

TPWKY – Ep 216 – Cyclospora

[00:00:00]

EW: Hi, I'm Erin Welsh

EAU: I'm Erin Allmann Updyke.

EW: And this is, this podcast will Kill You

EAU: We're coming to you with a very rapid fire episode,

EW: Rapid Fire episode on Cyclospora

EAU: cyclospora.

EW: it's been in the news. You've seen it in the news. Many of you have asked us about it and we had not yet covered it.

EAU: Mm.

EW: um, yeah, we wanted to kind of like. Put some stuff together really quickly to get information out to you

EAU: Yeah.

EW: What this thing is, where it came from and what's going on with the current outbreak. A little bit of that. Um, we will note that we are recording this on Sunday, July 12th. And so this will come out, you know, in a week and a few days and things. The numbers will probably have shifted by then. Maybe

EAU: 100%. They will be different,

EW: will be different. We might know more about like what foods are linked to this outbreak

EAU: eh? I doubt it, but maybe,

EW: But you know, we will be giving you some information that is sort of evergreen in terms of what this parasite is and, uh, why it's a foodborne illness that we have been looking out for, for a number of years,

EAU: Yeah.

EW: stopped looking out for kind of,

EAU: Kind

EW: yeah,

EAU: get into it.

EW: of that.

EAU: Yeah. But first it's quarantini anytime.

EW: It is, you know, we're still gonna do one even for this.

EAU: Mm-hmm.

EW: Um, I think we ended up, we landed on this stinks.

EAU: stinks. It's so accurate on so many levels there.

EW: Yep. It, it really stinks.

EAU: Yep.

EW: and it's basically like, honestly it's water

EAU: Water,

EW: electrolytes,

EAU: non, non-branded, non-proprietary. And I want everyone to know you probably don't actually need electrolytes, uh, in your life unless you are actually having profuse watery diarrhea or working out way more than most of us actually work out.

EW: and

EAU: is not advice,

EW: and branded supplements. So listen,

EAU: know,

EW: it's

EAU: it's for fun. It's quarantine time.

EW: Uh, we'll post the full recipe, not that you need one for this. Honestly, on our website and on our social media, make sure you're following us there. If you're not already on our website. There's all sorts of things. I don't think we'd really need to get into it for

EAU: No,

EW: fire

EAU: listen.

EW: people want the information.

EAU: Let's get to it.

EW: break and begin.

EAU: So the disorder, the disease we're talking about today is known as cyclosporiasis. It's caused by a parasite called cyclospora cayetenensis, I think I'm saying that right. There are a number of other species of this pathogen that infect snakes and insectivorous animals, some that infect monkeys, but it's only this one species that seems to be important for humans and which infects only humans as far as we know. It's a type of parasite called an apicomplexan.

EW: Okay.

EAU: Which I know that we've talked about parasites in this group, in this phylum before, but I, I don't know that we've actually said that word, but it's the same group that includes malaria, parasites, toxoplasmosis, cryptosporidium,

which we have not done yet. And of course there are lots of other protozoan parasite friends that we've covered on this podcast, like Chagas Disease, Giardia, et cetera. Those are just sort of slightly different vibes. All right,

EW: Yeah.

EAU: so we get exposed to the infectious stage of this parasite from either food or water in our mouths that has been contaminated with old poop.

EW: Um, tell me about old,

EAU: We'll get there, Erin,

EW: okay,

EAU: but I wanted you to ask that because it's an important part. Okay. Old poop. Not just any poop.

EW: You set me

EAU: I did. So the infectious stage of this parasite, these are single cell parasites, by the way, like, okay. And the infectious stage are these teeny tiny little balls, little spherical balls. And by teeny tiny, I mean they're like eight to 10 microns. They're very small. You cannot see them with your eyes.

EW: Okay.

EAU: And these balls are filled with these two bunches of bananas, like they, these little critters that are shaped like bananas. we eat these little, little tiny balls filled with four bananas total. Okay?

EW: Okay.

EAU: Once these banana filled balls pass through our stomach and get to our small intestine, they punch their way out of the ball. And these bananas, these sporozoites invade the cells that line our small intestine.

EW: Okay. Question real quick.

EAU: Give it to me.

EW: the ball once, once it lands safely, these bunches of four bananas, that's still one individual. Like is that still one individual thing or is it multiple.

EAU: It's four sporozoites.

EW: Okay.

EAU: Yeah. In each one of these balls.

EW: interesting,

EAU: know it [00:05:00] gets, it gets better, Erin. Okay. This is a really interesting parasite.

EW: Yeah.

EAU: Once they are inside the cells, so these are intracellular parasites. They're invading the cells inside our small intestine, and there they start to reproduce asexually. So they're making a bunch more of these banana shaped critters. They now have a different name. Again, why? Because they're different. And then at some point, some of these bananas that are invading our cells, replicating, and then going out to invade more and more of the cells in our small intestine. At some point, some will differentiate into a form that actually undergoes sexual reproduction.

EW: What proportion.

EAU: I have no idea, Erin.

EW: Okay. It

EAU: Not a clue,

EW: Yeah.

EAU: but some of them do. And so they form these basically like micro and macro gametes, and then they fertilize each other to form a zygote the same way that we think of a zygote in humans, except completely different because it's a single cell parasite.

EW: Yeah.

EAU: And then these zygotes become oocysts. These are what will pop out of our small intestine cells, travel the rest of the way through our guts and be pooped out in an explosive fashion.

