Utilizing Technology to Decrease Laboratory Identified *Clostridioides difficile* Events

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ABSTRACT

Background: Hospital acquired infections (HAIs) are known to cause longer hospital stays and increase morbidity. To estimate the burden of HAIs in a facility, National Healthcare Safety Network (NHSN) utilizes the laboratory identification of multi-drug resistant organisms (MDROs) and *Clostridioides difficile* infection (CDI) for national benchmarks. *Clostridioides difficile* (C. diff) is nationally tracked and utilized by Centers for Medicare and Medicaid Services (CMS) to reimburse facilities.

Methods: Retrospective chart reviews were conducted on all identified patients with concerns for CDI which were considered Hospital Onset (HO). Best Practice Alerts (BPAs), which are informational pop-ups when providers order tests, were modified. Algorithms were developed for education on clinical presentation and reasoning for CDI testing was presented to clinical staff. These included the C. diff Stool Collection Algorithm upon Admission (Calendar Days 1-3) and the C. diff Stool Collection Algorithm (Calendar Day 4 or later). The algorithms encompass education on clinical signs and symptoms of infection, such as the new onset of at least one of the following: temperature ≥38.1°C, nausea, loss of appetite, abdominal pain/tenderness unrelated to another condition or disease process, or unexplained leukocytosis.

Results: After two months, improper *Clostridioides difficile* testing declined significantly. We realized our first month with zero CDIs.

Conclusion: Early detection of CDI is still an issue for admissions, inappropriate testing after laxative use has lowered. Education for team members on these issues continues to be of importance.

INTRODUCTION

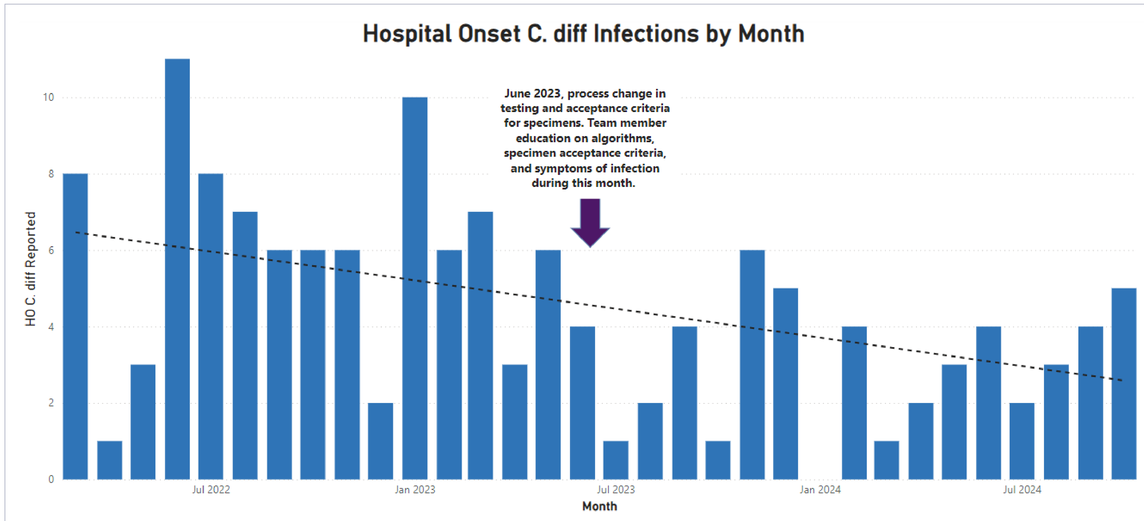
C. diff is a bacteria that is naturally occurring in the environment. Patients exposed to antibiotics are at the greatest risk for developing CDI. In 2022, it was estimated that the average cost associated with a hospital acquired CDI is $37,518 per case. At our institution, in 2019, C. diff testing changed from polymerase chain reaction (PCR) testing to PCR with toxin cytotoxicity assay for confirmation. This assay change, along with an advisory to ordering clinicians not to order testing on patients receiving laxatives, created several months of low infection counts. Starting around June of 2023, the facility implemented stricter acceptance policies and more stringent education around ordering testing.

MATERIALS & METHODS

The facility developed and implemented C. diff Stool Collection Algorithms to provide ongoing guidance. The use of diarrhea-inducing agents (e.g., tube feedings, bowel prep, oral contrast) was also monitored. BPAs for testing after laxative use display for 72 hours after the last dose, which was an increase from the previous 48-hour BPA. At-home use of laxatives did not trigger the BPA upon admission, thus did not interfere with test ordering. Specimens not meeting types six or seven on the Bristol Stool Form Scale were rejected for testing, with the option to contact Infectious Disease for approval when necessary. The laboratory transitioned to Enzyme Immunoassay testing in June 2023 to decrease false positives and workload.

