Implementation of a **Bowel Protocol** to Improve Enteral Nutrition and Reduce *Clostridium difficile* Testing

Jillian Wanik, DCN, RDN
Colleen Teevan, PharmD, BCPS, BCCCP
Lynn Pepin, BSN, MS, RN, CIC
Laura Andrews, PhD, APRN, ACNP-BC
Linda Dalessio, EdD, CCRN, APRN-BC
Jennifer Feda, RDN, CDN
Noubar M. Kevorkian, MD
Sharon Weintraub, MD

BACKGROUND Underfeeding is common among adult patients receiving enteral nutrition. Constipation and diarrhea have been associated with low enteral nutrition volume in critically ill patients. In patients with diarrhea, *Clostridium difficile* is often suspected and tested for, although medications, illness, or enteral formulas are usually the cause. The use of bowel protocols to proactively address constipation, diarrhea, and inappropriate testing for hospital-onset *C difficile* infection, thereby improving enteral nutrition, remains unclear.

OBJECTIVE To evaluate the efficacy of implementing protocols to decrease constipation, diarrhea, and inappropriate testing for hospital-onset *C difficile* infection, and to deliver larger enteral nutrition volumes in a critical care unit.

METHODS A prospective convenience sample was used. The primary outcome was the proportion of patients receiving greater than or equal to 80% of their prescribed caloric volume 1 week (minimum 4 days) after initiating enteral nutrition. Rates of testing for hospital-onset *C difficile* infection were analyzed before and after the protocol was implemented.

RESULTS After the protocol was implemented, patients experienced significant increases in delivery of enteral nutrition volume—up to 78% of the goal volume (P = .048). The standardized infection ratio of hospital-onset *C difficile* infection decreased 43% (P = .04).

CONCLUSIONS The implementation of bowel protocols improved delivery of total enteral volumes and reduced inappropriate testing for hospital-onset infections with *C difficile,* and they may improve patient safety and facilitate positive patient outcomes. (*Critical Care Nurse*. 2019;39[6]:e10-e18)

CE 1.0 hour, CERP A

This article has been designated for CE contact hour(s). The evaluation tests your knowledge of the following objectives:
1. Identify 3 complications of diarrhea in hospitalized patients.
2. List 3 antidiarrheal agents that can be used in patients receiving enteral nutrition.
3. List 4 commonly used medications that can cause diarrhea.

To complete evaluation for CE contact hour(s) for test C1963, visit www.ccnonline.org and click the "CE Articles" button. No CE fee for AACN members. This test expires on December 1, 2022.

In critically ill adult patients, enteral nutrition (EN) policies, procedures, and flowcharts can help standardize nutrition therapy and are associated with improved delivery of EN.[1-3] Clearly defined flowcharts that start bowel and prokinetic agents concurrently with EN can reduce interruptions to EN by increases in gastric residual volume (GRV).[4,5] Shorter length of stay, fewer infections, and shorter duration of mechanical ventilation are associated with patients receiving rates of EN at 60% to 70% of goal within the first week after admission to a critical care unit.[3] In a prospective, observational international cohort study investigating nutritional support, 80% of the goal volume indicated adequate enteral nutrition.[4] Additional research associates an optimal range of calorie intake between 70% and 100% with significantly improved survival in critically ill patients.[6]

At the Hospital of Central Connecticut, an interprofessional critical care advisory team completed in 2014 work related to enteral nutritional volumes; the aim of this work was to improve rates of achieving EN goals. Team members included the critical care medical director, medical and surgical intensivists, and members of the critical care staff: the nurse manager, a nurse educator, advanced practice registered nurses, staff nurses, a dietitian, a social worker, and a pharmacist. Upon initiation of this protocol, rates of achieving EN volume goals increased from 63% to 79% (J. Wanik, DCN, RDN, unpublished data, March 2015). Quarterly reviews over the subsequent 2 years, however, showed a reduction in these rates to 68%. Investigation into the cause of these reductions found that EN was held or ceased unnecessarily because of a lack of clear guidelines for managing increased GRV or the development of constipation or diarrhea.

Critical illness, immobility, antibiotics, and sedatives such as opioids can lead to constipation or diarrhea, and they may slow gastrointestinal motility, which in turn leads to a larger GRV.[7,8] All of these factors can contribute to a longer length of stay.[9] Constipation, if not treated effectively, can lead to clinically important bowel dysfunction, feeding intolerance, worsening distention, and discomfort.[6,10,11] In severe cases, it can effectively evolve into a large-bowel obstruction, even leading to perforation of the gastrointestinal tract.[12]

Diarrhea is a common complication in hospitalized patients: up to 32% develop diarrhea.[13,14] Stool frequency increases the risk of losing fluid and electrolytes, potentially interrupts nutritional support, increases skin breakdown, and contributes to the development of pressure injury. These complications may ultimately result in a longer length of stay. Health care providers often focus on *Clostridium difficile* infection as the primary cause of diarrhea, yet less than 20% of diarrhea in hospitalized patients

