Norwalk-like viruses: When the runs can slow you down

Background and epidemiology: In 2002, outbreaks of gastroenteritis caused by Norwalk-like viruses (NLVs) occurred on a cruise ship bound for Alaska,[1] a trans-Canada VIA Rail train[2] and a Christian camp northwest of Vancouver.[3] In the case of the cruise ship, 13% of the estimated 1266 passengers and crew were affected, and the ship had to be taken out of service for aggressive sanitation and disinfection procedures.[1]

Norwalk virus was first identified in 1972 after an outbreak of gastrointestinal illness in Norwalk, Ohio. Other viruses of the Caliciviridae family have subsequently been identified as causing similar Norwalk virus illnesses, and the term "Norwalk-like viruses" refers to any members of this family.

NLV infections occur year-round and are the leading cause (in over 65% of cases) of nonbacterial outbreaks of gastroenteritis occurring in Canada and the United States.[4] NLVs are highly contagious (a person can become infected with fewer than 100 viral particles). Virus transmission is primarily fecal–oral. Affected individuals typically drink contaminated water (including poorly maintained municipal water supplies, wells, recreational lakes, swimming pools and water stored aboard cruise ships) or eat food that has been handled by an infected food service worker or harvested or washed in contaminated water (e.g., shellfish, fruit and salad ingredients).

Canapress

Concentrated living quarters of cruise ships can facilitate large-scale outbreaks of gastroenteritis caused by Norwalk-like viruses.

Symptoms of nonbloody diarrhea, nausea, vomiting, abdominal cramps, myalgias, malaise, headache and low-grade fever appear 24–48 hours after infection and last 12–60 hours. During this acute stage and until about 48 hours after the symptoms resolve, the disease is believed to be communicable.[5] Secondary person-to-person spread is facilitated by enclosed living quarters and reduced levels of personal hygiene and commonly occurs through hand-to-hand contact with fecally contaminated skin, fomites (any contaminated object such as a cutting board, door handle or toys) or spattering and aerosols of infectious material from soiled linens and clothes. Anyone can be infected by NLV, but outbreaks typically occur in institutional settings such as nursing homes, day-care centres and schools, and other group settings such as banquet halls, cruise ships, dormitories and campgrounds.

NLVs are very stable and withstand freezing, heating to 60°C and disinfection with chlorine (at concentrations below 10 ppm).[6] They are also resistant to acidic conditions, vinegar, alcohol and high sugar concentrations, which enables their survival on fruits and prepared foods.

Clinical management: In isolated cases of acute gastroenteritis other etiologic agents need to be considered, including other viruses (rotaviruses, adenoviruses, caliciviruses and astroviruses), bacteria (*Salmonella*, *Shigella* and *Escherichia coli*) and parasites (*Giardia*). Rotavirus is the most common cause of diarrhea in infants and children less than 5 years old, whereas adenoviruses and astroviruses are common causes of diarrhea in young children; NLVs typically affect older children and adults.[7] Vomiting is more common than diarrhea in children with NLV infection.[8] The diagnosis of NLV outbreaks is usually based on a patient's clinical presentation, and specific diagnostic tests are often not needed. During suspected outbreaks refrigerated stool or vomit specimens collected during the acute phase of the illness can be examined by means of electron microscopy for NLV particles. Serologic testing can also be useful to detect a specific viral strain. Seroconversion, defined as more than a 4-fold rise in IgG antibody titre during the acute and convalescent phases, is indicative of recent infection.[8] NLVs are not routinely detected in water, food or environmental specimens, but during an outbreak such specimens should be tested by means of electron microscopy. Nucleic acid hybridization assays and polymerase chain reaction techniques are not yet widely used for outbreak investigation.[8]

No specific antiviral medications are currently indicated, and the emphasis for treatment should be on avoiding dehydration by means of fluid and electrolyte replacement. Oral rehydration is preferred over parenteral except in cases of severe dehydration. Complications of NLV infection, including severe dehydration and electrolyte imbalances, are more common in elderly people, malnourished children and immunocompromised people, but they are rarely fatal.[8] Long-term sequelae of NLV infection have not been reported. Although acute symptoms typically last 1–3 days, patients may feel debilitated for 2–3 weeks after becoming ill.

Prevention: No vaccine against NLVs is currently available. Outbreaks are preventable and controlled by practising good sanitation and hygiene. Raw fruits and vegetables should always be washed thoroughly with clean water, and shellfish should be thoroughly cooked (a temperature of 85°C–90°C for 90 seconds is required to destroy viruses).[9]

Once an outbreak has occurred, the challenge of implementing control measures must be tackled.[10] Food handlers with symptoms of vomiting or diarrhea should be excluded from work immediately and should not return to

work until at least 48 hours after the symptoms stop. Epidemic diarrhea occurring in an institutional setting or other group settings is a reportable disease in most jurisdictions, and in the event of an outbreak the local medical officer of health should be notified immediately. Affected individuals should be isolated from group activities until they are symptom free for 48 hours. Infection control precautions, including the use of gloves, masks and gowns, should be used by staff when caring for ill people or cleaning contaminated areas. Aggressive sanitization and disinfection of commonly touched surfaces should be implemented. Soiled clothes and linens should be handled with minimal agitation (to prevent aerosolization of viral particles) and laundered with detergent on a hot water cycle. Immunity to NLV lasts only up to 14 days, which makes people vulnerable to repeat infections throughout their lifetime and creates a challenge for the development of future vaccines.

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