Evaluation of *Clostridium difficile* Testing and Ordering Practices
Last updated July 2018

The goal of this evaluation is to gain a better understanding of *C. difficile* testing and ordering practices. Use the results to identify gaps and determine where training/education and improved processes may be useful to improve the appropriateness of *C. difficile* testing and ordering.

Summary of the evaluation process
1. Obtain a line list of *C. difficile* test orders
2. For each *C. difficile* test ordered, review the patient's health record to collect the following data:
    a. Documentation of ≥3 unformed stools within 24 hours
    b. Documentation of stool characteristics (e.g., unformed, soft, liquid, takes the shape of the container, Bristol stool chart types)
    c. No laxatives in previous 48 hours
    d. Unexplained diarrheal symptoms (i.e., symptoms not clearly attributable to underlying conditions [inflammatory bowel disease, and therapies such as enteral tube feeding, intensive cancer chemotherapy]; gastrointestinal surgery; underlying diseases and/or medical or surgical interventions that increase the chance of iatrogenic diarrhea)
    e. Specimen not tested in previous 7 days for that patient (i.e., retesting patient)
    f. Elevated white blood cell (WBC) count
    g. Fever (patient temperature ≥ 38 degrees Celsius)
    h. Abdominal pain
    i. Amount of time from test order to test result

1. **Obtain a line list of *C. difficile* test <u>orders</u> (all patients tested, whether positive or negative results) for a specified timeframe. Aim to evaluate a minimum of 25 *C. difficile* test orders.**

2. **Review each *C. difficile* testing order for clinical signs and symptoms suggestive of CDI**
Use the data collection tool below to review each test that was ordered for clinical signs and symptoms suggestive of CDI. For each column, review the medical record to answer yes, no, or unknown. Unknown information is useful to identify potential gaps in documentation and processes.
* Column #1 is the patient identification number (i.e., medical record number)
* Columns #2-6 include the recommended criteria for *C. difficile* testing.
* Columns #7-9 include clinical information that can be useful to inform testing.
* Column #10 evaluates whether stool was collected for testing within 24 hours of test order; this information can be useful to learn more about the time the order is placed in relation to when the test is performed. (To further explore these processes, the facility can add "date order placed" and "date test performed" to learn about the amount of time from test order to test result.)
* Column #11 is the final result for the *C. difficile* test that was ordered.
* Column #12 is the final determination as to whether the order for the test was appropriate based on the documented information. When making the final determination, it is suggested to focus on columns #2-6, (IDSA/SHEA recommended testing criteria), recognizing that the additional clinical information in columns #7-10 may be helpful to understand ordering practices.

Data collection tool

Evaluation time period: *start date* _____   *end date* _____

1	2	3	4	5	6	7	8	9	10	11	12
ID #	Patient had unformed stool	Patient had ≥3 unformed stools in 24 hours	Patient did not have laxatives in previous 48 hours	Patient did not have other therapies that may have diarrhea symptoms*	Patient did not have a specimen tested in previous 7 days (i.e., no retesting)	Patient had elevated WBC count	Patient had fever**	Patient had abdominal pain	Test per-formed within 24 hours of test order	C. diff test result (+ / -)	Patient met testing criteria
001											
002											
003											
004											
005											
006											
007											
Total											

*Unexplained diarrheal symptoms (i.e., symptoms not clearly attributable to underlying conditions [such as inflammatory bowel disease, and therapies such as enteral tube feeding, intensive cancer chemotherapy]; gastrointestinal or bowel surgery; underlying diseases and/or medical or surgical interventions that increase the chance of iatrogenic diarrhea)

**Fever: ≥38 degrees Celsius

3. **Summarize results of *C. difficile* testing orders**
   - Overall summary
     - Total number of *C. difficile* test orders: _____
     - Number of orders that met testing criteria: _____
     - Number of orders that did not meet testing criteria: _____
   - For the last row in the table, sum the number of "yes" responses for each column. Review this information to inform strengths and challenges in ordering practices.
     - Strengths:

     - Challenges:

   - To get a closer look at ordering practices among orders that did not meet testing criteria, highlight these orders (rows) and only consider them for the questions below.

     Among orders that did <u>not</u> meet testing criteria:
     - Number of orders that had unformed stool: _____
     - Number of orders that had <3 unformed stools in 24 hours: _____
     - Number of orders on patients that had laxatives in previous 48 hours: _____

- o Number of orders that had other therapies/conditions that may have explained diarrheal symptoms (IBD, tube feeding, chemotherapy, bowel or gastrointestinal surgery, etc): _____

  - o Number of orders that had a specimen tested in previous 7 days (i.e., retest): _____

  - o Number of orders where the test was not performed within 24 hours of test order: _____

  - o Total number of orders that did not meet testing criteria: _____

  - o Review the results to determine whether there are patterns in inappropriate testing practices by role and unit/area/department

  - o Review information from the following to identify strengths and gaps
    - ▪ Providers
    - ▪ Laboratory
    - ▪ Nursing (including documentation of signs/symptoms)

4. Summarize findings

Focus on patients with positive *C. difficile* test results. Re-calculate the number of hospital-onset (HO)-CDI cases to find the "true" number of cases of HO-CDI in the facility.

