

## Key Points

- Avoid unnecessary use of certain antibiotics (broad spectrum, especially fluoroquinolones)
- Perform hand hygiene with alcohol based hand rubs (routinely) or soap and running water (if hands visibly soiled or gloves not worn)
- Ensure that contact precautions are observed
- Ensure good hygiene of patient environment and patient equipment

## Why is *C. difficile* important?

Virulent (aggressive) strains of *C. difficile* have emerged worldwide and have caused extensive outbreaks in hospitals and the community with significant mortality, especially in the elderly

*An awful tragedy occurred at Stoke Mandeville in 2004 and 2005. Over 30 people died as a consequence of two outbreaks of infection caused by the bacterium Clostridium difficile* (Professor Sir Ian Kennedy)

Commission for Healthcare Audit and Inspection. Investigation into outbreaks of *Clostridium difficile* at Stoke Mandeville Hospital, Buckinghamshire Hospitals NHS Trust. July 2006

<http://www.buckinghamshirehospitals.nhs.uk/healthcarecommission/HCC-Investigation-into-the-Outbreak-of-Clostridium-Difficile.pdf>

## 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.<sup>1</sup>

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	Complications	Monitoring and treatment
<ul style="list-style-type: none"><li>• Watery diarrhoea/green appearance</li><li>• Fever</li><li>• Loss of appetite</li><li>• Nausea</li><li>• Abdominal pain/tenderness</li></ul>	<ul style="list-style-type: none"><li>• Relapse of diarrhoea</li><li>• Pseudomembranous colitis</li><li>• Toxic megacolon</li><li>• Perforations of the colon</li><li>• Sepsis</li><li>• Death</li></ul>	<ul style="list-style-type: none"><li>• Ask if this could be <i>C. difficile</i> diarrhoea</li><li>• Quickly identify patient deterioration</li><li>• Stop all unnecessary antibiotics</li><li>• If diagnosed, treat with metronidazole (oral or IV) or vancomycin (oral only) - refer to Therapeutic Guidelines: Antibiotics</li><li>• Monitor fluid balance: correct dehydration</li><li>• Monitor diarrhoea: stool chart</li><li>• Monitor signs of escalating infection: rising CRP, renal failure, falling albumin, rising WBC, fever</li></ul>

### Antibiotic prescribing

- Comply with Therapeutic Guidelines: Antibiotic consistent with antimicrobial susceptibility results<sup>3</sup>
- 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<sup>3</sup>
- Always specify a stop or review date for every antibiotic course
- Use single dose surgical prophylaxis wherever possible as per Therapeutic Guidelines<sup>3</sup>

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

#### Contact Precautions<sup>4</sup>

*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.<sup>1</sup>

- 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

#### 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  
  
Infection Control Policy  
(PD2007\_036) at  
[http://www.health.nsw.gov.au/policies/pd/2007/PD2007\\_036.html](http://www.health.nsw.gov.au/policies/pd/2007/PD2007_036.html)  
  
Hand Hygiene Policy  
(PD2010\_058) at  
[http://www.health.nsw.gov.au/policies/pd/2010/PD2010\\_058.html](http://www.health.nsw.gov.au/policies/pd/2010/PD2010_058.html)

## References

1. Cohen SH, Gerding DN, Johnson S et al. Clinical Practice Guidelines for *Clostridium difficile* Infection in Adults: 2010 Update by the Society for Healthcare Epidemiology of America (SHEA) and the Infectious Diseases Society of America (IDSA). *Infection Control and Hospital Epidemiology* 2010;31(5):431-455.
2. Health Protection Agency Good Practice Guide to control *Clostridium difficile*, January 2007
3. National Therapeutic Guidelines : Antibiotics (CIAP at <http://proxy9.use.hcn.com.au/>)
- 4 NSW Health Infection Control Policy (PD2007\_036)
5. NSW Health Notification of Infectious Diseases under the Public Health Act 1991 (PD2006-014)
6. Razavi B, Apisarnthanarak A, Mundy LM. *Clostridium difficile*: Emergence of Hypervirulent and Fluoroquinolone Resistance. *Infection* 2007; 5:300-307.
7. Fenner L, Frei R, Gregory M et al. Epidemiology of *Clostridium difficile*-associated disease at University Hospital Basel including molecular characterization of the isolates 2006-2007. *Eur J Clin Microbiol Infect Dis* 2008;27:1201-1207.
8. Freeman J, Bauer MP, Baines SD et al. The Changing Epidemiology of *Clostridium difficile* Infections. *Clin Microbiol Rev.* 2010;23(3):529-549.

### Hypervirulent strains of *C. difficile*

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

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

Strains of *C. difficile* can be hypervirulent. As an example a hypervirulent form of 027 strain has<sup>6,7</sup>

- Increased production of toxin A and toxin B. Toxin A is an enterotoxin (causing cytokine-mediated hypersecretion 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 *C. difficile*<sup>8</sup>

#### 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.

Netherlands reported a significant decrease in the prevalence of 027 strain to 3 percent of all *C. difficile* samples by the first half of 2009. In the UK, 027 strain is the most common strain of *C. 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 *C. difficile* samples in the USA between 2006 and 2009.

#### Detection

The *C. 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 *C. 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 *C. 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.