The Scoop on Poop: Norovirus in the Healthcare Setting (and beyond!)

Jenny Bender, MPH, BSN, RN, CIC
September 22, 2023

1

Disclosure

+ I am an employee of the clinical team of PDI Healthcare. The content of this presentation is not representative of the views of PDI or its ownership.
+ There will be NO discussion of any PDI products and/or solutions in accordance with CE Requirements.

2

Objectives

- Explore the fundamentals, clinical significance and epidemiology of Norovirus.
- Understand, recognize and effectively control a Norovirus outbreak using successful intervention measures.
- Compare and contrast infection prevention recommendations for both norovirus and *C. difficile* in the long-term care setting.

3

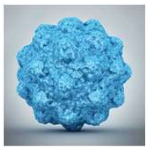
Gastroenteritis Overview

- What is it?
  - Inflammation of the intestines that causes diarrhea, abdominal cramps, nausea, loss of appetite
  - Two most common causes of gastroenteritis are viral and bacterial infections

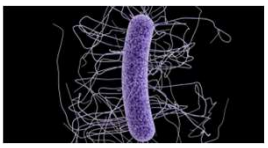
https://www.health.harvard.edu/staying-healthy/gastroenteritis-in-adults-a-to-z

Viral Gastroenteritis

- Usually responsible for mild episodes of gastroenteritis
- Very contagious and usually spread on unwashed hands
- Also spread through surfaces, water, and food



Bacterial Gastroenteritis



- Can be spread by close contact with an infected person, food, or water
- In some cases, can be caused by a toxin produced by bacteria
- More aggressive bacteria can cause serious forms of food poisoning

Norovirus Background

- Original name: "Norwalk agent"
  - Aliases Norwalk-like viruses [NLVs] or small round-structured viruses [SRSVs])
  - Also known as the "stomach flu", "food poisoning", or "winter vomiting bug"
  - Outbreaks occurring more in the winter
  - Named after Norwalk, Ohio:
    - After an outbreak of acute gastroenteritis occurred among children at Bronson Elementary School in November 1968
    - Renamed "norovirus" in 2002

7

Norovirus Background

- Genus: *Caliciviridae* family
  - Seven genogroups (G) and more than 30 genotypes
- Non-enveloped, single-stranded RNA genome
  - Non-enveloped- does **not** have lipid bilayer or "envelope" surrounding the protein capsid
  - Non-enveloped= Can withstand harsher conditions!
- Majority of viral gastroenteritis outbreaks worldwide caused by GII.4 (genogroup II genotype 4)
- New norovirus strains emerge about every 2 to 4 years!
  - 50% more norovirus illness in years when there is a new strain of the virus going around

8

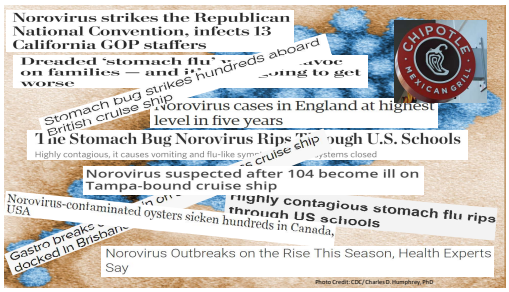


Photo Credit: CDC/Charles D. Humphrey, PhD

9

Norovirus Burden - Global

- Most common cause of diarrheal episodes globally!
  - Causes 18% of diarrheal disease globally
- Estimated to cause approximately 200,000 deaths annually worldwide
  - Of those, 70,000 or more among children in developing countries
- Highest incidence occurs in young children
- Global economic burden: 4.2 billion US dollars in direct healthcare costs and ~60 billion US dollars in societal costs (e.g. lost productivity) worldwide
- Burden of disease most likely much higher due to surveillance and testing deficiencies worldwide

Source: Lopman, B. A., Steele, D., Kirkwood, C. D., & Parashar, U. D. (2016). The Vast and Varied Global Burden of Norovirus: Prospects for Prevention and Control. PLoS Medicine, 13(8), e1001999. http://doi.org/10.1371/journal.pmed.1001999

10

Norovirus Burden - US

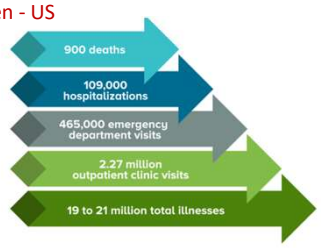


Figure: **Burden of Norovirus in the United States**. Estimates of the annual number of illnesses and associated outcomes for norovirus disease in the U.S., across all age groups. Lifetime risks of disease are based on a life expectancy of 79 years of age.

