

# Norovirus Gastroenteritis:

## Management of Outbreaks in Healthcare Settings



U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention

# Norovirus



- ❑ The most common cause of cases of acute gastroenteritis and gastroenteritis outbreaks
- ❑ Can affect nearly everyone in the population (from children to the elderly and everyone in between!) particularly because there is no long term immunity to the virus
- ❑ Causes acute but self-limited diarrhea, often with vomiting, abdominal cramping, fever, and fatigue
  - Most individuals recover from acute symptoms with 2-3 days , but can be more severe in vulnerable populations

# Burden of Norovirus Infection



- ❑ #1 cause of acute gastroenteritis in U.S.
  - 21 million cases annually
  - 1 in 14 Americans become ill each year
  - 71,000 hospitalized annually in U.S.
  - 80 deaths annually among elderly in U.K.
  - 91,000 emergency room visits overall in the U.S.
  
- ❑ Occurs year round with peak activity during the winter months
  
- ❑ Cases occur in all settings, across the globe

# Norovirus in Healthcare Facilities

- ❑ Norovirus is a recognized cause of gastroenteritis outbreaks in institutions.
- ❑ Healthcare facilities are the most commonly reported settings of norovirus gastroenteritis outbreaks in the US and other industrialized countries.
- ❑ Outbreaks of gastroenteritis in healthcare settings pose a risk to patients, healthcare personnel, and to the efficient provision of healthcare services.



# Norovirus Activity in Healthcare

- Incidence of norovirus outbreaks in acute care facilities and community hospitals within the United States remains unclear.
- This is in contrast with the established high burden of acute care hospital outbreaks reported in many other industrialized countries.

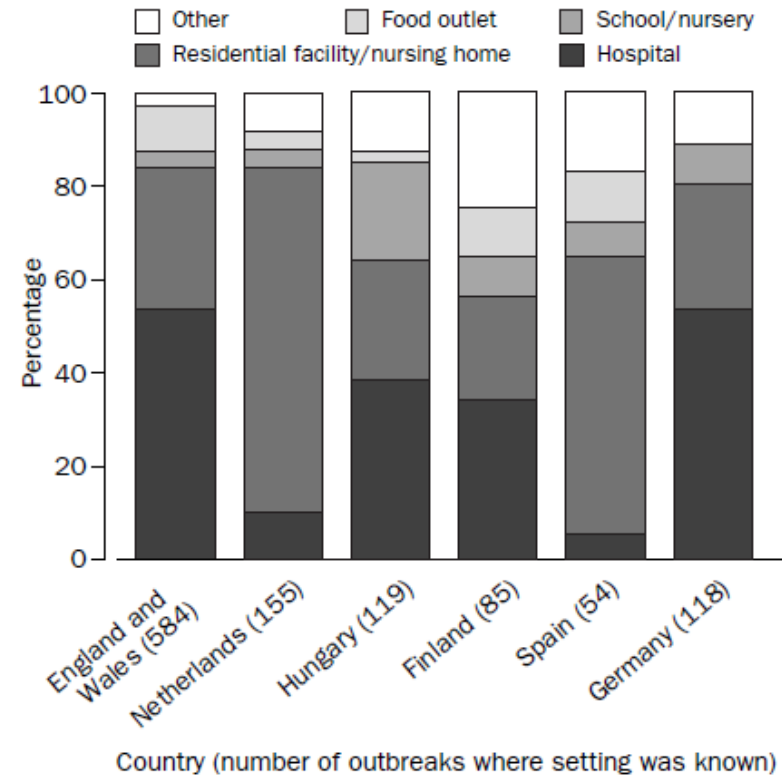
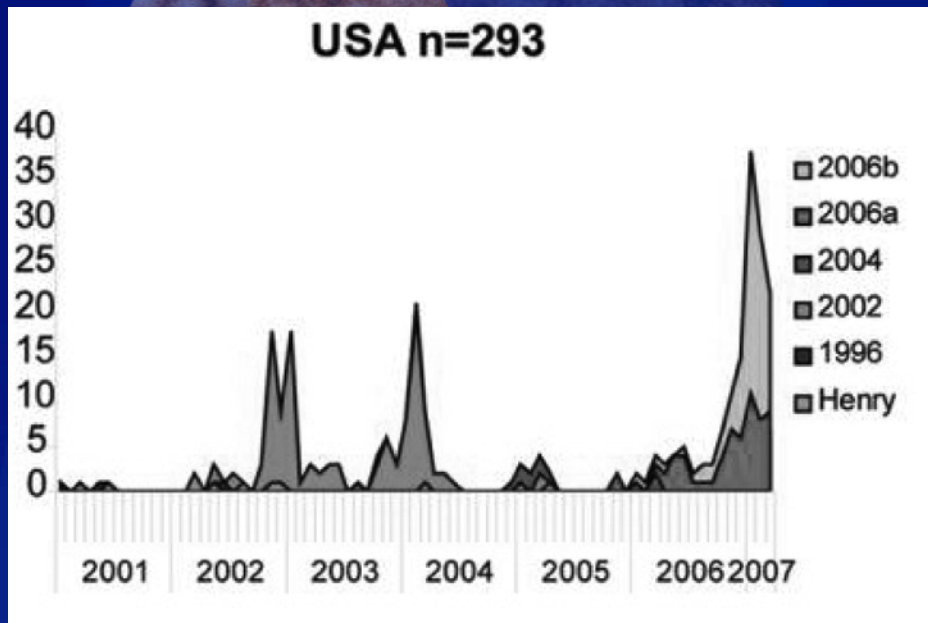