EW: Yeah.

EAU: And then these balls, these oocysts have to live in the environment for at least a week before they grow those banana things inside of them and actually become infectious. That's why I said old poop. Yeah.

EW: Okay, so just so I understand, so what

EAU: Give it to me.

EW: You consume these little, these little banana B banana filled balls. Those then invade once they're safely in your gut, they invade your cells there, they replicate asexually a certain point. They begin to rep, some will, differentiate so that they can undergo sexual reproduction. And then those, the offspring produced by those are the ones that make it into the, the environment for, to then mature and infect other, potentially other people.

EAU: Nailed it.

EW: you've pooped out these parasites.

EAU: 'em out.

EW: They then will in the environment, in water. Like what?

EAU: Sure. Wherever, wherever they land. These are incredibly hardy parasites. So the oocysts, which take a week to become infectious, but during that week and after, once, they are what they call sporulated and infectious. They, I tried to get a number on exactly how long they can live, and I could not find that in the literature. Maybe I was not looking at the right terms, but I can assume based on the studies that I did read, that it's a long time that they're able to persist in the environment. They also can withstand freezing to a certain degree. Freezing is not guaranteed to kill them. They also withstand most of the disinfection techniques that we use, including chlorination. So the only way to actually rid them of, let's say our water sources, if you know poop is contaminating water sources, is with physical filtration to literally remove them, get them stuck on a filter or with like UV filtration.

EW: What about like boiling?

EAU: Boiling will do it. Yes. So heat does kill them. Same thing with cooking your foods. If your foods and food can get contaminated, both because the soil can be contaminated, um, if you're using reclaimed water or you know, unfiltered water to irrigate your crops, then they can get contaminated that way. And apparently they're quite sticky, the oocysts. And so they really glom on to, let's say, the tiny bumps and hairs covering a raspberry

EW: Yep,

EAU: and so

EW: yep. Yeah. Raspberries are, are culprits.

EAU: often.

EW: Speaking of timeline from ingestion of these parasites to symptoms to the diarrhea, how long is that taking, and then how long does it take for symptoms to resolve? How do

EAU: Ooh,

EW: All

EAU: question.

EW: stuff.

EAU: So glad you asked. It's the next thing I have written, Erin. So the incubation period, usually it's about a week, but it could be as short as two days. It could be as long as two weeks, but on average it's a week, which for a foodborne infection is a very long time.

EW: long

EAU: And we'll talk about the importance of that when we try it, when we talk about like tracing what was the source of this outbreak, right?

EW: Right.

EAU: It's also very possible and very, probably more common than we know that people have asymptomatic infections.

EW: Okay.

EAU: They're not getting sick at all, does not mean that they're not infecting others because they can still be excreting oocysts in their stool. And again, we do not have great numbers on like, how often are we having asymptomatic versus symptomatic infections, the symptoms themselves. So [00:10:00] after that week in the literature. Never so often have I seen the words explosive, foul smelling, diarrhea.

EW: Not even with c Diff or Noro

EAU: I, I don't remember seeing specifically the words explosive quite as often as I do with this parasite in particular.

EW: Okay.

EAU: We can get a little bit more into the symptoms. It's a very watery diarrhea, hence the explosiveness. We talked in our poop episode about how our anal canal has sensors to detect between a poop and a fart, and they're really not good at detecting liquid. So when we have like very watery stools,

EW: This is when

EAU: part of it,

EW: a fart is,

EAU: the way to go.

EW: go the wrong way.

EAU: Yep. We also see a lot of abdominal cramping, bloating. People can have nausea or like a headache. Not often do we see vomiting, but sometimes people might have vomiting and sometimes people might have a fever, but it's not super common that you get a fever with this particular parasite. But it can last for quite a long time. So we can see like weight loss because of how just like yucky people are feeling and that they're not really eating. Their appetite is

down. And when I say it can go on for a long time, I mean this can go on for weeks to a month to six weeks if it's untreated.

EW: Whoa.

EAU: Yes. So it's usually at least two weeks of illness and like five to 15 explosive liquidy stools a day, not minor. That can go on for at least two weeks if it's untreated. But often it's lasting longer than two weeks. Right? Like a month, five, six weeks. Whew.

EW: Uh, I have two questions about numbers.

EAU: it to me.

EW: How much, how many parasites does it take to get sick? And then how much are you pooping out during this process?

EAU: love that you asked me this question. I don't know. The only thing I saw in the literature of how many parasites does it take is that we think, I wish I had written the exact quote, but it was like, we think that it's quite low,

EW: Yeah.

EAU: So we don't really know. But it's probably just a handful of these individual oocysts, right? Each one has four sporozoites that are causing infection, then they're replicating asexually before doing the sexual reproduction thing. So I couldn't find a specific infectious dose. And similarly, I don't have an exact number on how many oocytes are you pooping out, but what makes this really challenging is that it's not a lot, this is not cholera where, or, or norovirus where you're releasing, you know, thousands, tens of thousands.

EW: Yep.

EAU: It is low numbers of these oocytes and it can be sporadic. So you might, even though you're having diarrhea continuously, you might not be releasing oocytes in every stool. And it's, in part because of this, it's not every single parasite that's getting excreted, right? Like it's only the oocytes that they're producing.

EW: that's kind of, I mean, that's so rude,

EAU: I know.

EW: why just save the, save the oocytes, the diarrhea for the oocytes.