(Centers for Disease Control and Prevention, 2021)

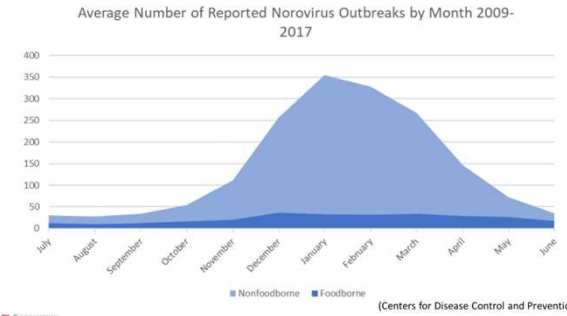
11

Norovirus is HUGE in the US!

- LEADING etiologic agent of viral gastroenteritis in people of all ages
- LEADING cause of acute gastroenteritis in all age groups in the United States
  - 19-21 million cases of acute gastroenteritis every year
  - 56,000-71,000 hospitalizations
  - 570-800 deaths, mostly among young children and older adults
  - Cost ~2 billion US dollars/year
- LEADING cause of severe acute gastroenteritis among U.S. children less than 5 years of age who seek medical care
- LEADING cause of foodborne illness & outbreaks from contaminated food in the United States
- There can be 50% more norovirus illness in years when there is a new strain of the virus circulating.

12

Norovirus Outbreaks Timeframe



(Centers for Disease Control and Prevention, 2021)

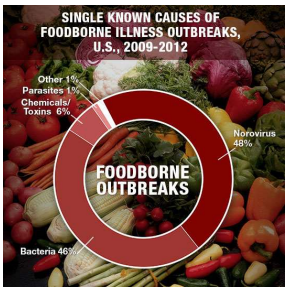
13

Important Outbreaks

- 2014: The cruise ship horror- nearly 700 passengers and crew on a Royal Caribbean ship from Caribbean
- Largest outbreak noted to be in Germany
  - Nearly 11,000 reported cases between September 19 and October 17, 2012
  - Frozen strawberries from China
- Healthcare outbreaks
  - Suspect largely underreported
  - Over half are reported to be in long-term care

14

Foodborne Outbreaks



- Norovirus is the **leading** cause of foodborne illness and outbreaks from contaminated food in the United States.
- It is the second leading cause of food poisoning related hospitalizations (second to *Salmonella).*

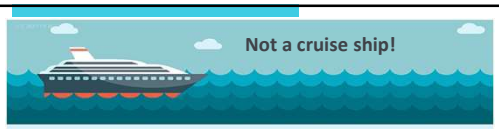
Centers for Disease Control and Prevention, 2023. https://www.cdc.gov/foodsafety/foodborne-germs.html

15

Where are outbreaks more likely to occur?

16

Not a cruise ship!



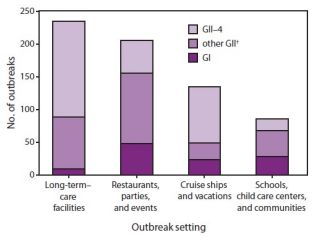
People Often Associate Cruise Ships with Acute Gastroenteritis (AGE) Illnesses, but They Are Relatively Infrequent

Healthcare facilities are the most common settings of norovirus outbreaks!

