

Foodborne Norovirus Outbreaks

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

[Maureen Marshall] Hi, I'm Maureen Marshall and today I'm speaking with Dr. Aron Hall, an epidemiologist specializing in norovirus at CDC. Our conversation is based on his study about foodborne norovirus outbreaks, which appears in CDC's journal, *Emerging Infectious Diseases*. Welcome, Dr. Hall.

[Aron Hall] Thank you.

[Maureen Marshall] First of all, Dr. Hall, what are noroviruses?

[Aron Hall] Noroviruses are a diverse group of viruses that belong to the family Caliciviridae. They're named after the original Norwalk virus that caused an outbreak of gastroenteritis in a school in Norwalk, Ohio in 1968. Currently, there are five recognized groups of noroviruses. We know that three of these groups affect humans. More than 25 different types of norovirus strains have been identified within these three groups and new strains continue to emerge. Because there are so many different types of noroviruses, people can get infected many times during their lifetime. It's possible to develop immunity to specific types, but we don't know how long that immunity lasts. This may explain why so many people of all ages get infected during norovirus outbreaks.

[Maureen Marshall] Please tell us about the signs and symptoms of an infection with noroviruses.

[Aron Hall] Noroviruses cause acute gastroenteritis, which is inflammation of the stomach and intestines. This leads to diarrhea, vomiting, nausea, and stomach pain. Some people with norovirus illness may get dehydrated from vomiting and having diarrhea many times a day. They may urinate less, have a dry mouth and throat, or feel dizzy when they stand up. When someone gets infected with norovirus, they may say they have "food poisoning" or the "stomach flu." Food poisoning can be caused by noroviruses but other germs and chemicals can also cause food poisoning.

[Maureen Marshall] Are these dangerous viruses?

[Aron Hall] Most people with norovirus illness get better in one to three days. However, some people may get severely dehydrated, especially young children, the elderly, and people with weakened immune systems. Each year, norovirus causes about 70,000 hospitalizations and 800 deaths, mostly in young children and the elderly.

[Maureen Marshall] How are noroviruses spread?

[Aron Hall] People with norovirus illness shed billions of virus particles in their stool and vomit. You can get infected with norovirus by eating food or drinking liquids that are contaminated with norovirus, or by touching surfaces or objects that have norovirus on

them then putting your fingers in your mouth, or by having direct contact with someone who's infected with norovirus, for example, caring for or sharing food, drinks, or eating utensils with an infected person. Food handlers, such as in restaurants, can spread norovirus to others when they are ill. They can easily contaminate the food and drinks that they touch. People who then consume these food or drinks can get infected and sick, leading to a norovirus outbreak. In fact, about 50 percent of all outbreaks of food-related illness are caused by norovirus. In many of these cases, sick food handlers were involved in spreading the virus.

[Maureen Marshall] How big of an issue is foodborne norovirus outbreaks in the US?

[Aron Hall] Noroviruses are the leading cause of outbreaks from contaminated food in the United States. In our study, we found that on average one foodborne norovirus outbreak was reported every day in the United States. These outbreaks resulted in over 10,000 illnesses, 1,200 healthcare provider visits, 150 hospitalizations, and one death each year.

[Maureen Marshall] So why is norovirus such a problem?

[Aron Hall] Noroviruses are a public health problem for several reasons. They are highly contagious. People with norovirus illness shed billions of virus particles in their stool and vomit, but it only takes a very small amount of norovirus particles (fewer than 100) to make someone sick. They spread easily, too. Earlier, we discussed some of the many different ways that noroviruses can spread, so we know an outbreak can happen easily. Noroviruses can also spread very quickly, especially in closed places like daycare settings, nursing homes, schools, and cruise ships. And, noroviruses are hard to get rid of. They can stay on objects and surfaces and still infect people after days or weeks. They can also survive both freezing and heating (although not thorough cooking) and even some disinfectants. Lastly, noroviruses are constantly evolving. This makes it very difficult to develop a vaccine to prevent norovirus illness. These are just a few of the major challenges with preventing and controlling noroviruses.

