

Norovirus Genogroup IX Outbreaks in Long-Term Care Facilities in Utah, USA

[Announcer] This program is presented by the Centers for Disease Control and Prevention.

[Sarah Gregory] Hello, I'm Sarah Gregory, and today I'm talking with BreAnne Osborn, an epidemiologist at the Utah Department of Health in Salt Lake City. We'll be discussing outbreaks of norovirus genotype IX in long-term care facilities in Utah.

Welcome, BreAnne.

[BreAnne Osborn] Hi, Sarah. Thanks for having me.

[Sarah Gregory] How is norovirus different from other gastrointestinal viruses? I mean, how prevalent is it compared to others?

[BreAnne Osborn] I think one of the biggest differences between norovirus and other GI viruses is just how contagious it is. It takes between maybe 18 and 1,000 viral particles to make somebody sick, which is super small. So to put that into perspective, each gram of poop (which a gram is about the same size of an M&M) can contain up to five billion viral particles of norovirus. So if you do a little bit of math, that's enough norovirus to potentially infect the entire world. So super gross.

But to the other part of your question, because it's so contagious, it can be a really common illness. And so, the CDC estimates that there's between 19 and 21 million people who get sick every year. And that's about the same amount of people as the population of the state of New York. So lots of people getting sick, and it's by far the most common gastrointestinal illness worldwide.

[Sarah Gregory] Yes, you hear about the wedding groups and things, and one person will get it and then everybody's sick. So I guess that's why.

[BreAnne Osborn] Right.

[Sarah Gregory] Are there different types of it?

[BreAnne Osborn] Yes. As with any virus, noroviruses are constantly evolving. Currently, they are divided into 10 different genogroups (genogroup I to genogroup X), and there are 48 different genotypes within those genogroups. So definitely different types, genetically.

[Sarah Gregory] Are there certain types that are more common than others?

[BreAnne Osborn] Yes. In the United States, more than 99% of norovirus cases are caused by noroviruses in genogroup I and genogroup II, and most of our outbreaks are caused by a variant of the genogroup II, called GII.4 Sydney.

[Sarah Gregory] What are the symptoms?

[BreAnne Osborn] Norovirus typically causes symptoms like vomiting and diarrhea and stomach cramping. Some people might also get a low-grade fever or chills or headaches. Usually, these symptoms start one or two days after ingesting the virus, and most people will recover on their own one or two days after that. So it's usually a pretty short illness. Some people refer to it as the 'stomach bug' or the 'stomach flu'. I think that's a little bit of a misnomer, because of course the

influenza virus that causes the flu typically causes respiratory symptoms. So it's not really systemic flu, but a lot of people refer to it that way.

[Sarah Gregory] And how is it spread?

[BreAnne Osborn] So if you're completely grossed out already, you might want to cover your ears a little bit. But it's typically spread via the fecal-oral route. So what we mean by that is that somebody's poop ends up in your mouth somehow, which is kind of gross. But because it takes so little norovirus to actually make you sick, you probably won't be able to actually see that the poop is there. And so, this can happen when people who are sick don't wash their hands very well (maybe after using the bathroom), and then they go and prepare your food. Or maybe they touch something like silverware that you end up putting in your mouth.

Another common way that it can be spread is through public vomiting incidents, and this is something that actually happened in our outbreak. And one of the residents in the long-term care facility threw up in a really busy hallway. And when this happens, the norovirus particles from the vomit can be suspended in the air, and then those particles can end up in people's mouths and their digestive tracts, they can end up on surfaces around them. It's a pretty hardy bug, and so it's hard to clean up after. So that's a really good way to get a lot of people sick all at once.

[Sarah Gregory] Is there a test to detect each of the different types?

[BreAnne Osborn] There are a couple of different testing panels out there that the doctors might order to test for norovirus in your poop, but they generally don't specify which genogroup or genotype of norovirus you have. That's something that's done more in a research lab or a public health laboratory for surveillance purposes. Usually there's not a huge difference clinically for the different types of norovirus.

