Public Health Ontario | Santé publique Ontario
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Antimicrobial Stewardship Strategy:

Targeted review of patients with *Clostridium difficile* infection

Targeted review of patients with Clostridium difficile *infection to ensure appropriate management, improve outcomes and reduce the risk of transmission.*

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Priority Level: **B**

Difficulty Level: **2**

Program Stage:

- Early
- ✓ Intermediate
- Advanced

For more information on these criteria and how they were developed, please see the Antimicrobial Stewardship Strategy Criteria Reference Guide.

Description

This is an overview and not intended to be an all-inclusive summary. As a general principle, patients must be monitored by the health care team after changes to therapy resulting from recommendations made by the antimicrobial stewardship team.

Rationale

Appropriate treatment of *Clostridium difficile* infection (CDI) is important for preventing complications and reducing the risk of transmission. Antimicrobial stewardship for patients with CDI can increase the use of appropriate therapy and improve adherence to guideline recommendations. Typical goals are improving adherence to CDI treatment recommendations, reducing the use of empiric therapy in patients with low clinical suspicion for CDI, minimizing the risks of recurrent infection and improving patient outcomes.

Implementation

Interventions may involve education about the risks of CDI, treatment recommendations and a review of management in patients with presumed or confirmed CDI (including feedback for clinicians).

Elements that should be assessed include:

- Appropriateness of CDI therapy in relation to guideline recommendations (e.g., choice based on severity, dose, duration).
- Ongoing need for concomitant non-CDI antibiotics (if applicable).
- Ongoing need for concomitant proton pump inhibitors or antimotility agents (if applicable).

Assessments can be performed by various health professionals, including pharmacists, nurses and infection prevention and control practitioners.

A checklist can facilitate the review.

Advantages

- Adaptable to different institutions.
- Multidisciplinary in both development and implementation.
- Allows for intervention in cases of inadequate therapy.
- Interventions may improve patient outcomes.
- Improves adherence to guidelines.

Disadvantages

- Potentially labour-intensive.
- Possible system/laboratory limitations for identifying patients with CDI.

Requirements

- Personnel to perform reviews.
- Means of identifying patients with CDI in a timely manner (e.g., via microbiology laboratory).

Associated Metrics

- Proportion of patients with CDI on appropriate guideline-directed therapy.
- Time to appropriate CDI therapy (before/after intervention).
- Number of patients requiring interventions, and type of interventions.
- Patient outcomes (e.g., length of stay, CDI recurrence).

Useful Resources

Select articles to provide supplemental information and insight into the strategy described and/or examples of how the strategy was applied; not a comprehensive reference list. URLs are provided when materials are freely available on the Internet.

- Jury LA, Tomas M, Kundrapu S, Sitzlar B, Donskey CJ. A *Clostridium difficile* infection (CDI) stewardship initiative improves adherence to practice guidelines for management of CDI. Infect Control Hosp Epidemiol. 2013;34(11):1222–4.
- Le F, Arora V, Shah DN, Salazar M, Palmer HR, Garey KW. A real-world evaluation of oral vancomycin for severe *Clostridium difficile* infection: implications for antibiotic stewardship programs. Pharmacotherapy. 2012;32(2):129–34.

- Jardin CG, Palmer HR, Shah DN, Le F, Beyda ND, Jiang Z, Garey KW. Assessment of treatment patterns and patient outcomes before vs after implementation of a severity-based *Clostridium difficile* infection treatment policy. J Hosp Infect. 2013;85(1):28–32.
- Wieczorkiewicz S, Zatarski R. Adherence to and outcomes associated with a *Clostridium difficile* guideline at a large teaching institution. Hosp Pharm. 2015;50(1):42–50.
- Bower D, Hachborn F, Huffam P. *Clostridium difficile* outbreak: a small group of pharmacists makes a big impact. Can J Hosp Pharm. 2009;62:142–7. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2826930/

  Description of a pharmacist-led three-pronged initiative to help control a CDI outbreak (stewardship interventions, assessment of patients at risk of/diagnosed with CDI, education).