Figure 4: **Setting of norovirus outbreak in 2002 for six European regions**

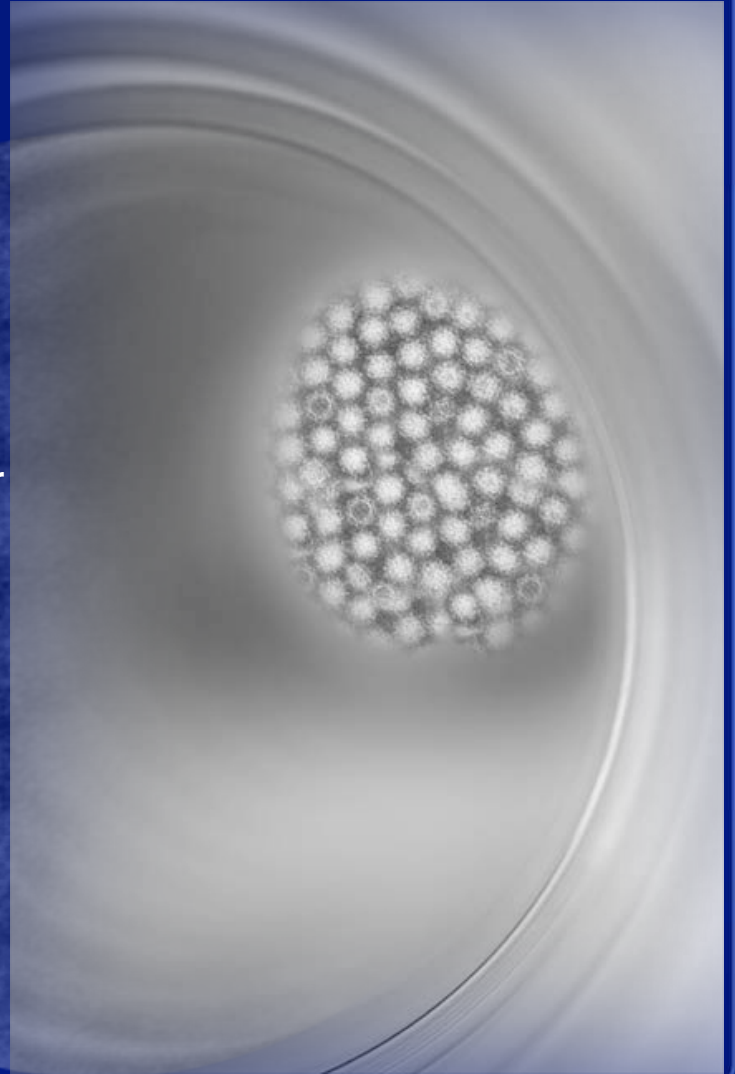
# Dynamic Nature of Norovirus in the US



- Genogroup II type 4 (GII.4) noroviruses cause >75% of outbreaks worldwide
- New strains of GI.4 emerge every 3-5 years
- The periodic emergence of new strains is associated with heightened norovirus activity
- New strains in the 2002/03 and 2006/07 winters caused a surge in outbreaks