EAU: Nope. They're like, no, no, no, we're just gonna keep it continuous, keep it, keep it moving. And so that can make it really hard to diagnose because if you're looking in the stool for these oocytes, they might be in very low numbers and they might not be there on one day. And so you might have to look for multiple days in a row.

EW: So

EAU: also hard to detect on, like typical stool studies don't actually look for them, and they don't stain the same way that other parasites do, which means you actually have to use like special stains to find them. They're easier to detect with PCR based methods. And so I, I did check they are on our like GI pathogen panel that I order when someone has unexplained diarrhea that I don't know if I need to treat or not. It is on ours, but again, even though PCR helps because you're increasing the number, like the amount of DNA in the sample, it makes it easier to detect if you only have a couple of o sites there, you still might not pick it up.

EW: not pick it up. That's interesting.

EAU: It's really interesting.

EW: how does it resolve?

EAU: Hmm. I mean either with time though, some people can have a kind of relapsing remitting course. So we do see that some people, you know, recover and then weeks later might have more symptoms or the symptoms are just like really, really prolonged. We also see, especially in people who are immunocompromised, so whether they are on immunosuppressive medications or maybe have uncontrolled HIV, the disease can spread outside of just the intestine and cause disease elsewhere. Like say the biliary system, that's the gallbladder and liver.

EW: Oh wow.

EAU: Or we sometimes see these kind of post-infectious inflammatory type syndromes that we see after other foodborne illnesses like salmonella or campylobacter.

EW: Right.

EAU: these are things like inflammation in the eye, joint pain and inflammation, bladder inflammation. And so that's kind of an interesting component that like we [00:15:00] don't really have a handle on. And it doesn't happen all that often, but it certainly can happen where you have this prolonged extraintestinal illness as a result of like inflammatory response to this parasite. The good news is that it is treatable and we use actually an antibiotic,

EW: Yeah.

EAU: Even though it's not a bacteria. I double checked the mechanism of action of the main antibiotic that we use, which is trimethoprim-sulfamethoxazole or Bactrim Septra in the us

EW: that you pronounce that. 'cause I just wrote like, t whatever the, the initials

EAU: Yeah, T PX or something.

EW: gonna handle this.

EAU: Um, the, the mechanism of it is that it's a folate blocker. It blocks the synthesis of folate. And so like all organisms need folate and most single cell organisms, including bacteria and many parasites make their own folate.

EW: Mm-hmm.

EAU: And we don't, we get it from our diet. And so by blocking the synthesis of folate, they can, this particular antibiotic can also work against some parasites, though not all,

EW: how? That's very cool.

EAU: I know I re-looked it up and I was like, I love learning things like this that I knew once before. So it is treatable if you can detect it. So really a lot of times it's diagnosis. That is one of the, the biggest challenges. The good news too, is that even though it's hard to detect and it can last for such a long time, it usually is a self-limited illness in that the mortality rate is very low. I do not have an exact number, but for example, in the US in the last few years, there have been only a small handful, like single digit number of mor of deaths associated with cyclospora. Globally, it probably contributes much more than we realize to mortality rates, however. Because this is a parasite that is endemic

in a lot of tropical and subtropical regions in the world where diarrheal illnesses kill children under age five, it's the leading cause of death.

EW: Yeah.

EAU: So the dehydration that can accompany any kind of diarrheal illness is something to take very seriously, especially in small kids and the elderly.

EW: Mm-hmm.

EAU: wanna say that this is like not an important illness. It definitely is. And we're probably underestimating it overall.

EW: Oh, absolutely.

EAU: Yeah,

EW: I mean for sure. And, and I'm sure that you'll get into some of the reasons for that in like the current and

EAU: exactly. Yeah.

EW: and also I think that, yeah, there's, there's a lot more when it comes to like the shape of outbreaks that associated with Cyclospora. Yeah.

EAU: it's really interesting and like what, who is getting the most sick? Like here in the US it's mostly adults, whereas in other parts of the world it's mostly children and not super young children, but like, you know, children age two to 5, 10, 12.

EW: Mm-hmm.

EAU: Um, and so that kind of gives us ideas as to like how endemic this parasite really is. How much is it just something that we live with versus something that is only there occasionally? Oh,

EW: Yep.

EAU: it's all so interesting.

EW: It is. I have a question about symptoms. Dur, you know, all these things. So, uh. Diarrhea can be caused by a lot of different

EAU: Yeah.

EW: And it can resolve on its own quite, you know, sooner rather than later. At what point with an illness like this, with Cyclospora, should someone, and I know this is not a medical advice podcast, but like at, at what point is going to the doctor for a diagnosis, like something that like, you know, that's, that's a good idea,

EAU: Yeah, that's such a, such a good question, Erin. There's not like a, a perfect answer to it. It so much depends on how severe your symptoms are. I would say probably on average like two to three days of severe diarrhea, that's not going away or getting better,

EW: Okay. Like not being able to keep anything

EAU: not being able to keep things down. It's gonna differ if you're having a lot of fevers or if you're super, super sick. But I would say probably two to three days is the point at which we know it's probably not Noro. It's probably not something, it might be something that we need to treat, is really the question.

EW: yeah. Okay.

EAU: And it is hard 'cause this isn't necessarily something that's always tested for or picked up on, on the first try.

EW: Yeah. Well, and I imagine too, it's different for, you know, different people of, like, if it's you're a small child or if you're, you know, elderly, then it could be more severe, more quickly, and

EAU: Exactly, exactly. Yeah.

EW: cool.

