PREDICTION AND PREVENTION OF *CLOSTRIDIOIDES DIFFICILE* INFECTION IN HOSPITALIZED ADULT PATIENTS

Lisa Job, MSN, RN, ACNS-BC, DNP Student

Sinclair School of Nursing
University of Missouri Health

Sinclair School of Nursing
University of Missouri Health

BACKGROUND

- *Clostridioides difficile* infection (CDI) is one of the most common healthcare associated infections (HAI) in the United States.
- Healthcare facility onset CDI (HO-CDI) is defined as CDI diagnosed greater than three days after admission to the facility (NHSN, 2018).
- *Clostridioides difficile* (*C. difficile*) causes approximately half a million infections in patients every year and costs up to $4.8 billion each year in extra healthcare expenses for acute care facilities (CDC, 2015).
- Evidence-based practice guidelines for prevention and management of CDI focus on antibiotic stewardship, infection prevention, early identification of risk factors, early interventions, treatment, and continuous surveillance (McDonald et al., 2018).

PURPOSE

- The purpose of the project was to evaluate the use of an existing diarrhea decision tree *C. difficile* verification tool by staff to identify risk factors, facilitate appropriate testing, implement early interventions, and reduce HO-CDI.

PIOT

- In hospitalized adult patients (P), how has a diarrhea decision tree *C. difficile* verification tool (I) affected HO-CDI (O) from January to June 2020 (T1) and July to December 2020 (T2) following implementation?

OBJECTIVES

- 10% reduction of HO-CDI.
- 90% compliance in use of the diarrhea decision tree *C. difficile* verification tool.

REFERENCES

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lmjqhy@umsystem.edu
http://nursing.missouri.edu/index.php

MATERIALS AND METHODS

Evaluation of an Existing Program

- **Setting:** A 244-bed, acute care, nonprofit tertiary care center located in southeast Missouri
- **Sample:** Purposive, convenience sample utilizing simple random sampling of patients meeting inclusion criteria (n = 58)
- **Inclusion criteria:** All adult inpatients 18 years of age and older with ICD-10 codes A04.71, A04.72, and CPT code 87324
- **Exclusion criteria:** Age younger than 18 years and/or no applicable ICD-10 codes, outpatient status
- **Independent Variable:** *C. difficile* verification tool
- **Primary Dependent Variable:** Use of the *C. difficile* verification tool
- **Secondary Dependent Variables:** Liquid stools documented; received stool softeners, laxatives, and / or enemas; received lactulose, IV contrast, tube feedings; antibiotics / PPI risk factors; symptoms of CDI; history of CDI; patient / family engagement documented; HO-CDI cases; demographics for patients with HO-CDI including age, gender, race and ethnicity

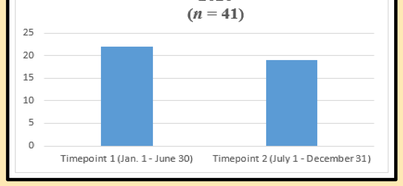
Program Intervention

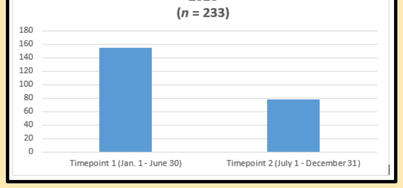
- **Program Intervention:** Education provided in January 2020 to improve knowledge of CDI and appropriate testing included: the use of the diarrhea decision tree *C. difficile* verification tool, an auto-cancel feature in the electronic health record to discontinue stool orders for *C. difficile* after 48 hours if not collected, definition and risk factors of CDI.

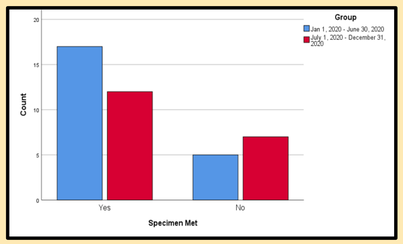
Follow-Up

- **Data Collection and Analysis:** Data collection via chart review
- Sample size calculation based on 95% CI, 5% margin of error, population size of 58, calculated sample size for a total of 51 subjects
- Nominal level data anyalyzed using Chi-square Test of Independence and phi coefficient
- IBM SPSS version 26 was used for statistical anaylsis. Statistical significance was defined as $p \leq .05$