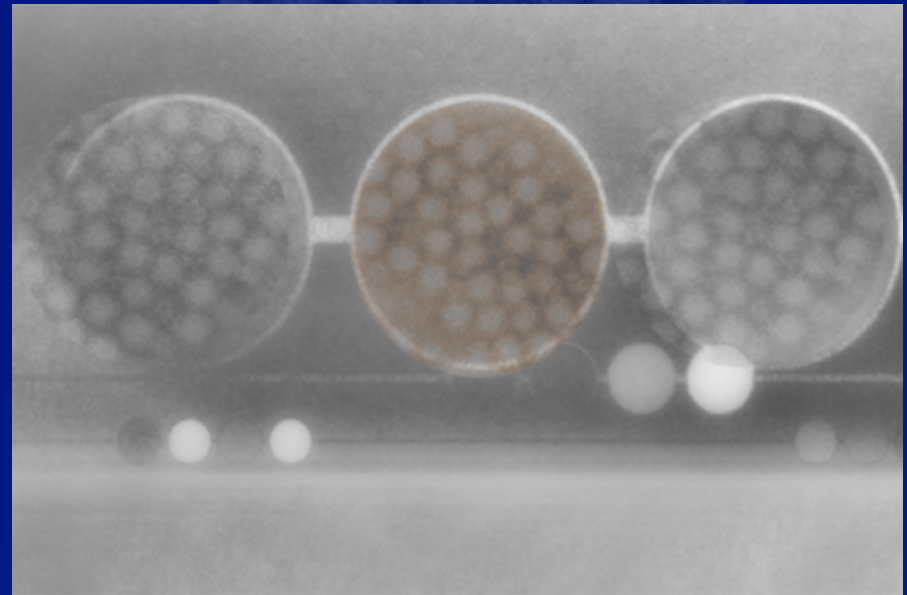
# Clinical Disease

- ❑ Infectious dose: 18-1000 viral particles
- ❑ Incubation period: 12-48 hours
- ❑ Acute-onset vomiting and/or diarrhea
  - Watery, non-bloody stools
  - Abdominal cramps, nausea, low-grade fever
  - 30% infections asymptomatic
- ❑ Most recover after 12-72 hours
  - Up to 10% seek medical attention; some require hospitalization and fluid therapy
  - More severe illness and death possible in elderly and those with other illnesses



# Viral Shedding

- ❑ Primarily in stool, but can also be present in vomitus
- ❑ Shedding peaks 4 days after exposure
- ❑ In some individuals, shedding may occur for at least 2-3 weeks
- ❑  $\sim 10^{12}$  viral copies/gram feces
- ❑ May occur after resolution of symptoms
- ❑ Infectivity of shed virus in environment unknown
- ❑ Shedding in asymptomatic individuals is common but their role in transmission is not known



