIN: This is the one you're going to get when you're traveling or when people get sick from traveling. It's usually this is the source. So, but again, you know, these are situations where you're really dealing with the best supportive care hydration. And, you know, it passes. There is a particular strain of E coli 0157, which can be very, very damaging to the body.

Basically, this one can cause hemolytic uremic syndrome. So basically, it causes inflammation of inflammation and damage to the blood vessel to the kidney. So, you can end up with kidney damage, and can get kidney failure because of the damage to the blood vessels. You can end up with clots throwing clots and all that is related to clots and, you know, heart conditions, strokes, things like that.

And so that particular strain can be extremely deadly for anyone who comes in contact with it. This is another one of those that states, and the CDC are always looking out for because it can be so damaging.

McGuire: And what is the source of E coli, and would it be different for the 0157 than it would be for just regular E coli?

ORNSTEIN: Now, the sources are the same you know, it's really that there are a number of strains that just naturally car and in our gut, in animal gut and so it's a little bit of luck of the draw with what you're going to get you know in this case what you see with the O157 is just heavy diarrhea for the first day and then it turns into bloody diarrhea.

And so is the case where you see bloody diarrhea, you've got something more than just your basic E coli infection. And that's, you know, that's when you're starting to see this problem where the bacteria is now getting outside the gut and its infecting other parts. In this case, the kidneys.

McGuire: Okay. And is the onset is it a slow onset or does it happen pretty quickly with E. coli?

ORNSTEIN: This one happens quick. In a couple of hours and you're starting to have severe diarrhea. You know, there's no mistake being sick. It comes and comes quick.

McGuire: Okay. Got it. Boy, that is interesting. So, Real-Life scenario, do you have a real-life scenario for E. coli?

ORNSTEIN: Yeah. So, this is one of the ones where it's a salad. So, there's the powered greens packaged salads outbreak. So, it was ten cases, four hospitalizations, one death. And the interesting thing about this and it sort of illustrates a fundamental problem with foodborne illnesses in general is that this is prepackaged food. So, it has multiple ingredients coming from multiple sources.

McGuire: Right.

ORNSTEIN: And so, the ability to actually figure out what or which part of that salad was, the actual cause becomes very, very difficult. And so, you know, tracking back, this is where the infection started. It's a slow process. And in this case, by the time they figured out the outbreak was already over all the product was sold. So, there was nothing left.

And so, again, it's one of those situations where they figured out what it was, but it didn't matter anymore.

McGuire: Yeah, yeah. And I know with some of these as we've gone through them, antibiotics are helpful for some and not for others. What about this one?

ORNSTEIN: So, two things about this. One thing you want to know about taking antidiarrheals. So, in this case, you don't want to do that because it basically stops your body from eliminating the pathogen. And so, we don't want to have the anti-diarrhea and antibiotics, again, are not beneficial.

McGuire: Okay.

ORNSTEIN: Because they can have an effect of a negative effect upon the hemolytic uremic syndrome it can make it worse.

McGuire: Okay.

ORNSTEIN: So again, most of these times they're going to let your body work it out on its own. And generally, in the most severe cases, will they actually use them and that is not universal because we've seen there are a number of different pathogens where antibiotics can make things worse, whether it's causing the toxin or the bacteria to break open, spilling out more toxins or eliminating natural flora so that particular organism doesn't have to compete with.

And so, it can really just flourish. So generally, that's you know, antibiotics are really not used well.

McGuire: Okay. Got it. And it's exciting to continue this conversation. I've learned so much so far. Let's move on now and we'll talk about vibriosis. Am I saying that right?

ORNSTEIN: Perfect. Perfect.

McGuire: All right.

ORNSTEIN: So vibriosis it's in uncooked shellfish, oysters. So, this likes to grow in brackish water. It's water, that's seawater and freshwater mix together. That's the environment that it grows in. And the CDC estimates about 80,000 cases a year, 500 hospitalizations, 100 deaths. So, you know, so it shows up, obviously, in shellfish.

