2. Mylotte JM. Surveillance for *Clostridium difficile*-associated diarrhea in long-term care facilities: what you get is not what you see. *Infect Control Hosp Epidemiol* 2008;29:760–763.
3. Guerrero DM, Nerandzic MM, Jury LA, Chang S, Jump RL, Donskey CJ. *Clostridium difficile* infection in a Department of Veterans Affairs long-term care facility. *Infect Control Hosp Epidemiol* 2011;32:513–515.
4. Mylotte JM, Russell S, Sackett B, Vallone M, Antalek M. Surveillance for *Clostridium difficile* infection in community nursing homes. *J Am Geriatr Soc* 2013;61:122–125.
5. Brown KA, Jones M, Daneman N, et al. Importation, antibiotics, and *Clostridium difficile* infection in veteran long-term care: a multilevel case-control study. *Ann Intern Med* 2016;164:787–794.

Laxative Use in the Setting of Positive Testing for *Clostridium difficile* Infection

To the Editor—*Clostridium difficile* infection (CDI) is the most common healthcare-associated infection in the United States.[1] In 2011, almost half a million infections and ~29,000 deaths were estimated to be associated with *C. difficile*.[2] Timely testing and treatment is critical for improving outcomes and reducing transmission.[3] Given the high rate of asymptomatic *C. difficile* carriage, appropriate testing is also essential.[4] In healthcare settings, *C. difficile* colonization is reportedly 5 to 10 times more common than CDI and other noninfectious causes of diarrhea.[5,6]

Unformed stools due to laxative use are often submitted for CDI testing, although these specimens are not appropriate for CDI diagnosis. Recent laxative use has been reported in up to 44% of CDI tested specimens.[3,7,8] Interventions to reduce the testing of inappropriate specimens, including those due to laxative use, have led to a reduction of CDI rates and treatment.[9] We further examined the relationship between laxative use and patients who tested positive for CDI.

A retrospective study was conducted at a 537-bed teaching community hospital and included hospitalized patients who tested positive for CDI in 2014 and 2015. Testing for CDI comprised an enzyme immunoassay (EIA) for glutamate dehydrogenase (GDH) and an EIA for detection of toxin A/B (*C. diff* Quik Check Complete, Alere, Waltham, MA). If the GDH test was positive and the EIA for the toxin A/B was negative, a confirmatory polymerase chain reaction (PCR) assay (Xpert *C. difficile*, Cepheid, Sunnyvale, CA) was performed. *Clostridium difficile* infection was diagnosed using either GDH-positive and toxin-positive or PCR-positive laboratory results.

Patients who received laxatives up to 24 hours prior to positive CDI testing were identified. Laxatives included docusate sodium, senna, polyethylene glycol, bisacodyl, milk of magnesia, sodium polystyrene sulfonate, and lactulose. Sodium polystyrene and lactulose were considered laxatives if the indications for use were neither hyperkalemia nor hepatic encephalopathy, respectively. Physician and nursing notes were reviewed to determine whether diarrhea (≥3 unformed stools over 24 hours) resolved within 24 hours of positive CDI testing. The medication administration record was reviewed to determine whether laxatives were administered for greater than 24 hours after positive testing. Validation procedures were conducted for >10% of the study population to ensure reviewer consistency.

TABLE 1. Demographic and Clinical Characteristics of Hospitalized Patients with Laxative Use Within 24 Hours of Positive Testing for *Clostridium difficile*

Demographic and Clinical Characteristics, n = 29	No. (%)[a]
Age, mean y (range)	68 (26–95)
Gender	
Female	9 (31)
Male	20 (69)
Race	
Black	6 (21)
White	23 (79)
Toxin EIA+	11 (38)
Toxin EIA−/PCR+	18 (62)
Ordering hospital service	
Medicine	15 (52)
Surgery	6 (21)
Intensive care unit (medical and cardiac)	8 (28)
Proton pump inhibitor use	19 (66)
H2 receptor blocker use	15 (52)
Corticosteroid use	13 (45)

NOTE. EIA, enzyme immunoassay; PCR, polymerase chain reaction.
[a]Unless units are otherwise specified.

