Chapter 19

Prevention of Healthcare-Associated Gastrointestinal Infections

Michael A. Borg and Rodianne Abela

Key Points
• Noroviruses are the commonest cause of healthcare-associated gastroenteritis. • Isolation of symptomatic patients, strict attention to Contact Precautions, and prompt decontamination of spillages of faeces or vomit are critical for prevention and control. • Good antibiotic stewardship is essential to prevent *Clostridium difficile* infections. • In outbreaks of gastroenteritis, hand hygiene should ideally be undertaken using soap and water because of the relatively limited effect of alcohol-based hand rubs on viruses and spores. • The use of gloves for care of patients minimises hand contamination and has been shown to reduce transmission of *C. difficile*.

Introduction

A variety of microbes can cause infectious gastroenteritis; most outbreaks in the healthcare setting are caused by viruses. Bacterial gastroenteritis can be associated with contaminated food and/or water and may spread through common vehicles or by healthcare personnel. Another major cause of healthcare-associated (HA) gastroenteritis is infection by toxigenic strains of *Clostridium difficile*.

Diarrhoea is defined as:

- 2 or more episodes of watery stools (Bristol Stool Type 7)[1-2]

  or

- 3 or more episodes of loose stools (Bristol Stool Type 6) over a period of 24 hours

All cases of acute diarrhoea and/or vomiting in healthcare settings should be regarded as potentially infectious. Nevertheless, it is important to exclude non-infectious causes of diarrhoea, such as:

- Laxative use;
- Food intolerances, such as cases of lactose intolerance and coeliac disease;
- Chemical and physical agents;
- Nasogastric feeding;
- Autoimmune diseases, e.g., inflammatory bowel disease;
- Surgery on the gastrointestinal tract; and
- Constipation associated with faecal impaction (overflow diarrhoea).

Viral Gastroenteritis

HA gastroenteritis is most commonly caused by viruses, including norovirus, adenovirus, and rotavirus. Vomiting, often sudden in onset and projectile in nature, is the major symptom. However, diarrhoea (mainly mild and short-term) can also be present, or occur on its own. Elderly patients are most at risk. Infections last 2 to 3 days and normally resolve spontaneously without the need for antibiotics. Immunosuppressed patients may shed viruses longer than others.

Outbreaks of viral gastroenteritis often have the following characteristics:

- Short incubation period (15 to 48 hours)
- Limited duration of illness (12 to 60 hours)
- Vomiting as the key symptom
- Affect both patients and staff

Noroviruses[3] are highly infectious and can be transmitted between patients, healthcare workers, and the environment in two ways:

- Direct person to person contact (especially following hand contact)
- Indirect person-to-person spread following aerosol dispersion of viral particles during vomiting. This in turn contaminates the environment, which serves as the reservoir for subsequent contamination of hands.

Most health care outbreaks of gastroenteritis start following admission of an index symptomatic patient. For this reason, all patients admitted with gastrointestinal symptoms should be immediately isolated in a single room on Contact Precautions for a minimum of 48 hours following resolution of symptoms. If single rooms are not available, patients with similar symptoms should be cohorted. Closure of a ward/unit can be considered, if feasible, to reduce the impact of the outbreak.

Stool and/or vomitus specimens should be submitted for microbiologic testing as early as possible. The tests should include viral studies. If such diagnostics are not readily available, Kaplan's clinical and epidemiological criteria can be used to establish the likelihood that the outbreak is being caused by norovirus.

Kaplan's criteria[4]:

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 from stool cultures.

Healthcare workers should wear gloves and an apron/gown for all contact with these patients and their environment. Hands must be washed with soap and water after every such contact, including after removal of gloves. Alcohol-based hand rub is not recommended for hand hygiene because the viruses that cause gastroenteritis tend to be of the non-enveloped variety and may be resistant to the effect of alcohol. Surgical masks or full face shields should be worn when there is an anticipated risk of splashing to the face, especially when caring for patients who are actively vomiting.

Bed linen and patient clothing should be changed daily. Removing and bagging linen should be performed in a way which minimises the dispersal of viruses from bed linen and clothes.

Environmental cleaning must be carried out to a high standard and cleanliness must be maintained. Increase the frequency of cleaning and disinfection of patient care areas and frequently touched surfaces during ongoing outbreaks. The ward or unit should be cleaned and disinfected twice daily. Special attention should be given to toilets, bathroom areas, commodes, and bedpans. Horizontal and frequently touched surfaces should be regularly disinfected throughout the day; these areas include the nursing station, nurse call system, telephones, door handles, sinks, and taps.

All spillages of vomit and faeces must be promptly contained, cleaned, and the area disinfected immediately. After putting on appropriate personal protective equipment (PPE) (select disposable gloves, apron/gown, and a visor or mask as appropriate) spills must first be absorbed with disposable towels. These towels should be disposed of by placing them into regular waste receptacles if the soiled material can be squeezed out of them, otherwise they must be segregated into biomedical waste container.

