Sea Sick: Contracting Norovirus on your Cruise

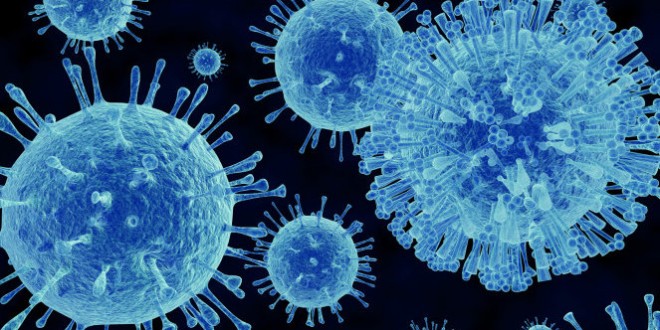
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1. **Introduction**

If one is diagnosed with a norovirus then they are experiencing what is commonly known as the stomach flu. Norovirus outbreaks usually occur in places that accommodate many people in one space such as cruise ships or hotels. Noroviruses are highly contagious but there are steps to protect against and prevent the spread of the illness.



1. **Background**

Noroviruses were formerly known as Small Round Structured Viruses (SRSVs) and Norwalk Like Viruses (NLVs), derived from an outbreak of viral gastroenteritis in an elementary school located in Norwalk, Ohio in 1968 (Reacher). Noroviruses “are now recognized as the leading cause of both acute gastroenteritis in individuals in the community and of outbreaks of gastroenteritis associated with hospitals, nursing homes, hotels and ships” (Reacher). In 1929 this virus caused illness was first discovered by Dr. J Zahorsky and termed “Winter Vomiting Disease.” In 1972, virologist Albert Kapikian “demonstrated characteristic viral particles by electron microscopy (EM) in human-passage fecal material” (Reacher). This demonstration lead to the discovery of a family of viruses we now know as Noroviruses.

“Noroviruses are a group of viruses that cause the ‘stomach flu,’ or gastroenteritis, in people” (Frumkin). If someone has had the stomach flu it was most likely cause by a norovirus. Symptoms experienced when one has contracted a norovirus are nausea, vomiting, diarrhea, and stomach cramping; occasionally people may also experience a low-grade fever, chills, headaches, muscle aches, and fatigue (Frumkin). As a result of these symptoms, people can experience dehydration from the loss of fluids.

Noroviruses are highly contagious viruses. They are often found on cruise ships because of the close living quarters and the constant change in personnel being introduced into the environment that can bring the virus with them and spread it to other crew members and passengers aboard the ship (Facts).

1. **Health Implications**

Noroviruses are highly contagious illnesses that can affect anyone who comes into contact with contaminated food, water, people, or objects. As a result of the multiple different strains of Noroviruses, “being infected with one type of norovirus may not protect you against other types” (Transmission). This means that if one contracts a strain of norovirus and falls ill, they can develop antibodies to that strain to help protect them in the future if they come into contact with that strain again, however, if they come into contact with a different strain than the original virus they will not have protection against the new strain.

Transmission of Noroviruses is typically due to the oral-fecal route. This means someone comes into someone’s contaminated stool and it ends up in their mouth. “This usually happens by: eating food or drinking liquids that are contaminated with norovirus, touching surfaces or objects contaminated with norovirus then putting your fingers in your mouth, or having contact with someone who is infected with norovirus [for example, caring for or sharing food or eating utensils with someone with norovirus illness]” (Transmission). With most of these modes of transmission, it is easy to absentmindedly come into contact with a norovirus. How easy is it to walk down stairs and used a guardrail then touched our eye or mouth? People often forget that public surfaces like that are covered in contaminants and they should wash their hands after coming into contact with one.

Noroviruses are fast acting and usually start affecting the infected within “12 to 48 hours after being exposed to norovirus. Most people with norovirus illness get better within 1 to 3 days” (Symptoms). Symptoms typically are nausea, vomiting, diarrhea, and stomach pains; severe symptoms are body aches, fever and headaches. When someone is infected with a norovirus they lose a lot of fluids and can become dehydrated. Symptoms associated with dehydration are “decrease in urination, dry mouth and throat, feeling dizzy when standing up, and children who are dehydrated may cry with few or no tears and be unusually sleepy or fussy” (Symptoms). When infected with a norovirus it is important to rest and replace lost fluids to prevent dehydration which could lead to more serious issues.



1. **Methodology**

In order to diagnose one as being infected with a norovirus there are three ways to test; RT-qPCR Assays, Conventional RT-PCR Assays for Genotyping, and newly developed Enzyme Immunoassays. “Human noroviruses cannot be grown in cell culture. Therefore, diagnostic methods focus on detecting viral RNA or antigen” (Diagnosis). The before mentioned tests detect the viral RNA or antigen associated with Noroviruses.

