

Vector Borne Diseases in Michigan: What You Need to Know

Podcast Transcript

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Storee Harris-Stubblefield (SH): Welcome to Prepared, Set, Go, podcast of Public Health Prepared. Public Health Prepared is the workforce development branch of the Michigan Center for Infectious Disease Threats and Pandemic Preparedness, or MCIDT Initiative, which is housed at and funded by the University of Michigan. We hope this podcast will better equip the public health workforce to handle ongoing and future health crises. Thank you for tuning in to our episode, which is the fourth and final training resource from our Preparedness Round Table series. Today we'll be talking about vector-borne disease, specifically Eastern Equine Encephalitis, or EEE. I'm your host Storee Harris-Stubblefield, the project coordinator at Public Health Prepared.

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SH: In this episode on vector-borne diseases, we'll be hearing from Dr. Juan Marquez and Jimena Loveluck, to gain insight on the clinical presentation of the disease, discuss the challenges of past outbreaks, such as social and political factors and anticipated challenges of future outbreaks. Our guests today are Dr. Juan Marquez, who is the Medical Director for Washtenaw County Health Department and Livingston County Health Department. Juan is a board-certified preventative medicine physician. He completed his residency at the University of Michigan. Jimena Loveluck is the Health Officer for Washtenaw County Health Department. In this role, she leads the health department's work to promote health and prevent disease and injury in our community through a range of programs and services. Ms. Loveluck has spearheaded the health department's COVID-19 response, overseeing all aspects of pandemic work including equitably administering vaccines, monitoring local data, supporting COVID positive residents, sharing current information and more. Ms. Loveluck has been working in public health for over 30 years. Welcome to the podcast. I'm excited to speak with you both today.

So before we start to discuss the EEE outbreaks in 2019 and 2020, Juan, can you talk a little bit about the clinical presentation of EEE, how it's transmitted, and what are the symptoms associated with the vector-borne disease?

Juan Marquez (JM): Yeah, sure, Storee. So EEE, so it's also known as Eastern Equine Encephalitis. So it's a virus, specifically it's a Togavirus that affects both animals and humans. And so I think for purposes of, kind of, our podcast, both Jimena and I really spent a lot of time with the human health side of things. But it certainly... EEE is also a very important virus for animals and veterinarians as well. And so we won't really touch too much upon on that. But just to kind of let you know that that is also a very important aspect of this virus. But we'll kind of focus more on the people's side of things.

JM: But so for EEE, so it is maintained between mosquitoes and wild birds. So there's basically a cycle where specific mosquitoes, so black-tailed mosquitoes typically and wild birds will kind of maintain transmission within that particular group of animals, typically, in freshwater, hardwood swamps.

And then what will happen is that there will be some bridging mosquitoes. So for example, '80s Culex mosquitoes, and then another cattail mosquitoes will then sort of bridge between those birds to what's considered a dead end mammal. So mammal hosts include like horses and humans. So we are actually are not the reservoir for this particular virus, nor are we really the preferred infected folks for the virus. It really is, we're considered dead end mammal that just happens to get infected with this particular virus.

And so if you look at sort of some of the characteristics we look for, for most diseases, including this one, we look at incubation periods, it's about four to 10 days, but it can be longer in immunocompromised folks. And the one good thing I would say is that most people who are infected are asymptomatic. You're infected and you just never develop symptoms. And that is the vast majority of people. We don't know how many, because we typically don't do active surveillance in people to test whether or not they've been exposed. And so we don't really know what percentage of folks are truly asymptomatic.

However, for those that are symptomatic typically they'll have a prodrome for several days. So think of like a fever, headache, nausea, and vomiting. And for the majority of folks, that's kind of all the symptoms they have, and then they feel better. So pretty non-specific constitutional symptoms. Less than 5% of those who are symptomatic will progress to meningitis or encephalitis. So infection of your central nervous system. And those would present with symptoms such as confusion, headache, focal neurologic deficits, meninges, seizures and then a significant portion of those will kind of lead to kind of a comatose or stupor as well. So unfortunately for those small number of individuals who do progress to these neuro invasive symptoms, the outcome is actually quite severe. So EEE is the most severe of all Alphaviruses.