Number of total patients with *C. difficile* test ordered and had positive test result: _____

Number of HO-CDI cases (classified as HO *before* this evaluation): _____

Among orders with positive C. difficile *test results*:

Number of CDI cases that met testing criteria ("true" positive CDI cases) – it is suggested to focus on columns #2-6, (recommended testing criteria): _____

Of the "true" CDI cases, number of HO-CDI cases that met testing criteria and had positive test result on or after Day 4 of hospital admission ("true" HO-CDI cases): _____

Number of patients that did not meet testing criteria (*C. difficile* colonization cases or "true" non HO-CDI cases): _____

5. Next steps

How many hospital-onset CDI cases were "true" hospital-onset cases, as verified by the testing/ordering evaluation?

Answer:
- • Not many: "this is not an issue at our facility"
  - o Next steps: The MHA CDI Road Map is a useful tool to assess practices related to CDI, such as:
    - ▪ Hand hygiene practices
    - ▪ Patient isolation - prompt isolation processes; compliance with personal protective equipment for isolation practices
    - ▪ Environmental cleaning/disinfection
    - ▪ Antibiotic stewardship

- A lot: "this is an issue at our facility"
  - o Next steps: Identify gaps
    - ▪ Processes for diagnosing CDI:
      - Stool consistency criteria not met (criteria: stool specimen is liquid, watery, loose, takes the shape of the container)
      - Stool frequency criteria not met (criteria: ≥ 3 stools within 24 hours)
      - Diarrheal duration/timing/frequency criteria not met (criteria: ≥ 3 stools within 24 hours)
      - Laxative use (criteria: no documentation of laxatives within 24-48 hours)
      - Alternative explanations for diarrhea
      - Diarrheal signs/symptoms were present on admission
        - o Identify factors that resulted in delay of prompt testing

    - ▪ Testing practices:
      - Patient had a known negative *C. difficile* test in last 7 days (i.e., repeat testing, ordering multiple tests)
      - Patient had a known positive *C. difficile* test (i.e., repeat testing, ordering multiple tests, test for cure)

    - ▪ Documentation practices:
      - Information was not documented or available in the medical record at the time *C. difficile* test was ordered – specify details (e.g., stooling, laxatives, etc)

6. **Implementation strategies to improve appropriateness of *C. difficile* testing**
   The MHA CDI Road Map is a useful tool to implement and assess practices related to CDI.

   - Through a multidisciplinary process, establish *C. difficile* testing criteria, such as:
     - o Patients with unexplained and new-onset ≥3 unformed stools in 24 hours and
     - o No laxative use within 48 hours
     - o Include guidance for testing pediatric patients

   - Provide feedback on testing/ordering practices to staff/key stakeholders on a regular basis

   - Soft stop protocol: to prevent testing of patients with low probability for CDI, this method functions as a pop-up notice/alert that prompts the clinician to review clinical criteria before placing the order
     - o Clinicians ordering *C. difficile* testing receive an alert if certain clinical information, such as an order for laxatives within the previous 24 hours
     - o Alert provides details about pertinent clinical information and suggests that the order for *C. difficile* testing be reconsidered
     - o Be aware that the alert may lose effect over time as people get used to seeing it and then click through it

   - Hard stop protocol: to prevent testing of patients with low probability for CDI, this method only allows the clinician to proceed with placing the order if specific criteria are met
     - o Conditions for *C. difficile* testing may include documentation of at least three episodes of diarrhea in the prior 24 hours, and no documentation of laxative order in the previous 24 hours. If both conditions are met, then the order can be placed. If one or both conditions are not met, the order cannot be placed. If either of these conditions are not met, the order cannot proceed (or may only proceed if there is a process for the clinician to work with the lab to override the stop)
     - o Hard stops prevent testing of solid stool specimens and repeat testing

- Expiration of *C. difficile* test order
    - o Determine an amount of time (e.g., 48 hours) in which the *C. difficile* test order expires, if no specimen is collected

- Stool rejection policy
    - o The laboratory declines testing for stools submitted for testing that do not meet the designated *C. difficile* criteria (e.g., loose or watery stool)

