Improving Clostridioides difficile Infection Treatment and Outcomes Using a Web-based Tool to Support a Care Coordination Intervention

J. Nikki McKoy, MPH[1], Madeleine Biondolillo, MD, MBA[1], John A. House, MS[1], Emily Kunz, BA[1], Stella Safo, MD, MPH[1]
[1] Premier, Inc.

ABSTRACT

Background

Clostridioides difficile infection (CDI) is a highly burdensome disease, affecting 500,000 Americans each year. Despite extensive efforts to prevent and treat CDI, variability remains in the treatment guidelines, particularly as new medications are released. Treating CDI is particularly difficult, as approximately 25% of infected individuals experience recurrent CDI (rCDI).

Methods

We used a pre-post design to measure the impact of an intervention on rCDI, CDI readmission, and guideline-adherent treatment rates in adult patients who were admitted with or contracted CDI in the hospital. The intervention included the following:

- Web-based performance platform delivering education and care coordination support
- CDI care coordination for 8 weeks post-discharge (Figure 1)
- Education and tools for addressing CDI guidelines, workflow needs, and patient engagement
- Best practice sharing through peer-to-peer discussion calls

Results

Among the 77 patients consented in the Pre-Intervention period, 12 (15.6%) patients reported rCDI, compared to 6 (15.4%) of the 39 Intervention patients who provided a response (*P* = 0.98). While a total of 55 patients were consented in the Intervention period, none reported a readmission for CDI, however 9 (11.7%) of Pre-Intervention patients reported a readmission for CDI (*P* = 0.03). There was a significant difference (P < 0.001) between the use of appropriate treatment, as defined by the 2018 SHEA/IDSA guidelines, between the Pre-Intervention and Intervention groups (55.8% vs. 94.3%).

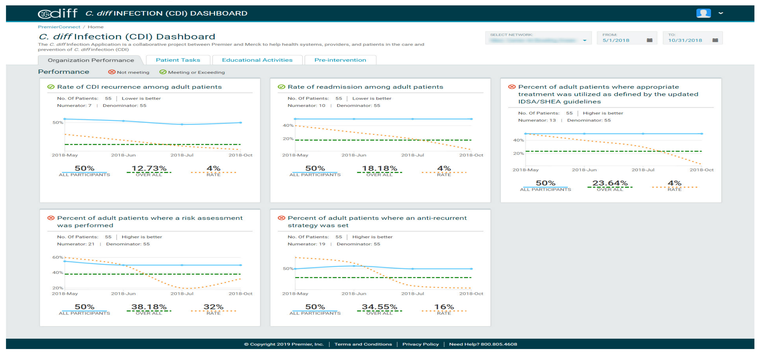
Conclusion

A comprehensive multi-disciplinary team approach to preventing rCDI, including post-discharge care coordination, provides support to patients and caregivers. Future research is needed to evaluate how web-based tools, like those used in this study, could engage patients in the management of CDI and rCDI. Interventions aimed at improving the care of these patients may reduce recurrences and rehospitalizations.

BACKGROUND

- *Clostridioides difficile infection* (CDI) is a highly burdensome disease, affecting an estimated 500,000 Americans each year.[1]
- Infection with *C. diff* results in considerable morbidity associated with diarrhea, abdominal discomfort, nausea, and fever.[1]
- CDI can also lead to hypovolemia and dehydration, pseudomembranous colitis, toxic megacolon, fulminant colitis, fulminant sepsis, and death.[2]
- Despite extensive efforts to prevent and treat CDI, variability remains in the treatment guidelines, particularly as new medications are released.
- Furthermore, treating CDI is particularly difficult, as approximately 1 in 6 infected individuals experience rCDI.[1] Thus appropriate management of the presenting CDI episode should lead to better patient outcomes.[3,4]
- This study aims to measure the impact of a multi-factored intervention on rCDI, CDI readmission and guideline adherent treatment rates in adult patients who were admitted with or contracted CDI in the hospital.

Figure 1: CDI Performance Platform



References

1. Centers for Disease Control and Prevention. What is C. diff? Centers for Disease Control and Prevention,. https://www.cdc.gov/cdiff/what-is.html. Published 2020. Accessed June 18, 2020.
2. Wenisch JM, Schmid D, Kuo HW, et al. Hospital-acquired Clostridium difficile infection: determinants for severe disease. *Eur J Clin Microbiol Infect Dis.* 2012;31(8):1923-1930.
3. Petrosillo N. Tackling the recurrence of Clostridium difficile infection. *Med Mal Infect.* 2018;48(1):18-22.
4. Ramsay I, Brown NM, Enoch DA. Recent Progress for the Effective Prevention and Treatment of Recurrent Clostridium difficile Infection. *Infect Dis (Auckl).* 2018;11:1178633718758023.