EAU: I'm trying to think if there's anything else. I wanted to make sure that you knew. Uh, I feel like there's a lot more, but Erin, can you tell me where the heck this thing came from?

EW: Let's give it a go.

If this current outbreak is the first time that Cyclospora has been on your radar, first of all, count yourself lucky because as you just shared Erin, it is not something that anyone wants to deal with. And second, it's totally understandable if you had never heard of this parasite before, because it was not actually that long ago that researchers first identified Cyclospora as infecting humans as a parasite capable of infecting humans.

EAU: was shocked, Erin. I couldn't avoid some of the numbers because they're just so recent and in every single paper, but like

EW: [00:20:00] recent,

EAU: what?

EW: I know 1979.

EAU: That's like, that's so recent,

EW: recent. So what happened that year in 1979, RW Ashford, who was a British parasitologist, uh, who was in the Department of Pathology at the University of Papua New Guinea, he reported that he had come across three cases of what appeared to be a new species of coccidia in routine stool samples from two patients over the years of 1977 and 1978. Two of the three at least, had been experiencing diarrhea and general malaise, like flu-like symptoms for some time, but a week or two.

EAU: Okay.

EW: And the infection over time begins, like seemed to resolve on its own. And at the time of finding these parasites, was like, well, it's possible that this parasite is causing diarrhea, but it's not conclusive by any means given that, you know, one patient was also co-infected with Giardia and the other could have had diarrhea from something else of, you know, just something they ate, virus, whatever. he also had difficulty, yeah, categorizing it like it looked like a co city in parasite, but he wasn't sure about the genus. And so the parasite remained unnamed and unclassified in that initial report.

EAU: Wow.

EW: and owing in part to this sort of unclassification, as well as just the relative obscurity of a three case, case report, you know, in from like a, a Journal of Tropical Medicine or whatever,

EAU: Right.

EW: it, it's a pretty niche area of study. His initial paper mostly went unnoticed until sporadic reports over the next decade, the 1980s, uh, of a coccidian and parasite infecting humans and that show, these, these reports show that this is, might not be one-off infections. These cases might be indications of a more widespread disease or a widespread parasite. And the researchers who worked on these cases throughout the 1980s, they also struggled with what this parasite was. Like, some thought, you know, it kind of looks like fungal spores in certain settings. They'd be like, it's fungal. Like others felt that it resembled blue-green algae. And so they called it cyanobacterium like body or CLB. There were like a few papers from the eighties that show that, and it didn't get its final name, cyclospora, cayetanensis, until 1994. And cayetanensis comes from the u, the Peruvian University where the research had been carried out. Uh,

EAU: Huh?

EW: was by Ortega et al.

EAU: Oh,

EW: studies on the parasite and been like, okay, this is, this is

EAU: this is what it is. And they named it 94.

EW: is when it got its final name. It's surprisingly recent.

EAU: Yeah.

EW: but the genus also was a little bit of a surprise too, because as you mentioned, cyclospora, this genus had been around since 1881

EAU: Huh?

EW: And all members up to this point of this genus, cyclospora infected only non-human animals, like you said, you know, voles or, uh reptiles or whatever.

EAU: Right.

EW: So does that mean that Cyclospora jumped into humans recently? I mean, probably not.

EAU: Okay.

EW: probably just, I think, I mean this is what people have suggested in the literature. It's probably just that it, it had been masquerading as other pathogens.

EAU: Yeah.

EW: Given that the course of disease is mostly self-limited, resolves on its own, given that it is also difficult to detect, seems to be difficult to detect, it was probably just lurking and causing periodic outbreaks or sporadic cases and or just sort of like endemic. And you know, in the places where cyclospora is endemic, it tends to be most common, as you said, in children. And in these children it tends to be more mild and asymptomatic. And it also might provide some protection later in

EAU: Right.

EW: meaning that an outbreak, like you might not see outbreaks take shape this the way that they do in countries where this parasite is not endemic.

EAU: Which is super interesting that like usually people who live in non-endemic areas and then travel to somewhere endemic, get way sicker

EW: sicker.

EAU: this parasite than people who, who live there. Yeah.

EW: And as far as I read, and it sounds like as far as you read too, there's no currently known animal reservoir for cyclospora. There could be one. it could

EAU: We just haven't found it.

EW: haven't found it yet,

EAU: Yeah.

EW: But it seems to be like. hardy, pretty, pretty chill on its own in the environment. You know, just

EAU: Yeah.

EW: Soil and water. And another thing that points towards a longer history of cyclospora in humans is just how far ranging these case reports in the 1980s and 1990s were.

EAU: Hmm

EW: you see case reports of travelers, uh, a lot of, a lot of travel associated illness. People returning from Haiti, from Peru, from Mexico, from Nepal. Also studies showing that residents of Nepal and Peru were infected with Cyclospora and also patients who had AIDS. These made up the bulk of these early [00:25:00] reports, so it's kind of, it was like all over the place. And in addition to showing that this is a pretty geographically widespread parasite, these also indicated that the parasite can cause a range of infections from asymptomatic to symptomatic. It can impact both immunocompetent and immunocompromised individuals. In a pretty relatively short period of time, a decade and a half or so. By the mid nineties, scientists had a pretty good handle on the distribution of the parasite, the clinical picture, treatment like studies had identified T-M-P-S-M-Z as a, as an effective therapy, and they also had some clues as to its transmission contaminated water seemed very viable as a source of infection, and there were some early hints that contaminated food could also lead to illness. In 1996, those hints about foodborne illness turned into shouting from the rooftops when the first major outbreak occurred in North America. And so this resulted in at least 1,465 cases of cyclosporiasis reported by 20 different US states, uh, the District of Columbia and two Canadian provinces over at least a month, likely in underestimate of true totals

EAU: sure.

