Workgroup B: Proposed Outbreak Investigation and Control Guidance for *Clostridium difficile*

1. Background [WG-A+B]

Clostridium difficile is a spore-forming, gram-positive anaerobic bacillus (APIC). CDC estimated that in 2011 there were nearly 500,000 *C. difficile* infections (CDI) in the United States and approximately 29,000 people died within 30 days of a CDI diagnosis (www.cdc.gov/hai/organisms/cdiff/cdiff_infect.html). CDI is a frequent cause of healthcare-associated infections (HAI) and is associated with increased length of hospital stay, costs, morbidity, and mortality (Dubberke). CDI is related to antibiotic exposure and most commonly manifests as a gastrointestinal infection ranging from uncomplicated diarrhea to severe and life-threatening pseudomembranous colitis (Cohen).

CDI can be spread from patient to patient via environmental surfaces or on the hands of healthcare workers. *C. difficile* spores can persist on environmental surfaces for extended periods of time. Both the skin and the environment of colonized patients become contaminated; healthcare personnel hands may become contaminated by touching the environment or the patient (www.cdc.gov/hai/organisms/cdiff/cdiff-patient.html). As CDI is strongly associated with previous antibiotic use, prudent use of antibiotics has a significant role in the prevention and control of CDI (www.cdc.gov/hai/organisms/cdiff/cdiff_clinicians.html).

The epidemiology of CDI has changed since the early 2000s largely due to the emergence of a new epidemic strain of *C. difficile*. The epidemic strain of *C. difficile*, BI/NAP1/027 is associated with more severe disease, higher mortality, and increased outbreaks. Outbreaks of CDI occur in healthcare settings such as acute care hospitals and long-term care facilities where there is potential for a large number of susceptible hosts to be exposed to infectious spores (www.cdc.gov/hai/organisms/cdiff/cdiff_faqs_hcp.html).

The ongoing challenge of CDI highlights the need for better use of diagnostics (appropriate test for the right patient), meticulous attention to infection prevention (including environmental disinfection), and improved antibiotic stewardship.

2. Key Points for a Successful Investigation

The following sections outline important actions and considerations in conducting an investigation of a potential outbreak of CDI in a healthcare facility. Some of these actions can be conducted by the facility, while others may require assistance from the health department. Collaboration between the facility and public health helps ensure a successful investigation. Public health should support the facility by providing guidance and resources. The health department may be able to provide assistance with infection control assessment, medical record review, laboratory testing, data analysis, and other activities as appropriate for the investigation. This will depend on the circumstances of the potential outbreak as well as the resources of the facility and the health department. The need for an on-site visit to the facility should be determined based on the number of the cases, patient population, severity of illness, and level of assistance required.

A. Initial Investigation

- Ensure the timeliness and appropriateness of testing practices. Patients should have ≥3 loose stools within 24 hours; testing stewardship prevents testing of patients with solid stool samples or other explanations for diarrhea (e.g. patients receiving laxatives or tube feeds). Note that nucleic acid amplification tests (NAAT) are very sensitive but do not distinguish CDI from asymptomatic carriage. If the cluster of cases is due to inappropriate testing, consider halting the investigation and taking steps to improve CDI testing practices.
- Construct a line list that includes admission date, admission source, location in the facility, movement of the patient within the facility, environmental cleaning, symptom onset date, date of positive test, testing method, previous history of CDI, prior antibiotic exposure, discharge date. (**Reducing *C. difficile* Infections Toolkit:** Best practices from the GNYHA/UHF *Clostridium difficile* Collaborative, page 24) [vi]
- Perform additional case finding through review of laboratory records and if indicated, medical chart review of epidemiologically linked patients.
- Utilize the list to identify commonalities among patients and determine if cases are epidemiologically linked and whether there is evidence of transmission.
- Establish a case definition including patient population, location, timeframe, as well as laboratory and clinical criteria. Consider using case classifications such as Suspect, Probable, and Confirmed.
- Capture information on infection control practices, environmental cleaning, and other relevant information.

B. Infection Control Assessment and Enhanced Precautions

- Perform an assessment of infection control practices such as hand hygiene, donning and doffing of PPE, and environmental cleaning on units affected by the outbreak (refer to the Hand Hygiene and Environmental Cleaning sections below).
- When investigating larger outbreaks consider utilizing the CDC Target, Assess, Prevent (www.cdc.gov/hai/prevent/tap.html) strategy to review awareness and perceptions of policies and practices related to CDI prevention in the affected facility or unit.
- Patients with CDI (including patients suspected of having CDI while awaiting testing) should be put in a private room and placed on contact precautions. [iv]
    - If single rooms are not available, cohort patients, providing a dedicated commode for each patient. [iv]
    - If there is a limited number of private single rooms, CDI patients with stool incontinence should be prioritized for private room placement. [viii]
- Maintain contact precautions for 48 hours after diarrhea has ceased: [viii]
    - Considerations should be made during an outbreak in a hospital to continue contact precautions for the duration of the hospitalization. [viii]
    - Clinical suspicion of CDI should outweigh negative enzyme immunoassay test results in patients with a high suspicion of having CDI, and the patient should remain on contact precautions. [iv] In such instances, supplementary testing with NAAT or a

glutamate dehydrogenase (GDH) test will be helpful if available. If the test result from either NAAT or GDH is negative, this excludes the infection control risk.