Tools and Resources

- Cohen SH, Gerding DN, Johnson S, Kelly CP, Loo VG, McDonald LC, 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). Infect Control Hosp Epidemiol. 2010;31:431–55. Available from: http://www.jstor.org/stable/10.1086/651706#full_text_tab_contents
- Debast SB, Bauer MP, Kuijper EJ; European Society of Clinical Microbiology and Infectious Diseases. European Society of Clinical Microbiology and Infectious Diseases: update of the treatment guidance document for *Clostridium difficile* infection. Clin Microbiol Infect. 2014;20(Suppl 2):1–26. Available from: http://www.sciencedirect.com/science/article/pii/S1198743X14600021
- Popovski Z, Dhami R, Creamer L, Jansen S, Elsayed S, Nancekevill B, et al. Multidisciplinary review process demonstrates the need for early pharmacist notification with treatment intervention benefits in *Clostridium difficile* infection (CDI). Poster presented at: Annual Professional Practice Conference: Canadian Society of Hospital Pharmacists. 2015 Jan 31–Feb 4; Toronto, ON.

Samples/Examples

- Example 1: London Health Sciences Centre – Initiative Description and Pharmacist Intervention Reporting Tool for *Clostridium difficile* Infections
- Example 2: Mount Sinai Hospital and University Health Network Antimicrobial Stewardship Program. First Episode *Clostridium difficile* Infection (CDI) Management Algorithm

These documents have been generously shared by various health care institutions to help others develop and build their antimicrobial stewardship programs. We recommend crediting an institution when adopting a specific tool/form/pathway in its original form.

Examples that contain clinical or therapeutic recommendations may not necessarily be consistent with published guidelines, or be appropriate or directly applicable to other institutions. All examples should be considered in the context of the institution's population, setting and local antibiogram.

The materials and information in this section are not owned by Public Health Ontario. ***Neither Public Health Ontario nor the institution sharing the document shall be responsible for the use of any tools and resources by a third party.***

Links with Other Strategies

- Disease-specific treatment guidelines/pathways/algorithms and/or associated order forms
- Prescriber education
- Prospective audit with intervention and feedback

Disclaimer

Citation

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For further information

Antimicrobial Stewardship Program, Infection Prevention and Control, Public Health Ontario.

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Public Health Ontario acknowledges the financial support of the Ontario Government.

Example 1: London Health Sciences Centre - Initiative Description and Pharmacist Intervention Reporting Tool for *Clostridium difficile* Infections

London Health Sciences Centre

***Clostridium difficile* Infections**
Pharmacist Intervention Reporting Tool

At London Health Sciences Centre (LHSC), we have developed and implemented an initiative which leverages pharmacists' abilities to aid in the treatment of *C. difficile* infections.

Description of the Initiative:
When a stool sample tests positive for *C. difficile*, the microbiology lab sends out an email to the inpatient pharmacists. The email contains the name, Personal Identification Number (PIN) and location of the patient. Upon receipt of this email, a pharmacist will perform an assessment of the patient and the medications they have been prescribed. This assessment is completed with the help of a treatment algorithm developed at LHSC. The aim is to ensure that the patient receives appropriate and timely treatment based on their disease severity and that other potentially exacerbating medications have been stopped if clinically reasonable. The pharmacist will contact the medical team if they have recommendations after performing the assessment.

Documentation:
In order to document these activities, the pharmacist fills out an intervention form. The intervention form includes the following information (see next page for the actual questions asked):

- Identifiers:
  - Pharmacist Identifier
  - Patient Identifiers (Initials, PIN and Medical Service)
- Treatment:
  - Stool sample date
  - Severity assessment (based on the treatment algorithm)
  - Regimen initially prescribed
  - Pharmacist treatment recommendation (if different than regimen initially prescribed)
  - Acceptance of pharmacist treatment recommendation (if applicable)
  - Time to first dose of antibiotics
- Risk Factor Modification:
  - For antibiotics, proton pump inhibitors, stool softeners, laxatives and antiperistaltics the following questions are asked:
    - Is the patient receiving any of these medications?
    - If so, can they be discontinued?
    - If not, what is/are the indication(s) for these medication(s)?