Preventing and treating constipation and diarrhea are essential to maintaining patients' overall health and recovery.

is attributable to this pathogen.[15] Most cases of diarrhea are associated with medications, enteral feeding formulations, or underlying critical illness.[15-17]

The current literature states that between 3% and 26% of the acute care hospital population is colonized with *C difficile*.[16,18] To our knowledge, no data support identifying or isolating patients colonized with *C difficile*. Current practice recommendations from the Society for Healthcare Epidemiology and Infectious Diseases of America recommend against testing asymptomatic patients.[19] Polymerase chain reaction testing at health care facilities does not distinguish between colonization and disease. At our facility, the standardized infection ratio (SIR) for laboratory-identified hospital-onset *C difficile* has increased over the past 2 years. The SIR is a summary measure used to track hospital-associated infections

Authors

Jillian Wanik is an assistant professor, University of Connecticut, and a dietician, Hospital of Central Connecticut, New Britain, Connecticut.

Colleen Teevan is a critical care pharmacist, Hospital of Central Connecticut.

Lynn Pepin is an infection control nurse, Hospital of Central Connecticut.

Laura Andrews is an associate professor, Yale School of Nursing, and senior acute care nurse practitioner, Hospital of Central Connecticut.

Linda Dalessio is an assistant professor, Nursing Western Connecticut State University, Danbury, Connecticut.

Jennifer Feda is a nutrition support dietitian, Hospital of Central Connecticut.

Noubar Kevorkian is a surgical intensivist, Hospital of Central Connecticut.

Sharon Weintraub is a surgical intensivist, Hospital of Central Connecticut.

Corresponding author: Jillian Wanik, DCN, RDN, Hospital of Central Connecticut, 100 Grand St, New Britain, CT 06050 (email: jillian.wanik@hhchealth.org).

over time at a national, state, or local level; it adjusts for various facility and patient factors that contribute to the risk of hospital-associated infection within each facility. The SIR compares the number of hospital-associated infections reported with the predicted number, considering the standard population (ie, the baseline per the National Healthcare Safety Network) and adjusting for several risk factors that are significantly associated with differences in infection incidence. In other words, an SIR greater than 1.0 indicates that more hospital-associated infections were observed than predicted; conversely, an SIR less than 1.0 indicates that fewer hospital-associated infections were observed than predicted.[20]

Preventing and treating constipation and diarrhea, and appropriately identifying active *C difficile* infection, are essential to maintaining patients' overall health and recovery. Because of an increase in the identification of *C difficile* colonization (vs *C difficile* infection) and a decrease in the EN volume delivered to patients receiving EN, we developed a quality improvement EN team from among the larger intensive care unit (ICU) advisory committee; the team also included infectious disease specialists. Members of this interdisciplinary team researched, created, tested, and evaluated a flowchart that addressed constipation and diarrhea and inappropriate *C difficile* testing hospitalwide. The flowchart defines diarrhea and parameters for appropriate testing, and it eventually evolved into hospital policy. Nurses and providers can avoid inappropriate testing by answering questions about the consistency and frequency of stools, laxative use, and relevant symptoms. The primary aim of the project was to achieve, through the use of these protocol-based interventions, a goal of delivering at least 80% of prescribed EN; the secondary aim was to reach a hospital-onset *C difficile* SIR less than 0.7.

> The primary aim of the project was to deliver at least 80% of prescribed enteral nutrition.

Methods

Participants comprised a convenience sample of both medical and surgical adult patients (≥ 18 years old) admitted to the critical care unit from January 1, 2016, through January 31, 2017. We included eligible patients who we anticipated would require EN support and who remained in the ICU for 72 hours or longer.

This study retrospectively investigated a before-and-after intervention. Registered dietitian nutritionists and a dietetic intern collected data from inpatients before protocol implementation, from January 1 to March 1, 2016. The constipation protocol was implemented in April 2016 and the diarrhea protocol in July 2016. Data were also collected after the protocols had been implemented, from September through January 2017. Patients were identified from daily Department of Food and Nutrition ICU census sheets. All patients who started receiving EN were considered eligible and were recorded on a tracking form. Once identified, a patient's information was obtained from the electronic health record. Patients were retrospectively included in the project if they had orders for EN for at least 4 days (≥ 96 hours). Patients were excluded if they were transferred out of the ICU or did not have an order for at least 3 days of EN.

Enteral nutrition order information and start time, and the type of formula, were obtained from the electronic health record with each patient's body mass index, weight at admission, and initial nutritional assessment by and recommendations from the registered dietitian nutritionist. We used documentation of intake and output to determine each patient's total formula intake, receipt of propofol (for sedation), additional protein supplements, and GRV. All data were recorded in a spreadsheet.

