

**Dr. Kendal Williams:** Welcome everyone to the Penn Primary Care Podcast. I'm your host, Dr. Kendal Williams. So as I mentioned at the end of our last podcast we're gonna space things out a little bit over the summer because of everyone's schedule. But there's one topic I really wanted to get to over the summer. And that is some of the summer illnesses, particularly infectious diseases that we see that are more specific to the months of June through September or so. And so we're gonna do that today with a particular focus on Lyme disease. And to do that, I invited two colleagues from the Division of infectious diseases to join us.

Dr. Anne Norris has not been here before. She is an associate professor of clinical medicine with a focus on tickborne illness. When I reached out to colleagues in the ID division about who is sort of your expert on tickborne illness, they all said Dr. Norris. So, Anne, thanks for coming to the podcast. And I also have the pleasure of having back Dr. Kathleen Degnan who was here earlier to talk with us about COVID, she's an assistant professor of clinical medicine and the associate director of antimicrobial stewardship at hub. Hi Kathleen.

**Dr. Kathleen Degnan:** Hi, Kendall. Thanks so much for having.

**Dr. Kendal Williams:** So I'm gonna actually start with just a general question because we talk about summer fever. And I like this term because, you know, we have a lot of these viral illnesses that we see in the winter and spring. And then in the summer, we are supposed to be relatively free of them, at least before COVID and all that. And then sometimes patients do come in with a fever out of the blue that makes us think, and that's often sort of the bucket in which we would put Lyme disease. So, Anne let me just start with you and sort of, when do you start thinking about Lyme disease?

**Dr. Anne Norris:** Yeah. So what makes summer fever unique in my mind is that patient. Who has had more than a, a day or two of fever, and it's undifferentiated. They are, they have a fever, malaise, headache, but no organ is complaining. They don't have a UTI or a URI and we're just not sure what's going on. We in the ID community, like to call this doxycycline deficiency syndrome, because so often these patients turn out to have a tickborne disease that is treatable with doxycycline. There are, of course other causes viral entities that cause fever as.

**Dr. Kendal Williams:** So let's jump into lime. Kathleen, let's talk about Lyme generally first ticks and all that and how we get Lyme and where's it come from?

**Dr. Kathleen Degnan:** Sure. Yeah. So, I think of Lyme disease is a very common entity in certain parts of the country. Depending on somebody's. Exposure. So we know that Lyme disease is carried by a particular tick, something called the blacklegged tick or ixodes scapularis which is present in a lot of the Eastern us, but particularly in the Northeast and upper Midwest. And so, people going outta their homes, into areas, grasses, tall grasses, brush can come across these ticks that are often just hanging out at the end of grasses and leaves ready to hop onto any passersby.

And so, that's really the risk is people being outdoors and these warmer months in areas where there are these particular ticks that can carry Lyme disease or *Borrelia burgdorferi*. And then we also do some sometimes see in people who. Not had a ton of outdoor exposures, but who have pets who have outdoor exposures and then bring them into the home and they jump onto the humans.

**Dr. Kendal Williams:** You know, with the weather becoming warmer in the winter in this area. I'm wondering if we're starting to see Lyme a little bit more in an extended season or in the winter. I know there's ticks throughout the year. Now I know this from having dogs and doing a lot of walking in the woods myself. Has that been something that's been empty of discussion?

**Dr. Kathleen Degnan:** Yeah, I'd say we've definitely been seeing that we had a discussion amongst our group. We've been seeing tickborne illnesses more commonly than we have in the past because of global warming in these like colder traditionally colder months. I saw a case of anaplasmosis that somebody acquired right at the end of November, early December, this past year. So it's definitely been an issue with the like global warming phenomenon that we're seeing these tick born illnesses more year round now.

**Dr. Kendal Williams:** So for as a, in a primary care community, probably the most common presentation of Lyme disease is gonna be somebody that comes in with a rash and maybe some symptoms beyond that, but just the rash. Any pearls Anne, in terms of how we should think about this really early stage of Lyme?

