What is *Clostridium difficile* (*C. difficile*)?

*C. difficile* is a spore forming bacterium that can be found in stool specimens of many healthy children under the age of one year and some adults.\(^1\) Following antimicrobial treatment toxin-producing strains of *C. difficile* can multiply and may cause illness. *C. difficile* is a common cause of antibiotic-associated diarrhoea.

**Risk factors for *C. difficile***

- Exposure to antibiotics; administration of multiple antibiotic courses increases the risk further
- Gastric acid suppression (Proton pump inhibitors or H2 blockers)
- Gastrointestinal surgery or manipulation of the GI tract, including tube feeding
- Cancer chemotherapy
- Age > 64 years
- Duration of hospitalisation

**Specimens and diagnosis**

- Collect stool samples from symptomatic patients for *C. difficile* testing as soon as practicable. Request *C. difficile* testing, specifically—some laboratories do not test for it routinely.
- Testing for *C. difficile* or its toxins should be performed only on unformed stool unless ileus due to *C. difficile* is suspected.
- Repeat testing during the same episode of *C. difficile* infection is of limited value and should be discouraged within 4 weeks of a positive test.
- All patients with severe infection should have *C. difficile* culture performed. Isolates of *C. difficile* should then be referred for typing as soon as practicable. Note that currently typing is only performed from cultures.
- Colonic appearances (pseudomembranous colitis) or biopsy findings at endoscopy and/or radiological appearances may be diagnostic and should prompt laboratory testing for *C. difficile*.

**Patient—symptoms, complications and treatment**

**Clinical Symptoms**

- Watery diarrhoea/green appearance
- Fever
- Loss of appetite
- Nausea
- Abdominal pain/tenderness

**Complications**

- Relapse of diarrhoea
- Pseudomembranous colitis
- Toxic megacolon
- Perforations of the colon
- Sepsis
- Death

**Monitoring and treatment**

- Ask if this could be *C. difficile* diarrhoea
- Quickly identify patient deterioration
- Stop all unnecessary antibiotics
- If diagnosed, treat with metronidazole (oral or IV) or vancomycin (oral only) - refer to Therapeutic Guidelines: Antibiotics
- Monitor fluid balance: correct dehydration
- Monitor diarrhoea: stool chart
- Monitor signs of escalating infection: rising CRP, renal failure, falling albumin, rising WBC, fever
Clostridium difficile — Information for clinicians

Antibiotic prescribing

- Comply with Therapeutic Guidelines: Antibiotic consistent with antimicrobial susceptibility results
- Use minimum durations of treatment and use the minimum number of agents required
- Avoid use of broad spectrum betalactam agents (including ceftriaxone, cefotaxime, cefepime, ceftazidime, ticarcillin/clavulanate, piperacillin/tazobactam and meropenem), fluoroquinolones (including norfloxacin, ciprofloxacin and moxifloxacin) and lincosamides (including clindamycin and lincomycin)
- Restrict prescription of IV antibiotics to indications specified in the Therapeutic Guidelines: Antibiotic
- Always specify a stop or review date for every antibiotic course
- Use single dose surgical prophylaxis wherever possible as per Therapeutic Guidelines

Infection prevention and control - apply the following in addition to standard precautions

Contact Precautions

C. difficile is spread in faeces, which can cause widespread environmental contamination. A patient with diarrhoea, their equipment (eg. commodes, rectal thermometer) and near environment are contaminated with C. difficile bacteria and spores. These can then be transferred to other patients mainly via the equipment; or hands or clothing of healthcare staff who have touched the patient or a contaminated surface.