Disclaimer: *Every effort has been made to ensure that the following information provided is accurate, up-to-date, and complete, but no guarantee is made to that effect. The drug information contained herein may be time sensitive and additional information may have become available since the time of writing. This document is a reference resource designed as a supplement to, and not a substitute for, the expertise, skill, knowledge, and judgement of the healthcare practitioners. The information contained herein is not intended to cover all possible uses, directions, precautions, warnings, drug interactions, allergic reactions, or adverse effects. This information is for use within the London Health Sciences Centre only.*

Example 1: London Health Sciences Centre - Initiative Description and Pharmacist Intervention Reporting Tool for *Clostridium difficile* Infections (continued)

Pharm initials	Patient Initials	PIN	Sample Date	Service	Severity Assessment	Initial Therapy Prescribed	If 'other' Initial Therapy prescribed, please explain	Was pharmacist intervention required on initial therapy choice?	If intervention Required, Pharmacist Suggested:	Intervention Accepted	Time to First dose of Abx from Notification of C.Diff
					Severe Uncomplicated	Metrondiazole 500mg PO/FT STAT then q8h x10-14 days		Yes	Vanco 125mg po q6h based on severity assessment	yes	45 min

Patient is on Systemic Antibiotics (Yes/No)	Discontinued Antibiotics (specify Abx)	If antibiotics continued, specify drug & indication	Patient on PPI (Yes/No)	D/C PPI Intervention Accepted (Yes/No)	Continue PPI (Specify PPI & Indication)	Patient on Laxatives (Yes/No)	Laxative Intervention Accepted (Yes/No)	Continue Laxative (Specify Drug & Indication)
Yes		Periop Ancef 1gm IV q8h x 24hrs	Yes	Yes		Yes	No	PEG prn due to narcotics for periop pain (as per Pain Team)

Patient on Stool Softeners (Yes/No)	Stool Softener Intervention Accepted (Yes/No)	Continue Stool Softener (Specify Drug & Indication)	Patient on Antiperistaltics (Yes/No)	Antiperistaltics Intervention Accepted (Yes/No)	Continue Antiperistaltic (Specify Drug & Indication)
Yes	Yes		No		

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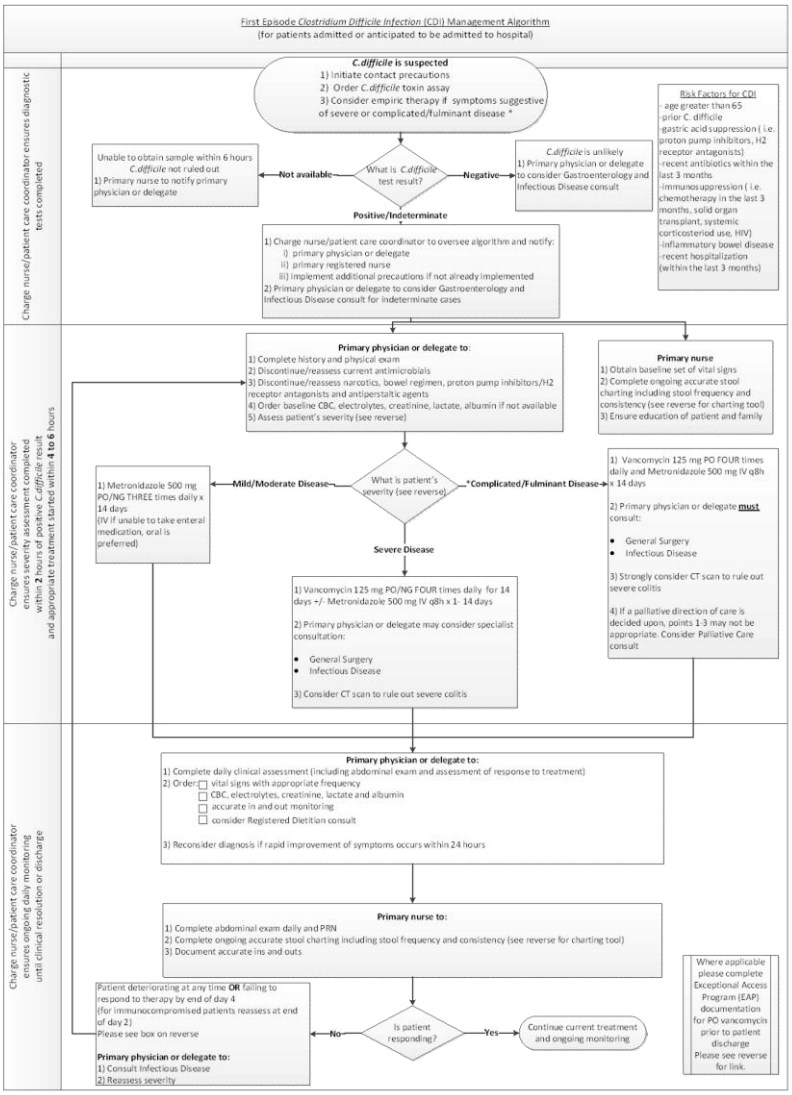
Example 2: Mount Sinai Hospital and University Health Network - First Episode *Clostridium difficile* Infection (CDI) Management Algorithm