- Provide training on PPE donning and doffing practices with follow up audit and feedback provided to ensure adherence to best practices.
- Visitors should be instructed on the use of gowns and gloves. [iii]

C. Hand Hygiene
- Perform hand hygiene audit on affected unit and feedback data. [iii]
- Education on hand hygiene should be conducted followed by further observations of hand hygiene.
- Visitors should be instructed on performing hand hygiene. [iii]
- Strict hand hygiene should be performed with soap and water during an outbreak to physically remove spores. [iv]

D. Environmental Cleaning
- Audit cleaning procedures on affected units; provide feedback to environmental services staff. [xiii]
- Perform terminal cleaning after CDI patient transfer/discharge with a C. difficile sporicidal agent (EPA List K agent). Additional disinfection with no-touch technologies can be considered (e.g. UV light). [viii] (https://www.epa.gov/pesticide-registration/list-k-epas-registered-antimicrobial-products-effective-against-clostridium) [v]

E. Antimicrobial Stewardship
- Review CDI cases to optimize management by discontinuing unnecessary antibiotics and modifying antibiotic regimens to avoid antibiotics that create the greatest risk for CDI such as clindamycin, fluoroquinolones, and cephalosporins if possible. [xiii]
- If an outbreak is confirmed, conduct additional review of antibiotic prescribing practices to identify opportunities to improve overall stewardship to optimize the frequency and duration of antimicrobial therapy and the number and types of antimicrobial agents prescribed. [viii]
- A strong antimicrobial stewardship program is a key to preventing outbreaks of CDI. [iv]

F. Additional Surveillance
- Continue enhanced surveillance for additional cases while implementing control measures and assessing infection control practices.
- Utilize surveillance data to determine if control measures have interrupted transmission.
- Testing for cure is not recommended.
- Screening of asymptomatic patients is not recommended. [iv]
- Public health should follow up with the facility on a weekly basis (e.g., telephone or email contact) to monitor for additional cases and assess implementation of mitigation measures.

- If after 4 weeks there are no further cases, consider concluding the investigation.

3. Investigation and Control Resources

[See Scabies table for examples of specific investigation resources (e.g. line lists)]

4. Other Recommended Resources/Key References [WG-A+B]

[i] Association of Practitioners in Infection Control. *Guide to Preventing C. difficile Infections*. http://apic.org/Resource_/EliminationGuideForm/59397fc6-3f90-43d1-9325-e8be75d86888/File/2013CDiffFinal.pdf.

[ii] Banach D, Bearman G, et al. (2018). Duration of Contact Precautions for Acute-Care Settings. Infection Control & Hospital Epidemiology, 39(2), 127-144. https://doi:10.1017/ice.2017.245.

[iii] Cohen, Stuart H., 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*, vol. 31, no. 5, 2010, pp. 431–455. *JSTOR*, JSTOR, www.jstor.org/stable/10.1086/651706.

[iv] Dubberke E, Carling P, et. al. (2014). Strategies to Prevent *Clostridium difficile* Infections in Acute Care Hospitals: 2014 Update. *Infection Control & Hospital Epidemiology, 35*(S2), S48-S65. https://doi:10.1017/S0899823X00193857.

[v] Duberke E, Gerding D. Rationale for Hand Hygiene Recommendations after Caring for a Patient with *Clostridium difficile* infection. A Compendium of Strategies to Prevent Healthcare-Associated Infections in Acute Care Hospitals. Fall 2011 Update. https://www.shea-online.org/images/patients/CDI-hand-hygiene-Update.pdf.

[vi] United States Environmental Protection Agency (2018). *LIST K: EPA's Registered Antimicrobial Products Effective against Clostridium difficile Spores*.

[vii] Greater New York Hospital Association/United Hospital Fund (2011). *Reducing C. difficile Infections Toolkit: Best practices from the GNYHA/UHF Clostridium difficile Collaborative*. https://apic.org/Resource_/TinyMceFileManager/Practice_Guidance/cdiff/C.Diff_Digital_Toolkit_GNYHA.pdf

[viii] Gould C, McDonald C. *Clostridium difficile* (CDI) Infections Toolkit Activity C: ELC Prevention Collaboratives. Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention.

[ix] McDonald C, Gerding D, et. al. 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), Clinical Infectious Diseases, Volume 66, Issue 7, 19 March 2018, Pages e1–e48, https://doi.org/10.1093/cid/cix1085.

[x] Massachusetts Department of Health. Infection Prevention in Long Term Care *Clostridium difficile* (*C. difficile*).

[xi] www.cdc.gov/hai/prevent/tap.html (CDC Target, Assess, and Prevent Strategy)

[xii] www.cdc.gov/antibiotic-use/healthcare/index.html (Antibiotic Prescribing and Use in Hospitals and Long-Term care)

[xiii] www.cdc.gov/hai/organisms/cdiff/cdiff_infect.html (*Clostridium difficilie* Infection)

[xiv] www.cdc.gov/hai/organisms/cdiff/cdiff-patient.html (*Clostridium difficilie* Resources for Patients)

[xv] www.cdc.gov/hai/organisms/cdiff/cdiff_clinicians.html (*Clostridium difficilie* Resources for Clinicians)

[xvi] www.cdc.gov/hai/organisms/cdiff/cdiff_faqs_hcp.html (*Clostridium difficilie* Frequently Asked Questions for Healthcare Providers)

[xiii] Subject Matter Expert Advice (opinion?)