[Sarah Gregory] Let's go back to the spread for a second. I understand about the fecal-oral transmission if somebody doesn't wash their hands properly and touches something and you get it, or somebody vomits. But then, how does it spread so quickly from person to person? I mean, they're not all vomiting on each other.

[BreAnne Osborn] Right. And that's why I think you see a lot of these outbreaks in facilities like nursing homes or schools where there's a lot of people all together, and you might, in some of these situations (like a nursing home, for example), the residents might have a little bit of a hard time washing their hands or taking care of themselves in some way and they have to have help from staff, which helps it to get all over the place pretty easily.

[Sarah Gregory] So it's not somebody coughing on each other or anything like that?

[BreAnne Osborn] No. Not nearly the same thing as COVID. Not at all.

[Sarah Gregory] Okay, that's interesting.

What's the standard treatment for it? Is there a treatment?

[BreAnne Osborn] There's not really a treatment for it. Most people, like I said, recover on their own after a day or two. But some people might get dehydrated, so they might need some IV fluids or something else to help them get rehydrated.

[Sarah Gregory] How often do these outbreaks occur in the United States?

[BreAnne Osborn] As you might have guessed, norovirus outbreaks are super common in the US. About 2,500 of them are reported to the CDC each year, and there's probably a lot that don't get reported as well. Most of these outbreaks happen between November and April, so they are more common during winter months, but it's possible to get norovirus and have outbreaks any time of the year.

[Sarah Gregory] Your study particularly focused on a cluster of norovirus genotype IX (which is unusual) outbreaks in long-term care facilities. When and where was genotype IX first discovered?

[BreAnne Osborn] This is actually a pretty interesting story. The oldest norovirus GIX sequences that we have actually come from samples that were taken from US troops who were deployed to Saudi Arabia in 1990 for Desert Storm. So they had an outbreak there of vomiting and diarrhea, and my understanding is that they got samples on 22 of the soldiers there, and 14 of them were found to have been positive for norovirus GIX. I believe there were some other norovirus types and genotypes that they found there, but at least 14 of them did have this less common strain, and at the time, the first that we knew of.

[Sarah Gregory] Have there been other outbreaks of this genotype before? Before this one, I mean, here in the long-term care facility.

[BreAnne Osborn] Yeah. Other than this outbreak and the one during Desert Storm, there have been a few other outbreaks reported in the literature. Most of these are reported in surveillance data from China or from the United States. But we don't typically have a ton of details on these other than they happened.

One outbreak that we do have some details on happened just a couple years ago in 2018. There was a group of travelers who were returning home to China from Thailand, and 23 people got sick and two of them at least had norovirus GIX. So it has happened, and we do have some data on those outbreaks, but it's definitely less common than a lot of other types.

[Sarah Gregory] How serious can this get for the elderly, and can it be fatal? You said it usually just self-corrects in a couple of days.

[BreAnne Osborn] Most people will recover on their own without any major problems, but it can be more serious in the elderly. There's an estimated 900 deaths due to norovirus every year, and most of those people who die are 65 years or older. And we did unfortunately have one death reported in our long-term care facility outbreak. So it can be more serious in the elderly, for sure.

[Sarah Gregory] And since it's so very unusual, how was it spread in this long-term care facility?

[BreAnne Osborn] These are very common facilities for these types of outbreaks. The residents sometimes have a hard time caring for themselves, so they sometimes have to have help while they go to the bathroom or for washing their hands, or maybe they are in a memory care unit, and they have a hard time remembering to wash their hands. So all of these things are things that staff have to help them with. It introduces a lot of ways for norovirus to make its way around the facility—through different people, through different staff, through the residents themselves—there's a lot of opportunities there.

[Sarah Gregory] But I mean, specifically, if this is an unusual strain, how did this strain get there?