EW: And very widespread from a, a geographic sense. The outbreak, was ultimately linked to raspberries from Guatemala and crucial to the epidemiological tracing were several dozen events, like gatherings where raspberries were served. And so

EAU: Huh.

EW: clusters, those really helped to narrow down the exposure and like the specific exposure. 'cause they were

EAU: Okay.

EW: here's, you know, at this banquet there was a raspberry dessert and this person had raspberries there and this person didn't,

EAU: Yeah.

EW: is so interesting.

EAU: It's so interesting, Erin, all of this like tra contact tracing and, and, and like questionnaires and ident trying to identify the source is so, so interesting

EW: Yep.

EAU: and so hard.

EW: It is very hard.

EAU: Yeah.

EW: hard. Um, especially with the week, the week

EAU: Exactly.

EW: what they ate a week ago?

EAU: I can't barely remember what I ate two days ago. Okay. A week. I literally have no clue. Not uh uh. Not a clue.

EW: I do. I remember, but only because I was traveling back from Wyoming,

EAU: Okay. Where

EW: we stopped to eat and stuff

EAU: I don't even,

EW: for camp breakfast,

EAU: can't even think where I was a week ago, Erin. Something's wrong with my brain.

EW: this

EAU: It's really hard.

EW: foodborne, foodborne outbreaks can be very difficult to get a, to get a handle

EAU: Yeah.

EW: And it turned out that with, with continued study, the raspberries were actually being exported during a time of year that cyclospora is more prevalent, so it tends to be seasonal in endemic countries. And while the precise method of contamination, like how did these raspberries get contaminated in the first place, it, it was never figured out.

EAU: Yeah.

EW: Researchers narrowed it down to a handful of farms. And they suggested that it was likely from contaminated water. So maybe either irrigation, maybe fertilizers or pesticides were diluted with contaminated water and then sprayed over the crops.

EAU: Okay.

EW: And this would help to explain the sheer number of raspberries that had been contaminated, but again, it doesn't take that many, uh, cycles to cause infection. So why raspberries? We touched on this a bit, but, uh, raspberries have been one of the things implicated in this current outbreak. Also, cilantro and lettuce, we will get there in a bit, raspberries are difficult to scrub clean. You can't just run them under the water and expect the cyclo, the, the cyclospora, the oocytes to just pop off. Um, all those nooks and crannies.

EAU: A little teeny tiny hairs

EW: Yeah.

EAU: just grabbing on,

EW: yeah, raspberries are, are often, are often the culprits in

EAU: yeah.

EW: And the 1996 epidemic, it acted as somewhat of a wake up call and certainly an a warning bell. More cyclospora outbreaks were on the way and they would only get worse unless we did something about it. In 1997 and 1998,

both saw outbreaks in North America associated again with raspberries and other berries. There was a cruise ship that had over 200 people report infections.

EAU: Wow.

EW: There was a wedding in 2000 in Philadelphia that sickened 83 attendees, again linked though not definitively to raspberries. Poor raspberries,

EAU: raspberries.

EW: and they're, they're not the only culprit by any

EAU: No.

EW: There have been outbreaks linked to basil, uh, snow peas, cilantro, green onions and salad mix. in fact, a large outbreak in 2019 involving over 2,400 cases across North America was associated with fresh basil. The lesson from all of these outbreaks is pretty clear, and it was summed up nicely in the last few sentences of the New England Journal of Medicine article [00:30:00] detailing the situation in the 1996 outbreak quote. "In summary, cyclospora has now been established to be a foodborne pathogen. This outbreak is a reminder that our supply of fresh produce has become increasingly international and underscores the need to identify and investigate foodborne outbreaks promptly, to consider that a local cluster of cases could be part of a widespread outbreak, and to pursue investigations to the source of the implicated vehicle. For imported vehicles. International collaboration is critical to the success of the investigation and to the identification of appropriate measures of prevention and control." End quote,

EAU: Love it.

EW: which food item?

EAU: Mm-hmm.

EW: An incredibly clear levelheaded and well reasoned response. Who could argue with that?

EAU: not me,

EW: Not me,

EAU: but

EW: but do so following the outbreaks in 1996 and 1997, the Guatemalan government has cooperated with the FDA and the berry industry to institute policies to reduce contamination of cyclospora, to help identify the source of these outbreaks. And other countries where contaminated food was traced have also followed suit. Which is great and no doubt has reduced exposures to foodborne pathogens and parasites. But of course, no policy is perfect. And so it is crucial to have a well-functioning, well-funded surveillance system in place in this country to gather data and report any foodborne parasites or pathogens that pop up. Seems pretty obvious.

EAU: pretty obvious.

EW: Who wouldn't want that?

EAU: I want it.

EW: I want it too. And we did have something like that. Technically we still do, but it is kind of a shell of its former self. Lemme tell you about FoodNet. Yes. Cyclospora was not the only foodborne infection popping up in the 1990s in North America. E Coli O157 was the real baddie having sickened over 700 people and killed four children in 1992 and 1993. And in response to this, I mean, it was a horrifying outbreak. A lot of fear. Listen to our e Coli episode. I

EAU: Yes, we talk. It's like mostly what we talk about.