The fatality rate is about 30%. And typically it occurs, two to 10 days, after onset that can occur afterwards. And then for those who do survive, unfortunately there is sequela that occurs in more than 1/2 of the survivors. So kind of the take home for that is that for most people, this is, even if they get infected, they're not gonna notice any symptoms. Even if they do notice symptoms, they're gonna be pretty mild, but for a small number of folks is this can be really very severe. And then, unfortunately we don't have great treatment for EEE. And if somebody does present with these sort of neuro invasive symptoms, typically they're hospitalized. There is a very thorough workup for them and the diagnostic testing that would come for EEE specifically would be typically serological testing, and sort of their blood or CSF or a PCR that can identify this as well.

JM: But again, we don't have a sense of how many folks are really impacted by this. We just know those who are impacted, those who get very sick. We kind of have a sense of those numbers. So typically in the US you average about 11 cases per year. And in 2019 it was sort of, across the US was a sort of a, more of an outbreak where you had 38 cases. And then in Michigan specifically, I don't know if it's possible to link sort of links in the podcast, but really Mary Grace Stobierski's paper from 2022 was just fantastic. Has a great overview of sort of activity in Michigan. So I would highly encourage folks to read the paper.

So since 1980 there have been 36 confirmed human cases. And then between, in the last 10 years, there have been 19 cases. This includes 14 as part of the sort 2019 and 2020 outbreak, which I know we'll talk about. There was 10 cases in 2019 and four cases in 2021. And unfortunately you had eight deaths during that outbreak. So slightly higher fatality rate than we've traditionally seen. So yeah, so I would say those are typically the kind of the symptoms and sort of the transmission that we would think about.

SH: Thank you so much for that succinct but brief overview in terms of the clinical aspects. I also wanted to say that we will have links to resources so we can link that paper as well for our audience. Just to touch on this really quickly before we move on, in terms of mitigation, what can individuals do to prevent mosquito bites?

JM: Yeah, so that's a great question. So for EEE specifically, there's no vaccine available. So you unfortunately can't, somebody can't go to the doctor and ask for a vaccine. And so really it's avoiding insect bites. So that would be things such as wearing insect repellent, wearing long sleeve shirts and pants. You can treat your clothing and gear with 0.5 permethrin to avoid mosquitoes. And those are personal things you can do. You can also avoid being out in the outdoors between dusk and dawn. And then around your home or around your work or whatnot. Maintaining window and door screening. So don't have an open door or open screen.

And then really this is actually pretty important is emptying water around mosquito... Emptying water around your house, 'cause those can serve as mosquito breeding grounds where you can actually, unintentionally have a breeding ground for mosquitoes. So that would be things like buckets, kitty pools or tires, actually, even is actually one of the places we've seen. So if you have any pools of water around your house, that can serve as a place where mosquitoes will gather and can put you at risk. So just going around and removing those would be a good start. But again, no vaccine available for this particular virus.

JM: But there are sort of non-pharmaceutical interventions that can be done.

SH: Thank you so much for those tips. I just learned a few things myself, so thank you so much for that. Shifting to talking about the most recent outbreaks, Jimena, you worked really closely with Dr. Marquez during the outbreaks. Can you talk a little bit about the strategy and approach that you use?

Jimena Loveluck (JL): Yeah, absolutely. So one thing just for context, Dr. Marquez and I had just started in our roles as medical director and health officer when we had this EEE outbreak in 2019. I had been about a month into my role as health officer. And so it was really important for us to work very closely together. I am not a clinician or a doctor, so it was very important to work with the expertise that Dr. Marquez had, and also as we were new, really work with our team at the health department as well as with the state. So one of the things in Michigan, we have a public health code in Michigan that gives authority to local health departments particularly through the local health officers to take actions when there are public health emergencies.

And in Michigan, the state and local health departments have parallel authority. In the case of the 2019 and 2020 EEE and particularly the 2019, which was the largest human EEE outbreak that Michigan had ever seen as Dr. Marquez mentioned, it affected so many counties. And I wanna say it was, let's see. It was 20. 20 counties in Michigan were impacted by having either animal or human EEE cases. And so for that reason, the state health department, the Michigan Department of Health and Human Services really took the lead on the emergency response. And so it was a little bit of a different situation, mostly because we as local health departments are typically the first to respond to our local public health emergencies. But given the expansiveness of this outbreak, the state took the lead, and of course we were working very closely together with all the local health departments impacted by EEE cases, whether they were human or animal.

