Norovirus
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

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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

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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

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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