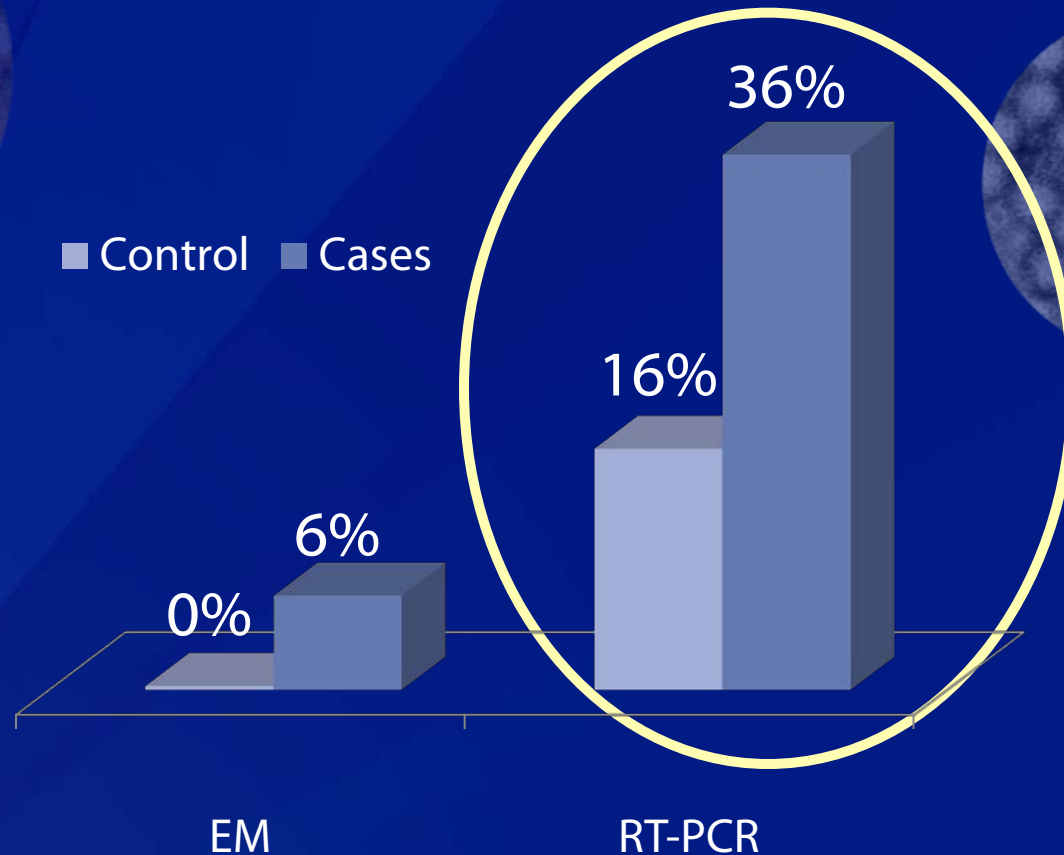


# Immunity to Norovirus

- ❑ Short-term immunity after infection
- ❑ There is little cross protective immunity (against different genotypes)
- ❑ No long-term immunity
  - Protection believed to last less than one year, and in some studies, protection may only last a few months
- ❑ Genetic susceptibility
  - A portion of the population may be genetically resistant to norovirus infection
  - Currently no commercially available test to identify those who might carry genes conferring resistance to norovirus infection