Available online from:

http://www.antimicrobialstewardship.com/sites/default/files/article_files/cdi_algorithm-final-_oct_011_0.pdf

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Example 2: Mount Sinai Hospital and University Health Network - First Episode *Clostridium difficile* Infection (CDI) Management Algorithm (continued)

MSH + UHN ASP ANTIMICROBIAL STEWARDSHIP PROGRAM

Risk Factors for Severity

- age greater than 65
- immunosuppression (for example neutropenia, solid organ transplant, stem cell transplantation, allograft, HIV with CD4 less than 50, systemic corticosteriods with equivalent of 20mg per day of prednisone)

Severity Criteria

- temperature greater than 38°C
- increase in serum creatinine by greater than 50% from baseline or significantly reduced urine output
- WBC greater than 15X 10^9 L
-hypoalbuminemia with albumin less than 30
-abdominal exam consistent with peritonitis (localized or generalized)
- immunosuppression (for example neutropenia, solid organ transplant, stem cell transplantation, allograft, HIV with CD4 less than 50, systemic corticosteriods with equivalent of 20mg per day of prednisone)
-shock* (see below for definition)

C.difficile Severity

Mild to Moderate disease: Patient i) has less than 2 severity criteria **AND** ii) is hemodynamically stable (SBP greater than 90mmhg or DBP greater than 60 mmhg) with no signs of shock*

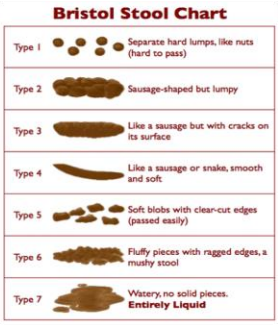
Severe disease: Patient i) has 2 or more severity criteria **AND** ii) is hemodynamically stable (SBP greater than 90 mmhg or DBP greater than 60mmhg) with no signs of shock*

Complicated/Fulminant Disease: Patient i) is hemodynamically unstable (SBP less than 90mmhg or DBP less than 60mmhg) or has signs of shock***OR** ii) has ileus or toxic megacolon

* shock = SBP less than 90mmhg or greater than 40mmhg decrease from baseline, urine output less than 0.5ml/kg/hr, decreased LOC, lactate level greater than 2.0mmol

Patient deteriorating or failing to respond to therapy if any of the following:

- ongoing frequency and volume of loose bowel movements by the end of the **day 4** (end of **day 2** for immunocompromised patients)
- ongoing fever of greater than 38 °C by end of **day 2**
- ongoing high WBC of greater than 15 X 10^9L
- worsening symptoms/deteriorating at any point



- Type 1–2 indicate constipation
- Type 3–4 are ideal stools as they are easier to pass, and
- Type 5–7 may indicate diarrhea and urgency.