What was interesting about what happened in Washtenaw County is that we actually in 2019 and in 2020, luckily never had an animal or human case of EEE, but our neighboring county in Livingston County had a horse that tested positive for EEE.

JL: And because of the radius that they were looking at for aerial spraying, it would impact the northern part of Washtenaw County. And so we were pulled into the response, not necessarily because we had a case in our county, but because there was a case in a neighboring county close enough that really to do effective aerial spraying it would have to come into the northern part of Washtenaw County. And so the state certainly felt that this was a public health emergency and took action to plan the aerial spraying. We participated in that aerial spraying because as Dr. Marquez mentioned, the risk to human life really is quite significant if someone does develop EEE with that 30% fatality rate.

So for us, even though the state was really leading the response, it was really important for us as a local health department to do our typical response activities. So making sure that we were sharing accurate and up-to-date information with our residents, making sure that that information was shared through various channels, that it was shared in multiple languages. And also working with our community partners and stakeholders. If you think about that time of year, this was late September, early October, we have schools that are back in session, lots of kids out at sporting events and sporting practices and other school activities. And given that the time that we're concerned about is that sort of dawn to dusk timeframe, we really worked very closely with our school systems, with our school superintendents to ensure that they were not only able to have accurate and up-to-date information, but they were also able to take preventive measures as well. And that really all of our residents understood what were some of those preventive measures that Dr. Marquez mentioned.

The other part was, excuse me, when the decision was made to go forward with the aerial spraying, that required even more information sharing with our residents because the aerial spraying, first of all, that was not something that people were used to happening. And so it was sharing information and making sure people understood what that process was. It was also very weather dependent. And so plans changed from day to day and hour to hour. And so it was really important to get our messaging out and keeping that up to date. And of course with that decision, we started hearing from our community members and they had questions and concerns.

JL: And so of course our role as a health department also is to respond to those concerns and those questions. And so we were constantly adapting the information we were sharing based on the feedback that we were getting from our community members.

SH: You mentioned some of that feedback. Would you regard it as pushback from the community and if so what were some of the things that they were expressing, and were those concerns and how were they specifically addressed?

JL: Well, I think that certainly there was concern around what potential impact there would be of the use of this pesticide that was being used in the aerial spraying.

And so this part of our county is a more rural area, many people have animals, there's more agriculture there, and of course people are very concerned, rightly so, about our environment and the long-term impact. For example, impact on pollinators, impact on animals and other agriculture. And so one of the things that we really worked hard in doing is working with our local commissioner who represented that district to make sure that she was able to share information with her constituents and residents who lived in that area. And ultimately the concerns were enough that we actually held a community town hall meeting in Webster Township to directly address those concerns and answer some of those questions.

I think one of the complicating factors at the time was that the aerial spraying really was also conducted in partnership with another state agency, the Michigan Department of Agriculture and Rural Development, otherwise known as MDARD. We use a lot of acronyms in public health. And so both MDHHS and MDARD worked together to plan and implement this aerial spraying. And at the time, MDARD's administrative rules allowed people to opt out of having their property sprayed. And so we ended up having to manage and respond to a lot of requests from residents to opt out. That was in 2019. It ended up being so challenging in terms of really being effective in that strategy of aerial spraying that MDARD in 2020 changed their administrative rule on a temporary basis to remove the opt out option.

JL: So in 2020 the way that aerial spraying took place was very different than it was in 2019. And so the town hall was really an opportunity to talk about why people may be opted out, answering the concerns and questions they had that led them to that decision, also encouraging them to really think about that carefully in terms of the ultimate benefit that we were trying to see happen as a result of the aerial spraying. And the town hall, we had not only representatives, myself and Dr. Marquez from the Department of Public Health, but also we had our County Administrator, we had our Commissioner from that district, and we also, with the assistance of the Michigan Department of Health and Human Services, brought in someone who had expertise in the area of pollinators. I believe they were actually affiliated with the Michigan Pollinator Association and also part of the Entomology Department at Michigan State University. So that was expertise that we didn't have at the local level, and we knew that there were gonna be a lot of questions about that. And so having her expertise at the town hall was also really helpful.