Since January 2013, all acute care hospitals must report *C difficile* LabID events to the Centers for Medicare and Medicaid Services via the National Healthcare Safety Network. Thus data are robust regarding the identification of *C difficile* at our facility. Our hospital's SIR increased from 0.710 in 2015 to 0.952 in 2016—a 34% increase. In 2016 a multidisciplinary team performed a root cause analysis of each hospital-onset event. Team members reviewed time lines to ascertain deficiencies in the testing process. A report was built in the electronic health record in order to identify pending orders for *C difficile* testing, thus allowing infection prevention team members to collaborate with nurses and providers caring for patients at the bedside to address potentially inappropriate testing before collecting specimens. A best practice alert was also built into the electronic health record to alert providers ordering a test for *C difficile* to review the administration of cathartics within the preceding 48 hours.

To evaluate nursing staff knowledge regarding care of patients receiving EN, a dietetic intern surveyed ICU
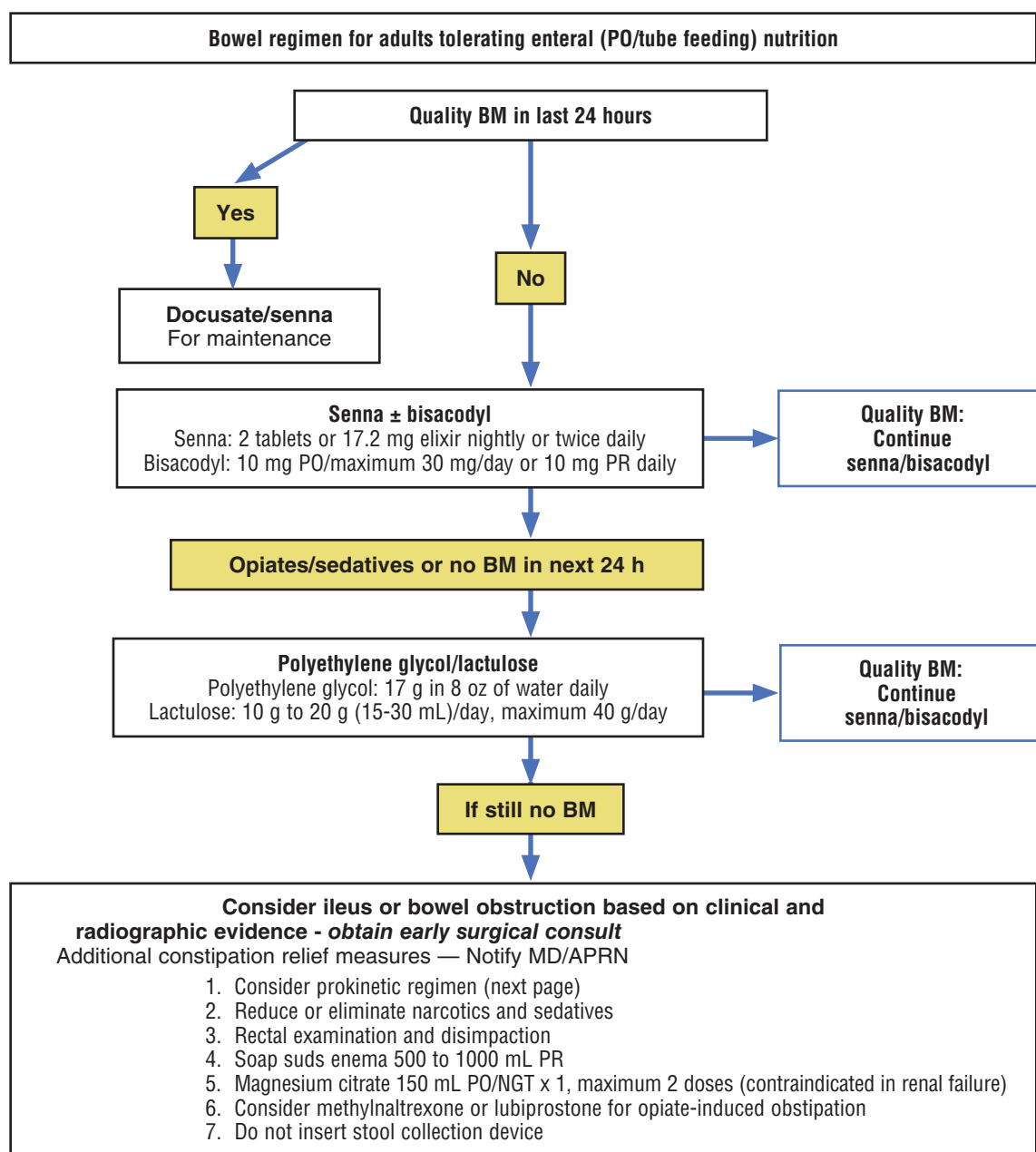
Bowel regimen for adults tolerating enteral (PO/tube feeding) nutrition

Quality BM in last 24 hours

Yes

No

Docusate/senna
For maintenance

Senna ± bisacodyl
Senna: 2 tablets or 17.2 mg elixir nightly or twice daily
Bisacodyl: 10 mg PO/maximum 30 mg/day or 10 mg PR daily