A total of 211 patients with CDI were included in the study. Overall, 82 patients (39%) had received laxatives within 7 days prior to positive CDI testing. Of these, 29 (14%) had received laxatives in the 24 hours prior to positive testing (Table 1). In the 24 hours prior to positive testing, 11 patients (38%) received 1 laxative; 12 patients (41%) received 2 laxatives; 4 patients (14%) received 3 laxatives; and 2 patients (7%) received 4 laxatives. The most commonly administered laxatives were docusate sodium (72%), polyethylene glycol (41%), senna (38%), and bisacodyl (17%). Furthermore, 15 patients (52%) continued to receive laxatives for >24 hours after positive CDI testing.

Of the 29 patients, 12 (41%) had resolution of diarrhea within 48 hours of positive CDI testing, including 9 (31%) who had resolution within 24 hours. Of the 9 patients who had resolution of diarrhea within 24 hours, 2 patients (22%; both toxin EIA−/PCR+) did not receive CDI treatment, and 7 patients (78%; 3 toxin EIA+, 4 toxin EIA−/PCR+) received CDI treatment.

Other studies have reported the association of laxative administration with testing for CDI.[3,7,8,9] We reviewed this association for those patients who tested positive for CDI. Surprisingly, 82 patients (39%) received laxatives within 1 week of CDI diagnosis; 29 (14%) received laxatives (usually ≥2) within 24 hours of positive testing. Despite positive results for CDI, 15 patients (52%) continued to receive laxatives for >24 hours after diagnosis.

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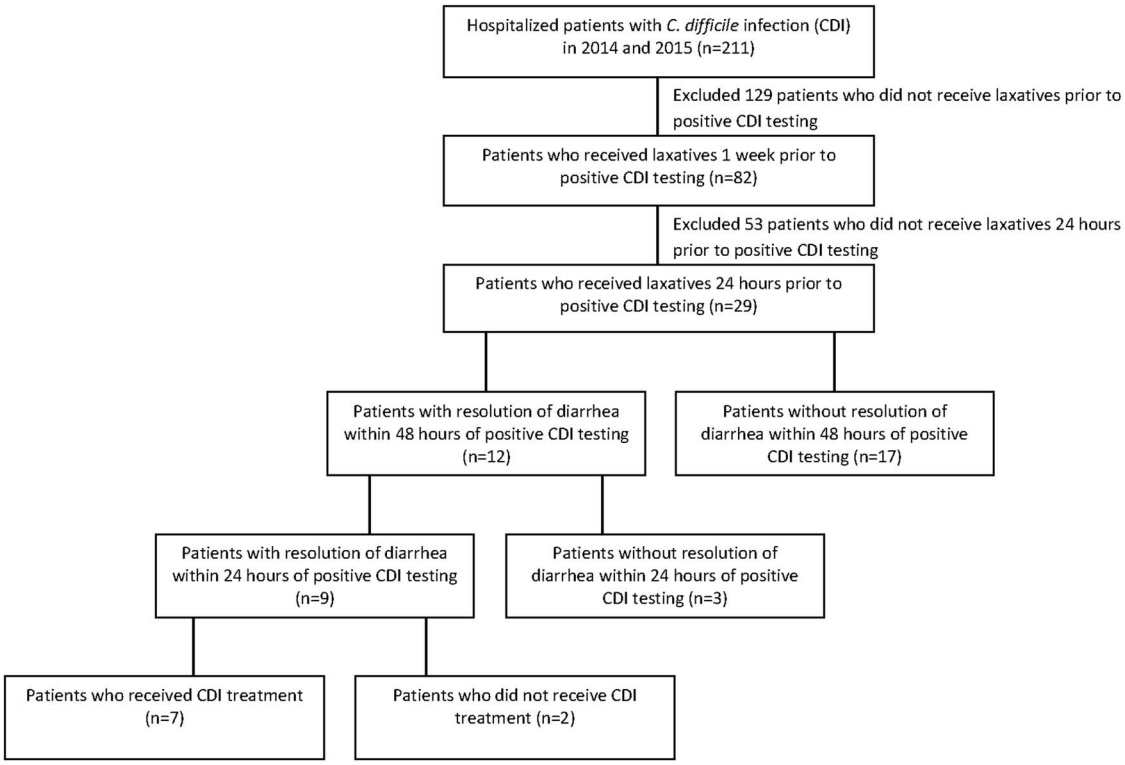