Lopman, B, Global Burden of Norovirus and Prospects for Vaccine Development. August 2015. Available at https://www.cdc.gov/norovirus/downloads/global-burden-report.pdf
Acute Gastroenteritis Illness Infographic. Available at: https://www.cdc.gov/nceh/vsp/age-illness-infographic.htm

17

3 Out of 4 Norovirus Outbreaks are in Long Term Care Facilities



https://www.cdc.gov/norovirus/setting-outbreaks.html

18

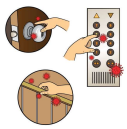
Norovirus Epidemiology

- R_0 = 2.75
- Infectious Dose: Swallowing as few as 18 norovirus particles can make someone sick
- A single gram of feces from an infected individual can contain 10 billion infectious doses of norovirus.
- Relatively stable in the environment and can survive freezing and heating to 60°C (140°F)
- Incubation: Individuals generally become ill 12 – 48 hours after exposure (ingesting norovirus)

19

Norovirus Epidemiology - Transmission

- Transmitted primarily through the fecal-oral route – Direct person-to-person spread or contaminated food/water
- Can also spread via a droplet route from vomitus
- Virus can be shed in the stool for several weeks after recovery



Centers for Disease Control & Prevention (CDC). Norovirus, Clinical Overview. Last reviewed 2016. Accessed on March 13, 2017. Available from: https://www.cdc.gov/norovirus/hcp/clinical-overview.html

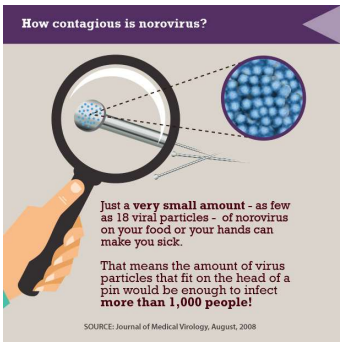
20

Norovirus Epidemiology - Transmission

- HIGHLY contagious!
  - Infected person can shed BILLIONS of norovirus!
  - Only need about 18 viral particles to get sick!
- Spread via the fecal-oral route:
  - Direct contact with an infected person– shake their hand, touch your mouth
  - Consume contaminated food or water— infected person handles food/ water and you eat/ drink it; eating raw oysters
  - Contact with contaminated surfaces, objects, or substance— you're minding your own business, touch an infected doorknob & then grab a sandwich
  - Through aerosolized vomit droplets that land on surfaces or on your mouth— being in the wrong place at the wrong time… someone's norovirus vomit lands on your mouth unknowingly
- Someone with norovirus can shed the virus before AND AFTER their symptoms
  - Can shed norovirus for 2 weeks or more after recovering

Centers for Disease Control & Prevention (CDC). Norovirus, Clinical Overview. Last reviewed 2016. Accessed on March 13, 2017. Available from: https://www.cdc.gov/norovirus/hcp/clinical-overview.html

21



22

Norovirus Symptoms

- **Common symptoms:**
  - cramping
  - nausea
  - acute onset vomiting
  - watery diarrhea
- **Less common symptoms:**
  - Low grade fever
  - Chills
  - Headache
  - Muscle aches
  - Fatigue

Centers for Disease Control & Prevention (CDC). Norovirus, Clinical Overview. Last reviewed 2016. Accessed on March 13, 2017. Available from: https://www.cdc.gov/norovirus/hcp/clinical-overview.html

23

Norovirus Symptoms

- Symptoms usually last 24 to 72 hours
- Typically full recovery without any long-term problems
  - However, new research showing possible long-term GI issues
- Immunity: Not great!
  - Some immunity possible for an unknown period of time
  - Some people may have a natural genetic immunity
- BUT— Due to the many types of noroviruses, you can get infected several times in your lifetime!
- **30% asymptomatic infections**

Centers for Disease Control & Prevention (CDC). Norovirus, Clinical Overview. Last reviewed 2016. Accessed on March 13, 2017. Available from: https://www.cdc.gov/norovirus/hcp/clinical-overview.html

24

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.
- ~10^{12} viral copies per gram of feces
- May occur after resolution of symptoms

25

Diagnosing Norovirus

- Best to test stool within 48 to 72 hours after symptom onset
- Gold standard is real-time reverse transcriptase-polymerase chain reaction (RT-qPCR)
  - PCR detects the genetic material (RNA) of the virus
  - It can be used to test stool, vomitus, and environmental specimens
- Enzyme immunoassays (EIAs) can be used during outbreaks
  - EIAs not sensitive enough (<50%) for diagnosing individual cases
- Use Kaplan criteria in outbreak scenarios where laboratory testing unavailable