EW: Okay. But the USDA was like, okay, we gotta start testing some meat and produce and we gotta implement a, a certain inspection system.

EAU: We gotta do something.

EW: Kind of system for this. of course, in order to justify the continued funding of such a system, there needed to be a, a way to measure its efficacy. Did infections go down? Did exposure go down? Thus Food Net was born. So in 1995, the Food Safety and Inspection Service of the USDA linked up with the CDC to create the Foodborne Diseases Active Surveillance Network FoodNet which was intended to monitor the incidence of certain foodborne pathogens across the country, to get a sense of where infections were happening and estimate how many infections there were. Total FoodNet started out small. Collaborating with just a handful of state and local health departments covering, you know, at the very beginning, 14.3 million total,

EAU: Okay.

EW: then screening for just a few pathogens. But over the years, FoodNet proved how valuable of a surveillance tool it was,

EAU: Yeah.

EW: More and more areas were included in the surveillance and the overall surveillance network. The Data collected by FoodNet also went far beyond, is this pathogen present or not? Is there an outbreak or not? It was used to assess things like how food prep at long-term care facilities could improve, how the long-term effects of antibiotic resistant salmonella infections, how informed physicians are about certain types of e coli infections, and eventually online tools were launched, which then allowed users access to a huge array of data on foodborne illness. I mean, it was awesome.

EAU: Yeah, like really the amount of work and the fact that it was all an active surveillance network, not just passive surveillance is massive.

EW: Yep.

EAU: Was massive.

EW: massive. Yeah. By 2024, food net surveillance area had expanded to cover 16% of the US population, about 54 million people eight different infections and outcomes were required to be tracked. So Campylobacter, cyclospora, listeria, salmonella, Shigella Shiga Toxin producing e Coli, Vibrio Yersinia, and hemolytic uremia syndrome, which is caused by Shiga toxin producing e coli.

EAU: Mm-hmm.

EW: I mean great.

EAU: Great.

EW: what a valuable and fantastic public health tool. Essential you could say you could say. on July 1st, 2025, the CDC announced that FoodNet [00:35:00] was cutting back on the number of pathogens it monitored. Reporting became optional for all but two. So now the only required reporting was for salmonella and shiga-producing e coli, shiga toxin producing e coli. Cyclospora is of course one of the ones on the optional list. Why make reporting optional? Funding was the reason given. It's, it's, I'm sure, I mean, funding is, is a smokescreen for

This. We don't value this. And so now with cyclosporiasis cases rapidly rising and with no clear picture as to which food or foods are responsible, the American public is paying the cost. Right. So if the government is saving how much money, like one minute of the military budget for a day or something?

EAU: of the papers that I read actually said that the food net budget like to fund all of the local sites where they were working as well as the like central staff was \$7 million. And I don't, I, I, it was only one paper that I read, but I really, are you serious? Is that it?

EW: I mean, and it's, it's, it's the kind of thing where you expect something like this to grow and grow and grow over the years, to have the number of pathogens that you're screening for grow as you have increased technology capabilities of doing this and increase desire to, if you have the tools, why not use them to make the world a better place to help the general public

EAU: To make America healthy or something?

EW: I, I guess. And so yes, Under the guise of cutting budget, food net has now been diminished. When, what was once a trusted governmental public health institution like the CDC makes a policy change that reduces protections for its citizens, how can we interpret that any other way than shifting the cost and the consequences onto us, onto the general public? I mean, do you remember what Trump said during the pandemic in 2020?

EAU: No.

EW: on June 15th, or sometime in June, 2020, he said " if we stopped testing right now, we'd have very few cases, if any." Is that the same strategy we're using the Cyclo

EAU: If we just don't test for it, then it's not there, then we don't have it. That's not how the world works.

EW: I mean, yeah, it's, it's, it's shocking.

EAU: Yeah.

EW: that doesn't actually prevent disease from spreading

EAU: No.

EW: who, you know, who

EAU: Who knew?

EW: people knew. Everyone knew. So many states in this, in this current outbreak are still individually monitoring cyclospora like Michigan, which seems to be the epicenter of this current outbreak and has now launched, you know, like a, an, an interface where you can actually see cases and the number of

EAU: Their website is incredible Way to go,

EW: beautiful. Yeah. But other states, uh, such as Colorado, have suggested that without food net support, they may have to cut back on disease surveillance as well. I don't know if that has extended to Cyclospora and this current outbreak, but I know that without, with the loss of this federal monitoring system, we are not going to have, and we do not have this outbreak shows it as good ability to get a sense of the scope of an epidemic like this. We are scrambling in the dark without this former cornerstone of public health, and it makes it much more difficult to halt, its spread to gather information that we need the general public is trying to make up for this federal failure by crowdsourcing information on like threads and other social media platforms, seeing if they can piece together anecdotes to identify like a particular fruit or veggie or a farm linked to the cases like, oh, I got sick and I had these raspberries, and this is on the label and this is the date and whatever. Maybe that's where the answer will eventually come from.

EAU: Yeah.

EW: can do amazing things when they work together.

EAU: We love it.

EW: We do. At the same time, I don't want a future where public health is solely conducted on social media without any peer review.

EAU: No?

EW: Is not what we should have. What I want is a future where public health is prioritized and valued and respected and funded. One of the longstanding challenges in championing public health is that the money saved by public health programs like Food Net , it's not always easy to calculate or visualize to

see it as money saved, but the cost of cutting public health is very, very clear. We're seeing it right now. And so with that, Erin, I'll turn it over to you to tell me what's happening with this current outbreak.