# Norovirus Prevalence in the Community



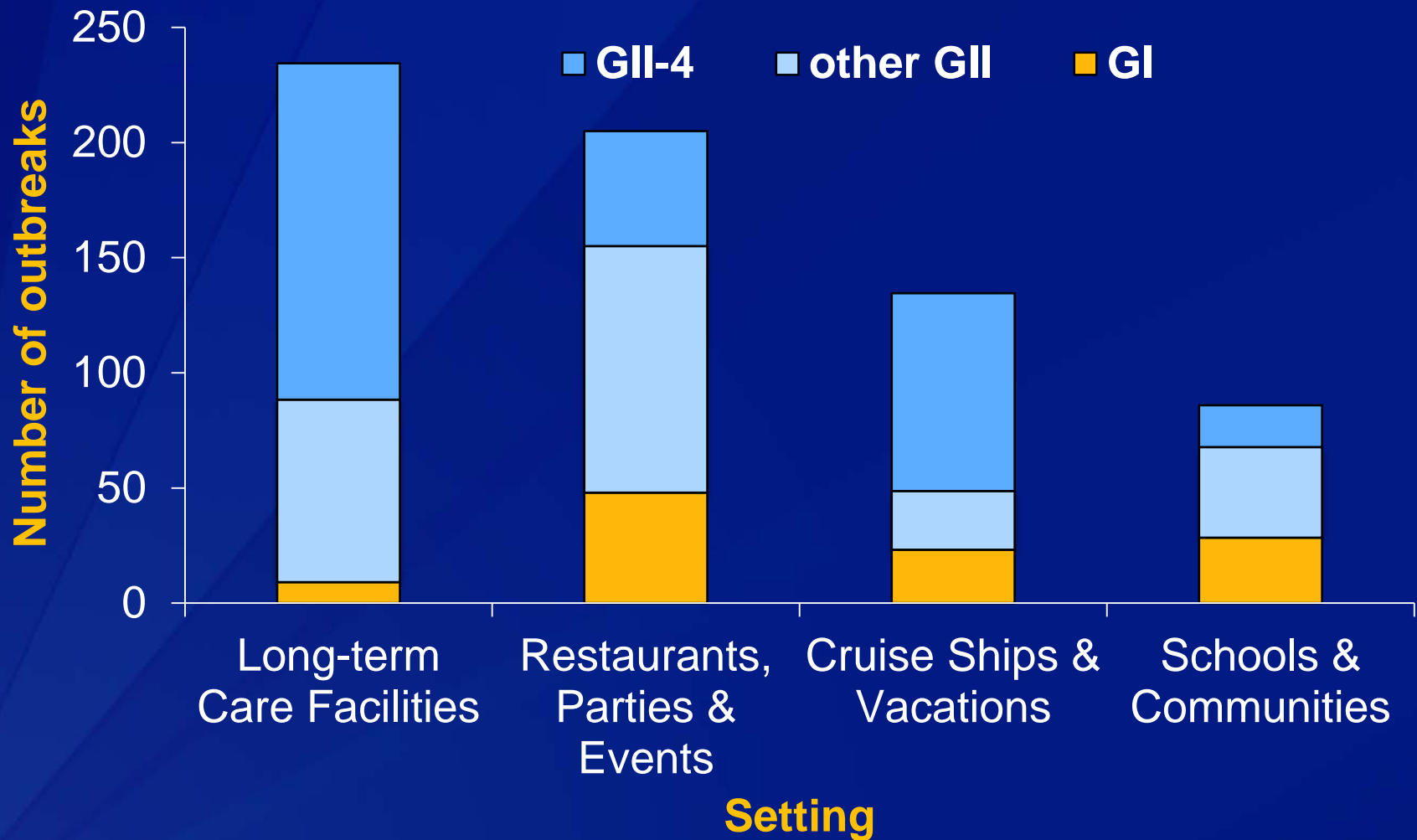
Using sensitive PCR diagnostics, norovirus is frequently detected in stools of both infected individuals (cases) and healthy asymptomatic individuals (controls)

# Transmission of Disease

- ❑ Person to person
  - Direct fecal-oral
  - Ingestion of aerosolized vomitus
  - Indirect via fomites or contaminated environment
  
- ❑ Food
  - Contamination by infected food handlers
  - Point of service or source (e.g., raspberries, oysters)
  
- ❑ Recreational and Drinking Water
  - Well contamination from septic tank
  - Chlorination system breakdown
  
- ★ In healthcare, the most likely and common modes of transmission are through direct contact with infected persons or contaminated equipment