[BreAnne Osborn] We don't know exactly how this strain got here. We do know that there have been some other GIX norovirus outbreaks in long-term care facilities in other states recently. So we don't know exactly how it got there in the first place. But we do know that our earliest cases were residents, and it probably started in residents in one facility and spread between the facility sites and healthcare workers.

[Sarah Gregory] What kind of surveillance is used to track outbreaks of norovirus?

[BreAnne Osborn] We do surveillance for norovirus differently than we do for some other illnesses, like *Salmonella*. For those types of illnesses, we use case-based systems, where we rely on clinical laboratories to notify us of every person who tests positive.

Norovirus is a little bit different. Because it's so common, it's just not really feasible to have every case reported, and it doesn't necessarily help us a ton because a lot of people won't go to the doctor when they are just a little bit sick. So in the United States for norovirus, we rely on outbreak-based reporting.

So the way that it works is that state public health departments and laboratories submit data on norovirus to CDC so that we can track things like the strains that are making people sick or what kind of a setting these outbreaks are happening in and how many people are getting sick.

[Sarah Gregory] Why do you think norovirus IX has been detected less frequently than other genotypes once it got started?

[BreAnne Osborn] That's a great question, and it's a question that I have as well. It's likely that we've detected less GIX norovirus because there probably is actually less norovirus GIX going around than other types. We don't really know why that is. So other strains like the GII.4 Sydney strain could be simply outcompeting norovirus GIX. It's also thought that this virus hasn't seemed to change too much genetically from when it was first discovered around 30 years ago, so that might play a part in it as well. But we'll have to keep learning so that we can hopefully answer that question in the future.

[Sarah Gregory] How were these outbreaks in your study first detected and how were they contained?

[BreAnne Osborn] These outbreaks were reported to us initially by the facilities themselves. Nurses and other staff in the long-term care facilities noticed that a lot of people got sick and that something wasn't quite right. And so, they gave us a call, which is exactly what they're supposed to do in those scenarios. Once that happens, we are able to give them some recommendations—maybe we'll ask them to close their dining halls; we might ask them to have everybody eat in their rooms; we might ask them to have staff who are sick stay home, just to try and prevent it from spreading further.

[Sarah Gregory] Tell us now a little bit more about your study and how you went about it.

[BreAnne Osborn] The calls from the facilities came in over the period of a week or two. And at first, we didn't think too much of it because these outbreaks are pretty common, and especially in these types of facilities. But once we started getting three, four, five facilities in the same county with outbreaks, that started to really raise our eyebrows a little bit.

So once things calmed down and we were able to control the outbreaks, we started to dig in so that we could really figure out what had happened. And so, the lab did some initial genotyping on the stool samples that we collected from the facilities during the outbreak, and they let us

know that it was part of this less common genogroup, which really started to get us thinking that these outbreaks were connected. So we did a little bit of digging on that, trying to find links between the facilities, and we found that the home health company was providing services to some of the residents with more complicated health needs (a lot of these residents had diabetes that required some extra care).

So once we found that, we started digging into that some more and got more information about which residents were being cared for by these employees, which facilities the employees were working in. We were able to interview the employees themselves and find out a little bit more about their illness. So it was a lot of piecing things together and figuring out where people were working and who they were interacting with.

[Sarah Gregory] And ultimately, what did you find?

[BreAnne Osborn] We found that the outbreak probably started, like I said earlier, in two residents of one of the facilities. And from there, that same home health company (the employees from that home health company) likely spread it to the other facilities. So lots of interacting with people; definitely a person-to-person outbreak.

[Sarah Gregory] Clearly somebody in this home healthcare company wasn't washing their hands properly. So will there be more trainings for employees? Do you know?

[BreAnne Osborn] That's certainly one aspect of it. The other part of this is that these outbreaks can be somewhat difficult to control, and in some ways norovirus, once it gets started in a facility, is kind of like a wildfire and it can be really hard to control. And so, there are some things that the home health company could do, for sure—making sure that employees aren't working while they're sick, making sure they are keeping up on their hand hygiene. But also, sometimes these things happen and it's best to learn from them and help the facilities themselves as they deal with them.