**Dr. Anne Norris:** Yeah. You know, there's this common impression that Lyme disease can do just about anything. And even though there are case reports of very unusual manifestations of lime, it's not syphilis, it's not the great pretender. It really has a fairly typical presentation and set of manifestations. And it's usually not the explanation for the nonspecific complaints of fatigue, diffuse pain, brain fog, stuff like that.

You write Kendall, erythema migrans, the rash of Lyme disease is the most

common manifestation of Lyme disease. So, EM is characteristically a slowly enlarging red patch. This is not a quarter size red mark on your skin. These things on average, get to be at least eight inches in diameter over the course of a couple of days. It can have a central clearing that's the bullseye effect, but it can just be a solid patch.

It can have bruising. It can look kind of blue. 5% of EM rashes, have a blistering effect. It shouldn't be confused with hypersensitivity from the insect attachment. IF you see the tick on the skin and a big red patch around it, that's not *e. migrans*, *e. migrans*. It's too soon for it to be *e. migrans*. You don't see the rash of Lyme disease until at least a couple days after the tick has fallen off. About 70% of people do have this EM rash. And about half of people also have the nonspecific fever, headache, chills, feel lousy.

**Dr. Kendal Williams:** And the rash doesn't always look like the target to lesion that we're expecting. Right?

**Dr. Anne Norris:** Yeah. It can be confusing. It can you know, It can look like cellulitis. At first, it can look like poison Ivy. It can, sometimes people confuse it with ringworm except ringworm because it has that big circle, multiple big circles. But ringworm lasts for months, EM lasts for maybe seven to 10 days. It can look like urticaria. All those irregular patches on the skin, but again are to carry it is evanescent present for less than a day. EM lasts over days.

**Dr. Kendal Williams:** So you're also as you said, a fair percentage of patients are also gonna have some associated symptoms. But let's go past the phase where they have the rash. Let's say it's not recognized or not, and not treated what happens then.

**Dr. Anne Norris:** Yeah, this happens a lot. I think Patients can develop early disseminated Lyme disease. And this is much more dramatic. These are the people that come in with the multiple EM lesions, you know, they look like a leopard. This is also when we see the Cranial nerve palsies in particular, Lyme disease in the summer is certainly the most common cause of an isolated seventh cranial nerve palsy, and is definitely the most common cause of bilateral seventh nerve palsies, but can also cause other cranial nerves to paralyzed.

I've seen people with six nerve palsy, people that couldn't swallow, people that had eighth nerve manifestations. So it loves, cranial nerves, but it can also affect other nerve roots. And so people can come in with other kinds of ridiculous symptom. This is also the stage where we see lymphocytic meningitis and the one manifestation of Lyme disease that really actually can be fatal, which is

cardiac Lyme disease.

There have been something like 11 deaths in the United States from myocarditis and pericarditis, from Lyme disease these present sort of weeks to a month or two after early infection. So most of that stuff we see in the late summer and early fall.

**Dr. Kendal Williams:** And these people are not feeling that ill at that stage. Right. They're not having summer fever right? When they present with Bell's palsy?

**Dr. Anne Norris:** They can. I mean, if they have lymphocytic meningitis, they're [inaudible]. But you're right. They can just come, they can just start having heart block. They can just come in with a complete heart block and be perfectly well, or they can have a seventh palsy and nothing else. Of course You're gonna ask them, did you have a bullseye rash last month? But sometimes they have no recollection of anything like that and they're otherwise.

**Dr. Kendal Williams:** And they may not have had. Associated symptoms with their early, very early phase disease that you described, like the fatigue or feeling unexplained fever. Right? They may not have that?

**Dr. Anne Norris:** Often they don't. Usually they don't.

**Dr. Kendal Williams:** Yeah. So if you get past that stage or maybe you have no manifestations at that stage, right. you can get into the later stages without it being detected at all. And what are those like?