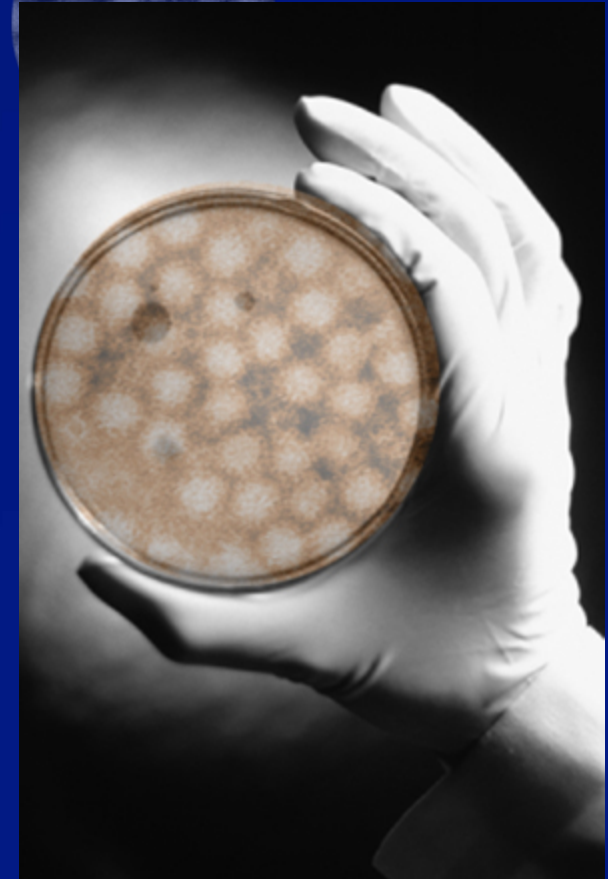


# Setting of Norovirus Outbreaks Reported to CDC, United States 1994-2006



# Laboratory Confirmation of Norovirus

- ❑ Where available, reverse transcription polymerase chain reaction (RT-PCR) confirmation is the preferred diagnostic for norovirus
- ❑ State public health laboratories may be able to provide RT-PCR diagnostics to confirm norovirus
- ❑ Typically, state laboratories require a minimum number of stool samples from a subset of symptomatic patients before initiating confirmatory testing



# Submitting Clinical Samples for Norovirus Testing

- ❑ Consult with receiving clinical, local or state health labs prior to submitting samples for norovirus identification
  - Depending on laboratory policies, may need multiple suspect cases before specimen testing can be performed
- ❑ Stool specimens should be collected from individuals during acute phase of illness
  - Virus may be able to be detected in specimens taken later in the course of illness, but sensitivity is reduced
- ❑ Submit stool specimens as early as possible during a potential outbreak or cluster
- ❑ While not ideal, vomitus may be submitted for testing to some labs
- ❑ Both staff and patient cases can be tested

# What should clinical staff do when they suspect norovirus?

- ❑ Key Infection Control Activities
  - Rapid identification and isolation of suspected cases of norovirus gastroenteritis
  - Communicating the presence of suspected cases to Infection Preventionists
  - Promoting increased adherence to hand hygiene, particularly the use of soap and water after contact with symptomatic patients
  - Enhanced environmental cleaning and disinfection
  
- ❑ Promptly initiate investigations
  - Collection of clinical and epidemiological information
  - Obtain clinical samples

# Infection Control: Patient Isolation or Cohorting



- ❑ In healthcare settings where risk of transmission is high, use of isolation precautions is often the most effective means of interrupting transmission
- ❑ CONTACT PRECAUTIONS – single occupancy room with a dedicated bathroom, strict adherence to hand hygiene, wear gloves and gown upon room entry
  - Use Contact Precautions for a minimum of 48 hours after the resolution of symptoms
  - Symptomatic patients may be cohorted together
  - Exclude ill staff members and food handlers in healthcare facilities for a minimum of 48 hours following resolution of their symptoms
  - Exclude non-essential personnel and visitors



# Infection Control: Hand Hygiene

- ❑ Wash with soap and water after contact with symptomatic patients
  - For all other indications, refer to the 2002 Guideline for Hand Hygiene\*
- ❑ Alcohol-based hand sanitizers
  - Currently available products appear to be relatively ineffective against norovirus
  - Consider using FDA-compliant alcohol-based hand sanitizers for other indications (e.g., before contact with NV patient)\*



\*CDC HICPAC Guideline for Hand Hygiene in Health-Care Settings:  
<http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf>

# Infection Control: Environmental Cleaning and Disinfection

- ❑ The use of chemical cleaning and disinfecting agents are key in interrupting norovirus spread from contaminated environmental surfaces.
- ❑ Increase the frequency of cleaning and disinfection of patient care areas and frequently touched surfaces  
e.g., increase ward/unit level cleaning to twice daily, with frequently touched surfaces cleaned and disinfected three times daily
- ❑ Use commercial cleaning and disinfection products registered with the U.S. Environmental Protection Agency (e.g., sodium hypochlorite (bleach) solution, hydrogen peroxide products, etc.)  
[http://www.epa.gov/pesticides/antimicrobials/list\\_g\\_norovirus.pdf](http://www.epa.gov/pesticides/antimicrobials/list_g_norovirus.pdf)
- ❑ It is critical to follow manufacturer instructions for methods of application, amount, dilution, and contact time

# Infection Control: Other Considerations

- ❑ To reduce transmission, and depending on the magnitude of the outbreak, cohort staff to care for patients who are
  - asymptomatic unexposed
  - asymptomatic, potentially exposed
  - symptomatic
- ❑ Remove communal or shared food items for staff or patients for the duration of the outbreak
- ❑ Group activities for patients may need to be suspended; minimize patient movements within a patient care area to help control transmission