26

Norovirus Diagnostics – Clinical Diagnosis

Kaplan's Criteria

1. Vomiting in more than half of symptomatic cases and
2. Mean (or median) incubation period of 24 to 48 hours and
3. Mean (or median) duration of illness of 12 to 60 hours and
4. No bacterial pathogen isolated in stool culture

27

Treatment

- No specific therapy
- Dehydration is the most common complication (especially in young children and the older adults)
  - Treat dehydration & electrolyte disturbances with oral or intravenous fluids
- Antiemetic / anti-nausea medication
- No Antibiotics! Practice stewardship!

28

Immunity & Susceptibility

- Immunity is of limited duration and variable: 6 months to 9 years
  - Strain (or genotype-specific) with little or no protection conferred across genogroups
- Some people may have innate resistance to noroviruses based on genetic factors (glycan expression)
  - Human Histo-blood Group Antigens (HBGAs) & secretor status controlled by the alpha1,2 fucosyltransferase FUT2 gene play a role in susceptibility
  - HBGA serve as receptors for norovirus capsid protein attachment and play a critical role in infection
  - HBGA receptors found in saliva & mucosal secretions from intestinal & epithelial cells of individuals with FUT2 (secretor) gene
  - Nonsecretors (no FUT2): highly resistant to symptomatic infections
  - Secretors (with a functional FUT2 gene): have greater susceptibility
- Some evidence shows blood types O and A most susceptible
- Blood type B may offer some protection (maybe?) More research needed

Nordgren, J., Kindberg, E., Lindgren, P., Matussek, A., & Svensson, L. (2010). Norovirus Gastroenteritis Outbreak with a Secretor-Independent Susceptibility Pattern, Sweden. *Emerging Infectious Diseases, 16*(1), 81-87. https://dx.doi.org/10.3201/eid1601.090353.
Shirato H. Norovirus and histo-blood group antigens. Jpn J Infect Dis. 2011;64(2):95-103. Review. PubMed PMID: 21519121. http://www5.nih.go.jp/nij/jjid/64/95.html

29

Long Term Health Effects?

- Evidence showing potential chronic long term health consequences after a bout with acute Norovirus gastroenteritis
  - Associated increased risk of IBS after viral gastroenteritis
  - 11-fold increase risk of IBS at 12 months[1]
- Risk of dyspepsia, constipation, and GERD are higher among people with Norovirus symptoms during an outbreak[2]
  - Incidence was approximately 1.5-fold higher ($P < .01$) [2]

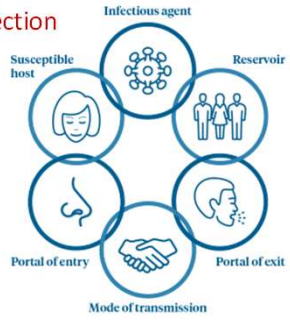
[1]Zanini B et al. Incidence of post-infectious irritable bowel syndrome and functional intestinal disorders following a water-borne viral gastroenteritis outbreak. *Am J Gastroenterology* 2012 jun; 107:894.
[2]Jack A. Porter, Dennis J. Xia, Danny Shlau, Jennifer Espiritu, Benjamin J. Espinosa, Mark S. Riddle, Postinfectious Gastrointestinal Disorders Following Norovirus Outbreaks, *Clin Infect Dis*(2012); 56 (7): 945-952. doi: 10.1086/cid/cis576; Available from: https://academic.oup.com/cid/article-lookup/doi/10.1093/cid/cis576

30

Norovirus Prevention and Control

31

Chain of Infection



32

Outbreak Identification

- Confirm you have an outbreak
  - Have you noticed an increase of vomiting/ diarrheal illness in your patient population via surveillance?
  - Have you had an increase in staff calling in sick?
  - Increase in chief complaint of N/V/D?
- Begin investigations promptly!
  - Notify leadership & key departments
    - Communication plan is important!
  - Notify & enlist help of local/state Department of Health (DOH)
    - Reporting outbreaks is required in most states
    - CaliciNet: national norovirus outbreak surveillance network of federal, state, and local public health laboratories