RT-qPCR Assays are the preferred way to test for Noroviruses. Conventional RT-PCR Assays follow initial RT-qPCR Assays testing and identify the genotype of the norovirus. The third type way of diagnosing Noroviruses is through “rapid commercial assays, such as enzyme immunoassays (EIAs), that detect norovirus antigen have recently been developed. However, these kits have poor sensitivity (50%) and are not recommended for diagnosing norovirus infection in sporadic cases of gastroenteritis” (Diagnosis).

When collecting specimens to be tested for Noroviruses, researchers choose specimens from the person and from their surroundings. Human specimens are usually stool, vomit, and serum. Samples are also taken from food and water that the infected came into contact with and their environment (Specimen).



1. **First Case**

Due to the close quarters that are common on cruise ships, norovirus outbreaks occur. On the Cruise Ship *Disney Wonder* such an outbreak occurred. The voyage took place from April 27th until May 1st of 2016. The causative agent was confirmed to be Norovirus and it affected 131 of the 2680 (4.89%) passengers and 14 of the 991 (1.41%) crew members. The main symptoms were vomiting and diarrhea (Investigation Update on the Disney). After the outbreak the cruise line and crew took measures to prevent the spread of the virus and took samples to send off to the CDC. Following the departure of passengers, “a CDC Vessel Sanitation Program environmental health officer boarded the ship upon arrival at the port of Miami on May 1, 2016 to conduct an environmental health assessment and evaluate the outbreak and response activities” (Investigation Update on the Disney). This case shows that the CDC has measures in place to investigate and solve underlying causes of noroviruses and has policies to implement to prevent the spread when an outbreak occurs.



1. **Second Case**

Another example of an outbreak of norovirus aboard a cruise ship occurred on the *Oceania Riviera*. This voyage took place from February 12th to the 22nd of 2016. Aboard this ship there was a higher prevalence of norovirus among passengers as 124 of 1225 (10.12%) were affected, however, only 3 of the 773 (.039%) crew members were affected (Investigation Update on the Oceania) In this case the main symptoms were also vomiting and diarrhea. The *Oceania Riviera* followed similar procedures as the *Disney Wonder* after the outbreak including increased cleaning and disinfecting and collecting stool samples of the afflicted to send to the CDC among other protocols in place. However, unlike the *Disney Wonder* the *Oceania Riviera* had to return early from its voyage to “complete multiple sanitation barriers prior to the next voyage” (Investigation Update on the Oceania). A CDC officer also boarded and conducted an investigation like the *Disney Wonder* case. These cases show how important it is to have a plan of action to prevent and recover from an outbreak.



**7. Analysis**

Due to the high level of contagiousness, especially in close quarters, people going on a cruise should be cautious. While noroviruses are contagious and there have been outbreaks on cruise ships in the past, there are measures that cruise partakers can use to protect themselves. If cruise staff members clean and disinfect appropriate surfaces well, chefs cook and handle food correctly, and guests practice proper hygiene then the spread of noroviruses can be greatly minimized.

**8. Solutions**

Noroviruses are spread through contact, whether it is contact with contaminated food, water, people, or surfaces varies but it is spread through direct contact nonetheless. Because Noroviruses are spread by contact there are measures that one can take to protect themselves and prevent the spread of the virus. One solution is to practice good hygiene. “Wash your hands carefully with soap and water— especially after using the toilet and changing diapers, and always before eating, preparing, or handling food” (Preventing). Hand sanitizer can also be used in addition to good hand washing. Another solution is to avoid areas that are commonly touched by many people such as, handrails, elevator buttons, door handles, toilet levers, and faucets. Some of these are not completely avoidable so if one does come into contact with one they should wash their hands thoroughly and not handle food or touch their face until after they do so.

If one has been infected or come into contact with someone who was infected they should disinfect all surfaces and “immediately remove and wash clothes or linens that may be contaminated with vomit or stool (feces). You should handle soiled items carefully without agitating them, wear rubber or disposable gloves while handling soiled items and wash your hands after, and wash the items with detergent at the maximum available cycle length then machine dry them” (Preventing). These steps can help solve the issue of contracting and spreading Noroviruses.



**9. Conclusion**

Noroviruses are a family of viruses that cause the stomach flu. If one comes into contact with one strain they can still contract other strains with no protection from the original strain. Noroviruses are highly contagious and prevalent in crowded places like nursing homes and cruise ships. These viruses are fast acting and only last a few days, during that time an infected person can experience nausea, vomiting, diarrhea, fever, stomach, body, and headaches. An infected person is also at risk of dehydration due to the loss of fluids. Noroviruses are commonly transmitted through the oral-fecal route. With proper hand washing hygiene, handling and preparing food correctly, and disinfecting surfaces the spread of these viruses can be minimized.

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