**Quality BM:
Continue
senna/bisacodyl**

Opiates/sedatives or no BM in next 24 h

Polyethylene glycol/lactulose
Polyethylene glycol: 17 g in 8 oz of water daily
Lactulose: 10 g to 20 g (15-30 mL)/day, maximum 40 g/day

**Quality BM:
Continue
senna/bisacodyl**

If still no BM

**Consider ileus or bowel obstruction based on clinical and
radiographic evidence - *obtain early surgical consult***
Additional constipation relief measures — Notify MD/APRN

1. Consider prokinetic regimen (next page)
2. Reduce or eliminate narcotics and sedatives
3. Rectal examination and disimpaction
4. Soap suds enema 500 to 1000 mL PR
5. Magnesium citrate 150 mL PO/NGT x 1, maximum 2 doses (contraindicated in renal failure)
6. Consider methylnaltrexone or lubiprostone for opiate-induced obstipation
7. Do not insert stool collection device

Figure 1 Constipation flowchart.

Abbreviations: APRN, advanced practice registered nurse; BM, bowel movement; MD, physician; NGT, nasogastric tube; PO, by mouth; PR, by rectum.

staff nurses about EN protocols, documentation in the electronic health record, and practices for checking GRV. In an effort to standardize practices, we created protocol algorithms, with clear steps to address either constipation or diarrhea, or potential *C difficile* infection (Figures 1-3 and Table 1). We developed algorithms by using a multidisciplinary approach that considered evidence-based practice guidelines and followed the format of

current facility protocols to help guide providers and nurses in appropriately identifying diarrhea and testing for *C difficile*. In addition, we reviewed published algorithms addressing these topics.[15,16] Multipronged education on these new protocols was provided to nurses, nurse technicians, and providers. The provider and nursing algorithms were distributed throughout the inpatient units; infectious disease physicians presented during grand
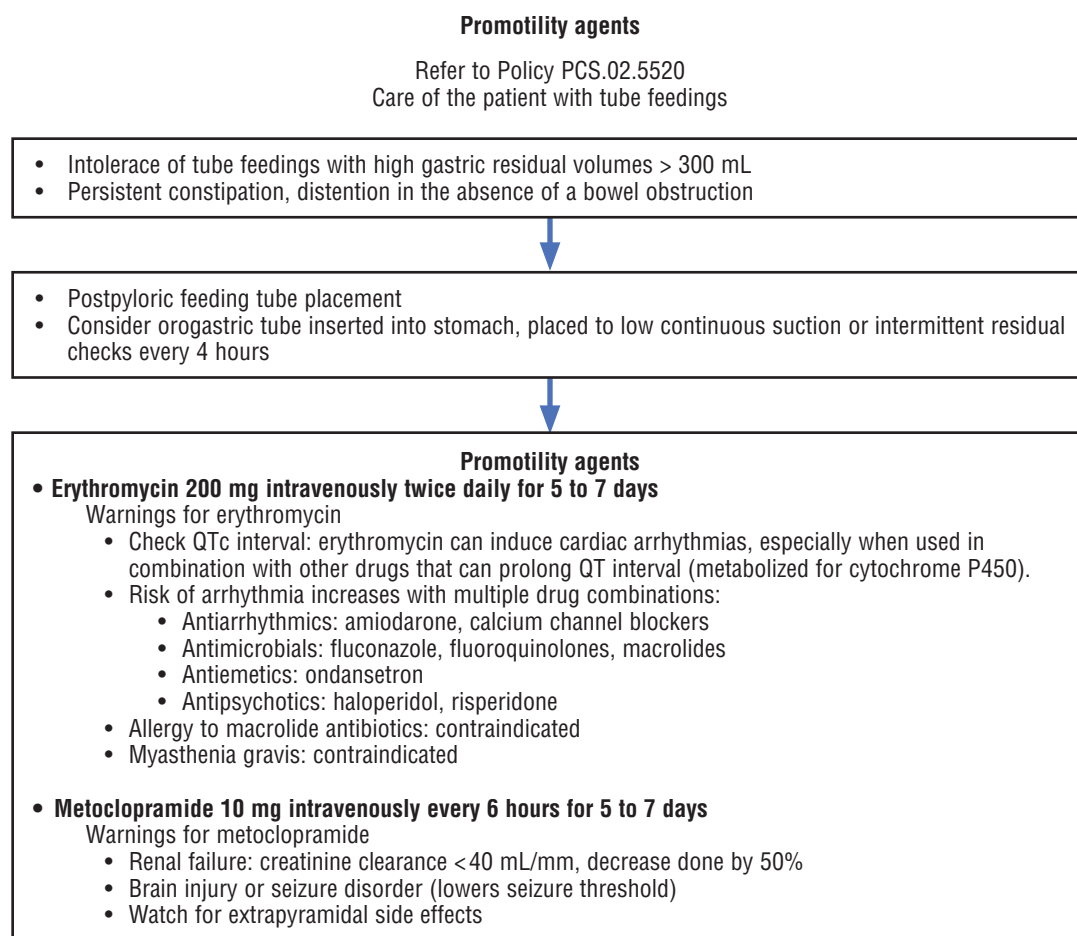
Promotility agents