RESULTS







Variable	2020 (T1) Jan. 1 – June 30 Total Subjects = 22 (*n*, %)	2020 (T2) July 1 – Dec. 31 Total Subjects = 19 (*n*, %)	*p*-value
Frequent Stools Documented	21 (95.5 %)	16 (84.2 %)	.23
Symptoms of CDI	15 (68.2 %)	11 (57.9 %)	.49
Stool Softeners, Laxatives, Enemas	1 (4.5 %)	5 (26.3 %)	.05*
Lactulose, IV Contrast, Tube Feeding	4 (18.2 %)	4 (21.1 %)	.82
Antibiotics / PPI	18 (81.8 %)	14 (73.7 %)	.53
History of CDI	2 (9.1 %)	3 (15.8 %)	.51
Patient / Family Engagement	20 (66.7 %)	10 (33.3%)	.01 *
Specimen Met Criteria	17 (77.3 %)	12 (63.2 %)	.32
Specimen Obtained	18 (81.8 %)	14 (73.7 %)	.53

*$p \leq .05$

Overall Compliance

Overall compliance in the use of the verification tool when a *C. difficile* test was ordered was 17.6% (n = 41); T1 (14.2 %, n = 22) and T2 (24.4 %, n = 19).

A total of 233 *C. difficile* orders were received during the two timepoints; T1 (66.5 %, n = 155) and T2 (33.5%, n = 78), noting a 50% decrease in the number of *C. difficile* tests ordered during T2.

Stool Softeners, Laxatives, Enemas Received

While the majority of the patients did *not* receive stool softeners, laxatives or enemas prior to testing, the patients in T2 were more than twice as likely to be on these GI stimulants (p = .05, Φ = .3, *OR* = 2.1).

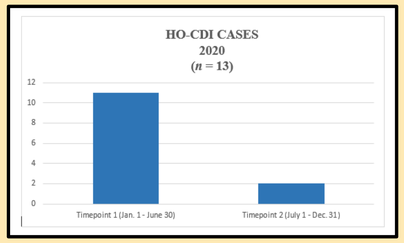
Patient and Family Engagement (PFE)

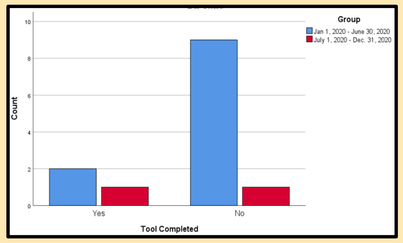
While the majority of the patients had documentation of PFE in risk for infection and symptoms of CDI (78.9 %, n = 30), there was a moderate to large statistically significant decline in PFE in patients during T2, most likely secondary to COVID pandemic and restrictions of visitors during T2 (p = .01, Φ = .4).

Specimen Met Criteria for Test

Specimen met criteria for testing on the majority of patients screened (70.7%, n = 29); T1 (77.3%, n = 17) and T2 (63.2%, n = 12). The use of the tool did result in cancellation of tests for 21.9% (n = 9) of patients screened.

RESULTS AND DEMOGRAPHICS FOR HO-CDI PATIENTS





- **Predominant race**: Caucasian (76.9%, n = 10), followed by Black or African-American (23.1 %, n = 3)
- **Predominant ethnicity**: All patients were not Hispanic or Latino (100 %, n = 13)
- **Predominant gender**: Male (61.5 %, n = 8)
- **Predominant age**: Top two age categories were 50 – 59 (30.8 %, n = 4) and 80 – 89 (30.8 %, n = 4); followed by 60 – 69 years (15.4 %, n = 2), 70 – 79 years (15.4%, n = 2), 30 – 39 years (7.7 %, n = 1)
- There were no statistically significant demographic differences between T1 and T2 in gender (p = .72), age (p = .49) and race (p = .40).
- **Tool Use**: The majority of the HO-CDI patients were *not* screened prior to testing (76.9%, n = 10); T1 (81.8 %, n = 9) and T2 (50 %, n = 1) with no statistically significant differences in the use of the tool between the two timepoints for HO-CDI patients (p = .33).

CONCLUSIONS

- A 10% decrease in HO-CDI cases was met with a 48% (n = 12) reduction in cases and Standardized Infection Ratio (SIR) in 2020 (SIR = 0.544, n = 13) compared to 2019 (SIR 0.985, n = 25).
- The 90% compliance in use of the *C. difficile* verification tool was not met (17.6%, n = 41).

RECOMMENDATIONS

- Continued use of the verification tool for future impact on *C. difficile* prevention, appropriate testing, management, and further reduction in HO-CDI cases.
- Update the verification tool and incorporate it into the electronic health record for ease of use at the point of care, to increase compliance, and to facilitate data collection for QI practices.
- Reeducation on the use of the tool and evidence-based practice guidelines for *C. difficile* and provide real-time data on HO-CDI cases and practices for clinical staff.
- Expand the screening tool to identify *C. difficile* present on admission and consider periodic screening throughout the hospital stay to identify risk factors and implement early interventions.

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