METHODS

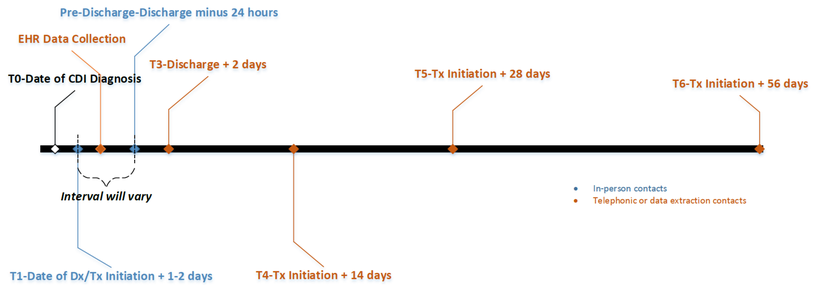
Study Design & Sample Selection:

- A retrospective pre-post evaluation of a multi-factored CDI intervention conducted among patients admitted at 5 participating Integrated Delivery Networks.
- The study sample included consented patients 18+ years diagnosed with CDI (ICD-10 codes A04.7, A04.71, A04.72) during an inpatient admission in the six months prior (pre-intervention period) or following the implementation of the intervention (post-intervention period).

Intervention:

- During the 8-month intervention period, the CDI care coordination team provided education and support to Patient-Participants and Clinician-Participants and monitored organization-level rCDI and CDI readmission rates.
- The intervention included the following:
  - Access to an online dashboard that enabled research site leadership, CDI Coordinators, and Clinician-Participants to engage in monitoring of their CDI-related performance (Figure 1)
  - Online education (self-study modules and case vignettes) to provide information on the Infectious Disease Society of America (IDSA) guidelines as well as training on care coordination for patients diagnosed with CDI
  - Online tools to support change efforts in their organization
  - Live peer-to-peer discussion group calls, led by project faculty or Premier personnel, to facilitate improvement through best practice sharing, reflection, and self-assessment
  - Access to a CDI coordinator who established a relationship with eligible patients prior to discharge, followed up with patients for up to 56 days to provide patient education (Figure 2), ensured access to medications, and acted as a resource for patients should they have any signs or symptoms of recurrence.

Figure 2: Patient Contacts



Variables & Outcomes

- Demographic data was captured during patient identification using data from the electronic medical record.
- In the pre-intervention period, recurrence and readmission were determined based on responses to a series of questions related to healthcare utilization (hospital stay/ER visit), symptoms and treatment in the 60 days after the patient's C. diff admission at the participating hospital site, during one telephone contact.
- In the intervention period, recurrence and readmission were determined based on responses to a series questions related to healthcare utilization (hospital stay/ER visit), symptoms and treatment asked during the T4 (14 days post-discharge), T5 (approximately 15-28 days post-discharge), and T6 (approximately 29-56 days post-discharge) contacts (Figure 2).

Analysis

- Continuous variables were compared using Student's T-test. Categorical variables were compared using Chi-squared or Fisher's exact test. P-value of < 0.05 was considered statistically significant. The analysis was conducted using SAS v9.4.

RESULTS

Table 1. Patient Demographics

	Total N = 132 100.0%	Pre-Intervention n = 77 58.3%	Intervention n = 55 41.7%	P-Value
Age				0.472
Mean ± SD	63.8 ± 16.8	64.6 ± 16.4	62.5 ± 17.3	
Median (IQR)	66.5 (54.5, 76.0)	68.0 (56.0, 76.0)	61.0 (54.0, 76.0)	
Gender				0.786
Female	81 (61.4%)	48 (62.3%)	33 (60.0%)	
Male	51 (38.6%)	29 (37.7%)	22 (40.0%)	

- The overall study sample (N=132) had a mean age of 63.8 years and was 61.4% female, and these were not significantly different between patients in the pre-intervention and intervention periods.

	Total N = 129 100.0%	Pre-Intervention n = 77 59.7%	Intervention n = 52 40.3%	P-Value
Recurrence Rate	18 (15.5%)	12 (15.6%)	6 (15.4%)	0.98
Missing (.)	14		14	
Readmission Rate	9 (7.8%)	9 (11.7%)	0 (0.0%)	0.03
Missing (.)	14		14	
Appropriate Treatment	93 (71.5%)	43 (55.8%)	50 (94.3%)	< 0.001

- Among the 77 patients consented in the pre-intervention period (Table 2), 15.6% reported rCDI which was not significantly different from 15.4% of patients reporting CDI recurrence in the intervention period (39 patients provided a response).
- Of a total of 55 patients consented in the Intervention period (Table 1), none reported a readmission for CDI, which was significantly lower than 11.7% of Pre-Intervention patients (n=77) who reported a readmission for CDI (P = 0.03).
- There was significantly higher use of appropriate treatment, as defined by the 2018 SHEA/IDSA guidelines, in the Intervention as compared to the Pre-Intervention group (55.8% vs. 94.3%, p<0.001).

CONCLUSIONS

- Study findings should be interpreted in view of limitations including potential recall bias, small sample size, lack of time and resources to match patients in the pre-intervention and intervention periods, and the number of patients lost to follow-up.
- A multi-factored web-based intervention supporting performance monitoring, disease education and care coordination positively impacted the readmission rate and the administration of evidence-based treatment among patients with CDI visiting Integrated Delivery Networks.
- Similar interventions aimed at improving care of patients with CDI may lead to better outcomes such as reduced recurrences and rehospitalizations.
- Future research is needed to evaluate how web-based tools, like those used in this study, could help better engage patients in their management of CDI and rCDI.

Disclosures

This project was funded and executed through a collaboration between Premier HealthCare Solutions, Inc., Charlotte, NC and Merck Sharp & Dohme Corp., a subsidiary of Merck & Co., Inc., Kenilworth, NJ, USA (MSD).
Presented at ID Week 2020: October 21-25, 2020.

https://bit.ly/2PYloGq