RESULTS/OUTCOMES

- Following an in-depth chart review, we discovered that 65% of positive tests reported to CMS lacked proper documentation of symptoms defining clinical infection. Additional issues included testing patients after tube feeding changes and within three days of discontinuing laxatives.
- 18% of positive tests reported to CMS had documented diarrhea upon admission, with testing delayed for three or more days. We identified gaps related to the inappropriate collection and testing of these stool specimens for C. diff.
- 35% of reported positives were in patients with diarrhea who started receiving tube feeds.
- 38% of reported positives had specimens collected within two days of laxative discontinuation.
- During this investigation, we observed that patient samples sent to the laboratory were tested if they met the semi-formed stool criteria for C. diff.
- Many patients on laxatives had samples sent for testing before the drug's half-life had elapsed. One of our frequently administered laxatives remains in the system for up to 72 hours. Collecting samples after the last dose and once the drug is out of the patient's system allowed for more accurate identification of diarrhea symptoms.
- The use of high-risk antibiotics contributing to C. diff infections remained relatively unchanged if not slightly increased.
- After implementation of algorithms, BPAs, strict specimen acceptance criteria, and new test methodology our C. diff testing remained relatively the same with a significant decrease in positives.
- By January 2024, our facility recorded its first month without a reported CDI.



DISCUSSION

Reducing hospital acquired infections is crucial for all healthcare institutions and their patients. C. diff is an important HAI that can cause significant morbidity and mortality. Furthermore, it is nationally monitored and used by CMS for facility reimbursement. Testing for CDI is challenging; we need to balance reducing inappropriate testing in patients who clinically don't have infection with diagnosing cases early in patients that warrant testing. Testing for CDI in patients on laxatives and with formed stools should be avoided to reduce the risk of false positives. However, patients with diarrhea on admission, should not be delayed in testing as this can result in delays in treatment and detrimental outcomes. Delaying testing will lead to positive tests being classified as HO infections which can impact reimbursement.

Continued education to providers and initiatives to reduce inappropriate testing for CDI are critical to capturing true cases of CDI and reducing unnecessary treatment in patients who are not clinically infected.

REFERENCES

- Tehrani L, Seville MT. Laxative use and Clostridium difficile testing and treatment. In: Program and abstracts of the Annual Scientific Meeting of the Infectious Diseases Society of America (IDWeek); October 7–11, 2015; San Diego, CA. Abstract no. 956.
- Polage CR, Solnick JV, Cohen SH. Nosocomial diarrhea: evaluation and treatment of causes other than Clostridium difficile. Clin Infect Dis 2012;55:982–989.
- Truong CY, Gombar S, Wilson R, et al. Real-time electronic tracking of diarrheal episodes and laxatives therapy enables verification of Clostridium difficile clinical testing criteria and reduction of Clostridium difficile infection rates. J Clin Microbiol 2017;55:1276–1284.
- Rineer S, Dizon J, Logan J, Hsu V. Laxative use and testing delays may overestimate the true burden of Clostridium difficile. In: Program and abstracts of the Annual Scientific Meeting of the Infectious Diseases Society of America (IDWeek); October 7–11, 2015; San Diego, CA. Abstract no. 955.
- Kayla A Carter, Anurag N Malani. Laxative use and testing for Clostridium difficile in hospitalized adults: An opportunity to improve diagnostic stewardship. In: Am J Infect Control. 2019 Feb;47(2):170-174. doi: 10.1016/j.ajic.2018.08.008. Epub 2018 Oct 6.
- Ariana Kavazovic BSca,*, Michele S. Fleming MSN, RN, CICa, Shelley Knowlson MSN, RN, ACCNS-AGa, Michelle Doll MD, MPHa, Kaila D. Cooper MSN, RN, CICa, Robin R. Hemphill MD, MPHa, Rachel J. Pryor MPH, RNa, Emily J. Godbout DO, MPHb, Michael P. Stevens MD, MPHa, Gonzalo Bearman MD, MPHa. Clostridioides difficile nurse driven protocol: A cautionary tale. In: American Journal of Infection Control 48 (2020) 108–111
- Strategies to Prevent Clostridioides difficile Infection in Acute Care Facilities. https://www.cdc.gov/cdiff/clinicians/cdi-prevention-strategies.html

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