The contaminated area should then be washed with hot water and detergent and finally disinfected with a freshly-made chlorine solution at 10,000 ppm. This solution should be prepared according to manufacturer's instructions or by mixing 1 part bleach with 9 parts water. All PPE should be discarded appropriately; hands must then washed well with soap and water.

Cohorting of staff and patients can reduce the spread of viral gastroenteritis. Staff from wards with cases of gastroenteritis must not work in unaffected areas until 48 hours have elapsed. Symptomatic staff should be excluded from the ward immediately; they should stay away from work until they have been symptom-free for 48 hours.

Monitor compliance with infection prevention and control (IPC) practices during the outbreak. It is important to provide prompt feedback regarding practices to reduce the risk of transmission. If these efforts

fail, then it may be necessary to close the ward to new admissions.

Visitors should be restricted to individuals important for the well-being of the patient. They may be asked to gown or wear an apron to reduce the risk of contamination. Visitors should be instructed in IPC practices, including hand hygiene, before visiting the patient and then washing their hands prior to leaving the unit.

Patients should not be transferred to unaffected wards or departments unless they need urgent specialised care. In such situations, IPC staff must be consulted to ensure proper additional precautions are in place to reduce the risk of exposure. Where possible, it is prudent to postpone non-urgent interventions until Contact Precautions are no longer required. Medically stable patients may be discharged to their place of residence. If patients will be discharged to a nursing home or residential facility, the IPC team should perform a risk assessment in conjunction with their counterparts in the nursing home.

If the agent is known, the IPC team and unit manager should determine when the outbreak has stopped. Some experts believe that two complete incubation periods must elapse without a new case prior to declaring the outbreak over. For example, the ward could be re-opened 72 hours after the last case in a viral gastroenteritis situation with a short incubation period. Terminal disinfection of the ward with a chlorine disinfectant and changing of bed curtains should be performed before re-opening.

Antibiotic-associated Gastroenteritis[5]

Diarrhoea is a common complication of antibiotic treatment; it occurs due to disruption of the microbial flora in the large intestine. In some patients, this microbial imbalance results in colonisation with *Clostridium difficile*. These anaerobic spore-forming bacteria can produce exotoxins that result in mucosal injury and inflammation of the large intestine. Symptoms ranging from mild diarrhoea to pseudomembranous colitis and even colonic perforation may occur. The risk of *C. difficile* infections (CDI) increases the longer the patient stays in hospital.

Antibiotic use is the major pre-disposing factor for CDI. Virtually all antibiotics, especially those with a wide spectrum, can predispose to the condition. Antibiotic stewardship initiatives that can reduce the volume of antibiotics prescribed, such as antibiotic restriction, are crucial for prevention of CDI.

Laboratory diagnosis can be achieved by testing diarrhoeal stools for *C. difficile* antigens and toxin production. Only loose/watery stools should be tested. Molecular testing kits are also available. Asymptomatic patients do not need to be tested. Positive results should be communicated to the patient care team immediately.

If the infection is present, effective IPC measures, together with appropriate antibiotic management (based on severity), must be instituted promptly in order to minimise risk of spread to other patients. Prophylactic antibiotics are not recommended even if the patient is at high risk of developing *C. difficile* disease.

Hygienic interventions, whether relating to hands or the environment, are important to prevent cross transmission. Hand hygiene should be undertaken using soap and water because of the lack of activity of alcohol-based hand rubs on *C. difficile* spores. Use of gloves and wearing of disposable gowns or aprons is also recommended.

During outbreaks, *C. difficile* has been cultured from numerous environmental sites, including toilets, commodes, bedding, and even cleaning equipment, such as mop heads. For this reason, a programme of thorough cleaning is critical to reduce environmental contamination with *C. difficile* spores. Chlorine-based compounds have long been the mainstay products for such applications.

Recently, hydrogen peroxide mist or fogging has been used for terminal decontamination of rooms after discharge of CDI patients with good results.

It is important to ensure that equipment does not serve as a fomite to spread *C. difficile* spores. For this reason, single use items are preferred or thorough cleaning/disinfection of equipment must take place between patients. Use of rectal thermometers should be discouraged. Rectal thermometers must always be disposable and not used on another patient.

Equipment used for physiotherapy or other rehabilitation purposes should be thoroughly cleaned and disinfected after each use as well as between patients. Where possible, use hydrogen peroxide mist periodically to ensure maximal deep cleaning.

Patients with CDI should be isolated as soon as possible in a single room with its own toilet facilities. If this is not achievable, cohorting with other CDI patients is an acceptable alternative. Screening patients for asymptomatic carriage is not recommended. Asymptomatic carriers can still contaminate their environment with *C. difficile* spores, though to a much lesser extent than symptomatic patients. Currently there are not enough data to support isolation and screening of asymptomatic patients.

Patients with CDI who have satisfactorily responded to treatment can be allowed out of the isolation room when the diarrhoea has resolved. Although they can still shed spores into the environment, there are no data to support extension of Contact Precautions beyond their period of illness or until hospital discharge.

Test-of-cure is not recommended for those patients who have responded to treatment, unless symptoms recur after a period of initial improvement or after stopping therapy.

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