MacCannell, T., Umscheid, C., Agarwal, R., Lee, I., Kuntz, G., & Stevenson, K. (2011). Guideline for the Prevention and Control of Norovirus Gastroenteritis Outbreaks in Healthcare Settings. *Infection Control & Hospital Epidemiology, 32*(10), 939-969. doi:10.1086/662020

33

Outbreak Identification - Definitions

- An outbreak of norovirus is defined as an occurrence of two or more similar illnesses resulting from a common exposure that meet either the confirmed or probable case definition for norovirus.
- Norovirus (lab-confirmed case)— clinically compatible symptoms AND detection of norovirus in the lab, such as by PCR or similar nucleic acid tests
- Norovirus (probable case)— clinically compatible symptoms AND detection of norovirus antigen by EIA or ELISA, OR epidemiologically linked to a confirmed case

Outbreak Identification - Samples

- Collect stool samples early (within first 2-3 days of symptom onset)
- If laboratory testing unavailable or not practical (time constraints or too many patients) use Kaplan's Criteria to assist in determining outbreak:
  - Kaplan's Criteria:
    1) Vomiting in more than half of symptomatic cases
    2) Mean (or median) incubation period of 24 to 48 hours
    3) Mean (or median) duration of illness of 12 to 60 hours
    4) No bacterial pathogen isolated in stool culture

MacCannell, T., Umscheid, C., Agarwal, R., Lee, I., Kuntz, G., & Stevenson, K. (2011). Guideline for the Prevention and Control of Norovirus Gastroenteritis Outbreaks in Healthcare Settings. *Infection Control & Hospital Epidemiology, 32*(10), 939-969. doi:10.1086/662025

Outbreak Control- Patients

- Contact Isolation & Standard Precautions
  - Upon entering the patient care area use gown and gloves
  - Use mask/ face shield if patient is vomiting (standard precautions!)
  - Minimum of 48 hours after the resolution of symptoms
  - Use clinical judgement on discontinuation of contact isolation precautions:
    - Infants, young children and people with suppressed immune systems may shed virus longer
- Private room preferential
  - Cohorting symptomatic patients if absolutely needed

MacCannell, T., Umscheid, C., Agarwal, R., Lee, I., Kuntz, G., & Stevenson, K. (2011). Guideline for the Prevention and Control of Norovirus Gastroenteritis Outbreaks in Healthcare Settings. *Infection Control & Hospital Epidemiology, 32*(10), 939-969. doi:10.1086/662025

Outbreak Control- Patients

- Minimize patient movements: within unit & throughout facility
  - Restrict movement unless it is for essential care or treatment
- Suspend group activities until outbreak is over
  - Important in behavioral health and long term care
  - Get rid of communal food sources!
- Notify receiving facility and transporters when transferring symptomatic or recovering patient
  - May be prudent to delay transfers
- Consider closing units to new patients, transfers & visitors until outbreak is controlled

MacCannell, T., Umscheid, C., Agarwal, R., Lee, I., Kuntz, G., & Stevenson, K. (2011). Guideline for the Prevention and Control of Norovirus Gastroenteritis Outbreaks in Healthcare Settings. *Infection Control & Hospital Epidemiology, 32*(10), 939-969. doi:10.1086/662026

37

Outbreak Control- Staff

- Exclude ill staff for at least **48 hours after symptoms resolve**
  - Some recommendations for 72 hours after symptom resolve
- Staff cohorting— keep staff with either symptomatic patients or asymptomatic; not a mixture
  - Staff that have recovered from recent norovirus infection associated with the outbreak: may be best suited to care for symptomatic patients until the outbreak resolves
- Exclude non-essential staff, students, and volunteers from working in areas experiencing outbreaks of norovirus
- Pay attention to your food handlers!
  - Follow same exclusion recommendations; **at least 48 hrs.**
  - Exclusions may be longer if required by health department
  - Excellent hand hygiene is a must!