**Dr. Anne Norris:** Right. So, the really two big categories here, the majority of late Lyme disease is Lyme arthritis. And this is a very characteristic syndrome. It's it is a large joint effusions, one joint at a time. Typically, the knee that LA just spontaneously appears that you go to sleep with a normal knee and you wake up with a cantaloupe where your knee used to be. And it lasts for a couple of weeks and then it kind of goes away. It's not highly inflammatory. This does not look like rheumatoid arthritis. It's not symmetric. You don't have an elevated Sed rate.

It doesn't involve the small joints, but. People typically have relapses. Maybe they come in with a, a big swollen elbow the next time or the other knee blew up. And this can go on literally for years. The other organ that manifests late Lyme disease is neurologic. We you can see a distal symmetric, peripheral neuropathy that looks a lot like diabetes with numbness and tingling in a hand, in a stocking glove distribution. There are very characteristic and nerve

conduction study findings. And there's also you can have a mono multiplex where various peripheral nerve are getting picked off at different times.

**Dr. Kendal Williams:** So if somebody has sort of one of these large joint effusions that come and go I think of crystalin disease as being the only other thing, really specific thing that will do that. So now I know that if I think of gout, I should probably be, especially if the tap is negative, I should be thinking about lyme.

**Dr. Anne Norris:** Well, if you're doing a tap, send synovial fluid for Lyme PCR, if you've thought of Lyme, because if the patient has not had antibiotics, it's a very good test. It's at least 80% of the time positive and you've secured the diagnosis.

**Dr. Kendal Williams:** Yeah. And we should talk about testing, in a few minutes. So my main thing, especially in primary care, I suppose, you know, when I'm doing hospital based care as well, I just don't wanna miss it. Right. So, and I think that's always the, I probably I'm, I'm almost certain, I probably miss one of these because I have not diagnosed Lyme that often. So just by the probabilities, I'm probably missing some. Right. So I think the important that thing.

**Dr. Anne Norris:** It's not an inpatient diagnosis that It's only the carditis that makes it into the hospital and maybe the meningitis, there's 9,000 cases of Lyme disease in 2019. And the majority of them were e migrans.

**Dr. Kendal Williams:** And you had shared with me that you see a lot of Lyme. So, can you kind of characterize your patient population? You're obviously probably getting a referral population, but what are some of the experiences that people have? I think this is gonna be sort of practical for us primary care physicians. So we don't miss anything other than what we've already talked about. But some of the things that your patients have experienced a lot of

**Dr. Anne Norris:** I see a lot of patients referred for either referred by providers or referred themselves for consideration of Lyme disease, you know, a hundred a year easily. And Two thirds of those patients have never met borrelia burgdorferi in their life. They either had a false positive Lyme antibody test, or they looked up Lyme disease on the internet and it seemed to match their symptoms. You know, Lyme does the things that we just described. Diagnosing Lyme disease, there's an algorithm for it. The Lyme antibody testing is actually pretty helpful. And so the fun of Lyme disease is that third of patients who really do have either late Lyme disease or some complication from Lyme disease that makes the Lyme conversation so interesting.

**Dr. Kendal Williams:** Let's talk about diagnosing it. You mentioned if you have a joint effusion to send PCR but that's not how most of us are approaching it. The first thing we're gonna do is send Lyme antibodies. Right? Look for look for Lyme antibodies.

**Dr. Anne Norris:** I would hope that most Lyme disease in the United States is getting diagnosed clinically CDC expressly. Recommends against sending a Lyme antibody when you're seeing a patient with what you think is erythema migraine. More than half 60%, at least of patients with early Lyme disease have a negative ly antibody. And that can be really confusing, that false negativity can put you off the hunt.