- Education
    - o Use data to educate providers, such as:
        - CDI surveillance data
        - *C. difficile* test ordering data
        - Impact of inappropriate testing on CDI surveillance
    - o Provide staff education on testing criteria – include specifics such as the facility definition for "loose or watery stool, "laxatives" (provide examples of medication names), and common alternative explanations for diarrheal symptoms [use your data to inform topics for education]

- Survey staff to identify potential gaps in practices/processes related to CDI prevention
    - o CDC targeted assessment of prevention (TAP) Facility Assessment [https://www.cdc.gov/hai/prevent/tap/cdiff.html]

7. Evaluate progress

As the facility implements strategies to reduce inappropriate testing for *C. difficile*, choose metrics to use to measure progress. Include time intervals for measuring each metric (e.g., evaluate metrics on a weekly, monthly, quarterly basis). Examples of metrics include:

- Number of *C. difficile* tests ordered
- Number and percentage of orders submitted for *C. difficile* testing that met testing criteria/protocol
- Number of *C. difficile* tests ordered that lacked an appropriate indication (i.e., did not meet the *C. difficile* testing criteria)
- Number and percentage of orders submitted for *C. difficile* testing where the patient had ≥ 3 stools within 24 hours
- Number and percentage of stool specimens sent to the lab that met the designated *C. difficile* criteria (e.g., loose or watery stool)
- Percentage of orders submitted for *C. difficile* testing where the patient had no documentation of laxatives in previous 48 hours
- Percentage of orders submitted for *C. difficile* testing where the patient had no alternative explanation for diarrheal symptoms (i.e., symptoms not clearly attributable to underlying conditions such as IBD, enteral tube feeding, intensive cancer chemotherapy, gastrointestinal or bowel surgery, diseases and/or medical or surgical interventions that increase the chance of iatrogenic diarrhea)
- Number of positive hospital-onset CDI cases
- Number of true positive hospital-onset CDI cases
- Number of false positive hospital-onset CDI cases
    - o Alternatively, number of false positives prevented
- Number of test attempts prevented (order initiated but not completed)
- Number of tests prevented from processing by the laboratory
    - o Include estimated dollar amount (e.g., ~$1000.00 per case) [Bunnell, 2017]
- Number of positive tests avoided (and subsequent antibiotic prescriptions for CDI therapy)
    - o Include estimated dollar amount (work with the lab to estimate; Yen et al (2018) published an estimate for nucleic acid amplification test as ~$34.20 per test) [Yen, 2018]

References

McDonald LC, Gerding DN, Johnson S, 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). Clin Infect Dis. 2018;66:e1-e48. Available at:
https://academic.oup.com/cid/article/66/7/e1/4855916

Minnesota Hospital Association. *Clostridium difficile* (CDI) Road Map. Available at:
https://www.mnhospitals.org/Portals/0/Documents/patientsafety/Clostridium%20Difficile/CDI%20Road%20Map.pdf

Bunnell KL, Danziger LH, Johnson S. Economic barriers in the treatment of *Clostridium difficile* infection with oral vancomycin. Open Forum Infect Dis. 2017;4:ofx078.

Drees M, Dressler R, Taylor K, et al. Testing stewardship: a "hard stop" to reduce inappropriate C. diff testing. Open Forum Infect Dis. 2017;4(Suppl 1):S1-S2.

Kociolek LK, Bovee M, Carter D. Impact of a Healthcare Provider Educational Intervention on Frequency of *Clostridium difficile* Polymerase Chain Reaction Testing in Children: A Segmented Regression Analysis. J Pediatric Infect Dis Soc. 2017;6(2):142-148.

Nicholson MR, Freswick PN, Di Pentima MC, et al. The use of a computerized provider order entry alert to decrease rates of *Clostridium difficile* testing in young pediatric patients. Infect Control Hosp Epidemiol. 2017;38:542-546.

University of Wisconsin Hospitals and Clinics. Adult Inpatient Testing Algorithm for *Clostridium difficile* Infection (CDI). Available at:
https://www.uwhealth.org/cckm/cpg/infection-and-isolation/related/CDI-Testing-Algorithm-Update_IV-to-oral-contrast-7-15-16.pdf?download=true

Vanderbilt University Medical Center. Guidance to Providers: Testing for *C. difficile* Infection. Available at:
http://www.mc.vanderbilt.edu/documents/infectioncontrol/files/Guidance%20for%20Providers%20FINAL%202011.pdf

White DR, Hamilton KW, Pegues DA, et al. The impact of a computerized clinical decision support tool on inappropriate *Clostridium difficile* testing. Infect Control Hosp Epidemiol. 2017;38:1204-1208.

Yen C, Holtom P, Butler-Wu S, et al. Reducing *Clostridium difficile* Colitis Rates Via Cost-Saving Diagnostic Stewardship. Infect Control Hosp Epidemiol. 2018;39(6):734-736.