- Isolate patients in a single room with ensuite or dedicated commode/bed pan
- Maintain contact precautions for patient care until > 48 hours after last diarrhoeal stool
- Gloves—put on gloves and other personal protective equipment prior to room entry. When removing gloves, take care not to contaminate hands (refer to Hand Hygiene)
- Use gown or apron made of impervious material. The choice will depend on the extent of contamination anticipated
- If wearing an apron, ensure that arms below the elbow are bare of wrist watch, rings or clothing
- Anticipated endoscopies
  - Use personal protective equipment including head cover, apron, mask, goggles, face mask (if more than one person is present)
  - Hand hygiene: Rubbing / washing hands before and after care

Hand Hygiene

- As in NSW Health policy, perform hand hygiene in accordance with the 5 Moments of Hand Hygiene
- Use alcohol based hand rub for hand hygiene before putting on and after removal of personal protective equipment used for contact precautions.
- If gloves have not been worn (when contacting the patient and/or their immediate surroundings) or hands are visibly soiled then hands must be washed with soap (or an antimicrobial soap) and running water to facilitate the mechanical removal of spores. Dry hands thoroughly with paper towels.
- Alcohol based hand rubs are not effective at removing C. difficile spores.
- Patients and visitors require education about correct hand hygiene practice, particularly performing hand hygiene with soap and water after toileting

Environmental Hygiene

- Follow specific advice from your Infection Control Professional
- Disinfect surfaces, including commodes and toilets with a chlorine-based disinfectant (1 in 1000 hypochlorite solution in cold water)
- Clean and disinfect reusable equipment before the next patient. Where possible dedicate such equipment for each patient. Disinfect or discard at patient transfer or when contact precautions cease (refer to Contact Precautions)
- Maintain enhanced levels of environmental hygiene within the endoscopy service and comply with requirements for reprocessing of endoscopes

Refer to

NSW Health Policies


Hypervirulent strains of *Clostridium difficile*

Some strains of *Clostridium difficile*, including 027, can be what is classed as ‘hypervirulent’. These have been identified in Australia.

Other strains causing *Clostridium difficile* infection have been reported overseas including *Clostridium difficile* ribotypes 001, 014, 078 and 106.

Strains of *Clostridium difficile* can be hypervirulent. As an example a hypervirulent form of 027 strain has:

- Increased production of toxin A and toxin B. Toxin A is an enterotoxin (causing cytokine-mediated hyper-secretion of fluids and a subsequent inflammatory haemorrhagic process); toxin B is a cytotoxin (causing cell death) and an enterotoxin.
- Deletion of portion of a gene that down-regulates production of toxin A and toxin B.
- Production of a third toxin—Binary toxin
- Increased spore production
- More resistant to fluoroquinolones and third generation cephalosporins

Epidemiology of 027 strain of *Clostridium difficile*

**Prevalence**

In North America, increasing rates of the 027 strain were reported in Canada and USA from March 2003. It was subsequently recognised as causing outbreaks in England, the Netherlands, Belgium and France.

The Netherlands reported a significant decrease in the prevalence of 027 strain to 3 percent of all *Clostridium difficile* samples by the first half of 2009. In the UK, 027 strain is the most common strain of *Clostridium difficile* accounting for 36 percent of all isolates in 2008/09; this was a decrease of 19 percent from 2007/08, and the proportion has continued to fall following enhanced surveillance and reporting. The 027 strain accounted for 54 percent of a collection of *Clostridium difficile* samples in the USA between 2006 and 2009.

**Detection**

The *Clostridium difficile* bacteria can be detected in the stool of infected patients by using laboratory tests that are commonly available in most hospitals. Identifying the 027 strain and its ability to produce toxins is complex and only performed by a limited number of laboratories across Australia.

**Treatment**

The usual treatment for *Clostridium difficile* infection includes, if possible, stopping antibiotics being given for other purposes and/or treatment with the antibiotics - metronidazole or vancomycin.

Depending upon the severity of the *Clostridium difficile* infection, metronidazole is likely to be the appropriate first-line therapy for most cases. Regardless of what therapy is used, patients should be carefully monitored to be sure they are responding to therapy and that there is no deterioration in their condition.

References

4. NSW Health Infection Control Policy (PD2007_036)
5. NSW Health Notification of Infectious Diseases under the Public Health Act 1991 (PD2006-014)