MacCannell, T., Umscheid, C., Agarwal, R., Lee, I., Kuntz, G., & Stevenson, K. (2011). Guideline for the Prevention and Control of Norovirus Gastroenteritis Outbreaks in Healthcare Settings. *Infection Control & Hospital Epidemiology, 32*(10), 939-969. doi:10.1086/662026

38

Outbreak Control- Staff

Hand Hygiene Compliance

- Follow hand-hygiene guidelines, and careful washing of hands with soap and water after contact with patients with norovirus infection.
- Remember that hand sanitizer does not work against norovirus!
- In-services for hand hygiene provided to all staff on all shifts
- For the duration of the outbreak, increase the frequency of hand hygiene audits on affected units.
- Provide written and verbal feedback to staff.

39

Outbreak Control- Staff

Isolation Precautions Compliance

- Use gowns and gloves when in contact with, or caring for patients who are symptomatic with norovirus.
- Cohort staff on each ward if possible.
- Ensure staff do not move between patient cohorts.
- In-services for use of personal protective equipment provided to all staff on all shifts

40

Outbreak- Hand Hygiene

- Performing excellent hand hygiene is KEY!
  - Healthcare personnel, patients, and visitors in affected patient care areas
- CDC recommends soap and water for hand hygiene after providing care or having contact with patients suspected or confirmed with norovirus gastroenteritis
  - 20 seconds **at minimum**
  - **Hand sanitizer does not work against norovirus**
- Universal gloving?
  - Some facilities institute universal gloving on units with an outbreak- unresolved issue
  - Gloving is **NOT** a replacement for hand hygiene with soap and water!

MacCannell, T., Umscheid, C., Agarwal, R., Lee, I., Kuntz, G., & Stevenson, K. (2011). Guideline for the Prevention and Control of Norovirus Gastroenteritis Outbreaks in Healthcare Settings. *Infection Control & Hospital Epidemiology, 32*(10), 939-969. doi:10.1086/662025

41

Outbreak- Environmental Control

- Cleaning and Disinfection:
  - First step: Clean areas of visible soiling (stool, vomitus)
  - Second step: Disinfect areas with a recommended solution
- Recommended solutions:
  - Chlorine bleach solution
    - Concentration of 1,000--5,000 ppm (1:50--1:10 dilution of household bleach [5.25%])
  - Or another Environmental Protection Agency (EPA) approved disinfectant (List G)
- Follow cleaning/ disinfection protocols: flow from least contaminated to most contaminated

MacCannell, T., Umscheid, C., Agarwal, R., Lee, I., Kuntz, G., & Stevenson, K. (2011). Guideline for the Prevention and Control of Norovirus Gastroenteritis Outbreaks in Healthcare Settings. *Infection Control & Hospital Epidemiology, 32*(10), 939-969. doi:10.1086/662025

42

Outbreak- Environmental Control

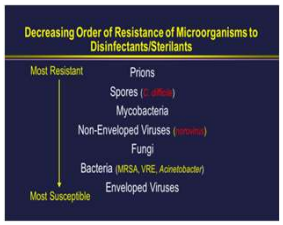
- Increase daily/ routine cleaning during outbreaks
  - Unit cleaning at least twice daily; frequently touched surfaces cleaned and disinfected three times daily
  - Pay attention to staff areas as well (breakrooms & bathrooms)
- Steam clean carpets & upholstery
- Use disposable equipment
  - If not using disposable equipment, ensure appropriate cleaning/ disinfection
- Change curtains upon discharge or transfer

MacCannell, T., Umscheid, C., Agarwal, R., Lee, I., Kuntz, G., & Stevenson, K. (2011). Guideline for the Prevention and Control of Norovirus Gastroenteritis Outbreaks in Healthcare Settings. *Infection Control & Hospital Epidemiology, 32*(10), 939-969. doi:10.1086/662026

43

Why is Norovirus More Difficult to Kill?