# Surveillance for Norovirus Cases

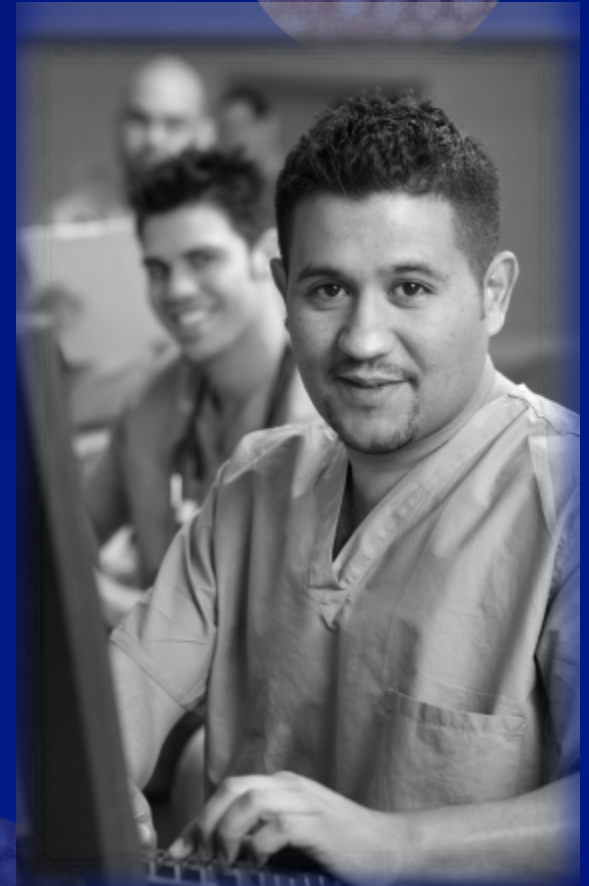
- ❑ Units can use a “line list” to track symptomatic staff and patients
- ❑ During an outbreak, collect key information to assist with controlling the outbreak and to inform local/state health departments on outbreak details
- ❑ Suggested line list elements
  - Case (staff/patient) identifier
  - Case location
  - Symptoms
  - Outcome / Date of Resolution
  - Diagnostics submitted



# Reporting Outbreaks

## Internal Communication

- ❑ Report gastroenteritis outbreaks (e.g., 2 or more suspected or confirmed cases among staff or patients) to infection control units
- ❑ Outbreaks should also be reported to clinical management
- ❑ Important to include communications, laboratory, environmental services, admitting, occupational health departments



# Reporting Outbreaks

## External Reporting

- ❑ Report norovirus outbreaks to your local, county, or state health department
- ❑ In most states, all outbreaks of public health significance are reportable to the state health department
- ❑ Health departments enter norovirus outbreak data (among other pathogens) into National Outbreak Reporting System (NORS) → Centers for Disease Control and Prevention (CDC)



# Summary: Management of Norovirus Outbreaks

- ❑ Create awareness of concurrent norovirus outbreaks in the community/ other local healthcare facilities
- ❑ Detect and confirm suspected norovirus cases rapidly
- ❑ During outbreaks, implement
  - Contact Precautions,
  - enhanced hand hygiene,
  - environmental infection control measures,
  - exclusion of ill staff from work for a minimum of 48 hrs after symptom resolution
  - surveillance for new and resolving cases,
- ❑ Develop a communication plan during outbreaks to include key departments and services
- ❑ Consult with and report outbreak to local/state health departments

# Additional Resources

- ❑ **Norovirus in healthcare settings**

<http://www.cdc.gov/HAI/organisms/norovirus.html>

- ❑ **CDC HICPAC Guideline for the Prevention and Control of Norovirus Gastroenteritis Outbreaks in Healthcare Settings**

<http://www.cdc.gov/hicpac/pdf/norovirus/Norovirus-Guideline-2011.pdf>

- ❑ **Updated Norovirus Outbreak Management and Disease Prevention Guidelines**

[http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6003a1.htm?s\\_cid=rr6003a1\\_e](http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6003a1.htm?s_cid=rr6003a1_e)

- ❑ **General information on norovirus**

<http://www.cdc.gov/norovirus/index.html>



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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



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