Refer to Policy PCS.02.5520
Care of the patient with tube feedings

- Intolerace of tube feedings with high gastric residual volumes > 300 mL
- Persistent constipation, distention in the absence of a bowel obstruction

- Postpyloric feeding tube placement
- Consider orogastric tube inserted into stomach, placed to low continuous suction or intermittent residual checks every 4 hours

Promotility agents
- **Erythromycin 200 mg intravenously twice daily for 5 to 7 days**
  - Warnings for erythromycin
    - Check QTc interval: erythromycin can induce cardiac arrhythmias, especially when used in combination with other drugs that can prolong QT interval (metabolized for cytochrome P450).
    - Risk of arrhythmia increases with multiple drug combinations:
      - Antiarrhythmics: amiodarone, calcium channel blockers
      - Antimicrobials: fluconazole, fluoroquinolones, macrolides
      - Antiemetics: ondansetron
      - Antipsychotics: haloperidol, risperidone
    - Allergy to macrolide antibiotics: contraindicated
    - Myasthenia gravis: contraindicated

- **Metoclopramide 10 mg intravenously every 6 hours for 5 to 7 days**
  - Warnings for metoclopramide
    - Renal failure: creatinine clearance < 40 mL/mm, decrease done by 50%
    - Brain injury or seizure disorder (lowers seizure threshold)
    - Watch for extrapyramidal side effects

Figure 2 Promotility agents used for constipation.

rounds and attended hospitalists' meetings. Nurses received education on competency days, via electronic learning modules, and during daily safety huddles.

Data Analysis

We used SPSS software version 24.0 to perform statistical analysis. Data were cleaned and screened for outliers, missing values, and invalid values before being analyzed. The α level was less than 0.05 for all analyses. Descriptive analyses included frequency distributions for patient sex, age, and ethnicity and service team (medical or surgical). We analyzed continuous variables (body mass index, time since admission that EN was ordered, and number of days receiving EN) with descriptive statistics (mean, median, and range). We used an independent sample t test for the continuous variables (changes in EN and tests for hospital-onset *C difficile*).

Results

We included in the analysis a total of 43 patients: 23 in the preprotocol group and 20 in the postprotocol group. Baseline characteristics were similar between the groups. Male sex was the only significantly different variable: the preprotocol group contained significantly more men (78%; $P = .046$) than did the postprotocol group. In the postprotocol group, the mean patient age was 65.7 years; 65% were female and 85% were white. Approximately 80% of the patients were on the medical service, while the other 20% were cared for by the surgical service, which is consistent with our daily census breakdown.