EAU: I would love to,

I'm gonna take a step back and give us a broader picture of where Cyclospora fits in, because it is probably something that most people never heard of until this year. Despite the fact that we have had outbreaks in the past. And globally, I said already this is a much more prevalent pathogen even than I realized [00:40:00] in some areas where it is endemic, like in parts of Latin America and in Southeast Asia, prevalences can range from 10 to 40% in some populations, meaning that that parasite is just around, it's just around. It's infecting people. Some of them show symptoms and some of them don't. So far in places like the US and Europe, it has not been considered endemic, however. There's a lot of questions as to whether or not it really is, because like you said, Erin, in the past, a lot of times outbreaks have been associated with produce that has been imported. But in the last few years, there have been well-documented cases of outbreaks associated with produce grown here in the us.

EW: Yeah, or I think the, there was an outbreak in Germany associated with a salad mix that had been grown in France,

EAU: oh, ooh.

EW: okay, now it's in Europe, potentially. Yeah.

EAU: In Italy ever since 2015, there were like 12% of environmental samples that were testing positive for cyclospora. And prevalence in some studies in humans was up to 27%. So it, it's certainly around, we maybe just haven't been paying that much attention to it, but cases in the US have certainly been on the rise since at least 2016. So despite the fact that food net. We can just say has crumbled at this point. Cyclospora is still a nationally notifiable disease, which means that there is a system here in the US called the National Notifiable Disease Surveillance System. It's like the longest acronym, but it is still the case that when hospitals and clinics pick up on cyclospora, they have to report that to the CDC. This is a passive surveillance system.

EW: Yep.

EAU: It's great that we have it. It is not the same thing as actively looking for cases of foodborne illness the way that Food Net did.

EW: Nope.

EAU: So even though Food Net only covered, what did you say, 16% of the US.

EW: like that.

EAU: It was actively looking for and identifying, Hey, these cases might actually represent a larger outbreak than what we're realizing. And that is what we have lost here.

EW: Yep. Passive surveillance is not a substitute for active surveillance.

EAU: it's not. And I think that it's really easy to just, well, at least on the CDC's website, what they have said is like, don't worry, we're still surveilling for these things and we're not in the same way, period. We are not. So all of the data that I have right now is from the National Notifiable Disease Surveillance System, so the N-N-D-S-S, and they only have updated it as of July 4th, which is annoying because they were supposed to update it yesterday, 'cause that's the end of a week.

EW: yeah.

EAU: But as of July 4th, according to the N-N-D-S-S, there were 1,838 cases so far in 2026. Okay.

EW: of July 4th,

EAU: As of July 4th.

EW: Yeah.

EAU: And this is just that had been reported to the CDC. There's always a delay between when something has been, I shouldn't even say reported to the CDC. These have just been reported to this surveillance system. The CDC then has to like confirm whether or not that case is a confirmed case. By this same point in 2025, we can compare, there were just over 1000 cases, so we're looking at over 800 more cases as of July 4th compared to 2025. But if we look at the beautiful state of Michigan who is doing a phenomenal job of keeping the public informed and of updating what their case numbers are, they have reported as of July 9th, 1,562 cases just in Michigan alone,

EW: Yep.

EAU: 44 hospitalizations, and several hundred of those cases happened just in the last week. So from July 5th to July 11th.

EW: Right.

EAU: Ohio has also reported a number of cases, and the Ohio State Department of Health is not updating it on a regular basis, but the Toledo, Lucas County has a really great active tracker. So way to go. Toledo County, they have reported 412 cases in Lucas County and 661 in northwest Ohio. And that's compared to like Ohio as a state, which so far only reported 177 as of July 8th. So.

EW: such a

EAU: It's a mess.

EW: Yeah.

EAU: A mess. And we are in the middle of it. We are not at the end of it, we are not at the beginning. We are smack in the middle of this. New York City. New York state has reported just under 400 cases. Um, again, I couldn't get info from their exact website. It's all from News Reports, North Carolina 200, Illinois 161. And that's just the cases that seem to maybe be associated with these outbreaks. Here's the thing. We do not know if this is one outbreak. If this is one multi-state outbreak, if this is [00:45:00] many, many outbreaks

EW: Yeah.

EAU: Are reported every single year, especially from May through August, which is Cyclospora season. So we've had cases in like over 31 states, but that's not unusual. What's unusual is the sheer number that have happened in the last less than one month, essentially.

EW: record breaking,

EAU: Yes. Yes.

EW: Or

EAU: it's.

EW: there.

EAU: It's getting there. It's getting there. If we look at overall numbers, like say yearly numbers, they have been increasing since 2016 per the National Notifiable Disease Surveillance. Before 2016, it was usually just a couple of hundred cases a year, except for years when we had larger outbreaks. But every year since 2017, there have been over 2000 cases. In 2025, there was 3,900 cases. 2024, there was 4,200 cases. But again, even, even knowing that at this point last year, we had seen well under the number of cases that we're seeing right now. And if you look at the actual state level data, like this is July 12th, there's probably close to 3000 cases that have actually been reported to states. And the CDC is just really lagging on updating that data overall. 'cause their numbers on their official website, say like 800. Ah. So it's not just the loss of Food net, it is also the massive reductions in force that we have seen at the FDA, the USDA and the CDC that have all had major effects on our ability, not just to identify and trace back the sources of these outbreaks, but also communicate with the public. A lot of the people that got laid off were in charge of this public facing communication.