SH: Thank you for reviewing that approach. Before we move on, Dr Marquez did you wanna add anything about that approach that you used?

JM: No, no. I think Jimena explained everything perfectly.

SH: Okay. Awesome. It's always great to talk about what we've done in the past to kinda help us prepare for the future. So kinda shifting gears and I wanna ask you both, what challenges do you foresee for anticipated future outbreaks? For example, we've been hearing about the Jamestown Canyon Virus, which is a mosquito-borne virus as well, was detected in Saginaw in June. And most recently EEE was detected in Bay and Berry County last week per MDHHS press release. So do you anticipate simultaneous outbreaks of vector-borne diseases like this more in the future? Or what kinda insights do you have about what we can see coming up in the near future when it comes to vector-borne diseases?

JM: Yeah. I guess I can start here. I really do think that as we move forward, we will see more vector-borne disease and outbreaks.

JM: And truthfully I know we're talking right now about mosquitoes, but even this year as an example, we are seeing a big increase in our Lyme cases this summer as compared to our previous years. And if you look five, 10 years ago, the Lyme just wasn't considered to be an issue in our county. And so we are seeing an increase in diseases, vector-borne illnesses, so not just mosquitoes, but ticks as well. So I certainly do think that we will continue to see an increase.

I think you might have mentioned the challenges that we might see in some of these outbreaks. I think one of... There's a few different challenges. So I think that one of the challenges is that there's a learning curve to understanding different outbreaks. So we know that there's, are outbreaks that we routinely see here in the county. And there's a rhythm, there's a process to these outbreaks. We have understanding, we know how they'll start. We know how they'll peak. We know how they'll end. We understand the control measures. We really have a very good understanding of outbreaks we routinely see.

Things such as these vector-borne outbreaks, specifically mosquito, if we do have an increase in disease for mosquitoes, we don't have that expertise yet.

If you look at, for example, Texas and Florida, who do see this more often, they do have a bit more expertise than we do. And so certainly there is, I think just a learning curve as we move forward to understand really what are the control measures that we can do, which are the control measures that are most effective. What messaging is most effective for folks, when we do see an outbreak, what expertise and experts do we have to bring in to make sure that we are addressing these nuances that we may not be familiar with.

So I think that one of the challenges will just truthfully be a learning curve as how do we combat these outbreaks. And then I think there is a bit of a challenge in surveillance, as I mentioned. If the majority of cases in humans are undetected, then we need better surveillance to understand the disease and the vectors. And currently there is very limited mosquito surveillance that is available in Michigan.

JM: I know specific counties have surveillance, we do have a limited program here in the county for mosquito trapping. But it's not one of our larger routine communicable disease surveillance that we engage in.

And so I think that one of the challenges is really increasing funding and increasing resources that will allow us to really get the surveillance to understand that really transmission patterns and what we're dealing with. So I think that those would be the two bigger challenges that I would see.

SH: Thank you so much. Jimena, would you like to add anything to those thoughts?

JL: Well, I think Dr. Marquez summarized it well. It's interesting because this EEE outbreak in Michigan, 2019, 2020, you think about what other big outbreak actually pandemic we were also dealing with during that time. And while we at a local level have some limited resources to do mosquito surveillance, and certainly the state, the Michigan Department of Health and Human Services also does regular mosquito surveillance that was impacted during COVID.

So when we talk about simultaneous outbreaks, the other important factor is, as Dr. Marquez mentioned, really going back to the resources and capacity, because when we have such a huge public health emergency, for example, like COVID, it really stretches all of us in local health departments so thin that it makes it very difficult to have the capacity to respond to multiple outbreaks.

And so I think that the question of resources and capacity is really important as we look more towards an increase in vector-borne illnesses.

The other thing I will also say is in public health, the core of our work is really addressing health inequities. And I think that as we also think about the impact of climate and climate change in this area, and just climate change in general, we have to recognize that climate change doesn't impact all communities the same. And that we see, just like we do in other health issues, we see disparate outcomes and impacts in various communities based on different levels of vulnerability and existing injustices.