Patients in the preprotocol group received EN support for a mean of 4.2 days and received 69% of their ordered volume. Patients in the postprotocol group received EN support for a mean of 5.6 days and received 78% of their ordered volume. Although the postprotocol group did
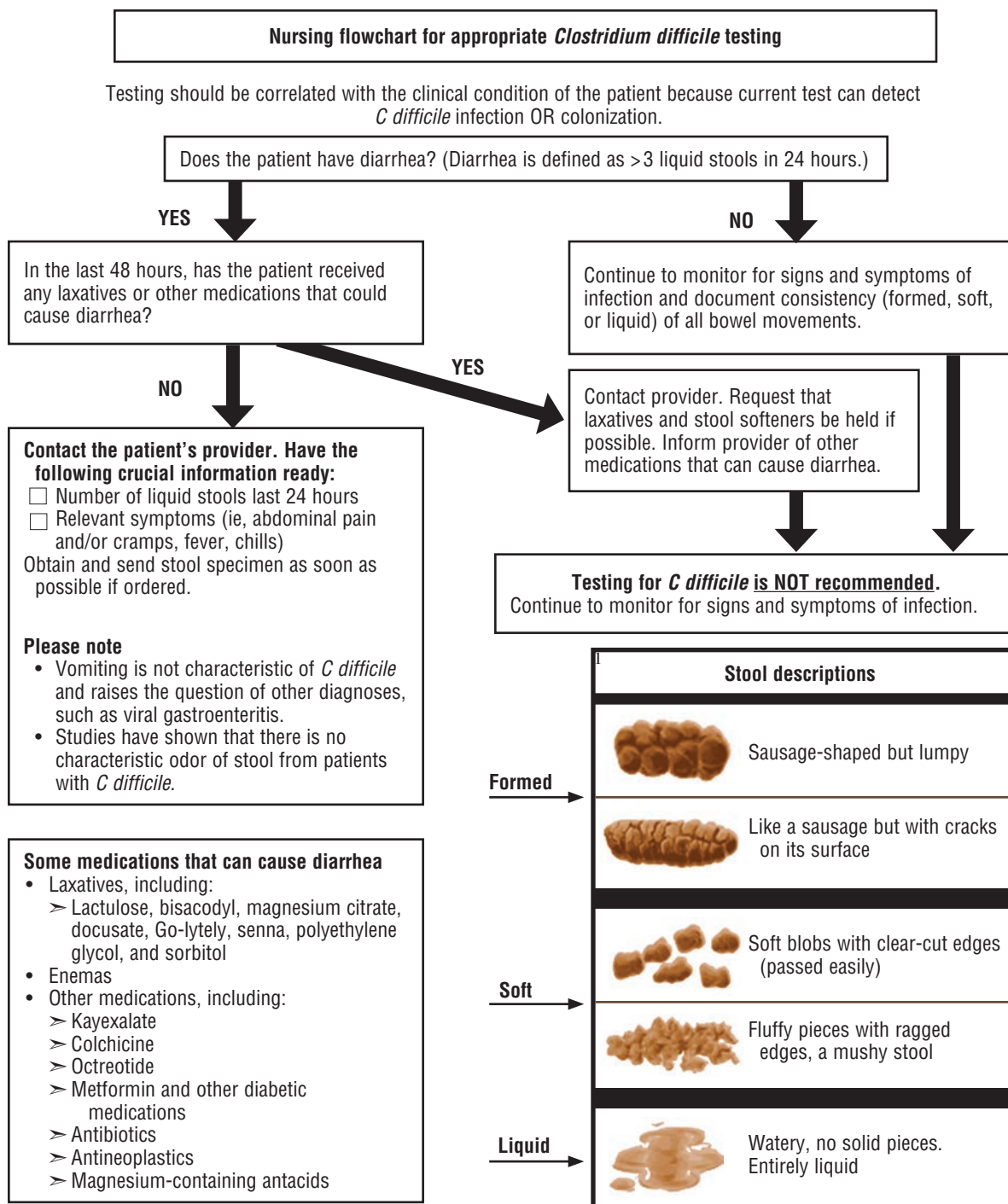
Nursing flowchart for appropriate *Clostridium difficile* testing

Testing should be correlated with the clinical condition of the patient because current test can detect *C difficile* infection OR colonization.

Does the patient have diarrhea? (Diarrhea is defined as >3 liquid stools in 24 hours.)

YES

NO

In the last 48 hours, has the patient received any laxatives or other medications that could cause diarrhea?

Continue to monitor for signs and symptoms of infection and document consistency (formed, soft, or liquid) of all bowel movements.

NO

YES

Contact provider. Request that laxatives and stool softeners be held if possible. Inform provider of other medications that can cause diarrhea.

Contact the patient's provider. Have the following crucial information ready:
☐ Number of liquid stools last 24 hours
☐ Relevant symptoms (ie, abdominal pain and/or cramps, fever, chills)
Obtain and send stool specimen as soon as possible if ordered.

Please note
• Vomiting is not characteristic of *C difficile* and raises the question of other diagnoses, such as viral gastroenteritis.
• Studies have shown that there is no characteristic odor of stool from patients with *C difficile*.

Testing for *C difficile* is NOT recommended.
Continue to monitor for signs and symptoms of infection.

Some medications that can cause diarrhea
• Laxatives, including:
  ➢ Lactulose, bisacodyl, magnesium citrate, docusate, Go-lytely, senna, polyethylene glycol, and sorbitol
• Enemas
• Other medications, including:
  ➢ Kayexalate
  ➢ Colchicine
  ➢ Octreotide
  ➢ Metformin and other diabetic medications
  ➢ Antibiotics
  ➢ Antineoplastics
  ➢ Magnesium-containing antacids

Stool descriptions

Formed
Sausage-shaped but lumpy

Like a sausage but with cracks on its surface

Soft
Soft blobs with clear-cut edges (passed easily)

Fluffy pieces with ragged edges, a mushy stool

Liquid
Watery, no solid pieces. Entirely liquid

Figure 3 Diarrhea and *Clostridium difficile* infection flowchart.

not meet the goal of 80%, the EN volumes those patients did receive increased significantly ($t_{41} = 2.1836$; $P = .048$). Table 2 presents baseline demographic and clinical characteristics of ICU patients before and after the bowel protocol was implemented.

Fifteen nurses completed the EN survey. Survey results are presented in Table 3. One nurse reported that they hold EN if the GRV is greater than 200 mL, but all other nurses reported that they hold EN only if the GRV is greater than 300 mL, which is consistent

Table 1 Antidiarrheal agents added to the regimen

1. Add wheat dextrin (tube feedings): 4 g, 3 times daily or add psyllium (per mouth): 3.4 g, 3 times daily
2. Add loperamide: 4 mg once, then 2 mg after each loose stool (maximum 16 mg/day)
3. Add diphenoxylate/atropine: 2 tablets 3 or 4 times daily to start, then reduce dose
4. Change to peptide-based enteral feeding

with the protocol in place. Five nurses reported that they were unaware that the policy stated to check GRV only with large-bore decompression tubes and not with small-bore feeding tubes. Two nurses reported that they knew not to check residuals with small-bore feeding tubes but they sometimes still do it out of habit (Table 3).