EW: Yep.

EAU: And then the question of what is causing this particular outbreak or however many outbreaks are going on right now. We don't know historically. Erin, you mentioned a lot of the common culprits, raspberries and other berries, things that you tend to maybe not wash that thoroughly or that are really difficult to completely wash. Same thing with pre-washed bagged salad mixes and like fresh herbs. Things like basil, cilantro, parsley. All of those have been implicated in the past. From what I could tell there's absolutely nothing that has been identified at this point. We do not know period.

EW: Mm-hmm.

EAU: Despite that Taco Bell in Michigan is like not serving any fresh lettuce or onion or anything like that. And I'm like, way to go Taco Bell. Be proactive. but places like Michigan have put together some really great resources on how people can try and protect themselves. Cooking your food does inactivate this parasite. So anytime that fruits and vegetables can be cooked, they're gonna be safer than if you're eating them raw

EW: Mm-hmm.

EAU: that you're not going to cook or cannot cook for whatever reason, washing them in a solution with vinegar, like completely submerging them and swishing them around and soaking them, they say maybe helps a little bit more than just a quick rinse.

EW: Hmm.

EAU: There's not like great data to support any of that because again, none of the things that we typically use for disinfection, even like chlorine, are actually effective in killing this. So all of that is the goal is washing it away, not killing or inactivating the parasite. Even freezing doesn't completely kill it because we have seen outbreaks associated with frozen raspberries in the past. So, yeah, I don't, I don't have a, there's not a perfect answer here. Authorities are recommending that if people, especially in areas where there have been a lot of cases reported so far, so Ohio, Michigan, New York, Illinois, um, also North Carolina, if people are having more than two to three days of diarrhea, it's recommended that they go get tested, um, in part so they can get treatment and in part, so that we can get a better handle on what's actually going on and how large this outbreak really is.

EW: Yeah.

EAU: That's what I got, Erin. It's a bit of a mess. And if we do not invest in public health infrastructure, which is the same refrain that we say every single time,

EW: time,

EAU: we are going to continue to see outbreaks like this. Outbreaks happen no matter what, but our ability to get a handle on them and to be able to identify what factors led to this outbreak and then get them under control is severely hampered when we fail to adequately fund public health,

EW: Yep.

EAU: to staff our agencies with knowledgeable people who know what the heck they're doing.

EW: Right.

EAU: So,

EW: I mean, and it's like, it is, it is not satisfying.

EAU: no.

EW: Or pleasant in any way to say, I told you so. In a situation

EAU: No.

EW: it's, it is really frustrating and it is, it is tiring. It exhaust, it's exhausting.

EAU: Yes,

EW: one wants to have to say, I told you so when it comes to matters of defunding public

EAU: no.

EW: but this, in many ways, our lack of ability to understand the, the scope and the source of this outbreak is very much associated with the, cuts in funding to food net to CDC, to other [00:50:00] governmental institutions that you mentioned. No one wants to say I told you so, but guess what? People,

EAU: you

EW: people told us. So,

EAU: Yep. Erin, that's Cyclospora thus far. Keep refreshing your news feeds because there will be more.

EW: Will be more, sources for this. So I have a bunch of different papers on Cyclospora. There was a paper, I think if you would like to read about the 1996 outbreak, an outbreak of nine in 1986 of Cyclosporiasis associated with imported raspberries by her waltz, et all. Um, and then there are a few reviews in there, but if you would like to read about the food net, uh, there's a paper from 2015 that talks about food net and it's called, it's

EAU: I saw that one

EW: Yeah. Foodborne Diseases Active Surveillance Network. So check it out.

EAU: I, my favorite paper for just an overview of Cyclospora in general was from Lancet Infectious Disease 2019 And it was called Human Cyclosporiasis. That one's a great overview. There was another one from Veterinary Parasitology in 2004 called Cyclospora casis, A Food and Waterborne Co City in Parasite. A bunch of other reviews just of the parasite itself. I have a number that details some of the previous outbreaks as well as some of the data on surveillance prior to the last few years. So there was like an MMWR that was from 2019 that looked at surveillance in the US From 2011 to 2015,

EW: Mm-hmm.

EAU: have links to the National Notifiable Disease Surveillance Systems. You can get updates every week on that. That data is not finalized by any means, but it's at least a sense of like where things are going as well.

Of course, as the Michigan Department of Health and the Toledo one. If I find others, I'll try and post them as well too, just so that people know where they can find more update information. The CDC seems to be updating every two weeks. I'm not really sure how often they're updating, but.

EW: Uh.

EAU: find the list of sources from all of our episodes on our website.

This podcast will kill you.com.

EW: You can, uh, thank you to Bloodmobile for providing the music for this episode and all of our episodes.

EAU: Thank you to Lianna and Tom, and Mark and Pete and Jessica especially for getting this episode out on such a short timeline. Sorry

EW: much.

EAU: making more work for you, but we really appreciate it.

EW: Thank you. Thank you. Um, and a big thank you to you listeners. Let us know what other questions you have about Cyclospora. We're curious. Uh, yeah.

EAU: We have questions too,

EW: Yeah, we

EAU: and as always, a shout out to our patrons. Thank you so much for your support. Over on Patreon. It means a lot,

EW: It really does. It really does Well. Until next time, wash your hands.

EAU: animals.