[Maureen Marshall] Are certain food items more likely to contain norovirus?

[Aron Hall] Foods that are eaten raw or served undercooked, such as leafy greens, fresh fruits, or shellfish, are most often implicated in norovirus outbreaks. Ready-to-eat foods, like sandwiches and salads, are also commonly involved in outbreaks. However, it's often hard to determine the specific food that caused an outbreak. That's because noroviruses spread in many ways. Food handlers may contaminate multiple different food items, and also, there are time lags in reporting illness which can hamper outbreak investigations. In our study, the specific food source for over half of the foodborne norovirus outbreaks was never identified.

[Maureen Marshall] You mentioned leafy greens, fresh fruits, and shellfish. Do we know why these foods are more susceptible to the virus?

[Aron Hall] Really, any food served raw or handled after being cooked can get contaminated with noroviruses. Fresh produce may be handled at several different points, including harvesting, processing, and preparation, before they are eaten. Also, water that's used to irrigate crops can cause norovirus contamination, which will persist on raw food. Raw or undercooked shellfish, like oysters, can be especially problematic when they're harvested from water that's contaminated with human waste. Oysters filter the contaminated water and absorb the noroviruses and other pollutants in their bodies. Over time, the amount of virus accumulates in the oysters. So, if you eat these oysters either raw or undercooked, you may get infected with norovirus.

[Maureen Marshall] Another study reported norovirus in as much as 50 percent of leafy green vegetables and as much as 34 percent of soft red fruit, like strawberries and raspberries. Aren't these percentages alarmingly high?

[Aron Hall] These percentages mainly tell us that it's common for fresh produce to come in contact with noroviruses during production and processing. However, the current methods for detecting noroviruses cannot distinguish between infectious and non-infectious virus. So, specific risks to the public's health from produce contaminated with noroviruses are unclear.

[Maureen Marshall] How can we prevent future norovirus outbreaks in the food industry?

[Aron Hall] First, we should focus on food handlers. In our study, we found that infected food handlers were the source of 53 percent of foodborne norovirus outbreaks, and they possibly contributed to 82 percent of outbreaks. Also, most outbreaks were caused by food in restaurants that was contaminated during preparation. To help prevent norovirus outbreaks, food handlers should always practice good hand hygiene, and avoid touching foods with bare hands. When they're sick, they should stay out of the kitchen and not handle or prepare food.

Second, we should consider taking steps to protect food before it reaches the kitchen. We found outbreaks caused by shellfish and produce that were likely contaminated during production. Using safe water for growing and irrigation can help prevent food from getting contaminated at the source.

[Maureen Marshall] Is there a vaccine that protects against norovirus?

[Aron Hall] Currently, there is no vaccine available to prevent norovirus illness, but research is being done in this area.

[Maureen Marshall] What should people do to avoid getting foodborne norovirus?

[Aron Hall] You can follow a few tips to help prevent the spread of norovirus. First, always wash your hands carefully with soap and water after using the toilet and changing diapers and before eating, preparing, or handling food. Second, wash your fruits and vegetables thoroughly, and cook oysters and other shellfish thoroughly before eating

them. Third, when you're sick, do not handle or prepare food for others. Fourth, clean and disinfect contaminated surfaces after throwing up or having diarrhea. And finally, wash any soiled laundry thoroughly after throwing up or having diarrhea. If you'd like to learn more about noroviruses and how to help protect you and your family from them, you can visit CDC's norovirus website at www.cdc.gov/norovirus.

[Maureen Marshall] Thank you, Dr. Hall. I've been talking with Dr. Aron Hall about his study, *Epidemiology of Foodborne Norovirus Outbreaks, United States, 2001–2008*, which appears in the October 2012 issue of CDC's journal, *Emerging Infectious Diseases*. You can see the entire article online at www.cdc.gov/eid.

If you'd like to comment on this podcast, send an email to eideditor@cdc.gov. I'm Maureen Marshall, for *Emerging Infectious Diseases*.

[Announcer] For the most accurate health information, visit www.cdc.gov or call 1-(800)-CDC-INFO.