Root cause analyses of hospital-onset *C difficile* events indicated that 49% of events were due to late or inappropriate testing. By disseminating the *C difficile* testing algorithm to nurses and providers and proactively reviewing pending orders for *C difficile* testing, inappropriate

testing was reduced by 54%. The SIR decreased from 1.290 in the third quarter of 2016 to 0.594 in the fourth quarter—a 46% reduction.

Discussion

Optimizing the delivery of EN while minimizing complications (constipation, *C difficile* infection, and diarrhea) is a fundamental issue when managing the care of critically ill adults. The implementation of constipation and diarrhea protocols was associated with significant improvements in goal EN caloric volumes to 78% (baseline 68%). Patients in the postprotocol group, however, did not meet the goal of receiving at least 80% of their prescribed target nutritional recommendations. These findings demonstrate a need for further education of the critical care unit staff and an updated protocol to improve EN therapy in ICU patients. The wide range of recommended calorie targets, with EN volumes at 70% to 100% of the target associated with improved survival in critically ill patients, warrants future exploration.

Table 2 Baseline demographic and clinical characteristics of critical care unit patients before and after the bowel protocol was implemented

Characteristics	Before protocol (n=23)	After protocol (n=20)	P
Age, y	65.3 (44-82)	65.7 (48-86)	Not significant
Male sex, No. (%)	18 (78)	7 (35)	.046
Ethnicity, No. (%)			
White, non-Hispanic ethnicity	19 (82.6)	17 (85)	Not significant
Black, non-Hispanic	3 (13)	1 (5)	Not significant
White, Hispanic	1 (4.3)	2 (10)	Not significant
Body mass index,[a] mean (range)	26.4 (18-33)	27.4 (13-35)	Not significant
Medical service, No. (%)	17 (74)	16 (80)	Not significant
Time from admission to when enteral nutrition was ordered, h, mean (range)	68.1 (23.4-114.4)	58.6 (1-94)	Not significant
No. of days receiving enteral nutrition, mean (range)	5 (4-7)	5.6 (4-6)	Not significant

Abbreviation: IQR, interquartile range.
[a] Body mass index is calculated as the weight divided by height in square meters.

Table 3 Survey of intensive care unit nurses regarding current practice and existing tube feeding policy

Survey questions	Responses (n=15), No.	
	Yes	No
Are you familiar with the current EN protocol?	12	3
Do you check GRVs in patients who have small-bore feeding tubes?	5	10
Do you chart EN shift totals in the IView section of the EHR?	15	0
Do you chart EN shift totals in the intake and output flow sheet section of the EHR?	15	0
How many years have you been an ICU nurse?	11 (range 3-30) y	

Abbreviations: EHR, electronic health record; EN, enteral nutrition; GRV, gastric residual volume; ICU, intensive care unit.

Although the primary quality improvement project focused on increasing the delivery of EN volumes by implementing bowel protocols, we identified a secondary opportunity to clarify procedures for *C difficile* testing. We implemented an algorithm and best practice alert and we educated staff during the course of this project. We achieved significant results in decreasing inappropriate *C difficile* testing. This decrease in inappropriate testing is important, as fewer inappropriately diagnosed *C difficile* infections provide substantial benefits to the institution. Providers did not stop ordering *C difficile* tests, but the orders were more appropriate (eg, based on timing and symptoms) after they received the education. Resulting benefits to the institution included improvements in quality and safety, and cost savings. These improvements, in turn, improve patient satisfaction and safety. Currently, enteric precautions are used for patients identified as being infected with *C difficile,* necessitating a private room and the use of personal protective equipment by both staff and visitors. These requirements can cause patients to feel isolated and involve more facility resources, including employee time and supplies.

Limitations

Limitations to this quality improvement initiative include the small sample size, which limited our ability to draw from the statistical analysis robust conclusions regarding the effect of the protocols. The small numbers of patients were due to several factors, including the short period of data collection (6 months), patient transfers out of the ICU before completing the 4-day EN period, or orders for fewer than 4 days of active EN.

Documentation of complete enteral information was inconsistent in the electronic health record. Patients were excluded from the analysis if EN volume data were missing from a shift. Because data collection was retrospective, it is unclear whether the data were simply not documented or whether EN had been stopped for part of a day for medical reasons. Because we initially focused on improving enteral volume delivery, data were not collected on timing and the number of bowel movements or the specific bowel medications used.

The survey of ICU registered nurses, which assessed their knowledge of existing EN policy, was limited to those nurses working the day shift. Future surveys should also include staff working night and weekend shifts.