And even if the Lyme antibody test is positive, it doesn't prove that the current problem is related to Lyme disease because people can keep a positive Lyme antibody literally for years, decades, after they've been curative, Lyme disease. So if you're seeing someone with that big red patch and maybe some flu-like symptoms start your doxycycline and don't send a Lyme antibody. If you're seeing somebody with unexplained fever, it's definitely reasonable to send a Lyme antibody. A positive IgM would be helpful for sure, but be prepared for a negative Lyme antibody test. And the patient still has Lyme disease.

**Dr. Kendal Williams:** What's the delay between you know?

**Dr. Anne Norris:** It can take a month, a month. So 30 days before the Lyme IgG will be positive. Patients that come in with the later manifestations. If you have someone that, has new cranial nerve palsy, new heart block, a new large joint EF fusion. Approaching a hundred percent of those patients will have a strongly positive line antibody test. So the test is super helpful in late later stage disease. It's just not helpful for the early patients.

**Dr. Kendal Williams:** So we should have treated him by the time, based on their clinical manifestations. somebody comes in with bilateral Bell's Palsy, for instance, you know, that in the summer that you should probably treat them and then send off the studies. So, and there are false positives as well, or people who have had previously had Lyme disease, been treated are still positive, and now presenting with new symptoms that may be Lyme. So you have those two scenarios, right?

**Dr. Anne Norris:** Yes, there are a lot of there. The IgM test in particular is commonly falsely positive and we're moving away from even doing IgM testing because of that. The screening test can also be falsely positive. Those low level positive Eliza tests can also be falsely positive, which is why CDC so strongly

endorses a confirmatory test, a two-tier strategy. So there are both false, positive and false negative tests with Lyme disease. You have to know when to apply the testing strategy.

**Dr. Kendal Williams:** So Anne at our lab at Penn lab, or even maybe quest or lab core, when we send off for Lyme antibody are they doing the two stage testing without even us it?

**Dr. Anne Norris:** Yeah. Yeah. So they are, they should be, any good lab will be, will do that. Penn Lab definitely does that. And the algorithm did change recently. CDC made way for the use of alternative antibody tests rather than a Western blott as the second. Or confirmatory test, which is really a welcome change. It can be run simultaneously. So it comes back sooner or in sequence waiting for the screen to be positive. The second test is faster, cheaper, and far less confusing than the Western blott test. Cause it's a yes or a no. And if it's a no, they don't have Lyme disease or the test is negative. And if it's yes, then your test has been confirmed as positive. It takes a little time to get used to it, because everybody's used to seeing the Western Blott.

**Dr. Kathleen Degnan:** And that's what I was gonna say. And I've definitely had patients come in with like a report out of their Western blot. That was just sent by people, erroneously, not even doing the initial positive Eliza. And I think that's very confusing to patients and to providers who aren't used to looking at Lyme testing to see this Western Blott with like a couple antibodies being positive, but they never had the initial screen.

**Dr. Anne Norris:** Yeah. I always say CDC again, recommends against that strategy. Don't send the Cadillac test because you just wanna get the answer faster without doing the screening test. I always say that you wanna confirm that you actually have antibody that might be Lyme disease antibody, a substantial amount of that before you characterize the shape and size of those antibodies, by doing the Western blot. There's such a high risk of false positivity and a couple of bands here and there, and patients are very uncomfortable with a couple of bands.

What does that mean? Does that mean I have a little bit of Lyme disease and it does not. There's a lot of cross reactivity with other organism.

**Dr. Kendal Williams:** So, as in all things, I think same thing with rheumatological tests, don't send it unless you have a real clear question that you're seeking to answer.

**Dr. Anne Norris:** That is so true.

**Dr. Kendal Williams:** So let's talk about treatment. You know, folks that are early on can be treated with doxycyclin for 10 days or so usually PO is that how you do it?