That's what we're always thinking. And there are a couple different strains of Vibrio. The one that we talk about the most or the one that's the most vulnerable is the Vibrio vulnificus. So, this one isn't very common, but it is deadly. Yeah, it doesn't. It doesn't. Like I said, not a lot of cases, but the fatality rate is 35%.

McGuire: Goodness. Significant.

ORNSTEIN: Right. So normally when you get the Vibrio, since we're dealing with the mild strain, this is going to be just like a lot of other things. You're going to have your diarrhea, stomach pains, cramping, and generally it resolves on its own. But, you know, like I said, there is the other most vibriosis vulnificus 35% fatality. And then there's also Vibrio cholerae, which is cholera.

Now that one's really interesting and that it causes you to lose huge amounts of fluid. You can lose up to, in this case, a liter of fluid in an hour. So that when we hear about cholera, it's generally and we don't have it here it's not really an issue here. It's more in developing countries, but it can be deadly because of the fluid loss.

And obviously, you know, all things associated with that, with its cardiac conditions or, you know, mental disturbances.

McGuire: Sure. This deadliest one, are they all from raw oysters or?

ORNSTEIN: They're all existing in that environment that shellfish, oysters, environment. And so, you can come in contact with that, obviously, by eating those types of foods. But they're living side by side as far as they're concerned. So, you can eat it. You can also get it through wounds. So, if in the water and you have a cut in your leg, you can get it that way as well.

And with the vibriosis vulnificus often that results in amputation because it is so aggressive that it will cause sepsis severe damage very quickly. So that is obviously one that you should avoid at all costs. It's also sometimes referred to as a flesh-eating disease, a flesh-eating bacterium.

So, when you hear that there are a number of ones, but it can be this, this one as well.

McGuire: Goodness. Okay. So, the oysters get infected from the water and then we ingest the oysters or we're in the water and the wound, we get it in through the wound. So, saltwater only obviously is my assumption because it's just the oysters or anything else from seawater that we can get sick from. Or it's just primarily those oysters.

ORNSTEIN: That's, you know, it's those shellfish. But your point, it doesn't actually survive in freshwater, which actually has certain things or conditions that are helpful to us. So, it doesn't end up with this oral fecal route because we don't have saltwater in the body. Maybe there's some salt in it, but it's not really going to survive in that environment.

It's not nearly as hearty as some of the others. So, it's susceptible to acidity and freezing and cooking and a lot of general cleaning products, disinfectants, bleach, alcohol, so it can be managed if, you know, you're not eating raw shellfish. And I know I've had oysters; raw oysters and I've never had a problem with it.

But the reality is you never know what you're getting. So, you know, anything rise is problematic.

McGuire: Boy, so it's interesting that we have the knowledge, but we still continue to have places that serve things like oysters. That's okay well that's that is interesting kind of take your chances. So, they have you have the onset of the diarrhea vomiting, all that same stuff in the treatment than would be the same? Fluids?

ORNSTEIN: Yep. Yep. There's you're dealing with the best supportive care and managing it that way. Just like many of the other pathogens that we've been talking about.

McGuire: And the symptoms, do they show up pretty quickly for this one?

ORNSTEIN: Yeah, it's they show up within a couple of hours. So, the vulnificus takes a little longer, but that could be a day two. But they don't show up, not as quick as some of the others we've talked about where it's like a couple of hours but sure.

McGuire: Yeah. Wow. That is really interesting. Do you have a real-life scenario for this one?

ORNSTEIN: Yeah, actually, yes. So, this is kind of kind of sad. So, Hurricane Ian, it brings in obviously all this saltwater into land and with it brings all these pathogens. And so, in this particular case.

McGuire: Just there's.

ORNSTEIN: So, Hurricane Ian vibriosis vulnificus, they were calling it a flesh-eating disease. They didn't really name it as what it is. But 65 cases, 11 deaths all through open wounds.

McGuire: Wow, so is this just living in seawater all the time? And it just depends on. Okay, interesting.

ORNSTEIN: Well, you know, it's sort of collecting within these shellfish, but that's sort of the situation with all of these that these are other than some of the ones to talk about, like living skin. They're endemic in the world. They're living in the soil, living in things. It is just around.