JL: And so I think it's also really important as we think about the impact that climate is having in this area and in public health in general, to also ensure that we are working towards climate equity. And really as we look at our response, whether it's an emergency preparedness response or a climate change adaptation response, that we are focusing on equity as a central core function and goal in our work.

SH: Thank you so much for highlighting equity when it comes to these conversations as well as mentioning the impact of climate change. I think we are seeing, it's been the hottest days on record recently, so I think that is at the forefront of many of our minds personally and professionally. You also mentioned COVID, and that is something that has greatly impacted everyone in this space of public health. With that said in terms of some lessons learned from COVID as well as the previous EEE outbreaks, how have you applied some of the knowledge and lessons learned from both of those? And how can those lessons be applied to future outbreaks? Like things that we've learned and we can keep to use in our toolbox going forward?

JM: Yeah, I can maybe start, or Jimena if you wanna start and I'll fill in?

JL: Go ahead. Go ahead.

JM: Okay. I think one of the things that we have learned is, well, there's many lessons I'd say that we're taking from COVID. I think that there are... I think we have learned the necessity for being able to scale response from our typical outbreaks, our... Maybe last days to weeks to maybe months. But it does not involve our entire department.

And so when we do have to scale, we have learned from the pandemic how we can incorporate things like emergency preparedness structures and including ICS structures into our day-to-day response so that we can be more effective at being able to scale a response. I think that one of the things that, one of the other take homes that we understood is that we do have to do more practice.

JM: So practice makes perfect. So I think just having us understand that the pandemic is once a century, a COVID pandemic might be a once in a century event, but there are smaller scale outbreaks that we can use the same lessons that are from COVID. And so one of the things we are trying to implement is really to put in emergency preparedness activities, drills and activities and trainings so that we understand how to respond to different types of outbreaks. So whether it's a food-borne outbreak or a vaccine preventable outbreak or a vector outbreak. Who do we... Who has to be involved?

What messaging has to be put out on day one? How many people do we have to pull into this response? What does the response entail? Who do we have to inform? So I think these are all things that were, that we can we sort of learned throughout the pandemic. And we'd like to be able to apply those lessons to maybe something that's not a statewide or a nationwide response, but really a response that we'll take many of our resources, but maybe it won't be a full blown response. And so that is something that we are working on to try to integrate really into our county communicable disease response.

So I think that would be the biggest thing I think is really just having seen something of the scale, how do we then not forget about it, and actually put it into... Many of us have worked through the pandemic and many of us are very tired in the pandemic. And so... But how do we not forget the lessons really and try to incorporate them. So that's not just save for that next pandemic in the future. But many of these lessons can really be put into your day-to-day activities or in small scale responses.

SH: Thank you so much. Jimena, would you like to share anything?

JL: Sure. I think all of the things that Dr. Marquez mentioned are definitely many of the lessons that we've learned and what we're putting in practice now. I think the other piece of course is where it's necessary really focusing on rebuilding trust in public health.

Unfortunately, as we all know, the COVID pandemic became very politicized.

JL: And certainly we were responding as quickly as we could with the information we had, and that information was constantly changing. And I know that that for many people was a very difficult situation and felt like they were getting mixed messages or conflicting messages. And so I think for public health in general ensuring that we are rebuilding where we need to, rebuilding that trust. And I think so much of what we did during COVID to respond and to really be effective in that response was working in partnership with so many community organizations and groups and across sectors.

And so I think we've always known that in public health it's important to work in partnership across sectors, but certainly during the COVID response, we saw just the wide array of organizations that's so important to engage with in order to respond to a public health emergency like COVID-19. And so whether that's schools or faith organizations, businesses, all of it we were working with just so many organizations and many new groups and organizations. And so I think also we very much looked at the data that we were seeing in terms of trends and particularly where we saw disparate impacts and directing resources, supplies, staff, volunteers directly to respond to where we were seeing those gaps. That was really important. And what I talked about previously in terms of really centering equity in our emergency response is just so important whether it's once in a century pandemic or smaller outbreaks that we may see or any other emergency.

The other thing is we certainly had to use our public health authority during that time, and it was used at the state level. It was also used at the local level here in Washtenaw County. Obviously, that authority is used very judiciously. It is not taken lightly. And when we make a decision like we did during COVID to issue emergency public health orders, it was done with lots of review of data, lots of discussions within our team, really thinking about the implications and implementation of those orders.