**Dr. Anne Norris:** So the Lyme treatment has gotten simpler with the accumulation of good comparative data, over time, the recommendations have moved toward shorter courses and largely oral regimens. So instead of the 14 to 21 days that we all were accustomed to. The Lyme guideline published in 2019 endorses, just 10 days of doxycycline or 14 days of amoxicillin or sine For early Lyme disease. And then for the early disseminated Lyme disease, you can also use oral therapy.

There are a number of studies in Europe, comparing selftroxone and doxycycline for neurologic Lyme disease that have been shown to be equivalent with no difference in outcomes and obviously fewer side effects. A lot of times, patients with what we think might be bacterial meningitis or complete heart block, get admitted to the hospital and start on selftrioxone because we're worried and we wanna cover broadly and that's totally reasonable. But once you've secured your diagnosis, you can switch to doxycycline for those patients.

**Dr. Kendal Williams:** So there's very few circumstances in which somebody's going home with a PICC line being treated for Lyme disease. I've had patients come in to see me who have had PICC lines and I always think that's probably something that was being treated inappropriately.

**Dr. Anne Norris:** Yeah. see a lot of that.

**Dr. Kendal Williams:** I guess you do.

**Dr. Anne Norris:** We kind of all do. ID docs, really see a lot of that.

**Dr. Kendal Williams:** Yeah, we'll get to that in a, hopefully we'll get to that later, but I, I wanted to talk about the, other bacteria and other diseases that are associated with a tick bite. That can be just as bad that can Cofee if not worse than Lyme disease itself. So, you know, we know of three of them, or I know of three of them anaplasmosis or liciosis and babesiosis, all of which seem to be more common.

Kathleen, you said you saw a patient with anaplasmosis. How do you know somebody has anaplasmosis? Or why do you think about it? What leads you to think about it. In any patient one that has Lyme disease or not?



**Dr. Kathleen Degnan:** Yeah, it's a great question. Kendal and I do more inpatient medicine. I see definitely less Lyme and have seen occasional cases, although they're not common by any means, but we see occasional cases each year of anaplasmosis less commonly Ehrlichia in this area. Although I know there was a recent case that we saw and then babesiosis, and I think in general, how I think about it is. Similar to what Anne said, where you have a patient with a febrile illness and not having like another organ system complaint, you've sort of like taken off your list of your differential symptoms of UTI, pneumonia, cellulitis, things like that. So somebody coming in with a febrile illness who potentially has epidemiologic exposures.

Like they're active outdoors in an area where you can get one of these diseases commonly in the spring or summer, although, as we said, sort of we're seeing creep into occasionally even the winter months with global warming and then no other clear alternative explanation for the fever. And then some lab abnormalities can also really make you think more about these. So with Anaplasma and Ehrlichia commonly you'll see leukopenia and thrombocytopenia. And then with babesia, you'll see, or you should see some. Component of anemia and some component of hemolysis, it causes a hemolytic anemia.

So I think of it in patients coming in with a fever potential tick exposure from outdoor activity without another clear explanation. And then with consistent labs like cytopenias, and then you can get some mild elevations in liver transaminasis.

**Dr. Kendal Williams:** I know that Lyme can affect the liver and can cause some LFT abnormalities, but mostly when I think about LFT abnormalities, I think about Anaplasma. Is that how you think about it as well?

**Dr. Kathleen Degnan:** I haven't seen usually too much LFT elevation in Lyme. And, but you can certainly see it with Anaplasma, Ehrlichia and even with the Babesia.

**Dr. Anne Norris:** Yeah, you actually Kendall you're right. If you see a transaminitis in a patient with Lyme disease, that's not unusual. And that doesn't make me think about these other organisms, I think about Anaplasma or Ehrlichia or babesia. When people remain sick two days into their doxycycline, they're still having a fever. They're extra sick. They just are more sick than your average line bear, if you will. Or if they have the CBC abnormalities that Kathleen mentioned, because these are intracellular pathogens that either attack platelets and white cells or attack your red cells.