McGuire: It's right, right. You know.

ORNSTEIN: The hosts are varied and numerous and you try to avoid them the best you can.

McGuire: Wow. Okay. And so, prevention. Well, you know, I was just going to say don't eat raw oysters, but you're always taking a risk swimming any time with an open wound. Right. I mean yeah that's pretty much yeah. Regardless.

ORNSTEIN: Absolutely. You know, you don't people don't really think about that much because like, oh, it's saltwater and salts supposed to be good for the wounds and things like that. But what I used to think of, like, oh, it'll clean out, it'll be good. But that is, that's, it's just another access point for pathogens to get in.

McGuire: And it doesn't have to be a big wound. Like we're not talking, you know, a recent incision or something. It could be anything.

ORNSTEIN: Yeah, just.

McGuire: Paper cut or just a cut. Okay. All right. Well, that's interesting. So, we've gone over some of these bacterial symptoms and when they start.

So, let's for example, let's talk about bacteria, the typical start of symptoms with bacteria, with some of these that we've discussed so far.

ORNSTEIN: Well, you know, we just talked about the Vibrio, and I want to look at that one a little bit. So, the Vibrio that is not as virulent, you'll see symptoms within a couple of hours, 96 hours, you know, you'll see watery diarrhea, cramping, vomiting, like you normally would, and sometimes fever, and it resolves 2 to 5 days.

But the *Vibrio vulnificus*, that's a longer duration onset. So not going to come on for one day to seven days. And that's partly the problem with how virulent it is. So, it's not showing up until much later. But when it does show up, the infection is much more advanced. And so, you're sort of seeing that severity related to that incubation period where the more general benign vibriosis is rapid sort of onset.

And then, you know, 2 to 5 days later you're done with it. But again, both of those problems, like both of those are best supportive care kind of thing. You're managing symptoms. And with *vulnificus* it becomes a real problem where death and amputation and things like that are occurring.

McGuire: Right. Well, so just to kind of summarize some of these, and so the camp of our *Campylobacter* is for start of symptoms is 2 to 5 days. Just to kind of do a recap real quick recap *E coli* is 3 to 4 days, correct?

ORNSTEIN: *E. coli* is really, it's 1 to 3. But again, there's ranges. If you actually look at the literature, you will see lots of different numbers because they can vary. It can vary based on the amount of organism that you are infected with. But you're really looking at like which ones are the rapid onset ones, which ones are more delayed.

So that's sort of how in a better way to think about it.

McGuire: Yeah, okay. I like that better. So, the ones that take longer would be just so we have them in our head, the most of them come on within the first few days. But there are some that take longer. Correct. Like salmonella can be later.

ORNSTEIN: Yeah. You know and say and things like you know the *perfringens* is going to be 8 hours, 16 hours kind of thing. Botulism is a rapid onset. You know, *E coli* slower. *Listeria* can be a rapid onset, you know, 9 hours to 48 hours. But again, that one also has the invasive form, which isn't going to show up for two weeks to six weeks.

You know, norovirus, rapid onset, anywhere from 12 hours, salmonella, rapid onset. You know, so all of these and again, they tend to have shorter duration as well. So, for the most part, they're common. They're going to be brutal and then they're going to pass. And that's sort of the case, sort of the rapid onset equates with the severity of the initial symptoms.

So, when they're coming on quick, the coming online gangbusters and then they're going away.

McGuire: Got it. Okay, got it. Thank you so much, Kirk. I can't thank you enough. I enjoyed this conversation. And like I said, some of this I knew and some of it was a big surprise. And I know that's probably the case for a lot of our listeners. So, thank you for your expertise.

ORNSTEIN: Very welcome. Thank you for having me.

McGuire: And thank you for listening to our podcast series on managing foodborne illness. We encourage you to explore all of the many courses available on [elitelearning.com](https://www.elitelearning.com) as you move forward throughout your career. This is Liana McGuire for Elite Learning by Colibri Healthcare.