Potential next steps include revising the facility EN protocol, as new guidelines now recommend no longer checking GRV,[1] and collecting additional data that include specifics on patient bowel movements and concurrent medication administration. Studies that use bowel protocols among larger sample sizes are warranted.

Conclusion

At one institution, implementation of constipation and diarrhea protocols significantly improved EN delivery, which approached the target level. Associated education and implementation of *C difficile* testing protocols decreased the number of hospital-onset *C difficile* infections. Bowel protocols and flowcharts can improve patient safety and facilitate positive patient outcomes. CCN

See also

To learn more about nutrition in critical care, read "Association Between Enteral Feeding, Weight Status, and Mortality in a Medical Intensive Care Unit" by Vest et al in the *American Journal of Critical Care,* March 2018;27:136-143. Available at **www.ajcconline.org**.

References
1. Taylor BE, McClave SA, Martindale RG, et al; Society of Critical Care Medicine; American Society for Parenteral and Enteral Nutrition. Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.). *Crit Care Med.* 2016;44(2):390-438.
2. Kattelman KK, Hise M, Russell M, Charney P, Stokes M, Compher C. Preliminary evidence for a medical nutrition therapy procedure: enteral feedings for critically ill patients. *J Am Diet Assoc.* 2006;106(8):1226-1241.
3. Dobson K, Scott A. Review of ICU nutrition support practices: implementing the nurse-led enteral feeding algorithm. *Nurs Crit Care.* 2007;12(3):114-123.
4. Cahill NE, Dhaliwal R, Day AG, Jiang X, Hyeland DK. Nutrition therapy in the critical care setting: what is "best achievable" practice? An international multicenter observational study. *Crit Care Med.* 2010;38(2):395-401.
5. McPeake J, Gilmour H, MacIntosh G. The implementation of a bowel management protocol in an adult intensive care unit. *Nurs Crit Care.* 2011;16(5):235-242.
6. Zusman O, Theilla M, Cohen J, Kagan I, Bendavid I, Singer P. Resting energy expenditure, calorie and protein consumption in critically ill patients: a retrospective cohort study. *Crit Care.* 2016;20(1):367.
7. de Guerra TSL, Marshall NG, Mendonça SS. Constipation in intensive care. In: Rajendram R, Preedy VR, Patel VB, eds. *Diet and Nutrition in Critical Care.* New York, NY: Springer; 2015:235-248.
8. Basilisco G, Coletta M. Chronic constipation: a critical review. *Dig Liver Dis.* 2013;45(11):886-893.
9. Masri Y, Abubaker K, Ahmed R. Prophylactic use of laxative for constipation in critically ill patients. *Ann Thorac Med.* 2010;5(4):228-231.
10. van der Spoel JI, Oudemans-van Straaten HM, Kuiper MA, van Roon EN, Zandstra DF, van der Voort PH. Laxation of critically ill patients

with lactulose or polyethylene glycol: a two-center randomized, double-blind, placebo-controlled trial. *Crit Care Med.* 2007;35(12):2726-2731.

11. Knowles S, McInnes E, Elliott D, Hardy J, Middleton S. Evaluation of the implementation of a bowel management protocol in intensive care: effect on clinician practices and patient outcomes. *J Clin Nurs.* 2014;23(5-6): 716-730.

12. Heaton KW, Lewis SJ. Stool form scale as a useful guide to intestinal transit time. *Scand J Gastroenterol.* 1997;32(9):920-924.

13. de Brito-Ashurst I, Preiser JC. Diarrhea in critically ill patients: the role of enteral feeding. *JPEN J Parenter Enteral Nutr.* 2016;40(7):913-923. doi:10.1177/0148607116651758

14. Thorpe D, Harrison L. Bowel management: development of guidelines. *Connect: Critical Care Nursing in Europe.* 2002;2(2):61-66.

15. Polage CR, Solnick JV, Cohen SH. Nosocomial diarrhea: evaluation and treatment of causes other than Clostridium difficile. *Clin Infect Dis.* 2012;55(7):982-989. doi:10.1093/cid/cis551

16. Reintam Blaser A, Deane AM, Fruhwald S. Diarrhoea in the critically ill. *Curr Opin Crit Care.* 2015;21(2):142-153. doi:10.1097/MCC.0000000000000188

17. Jack L, Coyer F, Courtney M, Venkatesh B. Diarrhoea risk factors in enterally tube fed critically ill patients: a retrospective audit. *Intensive Crit Care Nurs.* 2010;26(6):327-334. doi:10.1016/j.iccn.2010.08.001.16

18. Furuya-Kanamori L, Marquess J, Yakob L, et al. Asymptomatic Clostridium difficile colonization: epidemiology and clinical implications. *BMC Infect Dis.* 2015;15:516.

19. 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(7):e1-e48. doi:10.1093/cid/cix1085

20. National Center for Emerging and Zoonotic Infectious Diseases, Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention. The NHSN standardized infection ratio (SIR): a guide to the SIR. https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir -guide.pdf. Updated March 2019. Accessed June 7, 2019.