**Dr. Kendal Williams:** How do you diagnose them?

**Dr. Kathleen Degnan:** Yeah. So, in terms of diagnosis, you could even see them on a blood smear. So Anaplasma, you can see in neutrophil. Ehrlichia you can see the [inaudible]. And then Babesia is primarily diagnosed with blood smear. So you'll see them inside of red blood cells. And so we recommend that people send a blood parasite smear. Definitely the easiest thing to see would be Babesia just because the blood parasite smears focus on the red blood cells. And with the like fewer neutrophils and monocytes that you would see on those smears, you might miss Anaplasma or Ehrlichia.

So I also, usually in addition to sending a blood parasite smear would send PCR testing from the blood for Anaplasma and Ehrlichia. You can send also for a PCR testing for Babesia and I send that as well. But if you have a good microbiologist and parasitologists, you should be able to see Babesia on a blood smear.

**Host:** And it's really the same test that you're doing to check if you're concerned about malaria, right?

**Dr. Kathleen Degnan:** Yes. Yeah, definitely. You're totally correct. Kendall, you like, it's the same thing that you would order? So I think that's one common mistake I sometimes need to see in the hospital is people ordering just for like a peripheral blood smear which will be made in the lab. And then somebody has to come take a look at it. And that's what often the hematologists are looking at, but you really wanna order for blood parasite smear. And that's where they'll do the thick and thin smear and look for intraerythrocytic parasites.

And some people will say, or joke that the only way you can really differentiate between Babesia and malaria is by taking a travel history. And so if somebody hasn't left the US and you're seeing intraerythrocytic blood parasites, that should be Babesia.

**Dr. Kendal Williams:** Yeah I saw a patient who with was an FUO that was transferred down to Presbyterian, where I was working at the time from New Jersey. And that ended up being the diagnosis was babesiosis and just not something we see every day. But I, I think that since that, and that might have been five or 10 years ago, I was seeing it more commonly, do you see it more commonly than you used to? Anne do you see it more commonly?

**Dr. Anne Norris:** Oh, yeah, it used to be something that we only saw, like in the New England states, Martha's Vineyard up there. Then we started seeing it in New Jersey and now. Seeing it in Pennsylvania that there were six cases of the Babesiosis in Pennsylvania in 2010. And there were 68 cases in 2019. So,

it's not a ton compared to Lyme disease, but it's not the exceptional event anymore.

**Dr. Kendal Williams:** Yeah. I've heard cases from time to time. It's been, it's a thing. So it's a thing to look out for.

**Dr. Kathleen Degnan:** As Anne said, you can see co-infections 'cause it's the same ticks that Lyme, and Anaplasma that transmit Babesia. And so, as an said, if you're seeing somebody who's not improving with doxycycline since it's a different treatment, definitely think about Babesia.

**Dr. Kendal Williams:** So before we leave tick borne illness, I just wanna kind of give you an opportunity to you know, tell us some pearls or, mistakes, you see, primary care physicians make that we can avoid. And I mean, you're getting, you have this large referral population. in addition to what you've said that you want to tell us?

**Dr. Anne Norris:** Sure. I have a couple thoughts. One, we already said don't send a Lyme antibody test unless you have a true reasonable suspicion for Lyme disease. Not just someone who's achy tired and can't think right. There are five large placebo controlled randomized studies showing that treatment for Lyme disease beyond the recommended CDC regimens confers no benefit to patients with Lyme disease. So the people that got the real intravenous antibiotics versus the sterile saline or the real doxycycline or other antibiotics instead of the pink pills, in the long run felt no better. So, people often can feel yucky after Lyme disease.

It can be a very acutely disabling illness and I am holding with a couple of people every fall encouraging them that they are gonna get all the way better. But that more antibiotics are not gonna make that happen faster. I'd also just be careful with the Lyme testing that's available. There are a lot of. Marketed tests out there that have really lousy performance characteristics, and don't really correlate with the presence or absence of infection. So, there are very few times when you should do a PCR test and it's really just restricted to synovial fluid and blood cultures for Lyme disease are not a thing yet. They're not FDA approved. They haven't been proven to be useful, stick with the Lyme serology.