And I hope that we don't get back to a point where we have to do that, but that is an important authority that we have in public health. And so I think it's also important to preserve that authority because, it is, first of all used judiciously across Michigan. I don't think there was any local health officer if they were issuing orders that were doing it, just because they had the authority.

JL: It was to respond to our role and our duty to protect the public health. And so I think preserving that authority is also really important.

And we're seeing lots of efforts to try and take that authority away throughout the country. And so I think that's another part that we really need to be mindful of. And in building that trust, a lot of that I think also comes from having conversations and sharing the importance of not only the work we do in public health, but why it's important for us to have that ability to respond during emergencies.

SH: Thank you so much for that insight. As we wrap up for today, I do wanna ask you both to provide any final thoughts and as well as possibly sharing something that keeps you comforted or inspired during these times as public health workers and you're both working so diligently to protect the public, what is something that keeps you inspired and comforted and in any other final thoughts you have for our audience regarding vector-borne diseases?

JM: I guess just to summarize our discussion that we've had, EEE is a virus that we have seen. We've seen periodic outbreaks within Michigan. I think the expectation is that we will continue to see this, especially as climate changes. And I think that we need to really focus additional resources, both financial resources and training and people to understanding the outbreaks and be able to conduct the appropriate surveillance and prevention measures to be able to hopefully prevent or lessen the outbreaks in the future.

I think that there are certainly protective behaviors that individuals can take, as we mentioned before, things like insect repellent, making sure they wear long-sleeved shirts and pants, things of that nature that folks can do as well. So I guess it's... I think the expectation is that we will continue to see vector-borne illnesses. But I think there is an ability to respond to these. And I think that we just need to move forward with lessons that we continue to learn over time. And I think that in terms of things that are inspiring is really, I think we, both Jim and I have the chance to work with students, graduate students, undergraduate students who are very excited to really pursue public health. And I think that it's really enjoyable to work and see the enthusiasm and see really a lot of just enthusiasm for public health and to really see a fresh perspective about what can be done within public health.

SH: Thank you.

JL: I think Dr. Marquez and I have been working too closely together for too long, 'cause he said basically everything I was gonna say.

So in addition, I would just share that, I think it's really important for people to know that their local health department is a critical resource and such an important resource for all residents in that county, in that jurisdiction when it comes to all kinds of public health information, including EEE and how to prevent EEE and other vector-borne illnesses. But also obviously during COVID, as Dr. Marquez mentioned, I think people learned more about public health and what we do and the role of local health departments. And so I really think that we in public health and in local health departments in particular have a real opportunity given that we've been at the forefront of COVID response to really continue being that public health leader in our counties and in our jurisdictions, and ensuring that we are continuing to engage with our community members so that they can have the best health outcomes possible.

So local health departments really are an incredible and invaluable resources and resource, and not just for members who live in those areas, but also for our healthcare providers. We have worked so closely over the years with our healthcare providers, and particularly during COVID, but also people in many other sectors as well. So really I think that's an important piece that I would wanna emphasize.

And I was gonna say the same thing about what inspires me is, seeing this, it seems increased interest in public health. I just recently met with one of our interns who's studying public health as an undergraduate, and she said, "I had no idea that the health department did so much and such a wide range of services and work and response." And I think that is very eye-opening. And so I hope that not only will we see more people coming into the public health workforce, we certainly need people to take our place. And the public health workforce has a lot of challenges from the impacts of COVID. And so we definitely need to build that public health workforce pipeline.

JL: But I also hope that when people are thinking about careers in public health, they'll think about local governmental public health as a really interesting, exciting option.

SH: Well, Dr. Marquez and Jimena, thank you so much for the wonderful information that you shared with our audience today. We truly do appreciate it, and we wanna thank you for your commitment and diligence in protecting public health.

SH: Thank you so much for joining us today to share your experiences and provide some insight on this topic. To our listeners, we hope you've learned more about vector-borne diseases such as EEE today. We encourage you to check out the transcript and resources in the podcast notes. With that we'll end here for today. Stay safe and stay prepared.