

Norovirus

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Norovirus

- causes (epidemic) viral gastroenteritis, also known as acute infectious nonbacterial gastroenteritis
- occurs commonly worldwide
 - most often in outbreaks, but also sporadically
 - all age groups are affected
- only the common cold is reported more frequently than viral gastroenteritis as a cause of illness in the U.S.
- CDC estimates that 23 million cases of acute gastroenteritis are due to norovirus infection
- it is believed that norovirus is responsible for at least 50% of all foodborne outbreaks of gastroenteritis
- immunity can be acquired via antibody development
 - developing countries - percentage of individuals who have developed immunity is very high at an early age
 - industrialized countries (e.g. USA) - percentage increases gradually with age reaching 50% in the population over 18 years of age
 - immunity is not permanent and re-infection can occur



The Virus

- small, 27-32 nanometer
- positive strand RNA genome of 7.5 kb
- single structural protein of about 60 kDa
- also known as:
 - Norwalk-like viruses (NLVs)
 - small round structured viruses (SRSVs)
 - caliciviruses
 - because they belong to the family *Caliciviridae*
- many different strains makes long-lasting immunity difficult to develop
- environmental stability
 - survives ≤ 10 ppm chlorine
 - survives freezing and heating to 140°F (60°C)

Reservoir/Sources

- humans are the only known reservoir
 - virus is excreted in feces and vomitus of infected people
 - presymptomatic viral shedding may occur
 - shedding usually begins with onset of symptoms and may continue for 2 weeks after recovery

Mode of Transmission

- estimated 30 million virus particles released during a vomiting or diarrhea event
 - as few as 10 virus particles is sufficient infectious dose
- transmitted primarily through the fecal-oral route
 - consumption of fecally contaminated food or water
 - direct person-to-person contact
 - environmental and fomite contamination
- aerosolization of vomitus
 - results in droplets contaminating surfaces or entering the oral mucosa and being swallowed
- outbreak source
 - fecally or vomitus contaminated vehicle
 - water - municipal supplies, well, recreational lakes, swimming pools, and water stored aboard cruise ships
 - food – shellfish (clams and oysters) and salad ingredients are the foods most often implicated
- secondary and tertiary cases
 - direct person-to-person spread
 - contact with contaminated environmental surface
 - public vomiting with virus becoming airborne



Signs and Symptoms

- self-limited, mild to moderate illness characterized by:
 - nausea and acute onset-vomiting
 - watery non-bloody diarrhea with abdominal cramps
 - myalgia
 - headache
 - malaise
 - fever
- gastrointestinal symptoms last 24 – 48 hours
- recovery is usually complete and there is no evidence of any serious long-term sequelae
- rare fatal cases
 - severe diarrhea in susceptible persons (elderly, HIV / AIDS)
 - drowning in one's own vomitus
 - pulmonary edema regardless of age and health

Incubation Period

- average 12 – 48 hours
- range 10 – 50 hours



Diagnosis and Treatment

- Diagnosis is made through identification of the virus from stool sample using reverse transcriptase polymerase chain reaction (RT-PCR)
 - best results obtained from samples taken within 48 – 72 hours after onset of symptoms
 - good results can be obtained from samples taken as long as 5 days after symptom onset
 - virus can sometimes be found in stool samples taken as late as 2 weeks after recovery
- only symptomatic treatment exists
 - replacing fluid losses
 - correcting electrolyte disturbances through oral and intravenous fluid administration



Prevention

- frequent hand washing
 - after using the bathroom and changing diapers
 - before eating or preparing food
- carefully wash fruits and vegetables
- thoroughly cook shellfish before consuming
- immediately remove and wash clothing or linens that may be contaminated with virus after an episode of illness (use hot water and soap)
- flush or discard any vomitus and/or stool in the toilet and make sure that the surrounding area is kept clean
- thoroughly clean and disinfect contaminated surfaces immediately after an episode of illness
 - accelerated hydrogen peroxide
 - accelerated potassium peroxomonosulphate
 - heat >170°F
 - hypochlorite
 - parachlorometaxylenol
 - phenols