**Dr. Kendal Williams:** So, we're gonna do another podcast in the future on sort of the after effects of infectious disease, because I think there is a, seems to be some form of pathway that either COVID or EBV or Lyme leads people to feel lousy for the longer term. And we need to talk about that, but there doesn't seem to be anything, as you're saying, to justify the idea of chronic Lyme infection, right?

**Dr. Anne Norris:** Well, yeah, in fact the words, chronic Lyme infection. Send chills down my spine. There are late Lyme disease manifestations that are a consequence of true infection. And we talked about them. There is probably a syndrome of post-treatment Lyme disease illness, where patients have persistent symptoms after recovery from Lyme disease. There's a guy at Hopkins that has been studying this a lot, John Alcot and has shown that at the end of the year, those patients are no more ill than the general population, keeping in mind that 10 to 15% of the general population feels unwell in the ways that I've described.

**Dr. Kendal Williams:** So the other thing to talk about, I think during the summer are the entoral of viruses because you know, we have this transition that occurs from sort of the flu and URI type viruses, I suppose, the URI type viruses continue through the summer, but there's definitely a transition into what I would think of as sort of the entoral viral phase where you have very specific viruses causing very specific illnesses, almost all of which occurred in the summer and early fall.

So Anne, let's talk a little bit about the entoral viruses. What are some of the pointers that you want to talk about relative to, you know, Coxsackie virus, echovirus and so forth?

**Dr. Anne Norris:** In the winter you're right Kendal. We have these circulating respiratory viruses that everybody knows about. They come back in your respiratory panel and for unclear reasons in the summer, these make way for the emergence of the enteroviral infections, which really are occurring year round, but in temperate climates occur more commonly in the summer and fall.

Most enteroviral infections actually are completely asymptomatic. Again, result only in an undifferentiated febrile illness. They are a common cause of the common cold in the summer. More common than rhinovirus for instance, and have a little bit more of a GI component than the rhino viruses coronaviruses do. But enter viruses are also the major cause of viral meningitis in the summer.

In fact, when you're seeing someone with what we used to call aseptic meningitis in the summer, enterovirus should be very high on your list. Of course, just plug in Lyme disease. If there's a cranial nerve palsy or a radiculitis or a history of a rash, think of Lyme disease in that situation. There are other enterovirus strains that are responsible for instance, for hand foot and mouth disease, kocksackie, pluracy, para carditis.

And there is this emergence of this Acute flacid myelitis in children, who've had

enteroviruses, different strains of enteroviruses that is under intense study right now. Not tons of cases, but something that is emerging [inaudible].

**Dr. Kendal Williams:** Learning about viruses was really helpful 'cause they have distinct syndromes, particularly the aseptic meningitis. I remember seeing a statistic as a resident that I don't know, it was like 90% of aseptic meningitis. What we used to call aseptic meningitis due to viruses in 90% of that occurred during the summer and fall. So it was basically, you know, a June through September phenomenon was to see a viral meningitis.

**Dr. Anne Norris:** Yeah. And to discharge them from the emergency. Someone with meningitis, you know, it took a while to get comfortable doing.

**Dr. Kendal Williams:** Yeah. Yeah. So Kathleen, I'm gonna throw this next subject to you, but I, before I wanna do this, I wanna set it up. So, a few years ago we moved into this house and it had a pool, but it had a surface problem. There was a lot of cracks in it and my kids were really small. So we decided to just leave it covered. So for two or three years, we left it covered. And that I was made aware of the risk. Mosquitoes and began to recognize that I had this huge vat of water in my backyard. That was probably a mosquito breeding ground for the whole neighborhood, which is what led me to accelerate my plans to get it opened.

