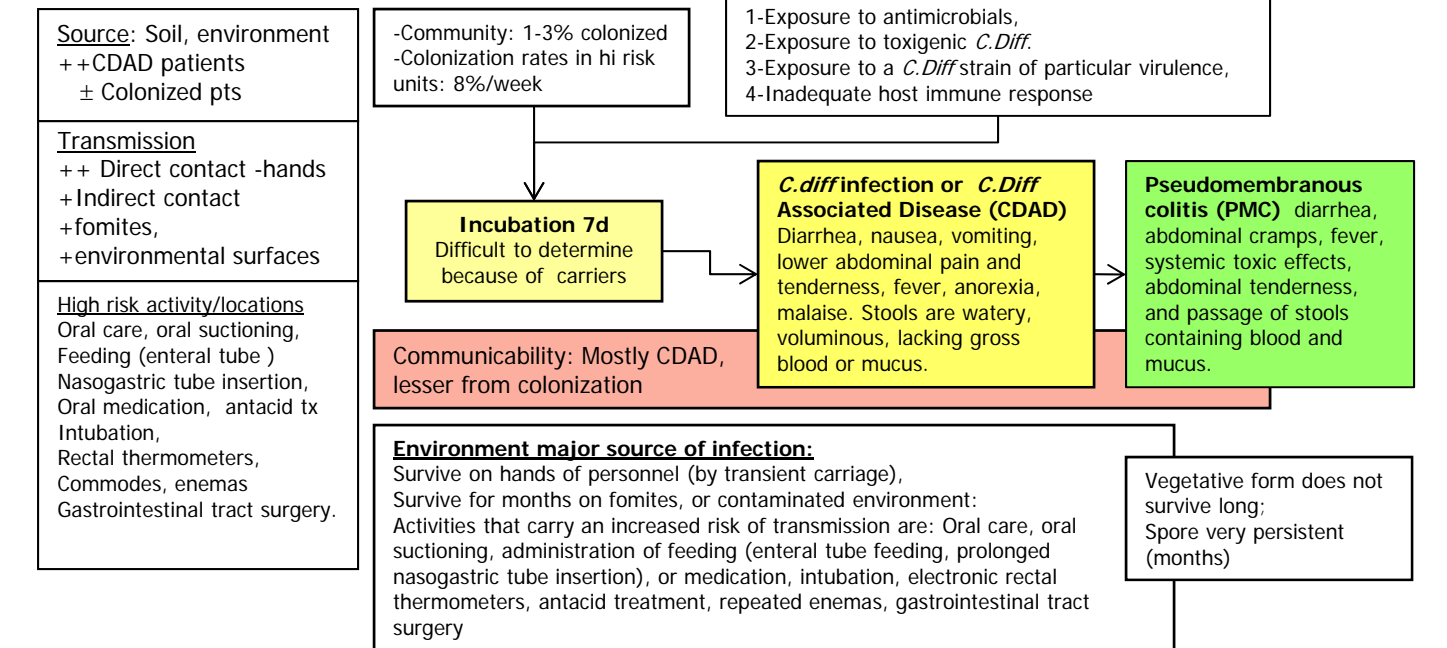


# Clostridium Difficile

## Epidemiology



## Diagnosis

### Most diagnostic tests detect the toxin:

**Enzyme immuno-assay for toxins:** Enzyme immunoassay (EIA) or cell cytotoxin assay  
Sensitive, cheap and easy to perform.

EIA for toxins A and B, or EIA for toxin A & toxin B cell culture cytotoxicity assay  
Latex agglutination tests should not be used.

**Cell cytotoxicity assay:** Stool extract added to tissue cell culture with /without neutralizing antitoxin. Toxin present if cytotoxic effect in cultures not neutralized and no cytotoxic effect in neutralized cultures. Most specific for CDAD, not very sensitive. 48-72 hours for result.

**Stool culture:** Oncycloserine-cefoxitin-fructose agar selective medium. Plates in anaerobic environment (4 hrs) then inoculation. Very sensitive but → false positive due to non-toxigenic isolates and result in > 72hrs

**Glutamate dehydrogenase (GDH) test:** Screening test (inexpensive, fast, sensitive but not specific (positive with other bacteria). Negative test useful to rule out CDAD. Positive test is often a false positive test and should be confirmed.

**Sigmoidoscopy or colonoscopy visualization of pseudo-membranes.** = pseudo-membranous colitis (PMC) is caused by *C.diff* in 90% of cases.

- Testing of asymptomatic patients not indicated for identification of carriers since treatment of carriers is futile.
- Specificity & sensitivity of the tests designed for CDAD.
- Testing asymptomatic persons results in poor positive predictive value. Most positive test results = false positives.
- False positive test in asymptomatic patient → additional antibiotic tx ↑ increase risk developing CDAD.
- Testing is not indicated for a test of cure (toxin may persist in the stools even after a successful treatment).
- Persistently positive test results at the end of treatment are not predictive of CDAD relapse.

## Treatment

**Simple measures** sufficient for 20% of patients, particularly mild disease  
1-All CDAD patients need fluid and electrolyte replacement,  
2-Avoid anti-peristaltic agents and opiates  
3-Discontinue antimicrobial therapy ASAP in patients in whom clinically significant diarrhea or colitis develops.

**Asymptomatic persistence of *C.Diff* and its toxins in stools following treatment is common. DO NOT repeat stool testing or re-treatment.**

Non responders to mild measures, patients with severe symptoms, patients who absolutely antibiotic therapy do require **specific therapy against *C.diff***.

1-First line: **oral metronidazole 500mg 3 times a day or 250mg 4 times a day for 10 days;** Metronidazole cheaper & not prone to promote VRE. IV therapy only until oral ingestion possible.