- Non-enveloped viruses such as Norovirus are more stable in harsher conditions
- Non-enveloped viruses do not have lipid bilayer or "envelope" surrounding the protein capsid
- The surrounding layer of an enveloped virus actually makes it easier to kill because it is more vulnerable

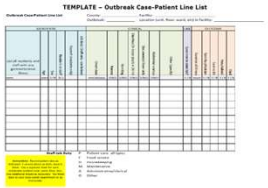


Rutala WA, Weber DJ. Healthcare Infection Control Practices Advisory Committee. Guideline for disinfection and sterilization in healthcare facilities, 2008. Available from cdc.gov/hicpac/pdf/guidelines/Disinfection_Nov_2008.pdf

44

Line List Management

- The best way to understand how an outbreak is progressing and evaluate outbreak control is to maintain a patient and staff line listing.
- A way to list all the affected patients and staff and have clinical information available about their illnesses



45

C. Diff Burden

- Due to age-related immunity factors and frequent antimicrobial exposure, older adults are at increased risk for developing CDI.
- While nearly half of CDI cases occur in people younger than 65, more than 90% of deaths occur in people 65 and older.
- Annually in the United States, CDI is linked to 29,000 deaths and at least $1 billion in extra health care costs.
- It is the most common cause of health care-acquired diarrhea in the long-term care setting.
- It represented 12.1% of all health care-associated infections in 2011.

46

C. Diff Microbiology

- Gram-positive, anaerobic, spore-forming and toxin-producing bacillus
- Family = Clostridiaceae, Genus = Clostridioides, Species = difficile
- Pathogenic strains produce multiple toxins that can produce diarrhea and inflammation
- Bacterium also forms spores, which makes it very difficult to remove from surfaces

47

C. Diff Epidemiology

- Most common pathogen causing health care–associated infections in the United States, accounting for 15% of all such infections
- Many people carry *C. difficile* without showing signs or symptoms. This is referred to as "colonization."
- Bacteria is passed in feces, but any surface contaminated with even a small amount can become a reservoir for spores.

48

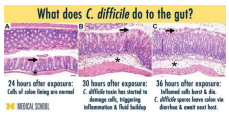
C. Diff Transmission

- Ingestion of spores, usually transmitted by:
  - Another person in a patient or resident environment
  - Contaminated shared surface
  - Contaminated medical equipment
  - Hands of healthcare personnel (HCP)
- Many have *C. difficile* in their normal flora
- Risk factors for *C. difficile* infection (CDI) are:
  - Recent hospitalization
  - Exposure to antibiotics
  - Advanced age

49

C. Diff Clinical Manifestations

- **Incubation period –** short, median of 2-3 days
- **Pseudomembranous colitis** – inflammatory condition that develops in response to toxins of microorganism
- When normal flora is disrupted (often related to abx treatment), organisms attach to the mucosa of the colon and can cause:
  - Mild to moderate diarrhea
  - Colitis
  - Toxic megacolon
  - Sepsis
  - Death



50

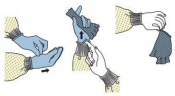
C. Diff Diagnostics

- Only watery or loose stool should be collected and tested for CDI
- PCR testing has excellent sensitivity and specificity
  - Turnaround time is 1-3 hours
- Non-laboratory methods
  - CT scan helpful to identify colitis
    - 90% of pseudomembranous colitis (PMC) are caused by CDI
    - Should not be relied upon to rule out CDI

51

C. Diff IP Management – Hand Hygiene

- If hands are not visibly soiled:
  - Hand hygiene before and after contact of a patient with CDI – either **soap and water** or **alcohol-based hand rub (ABHR)**
  - Soap and water may be preferential in **outbreak** or **hyperendemic settings**
  - Soap and water is preferred if direct contact with feces or fecal contamination is likely (e.g. after peri care)
- If hands are **visibly soiled**
  - **Use soap and water**
- **Strict glove use is essential!**



52

C. Diff IP Management - Isolation

- Place patients with known **or suspected** CDI on Contact Precautions.
- Gown and gloves
- Private room, if possible
  - May cohort with another CDI patient
- Dedicated bathroom and other equipment (stethoscope, BP cuff, etc.)
- Maintain contact precautions for duration of illness.
  - Can discontinue if diarrhea has resolved for 48 hrs

