



Burden of Clostridium Difficile Infection among Elderly Cancer Patients in the United States – A Population-based Study

Pramit A. Nadpara, PhD, MBA, MS, BPharm
Virginia Commonwealth University School of Pharmacy

Introduction

- Elderly cancer patients represent a population that is vulnerable for Clostridium difficile infection (CDI).¹ Non-Small Cell Lung Cancer (NSCLC) is the most common type of lung cancer, and ~40% of patients with newly diagnosed NSCLC have advanced stage (Stage III-IV) disease.
- Advanced NSCLC is a treatable, but not curable, clinical entity in patients. However, advanced NSCLC patients can still benefit from active cancer treatment.²⁻⁴
- Frequent hospitalizations, and chemotherapy treatment have been identified as factors associated with the development of Clostridium difficile infection.
- The objective of this study was to identify the patterns and determinants of Clostridium difficile infection in a nationwide sample of elderly patients.

Methods

- We used NCI's Surveillance, Epidemiology, and End Results (SEER) cancer registry linked Medicare (SEER-Medicare) claims data files from years 2007-2014.

Study cohort: Patients diagnosed with incident lung / breast / ovarian / colorectal / prostate cancer, or lymphoma / multiple myeloma / leukemia in the years 2007 to 2013, at age ≥65 years and surviving at least 9 months post-diagnosis.

Inclusion / Exclusion Criteria

- We excluded patients who were enrolled in a health maintenance organization, and/or were not covered by Medicare Parts A and B at any point during that time period.

Study Measures

- Using the Healthcare Common Procedure Coding System (HCPCS) and Current Procedural Terminology (CPT) codes, we identified patients who had received first-line chemotherapy either in a physician's office or at an outpatient department within a hospital.
- Incidence of CDI was determined by identifying any claim with primary/secondary diagnosis of CDI during the one year follow-up period following diagnosis.
- Recurrent CDI was identified by presence of any claim that was >2 weeks and ≤8 weeks from the index CDI diagnosis date.
- Covariates including antibiotics/proton pump inhibitors usage were captured and included in the analysis.

Statistical Analysis

- Pearson chi-square tests were used to determine unadjusted associations between categorical variables of interest.
- All analysis was performed using Statistical Analysis System (SAS) software Version 9.4.

Results

- We identified 72,419 elderly patients with lung / breast / ovarian / colorectal / prostate cancer, or lymphoma / multiple myeloma / leukemia diagnosis during the study years.
- While few (1261) patients developed Clostridium difficile infection within one year of diagnosis, more than 39% (497) of those patients developed recurrent Clostridium difficile infection.
- Patient characteristics were not associated with risk of developing Clostridium difficile infection, however, significant differences were observed in antibiotics/proton pump inhibitors exposure across all cancer types ($p < 0.001$).

Table 1. Descriptive characteristics of continuously enrolled Medicare Fee-for-service beneficiaries with incident cancer diagnosis in the United States, 2007-2014.

Characteristic	%	P-Value
Total	100	
Age at diagnosis, years		< .0001
65-69	18.35	
70-74	23.88	
75-79	24.45	
80-84	20.02	
85+	13.3	
Sex		< 0.1
Male	40.25	
Female	59.75	
Klabunde-Charlson comorbidity score		< 0.001
0	34.8	
1	30.2	
> 1	34.8	
Residence		< 0.001
Big Metro	48.42	
Metro	28.97	
Urban/Rural recode	6.45	
Less Urban	13.3	
Rural	2.85	

Table 2. Clostridium difficile infection and Clostridium difficile infection Recurrence among Cancer Patients in the US, 2007-2014

Year (2007-2011)	Number of Cancer Patients Included in the Study	Number of Cancer Patients Developing C.Diff within 1 year of Diagnosis	Number of Cancer Patients Developing recurrent C.Diff within >2 weeks and ≤8 weeks from the index CDI diagnosis date	Number of Cancer Patients Developing recurrent C.Diff within >2 weeks and ≥12 weeks from the index CDI diagnosis date
Lung	9894	181	68	74
Breast	20020	165	68	74
Colorectal	11742	509	199	209
Prostate	21015	100	34	37
Leukemia	2247	64	25	26
Lymphoma	4617	128	56	60
Myeloma	1606	58	24	26
Ovary	1278	56	23	25

Limitations

- An inherent limitation of using administrative claims data for epidemiologic studies is the possibility of misclassification as a result of coding errors. However, claims data have been evaluated for their utility as a source of epidemiologic and health services information in cancer patients.
- The results of this study are generalizable to the Medicare Fee-for-service (FFS) population aged 65 years and older, as data for Medicare beneficiaries enrolled in the managed care plan were not available for this study.
- Information on care received by beneficiaries outside of the Medicare system, or through non-Medicare providers, was not captured in this study.

Conclusions

- While the incidence of Clostridium difficile infection is lower among cancer patients, the rate of recurrent Clostridium difficile infection was significantly higher.
- Strategies to prevent Clostridium difficile infection recurrence in this population are therefore warranted

References

- National Cancer Institute: SEER Cancer Statistics Review, 1975-2009. http://seer.cancer.gov/csr/1975_2009_pop09/. Accessed May 15, 2016.
- Quiox E, Zalcman G, Oster JP et al. Carboplatin and weekly paclitaxel doublet chemotherapy compared with monotherapy in elderly patients with advanced non-small-cell lung cancer: IFCT-0501 randomised, phase 3 trial. *Lancet* 2011; September 17;378(9796):1079-88.
- Davidoff AJ, Tang M, Seal B, Edelman MJ. Chemotherapy and survival benefit in elderly patients with advanced non-small-cell lung cancer. *J Clin Oncol* 2010 May 1;28(13):2191-7.
- Effects of vinorelbine on quality of life and survival of elderly patients with advanced non-small-cell lung cancer. The Elderly Lung Cancer Vinorelbine Italian Study Group. *J Natl Cancer Inst* 1999 January 6;91(1):66-72.