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A Retrospective Review of Patients with Negative C. Diff Test Results

Introduction

- *Clostridium difficile* (C. diff) is a bacterium that causes diarrhea after exposure to antibiotics
- C. diff infection (CDI) is the most common hospital acquired infection
- CDI is treated with antibiotics such as Flagyl (orally: \$1.47/day) and Vancomycin (IV: \$7.73/day)
- It is estimated that C. diff caused 500,000 infections in 2011, resulted in 14,000 deaths, with \$1 billion annual costs
- Immunosuppressive conditions such as organ transplants and cancer have been associated with CDI

Introduction continued...

- Increased age and comorbidities such as end-stage renal disease have also been found to be a risk factor for C. diff colonization
- A positive C. diff test and the clinical presentation of diarrhea, fever, or abdominal pain is required for diagnosis
- Prior to 2013, Sentara Norfolk General Hospital (SNGH) performed enzyme immunoassays (EIA) to diagnosis C. diff infections
 - These tests have low sensitivities (63-94%) which resulted in the treatment of patients with negative C. diff tests. This led to the implementation of a multistep testing algorithm with improved sensitivity rates (83.8%) in July 2013.

Objectives

- To describe characteristics of patients who tested negative for CDI at SNGH
- To measure differences in those with negative tests who were treated and those who were not treated for CDI
- To determine if there is an association between transplant status, age over 65 years, and number of comorbidities with treatment status in those with a negative test

Methods

- **Study population:** 199 inpatients between 18-89 years of age, with negative C. diff tests from 2012 were randomly selected from SNGH records
 - Treated: those patients with negative tests who were treated for CDI with antibiotics
 - Untreated: those with negative tests who were not treated
- **Statistical Analysis:** SAS 9.3 was used to analyze the data

Results

Table 1. Statistical Analysis of Treated and Untreated Patients with Negative CDI Test

	Total Sample <i>Mean ± SD or n (%)</i>	Untreated Sample <i>Mean ± SD or n (%)</i>	Treated Sample <i>Mean ± SD or n (%)</i>
Number of Subjects, n	199	154	45
Age	59.68 ± 15.99	58.98 ± 16.68	62.07 ± 13.25
<65 years of age	112 (56.28%)	84 (55.55%)	28 (62.22%)
≥65 years of age	87 (43.72%)	70 (45.45%)	17 (37.78%)
Gender			
Male	110 (55.28%)	82 (53.25%)	28 (62.22%)
Female	89 (44.72%)	72 (46.75%)	17 (37.78%)
Transplant (Solid Organ + Stem Cell)			
No	170 (85.42%)	137 (88.96%)	33 (73.33%)
Yes	29 (14.57%)	17 (11.04%)	12 (26.67%)

Results continued...

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Number of Subjects, n	199	154	45
Number of Comorbidities (HTN, Diabetes, CVD, Cancer, or ESRD)			
≤2	136 (68.34%)	111 (72.08%)	25 (55.56%)
≥3	63 (31.66%)	43 (27.92%)	20 (44.44%)
Prior Diagnosis of C. diff			
No	182 (91.46%)	145 (94.16%)	37 (82.22%)
Yes	17 (8.54%)	9 (5.84%)	8 (17.78%)
Number of Admissions in the Prior Year	2.38 ± 2.12	2.32 ± 2.09	2.58 ± 2.23
Number of Antibiotics per Admission in the Prior Year	2.68 ± 1.72	2.63 ± 1.74	2.84 ± 1.66
Length of Stay	18.83 ± 19.15	16.35 ± 14.17	27.33 ± 29.27
HTN=Hypertension, CVD=Cardiovascular Disease, ESRD= End-Stage Renal Disease			

Results continued...

Factor	Test	P-value*
Age Over 65	$\chi^2 = 0.8341, DF=1$	0.3611
Transplant Status	$\chi^2 = 6.8317, DF=1$	0.0090
Number of Comorbidities	$\chi^2 = 4.3939, DF=1$	0.0361
Length of Stay	$T = -2.68, DF=197$	0.0080

*a p-value ≤ 0.05 denotes statistical significance

Conclusions

- 23% of patients with negative tests were treated for presumed CDI, which likely reflects the low sensitivity of the test used prior to 2013
- Patients were more likely to be treated if they had three or more comorbidities or a previous transplant
- The length of stay for treated patients was longer than for those who were not treated, which may be due to greater numbers of comorbidities
- Further research is needed to determine if the implementation of a new testing algorithm changed treatment rates among those testing negative for CDI at SNGH
- Lower treatment rates could result in treatment savings, shorter length of stays, and better quality of life for patients

References

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