2-Second line: **Oral vancomycin 125mg every 6 hours.** IV vancomycin does not deliver sufficient concentration in the gut lumen

3-other drugs are:

- Nitazoxanide, an anti-protozoal used against cryptosporidium and giardia, at a dosage of 500 mg 2 times per day for 7 days, or at a dosage of 500 mg 2 times per day for 10 days.

- Bacitracin 25,000 units four times daily for 7-10 days

- Teicoplanin orally 100-400mg twice a day for 10 days

- Fusidic acid orally 500mg 3 times a day for 10 days

**Recurrences are found in 10% to 20% of cases.** Early recurrences within 30 days are usually due to the same strains. Later recurrences are usually caused by new strains

## Control

### Surveillance

- **A case of CDAD** is defined as an individual patient with diarrhea in which
  - 1-The patient has a diarrheal stool sample positive for *C.diff* toxin A or B or a toxin-producing *C.diff* or
  - 2-Pseudomembranous colitis found in endoscopy or surgery or
  - 3-Pseudomembranous colitis at histologic examination
- **A case of healthcare facility associated CDAD** is defined as above with onset of symptoms more than 48 hours after admission or less than 4 weeks after discharge
- **A case of community associated CDAD** is defined as above with onset of symptoms in the community or less than 48 hours after admission, or more than 12 weeks after last discharge
- A symptomatic patient with an additional positive toxin assay within 2 weeks or less after the last specimen tested positive is a **continuation of the same CDAD** and not a new case
- A symptomatic patient with an additional positive toxin assay within 2 to 8 weeks after the last specimen tested positive is a **recurrent CDAD**
- A symptomatic patient with an additional positive test more than 8 weeks after the last specimen tested positive is a **new case of CDAD**

### 1-Interrupt transmission from person to person

- Hand-washing is preferred as **alcohol-based hand sanitizers less effective** against the spore forming *C.Diff*.
- Contact precautions including Gloving whenever touching:
  - patient
  - surfaces contaminated including areas in contact with the patient
  - high touch surfaces as bedrails, light switches, faucets
- Gowning whenever getting in the room.
- Patient placement:
  - Private room with a bathroom solely used by the patient
  - If private room not available, cohorting with another CDAD.
  - If sharing room at least a 3 foot separation between beds to avoid inadvertent sharing of items between patients.
  - Curtain or a red tape on the floor identifying areas of restricted access.
- Proper handling of contaminated waste (including diapers) and fomites
- Patient transport: Transportation or movement outside the room should be limited.
  - Patient need to be taught proper hand hygiene prior to getting out of their room.
  - Contact precautions status need to be communicated to all HCP susceptible to come in contact with the patient.

### 3-Education of healthcare providers, patient and visitors

HCP need to understand the difference between CDAD and *C.diff* colonization, the great propensity of *C.diff* to contaminate and persist in the environment as spores, the effective methods for environmental disinfection, the importance of handwashing, the proper implementation of contact precautions, the prudent use of antibiotics.

Participation of patients and visitors is crucial to minimize the contamination of the environment.

### 4-Prevent onset of CDAD

- Limit the use of antimicrobial agents: Restrict the use of clindamycin and of broad-spectrum antibiotics (particularly cephalosporins);
- Encourage the proper use of antibiotics.
- Carriers of the organism appear to be resistant to acquisition of outbreak-associated strains. Individuals with asymptomatic colonization are no more likely to develop *C.Diff* diarrhea than are those with negative stool cultures.
- Metronidazole not effective in eradicating asymptomatic carriage with *C.Diff*, and treatment with oral vancomycin results in only transient elimination of fecal carriage of the organism.
- Antibiotic treatment of asymptomatic patients excreting *C.Diff* is not recommended.

### NO active case finding

- Only test patient who are suspected of having *C.Diff* infection (CDAD), patients with diarrhea
- Do not screen asymptomatic patients
- Do not repeat a negative test
- Do not perform a test of cure
- Do not place asymptomatic patients in contact precautions



Discontinuation of contact precautions after diarrhea stopped

### 2-Environmental control

- Any object or surface coming in contact with feces becomes a source of spores.
- Spores found in CDAD patient rooms and to a lesser extent in colonized patient rooms.
- The heaviest contamination is found
  - On any surface in the bathroom (commode, sink, floor, tub, shower...),
  - In the immediate surrounding of the patient: beds, bedrails, over the bed tables, chairs and any patient furniture, bed sheets
  - High touch surfaces such as TV and light control buttons, call buttons, door handle, monitor cables...
  - Patient care equipment, instruments, devices are also contaminated through fecal shedding or the hands of the patient or of HCP.
- Most *C.diff* are found on rectal thermometers, blood pressure cuffs, tube feeding, glucose meters, infusion pumps, feeding pumps, flow-control devices on IV or tube feeding lines...

### Disinfectants

- *C.diff* spores are fairly resistant to quaternary ammoniums and phenolic compounds which are not sporicidal.
  - Only chlorine based (bleach) or vaporized hydrogen peroxide disinfectants are active on spores
- A 10% solution of sodium hypochlorite (household bleach has about 6% ClO<sub>2</sub>) is adequate. It must be made fresh daily (one part bleach and 9 parts tap water). The addition of 1 part vinegar (5% acetic acid) may improve the germicidal action.

### Cleaning

Thorough cleaning is necessary to maximize the disinfectant action of the germicide. Use a commercially available solution which contains a detergent or use a detergent for thorough cleaning before applying the bleach solution. Contact time of 1 minute should be sufficient. Wetting the surface with the bleach solution and allowing it to dry should provide sufficient contact time.