53

C. Diff IP Management - Environment

- *C. difficile* spores can exist for 5 months on hard surfaces and are resistant to commonly used disinfectants.
- *Must use* **EPA-registered sporicidal agent** and make sure that it is allowed to stay wet for the entire **contact time** listed
- **Monitor** consistency with environmental cleaning.
  - High to low, clean to dirty
  - High touch areas

54

Similar but Not Really

- Both enteric pathogens that cause diarrhea, with similar incubation periods, but with totally different epidemiology
- A little bit of norovirus can make someone very sick, while many people carry *C. diff* around in their normal flora with no ill effect.
  - However, both could be deadly if left untreated!
- Norovirus is easier to kill on surfaces; *C. diff* takes a lot of thought and effort.
- ABHR may be okay to use on your way out of a CDI room, but soap and water is definitely still required for noro!

55

Resources – Norovirus

Centers for Disease Control and Prevention. (2010, December 14). Norovirus Gastroenteritis: Management of Outbreaks in Healthcare Settings. Retrieved from General Information about Norovirus: https://www.cdc.gov/hai/pdfs/norovirus/NoroVirus-Gen508.pdf

Centers for Disease Control and Prevention. (2011, September 26). Norovirus in Healthcare Facilities Fact Sheet. Retrieved from General Information about Norovirus: https://www.cdc.gov/hai/pdfs/norovirus/229110-ANorpCaseFactSheet508.pdf

Centers for Disease Control and Prevention. (2018, December 7). NORS Dashboard. Retrieved from National Outbreak Reporting System (NORS): https://wwwn.cdc.gov/norsdashboard/

Centers for Disease Control and Prevention. (2021, March 5). Common Settings of Norovirus Outbreaks. Retrieved from Norovirus: https://www.cdc.gov/norovirus/trends-outbreaks/outbreaks.html

Minnesota Department of Health. (2020, September 8). 2020-2021 Norovirus Information for long-term care facilities. Retrieved from https://www.health.state.mn.us/diseases/foodborne/outbreak/facility/ltcfnorotoolkit.pdf

PA Department of Health Bureau of Epidemiology. (2019). Toolkit for Control of Norovirus Outbreaks in Long-Term Care Facilities. Harrisburg: PA Department of Health. https://www.health.pa.gov/topics/Documents/Programs/HAIP-AS/Norovirus%20Toolkit.pdf

EPA List G: https://www.epa.gov/pesticide-registration/list-g-epas-registered-antimicrobial-products-effective-against-norovirus

56

Resources – C. diff

APIC. Guide to Preventing *Clostridium difficile* Infections. 2013. Retrieved from https://apic.org/wp-content/uploads/2019/07/2013CDiffFinal.pdf

Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Healthcare Quality Promotion (DHQP). August 9, 2018. https://www.cdc.gov/hai/dpks/deadly-diarrhea/dpk-deadly-diarrhea.html

Centers for Disease Control and Prevention, *Clostridioides* difficile Infection: Preventing Transmission. Retrieved from https://www.cdc.gov/infectioncontrol/pdf/strive/CDI103-508.pdf

Clinical Practice Guidelines for Clostridium difficile Infection in Adults and Children: 2017 Update by the Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America (SHEA) Published CID, 2/15/2018 Retrieved from https://www.idsociety.org/practice-guideline/clostridium-difficile/

Clostridioides Difficile Fact Sheet. Virginia Department of Health. Retrieved from https://www.vdh.virginia.gov/epidemiology/epidemiology-fact-sheets/clostridioides-difficile/

Minnesota Department of Health. (2020, September 8). *Clostridium difficile* Toolkit for Long-term Care Facilities. Retrieved from https://www.health.state.mn.us/diseases/cdiff/hcp/ltctoolkit/index.html

EPA List K: https://www.epa.gov/pesticide-registration/list-k-antimicrobial-products-registered-epa-claims-against-clostridium

57

Thank you

Contact: jennifer.bender@pdihc.com

58