Please follow the below link for further information regarding Exceptional Access Program (EAP)
http://www.health.gov.on.ca/en/pro/programs/drugs/eap_criteria_list.aspx

MOUNT SINAI HOSPITAL Joseph and Wolf Lebovic Health Complex UHN Toronto General Toronto Western Princess Margaret Toronto Rehab

Available online from:

http://www.antimicrobialstewardship.com/sites/default/files/article_files/cdi_algorithm-final-_oct_011_0.pdf

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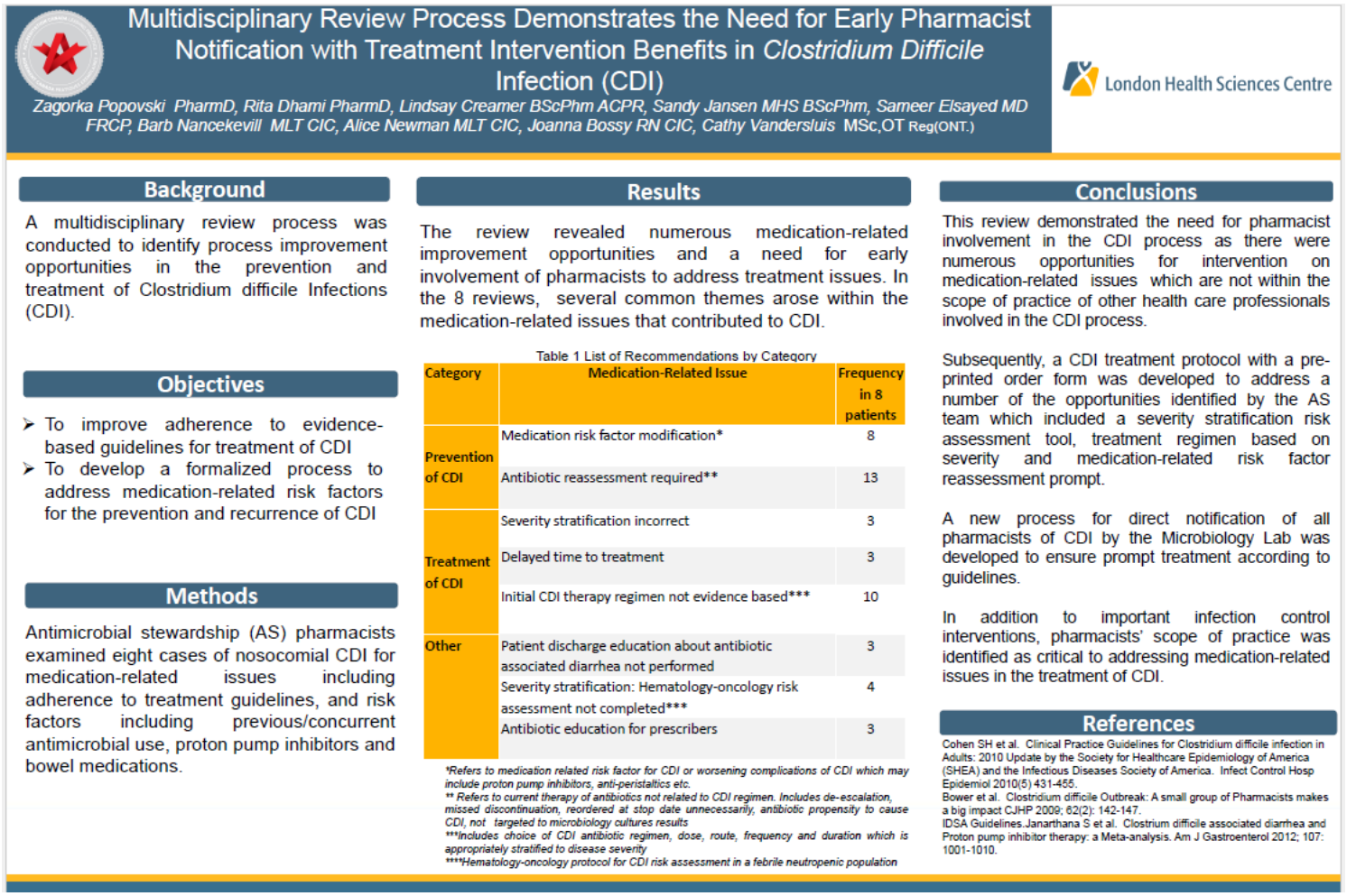
Poster: Multidisciplinary Review Process Demonstrates the Need for Early Pharmacist Notification with Treatment Intervention Benefits in *Clostridium difficile* infection (CDI)