But one of the things that was keeping me up at night was West Nile virus. And we're seeing more of that now and it's mosquito born and so forth. What can you tell us about that and how worried should we be about it?

**Dr. Kathleen Degnan:** Yeah, it's a great question. I mean, it's interesting. We just got an email maybe last week for like a health advisory from the state that Pennsylvania seeing its first West Nile Virus positive mosquito pools and saw them in the counties of Montgomery, Philadelphia, Bucks, and in Cumberland. And so it's definitely started off the season, started off and it's something to certainly be aware of and definitely a motivator for me to wear deet mosquito repellent.

When going out, when there's a lot of mosquitoes in the evenings, I think, as you said, kinda like it's important for people to try to like clear standing water off of their property and just be more cognizant of mosquitoes when they're outdoors because of the risk of West Nile virus. And we see a few cases each year in the hospital and they can be quite serious if people develop the neuro invasive disease.

And not everyone fortunately will develop that, but you know, people can

develop the abrupt, fevers, headaches, myalgias, things like that. And a lot of those people also get rashes and then a smaller percentage of people will go onto the neuro invasive disease, which is the really feared complication of West Nile virus.

**Dr. Kendal Williams:** So it's a meningo encephalitis. Is that a good way to describe it or is it more than that?

**Dr. Kathleen Degnan:** No, it is a meningo encephalitis. I think there are people that can have like a pure meningitis reportedly that happens more often in children than the encephalitis is more common in the older age group and people can get all sorts of neurologic manifestations. Things like flacid paralysis and definitely some like, gate abnormalities.

And it can be mild self-limited, but some people can develop with significant encephalopathy coma, and unfortunately, even death. So it can be quite severe and more severe. And it sounds like typically like the elderly and immunocompromised populations.

**Dr. Kendal Williams:** Yeah. So I guess it was a good idea for me to get my pool. Now it's a lovely salt pool and there are no mosquitoes and I've noticed a big difference. And I hope I, thankfully I didn't hear of any cases of West Nile virus among my neighbors. So I got through that period, but it was risky. So, but before we close out are there any other summer fevers we should worry about that we talked about?

**Dr. Anne Norris:** You'd have to consider. I don't know if you've ever heard of this. COVID, we definitely have to keep that on our radar and not get distracted by all these potentially more interesting diseases. I always look for the complaining organ. And, you know, there's nothing specific about summer with complaining organs other than people are outside. And so, they're more prone to cellulitis and skin injury and the vargo virus, infections, and tick borne virus infections that we've talked about.

**Dr. Kendal Williams:** I had a patient earlier this week that came in and was multiple COVID negative, but had URI symptoms and a diarrhea syndrome. And now that you mentioned it, I think that he probably has an enterovirus That would be a reasonable next option. I love these PCR tests where you get multiple. I mean, they're just like magic. I mean, it's just unbelievable to be able to identify a specific virus. It's something we've never had before. I'm sure you, as infectious disease, physicians love it as much as I do.

**Dr. Anne Norris:** Kathleen do you love it?

**Dr. Kathleen Degnan:** Sometimes, no, it is very cool.

**Dr. Kendal Williams:** We're beginning to at least be able to distinguish different types of manifestations of specific viruses, whereas before we would group them globally. And I find that interesting.

**Dr. Anne Norris:** I think the most interesting thing is the number of times that the only thing we isolate is rhinovirus and people are really sick. You know, it turns out that that common cold virus, doesn't just, it's not just serious because it makes your asthma worse, and you miss work. It can really make people sick.

**Dr. Kendal Williams:** I have found a newfound respect for Menanumovirus really causes. I've seen a couple of quite ill people with that. Well, Kathleen and Ann, thank you so much for joining us on the Penn Primary Care Podcast. This is very topical, I mean, I'm getting calls every day about these types of issues. So I hope it was as helpful for the Penn Primary Care Community as it was for me. And we're gonna have you back later to talk about more infectious things when the season demands. Thank you all. Please join us again next time.