[Sarah Gregory] I think you touched on this already, but how did you determine that the outbreaks were related?

[BreAnne Osborn] The lab eventually sequenced all of the norovirus samples, and found that they were all genetically nearly identical, which further confirmed that the outbreaks were most likely related.

[Sarah Gregory] Why do you think we are seeing an increase in norovirus outbreaks in the United States now?

[BreAnne Osborn] I'm not sure why we might be seeing more GIX outbreaks in the United States or if we're going to continue to see more in the future. That's another thing that we're going to have to watch closely and conduct surveillance for.

[Sarah Gregory] What's the main takeaway from your study?

[BreAnne Osborn] I think there might be two main takeaways from this study. I think the first is that different diseases are prevented in different ways. I think it's important for a facility to think through what their greatest threats might be and how to prevent those. We can't prevent everything and all illnesses all the time, but maybe thinking through some of the greatest threats. The other takeaway is that norovirus surveillance is really, really important, and we need to continue to collect that surveillance data so that we know what the trends are and what might be changing and how that might affect people's health.

[Sarah Gregory] I know from your study that you looked into precautions that were apparently not very successful in facilities. What can places actually do (these long-term care facilities) do to prevent the spread of norovirus?

[BreAnne Osborn] There are a lot of different precautions that you can take, and there's a lot of resources out there for facilities. But a few that I'll highlight here that I think would have been really helpful in these outbreaks is employee illness screening—so, asking staff if they have diarrhea or vomiting, and if they do, making sure that they are not working while they are actively ill. Another thing I think that could always be improved on in any facility is encouraging hand hygiene and handwashing among staff and residents. And then, of course, using cleaning products that are effective against norovirus. Your typical household cleaning products will not kill norovirus. It's kind of a really hardy bug and is sometimes hard to get rid of. So especially in a facility setting, make sure that you're using the proper cleaning products.

[Sarah Gregory] That brings me back to the handwashing. I know from *C. diff* that hand sanitizer doesn't work and you have to actually wash your hands. Is that true also for norovirus?

[BreAnne Osborn] Correct. So handwashing is by far the best way to do it (washing with soap and water). Hand sanitizer isn't always effective against it, and so...I mean, it's better than nothing, but it is always best to use soap and water.

[Sarah Gregory] I think we've gotten very complacent about, "Oh, we'll just dab on some hand sanitizer and we'll be good". So I like to reinforce that.

[BreAnne Osborn] For sure. Yeah, sometimes the convenience isn't worth it.

[Sarah Gregory] BreAnne, tell us about your job, what you do and where you work, and what made you interested in enteric diseases.

[BreAnne Osborn] I work at the Utah Department of Health and Human Services as an epidemiologist. So that means that I work on surveillance and outbreak investigations for a lot of different gastrointestinal illnesses. Every outbreak looks different—sometimes I'm working on an outbreak in a restaurant, sometimes it's a long-term care facility like this one, sometimes I'm working with a lot of different colleagues trying to figure out what commercially distributed food item made people across the country sick. But in a lot of ways, I'd say enterics chose me before I ever chose it. But I love what I do, and I love that it's never boring.

[Sarah Gregory] What would you say is the most interesting and rewarding part of your career so far?

[BreAnne Osborn] That's a really tough question, but I would say we don't always get to find the cause of the outbreak or get the answers that we're looking for. But when we do, it's incredibly satisfying.

[Sarah Gregory] Well, thank you so much for taking the time to talk with me today, BreAnne. It has been a pleasure.

[BreAnne Osborn] Thanks, Sarah.

[Sarah Gregory] And thanks for joining me out there. You can read the November 2022 article, Cluster of Norovirus Genotype IX Outbreaks in Long-Term Care Facilities, Utah, USA, 2021, online at [cdc.gov/eid](https://www.cdc.gov/eid).

I'm Sarah Gregory for Emerging Infectious Diseases.

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