FIGURE 1. Laxative Use Among 211 Hospitalized Patients with Positive Testing for *Clostridium difficile*.

It is critical for clinicians to distinguish patients with clinically significant diarrhea from those with diarrhea due to laxatives. Of the 29 patients who received laxatives 24 hours prior to CDI diagnosis, 12 patients (41%) had resolution of diarrhea within 48 hours including 9 (31%) with resolution in 24 hours. These findings illustrate that diarrhea in the setting of laxative use and positive CDI testing may be of noninfectious etiology.[10] As further supporting evidence, 2 patients (7%) had resolution of diarrhea without any CDI treatment.

Asymptomatic colonization among hospitalized patients with *C. difficile* may be as high as 21%.[4] Appropriate testing for CDI is critical given the inability of current testing to distinguish between asymptomatic carrier and disease state. Truong et al[9] recently reported a significant decrease in *C. difficile* test utilization from 208.8 to 143 tests per 10,000 patient days and a decrease in healthcare facility-onset CDI of >25% (ie, from 13.0 to 9.7 cases per 10,000 patient days) using real-time electronic data to enforce laboratory testing criteria, which they defined as the presence of diarrhea and absence of laxative use in the prior 48 hours.[9]

In addition to improving testing cascades for CDI by limiting specimens from patients receiving laxatives, education must also engage the nursing staff. Nurses are integral in the stewardship of specimen collection for CDI because they are likely more aware of when laxatives are administered, especially since laxatives are often ordered as needed and through order sets.

Further interventions are urgently needed to improve testing stewardship for CDI, as restricting collection to patients not on laxatives represent potential opportunities for significant impact. Furthermore, providers must also consider receipt of other agents (eg, tube feeds, oral contrast) that may cause noninfectious diarrhea when considering testing for CDI.

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REFERENCES

1. Magill SS, Edwards JR, Bamberg W, et al. Multistate point-prevalence survey of health care-associated infections. *N Engl J Med* 2014;370:1198–1208.
2. Lessa FC, Mu Y, Bamberg WM, et al. Burden of *Clostridium difficile* infection in the United States. *N Engl J Med* 2015;372:825–834.
3. Buckel WR, Avdic E, Carroll KC, Gunaseelan V, Hadhazy E, Cosgrove SE. Gut check: *Clostridium difficile* testing and treatment in the molecular testing era. *Infect Control Hosp Epidemiol* 2015;36:217–221.
4. Alasmari F, Seiler SM, Hink T, Burnham CA, Dubberke ER. Prevalence and risk factors for asymptomatic *Clostridium difficile* carriage. *Clin Infect Dis* 2014;59:216–222.
5. Polage CR, Gyorke CE, Kennedy MA, et al. Overdiagnosis of *Clostridium difficile* infection in the molecular test era. *JAMA Intern Med* 2015;175:1792–1801.
6. Polage CR, Chin DL, Leslie JL, Tang J, Cohen SH, Solnick JV. Outcomes in patients tested for *Clostridium difficile* toxins. *Diagn Microbiol Infect Dis* 2012;74:369–373.
7. 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.
8. 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.
9. 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.
10. Polage CR, Solnick JV, Cohen SH. Nosocomial diarrhea: evaluation and treatment of causes other than *Clostridium difficile*. *Clin Infect Dis* 2012;55:982–989.