Multidisciplinary Review Process Demonstrates the Need for Early Pharmacist Notification with Treatment Intervention Benefits in *Clostridium Difficile* Infection (CDI)

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London Health Sciences Centre

Background

A multidisciplinary review process was conducted to identify process improvement opportunities in the prevention and treatment of Clostridium difficile Infections (CDI).

Objectives

- To improve adherence to evidence-based guidelines for treatment of CDI
- To develop a formalized process to address medication-related risk factors for the prevention and recurrence of CDI

Methods

Antimicrobial stewardship (AS) pharmacists examined eight cases of nosocomial CDI for medication-related issues including adherence to treatment guidelines, and risk factors including previous/concurrent antimicrobial use, proton pump inhibitors and bowel medications.

Results

The review revealed numerous medication-related improvement opportunities and a need for early involvement of pharmacists to address treatment issues. In the 8 reviews, several common themes arose within the medication-related issues that contributed to CDI.

Table 1 List of Recommendations by Category

Category	Medication-Related Issue	Frequency in 8 patients
Prevention of CDI	Medication risk factor modification*	8
	Antibiotic reassessment required**	13
Treatment of CDI	Severity stratification incorrect	3
	Delayed time to treatment	3
	Initial CDI therapy regimen not evidence based***	10
Other	Patient discharge education about antibiotic associated diarrhea not performed	3
	Severity stratification: Hematology-oncology risk assessment not completed****	4
	Antibiotic education for prescribers	3

**Refers to medication related risk factor for CDI or worsening complications of CDI which may include proton pump inhibitors, anti-peristaltics etc.*
*** Refers to current therapy of antibiotics not related to CDI regimen. Includes de-escalation, missed discontinuation, reordered at stop date unnecessarily, antibiotic propensity to cause CDI, not targeted to microbiology cultures results*
****Includes choice of CDI antibiotic regimen, dose, route, frequency and duration which is appropriately stratified to disease severity*
*****Hematology-oncology protocol for CDI risk assessment in a febrile neutropenic population*

Conclusions

This review demonstrated the need for pharmacist involvement in the CDI process as there were numerous opportunities for intervention on medication-related issues which are not within the scope of practice of other health care professionals involved in the CDI process.

Subsequently, a CDI treatment protocol with a pre-printed order form was developed to address a number of the opportunities identified by the AS team which included a severity stratification risk assessment tool, treatment regimen based on severity and medication-related risk factor reassessment prompt.

A new process for direct notification of all pharmacists of CDI by the Microbiology Lab was developed to ensure prompt treatment according to guidelines.

In addition to important infection control interventions, pharmacists' scope of practice was identified as critical to addressing medication-related issues in the treatment of CDI.

References

Cohen SH 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. Infect Control Hosp Epidemiol 2010(5) 431-455.
Bower et al. Clostridium difficile Outbreak: A small group of Pharmacists makes a big impact CJHP 2009; 62(2): 142-147.
IDSA Guidelines.Janarthana S et al. Clostrium difficile associated diarrhea and Proton pump inhibitor therapy: a Meta-analysis. Am J Gastroenterol 2012; 107: 1001-1010.

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