



Incidence Rate of *Clostridium difficile* Infection and Associated Risk Factors in Hospitalized Patients: Hacettepe Adult and Oncology Hospitals

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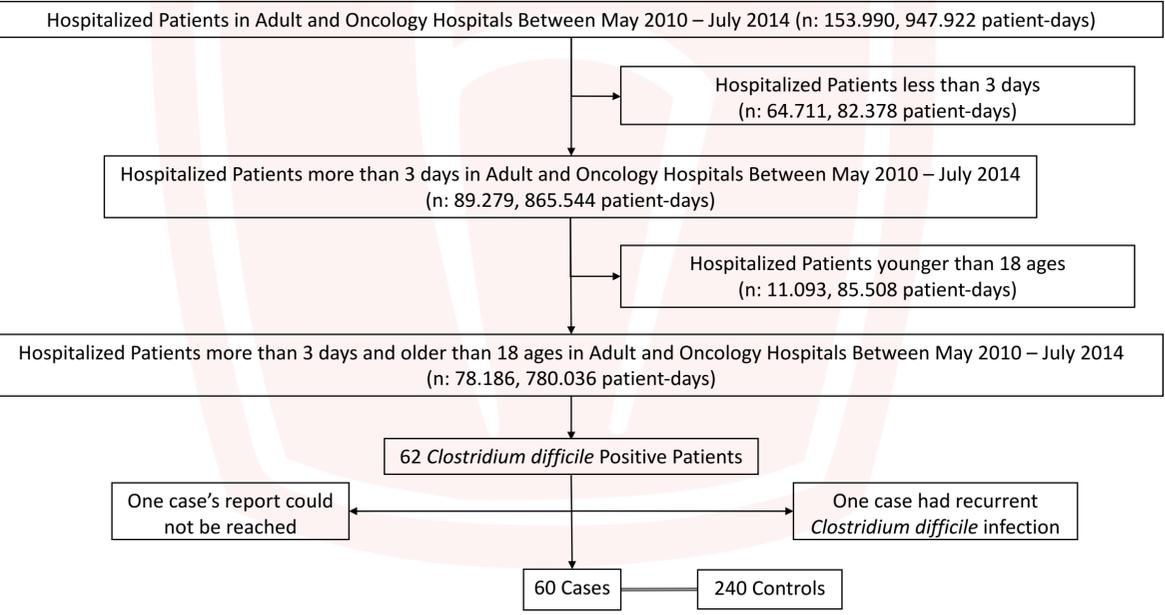
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Introduction

Clostridium difficile is a fecal-oral transmitted, Gram-positive, anaerobic, spore-forming bacillus. *Clostridium difficile* infection is associated with increased morbidity, mortality, cost and prolonged hospitalization among hospitalized patients¹. Aims of this study are to determine *Clostridium difficile* infection rate and related risk factors and to evaluate health-care costs and hospitalization stay in hospitalized patients in our tertiary healthcare center.

Methods

All patients hospitalized between May 2010 and July 2014 were evaluated for eligibility. A nested case-control study was conducted where cases were those aged 18 years and older, hospitalized for at least 72 hours, developed diarrhea and had positive nucleic acid amplification test for *Clostridium difficile* Toxin B. Four controls were individually matched to each case (n=60) on type of inpatient service (medical, surgical or intensive care units). Controls were randomly selected from the patients who were being hospitalized for at least 72 hours at the time matched case's stool sample was collected.



Results

The overall *Clostridium difficile* infection incidence was 0.78 per 10,000 patient-days or 0.78 per 1000 patients during the study period. Incidence rates were 1.40 per 10,000 patient-days in intensive care units, 1.79 per 10,000 patient-days in medical units and 0.15 per 10,000 patient-days in surgery units. Duration elapsed from hospital admission to the sampling time was similar in case and control groups, but the time period from sampling to discharge was longer in case group (p=0.04). Direct health-care costs were also found to be higher among cases (p=0.03). In univariate analysis, presence of immunosuppression, bone marrow transplantation and chemotherapy history, diagnosis of leukemia and inflammatory bowel disease, use of colistin, glycopeptide, carbapenem and antifungal agent, low levels of hemoglobin and albumin were found to be statistically significantly associated with *Clostridium difficile* infection. In multivariate logistic regression analysis, only inflammatory bowel disease and carbapenem usage were found to be significant risk factors for *Clostridium difficile* infection. Charlson Comorbidity Index, age, mechanical ventilation, past surgical history, enteral/parenteral nutrition, use of gastric acid suppressive agents and fatality rate were all similar between-case and control groups.

| Risk Factor | Multivariate analysis | |
|-----------------------------------|----------------------------|---------------|
| | OR (95% CI) | p-value |
| Renal Disease | 1.85 (0.98 – 3.49) | p=0.58 |
| Inflammatory Bowel Disease | 6.67 (1.50 – 29.61) | p=0.01 |
| Leukemia | 1.72 (0.59 – 5.03) | p=0.31 |
| Bone Marrow Transplantation | 2.39 (0.72 – 7.87) | p=0.15 |
| Enteral Feeding | 0.96 (0.45 – 2.05) | p=0.92 |
| Proton-Pump Inhibitor Usage | 1.48 (0.73 – 3.02) | p=0.27 |
| Carbapenem Usage | 2.90 (1.19 – 7.06) | p=0.01 |
| Glycopeptide Usage | 1.23 (0.46 – 3.27) | p=0.67 |
| Colistin Usage | 1.72 (0.55 – 5.31) | p=0.34 |
| Antifungal Usage | 1.17 (0.47 – 2.92) | p=0.72 |
| Combined Antibiotic Usage | 0.87 (0.65 – 1.17) | p=0.38 |

| Hospitalization Time Statistics (day) | Case (n=60) | Control (n=240) | p-value |
|--|-----------------------|------------------------|---------------|
| Total Hospitalization Time | 31 (18.25 – 59.75) | 26,5 (14.25 – 52.25) | p=0.20 |
| Time from Hospitalization to Sampling | 14.5 (8.25 – 38) | 15 (8 – 29) | p=0.91 |
| Time from Sampling to Discharge | 15 (5.25 – 23) | 7.5 (2 – 21.75) | p=0.04 |

| | Case (n=60) | Control (n=240) | p-value |
|--------------------------------|-----------------------------------|-----------------------------------|---------------|
| Total Health-Care Costs | 26,135 (9,398 – 56,850) TL | 13.508 (4,604 – 45,547) TL | p=0.03 |

Conclusion

As the largest case-control study reported from Turkey, it was found that *Clostridium difficile* infection incidence was 0.78 per 10,000 patient-days. In previous prospective studies from European countries, it was reported that *Clostridium difficile* infection incidence was 2.45 (0.13 – 7.1) and 4.1 (0 – 36.3) per 10,000 patient-days respectively^{2,3}. In this study, infection rate was revealed to be comparable with these ranges. *Clostridium difficile* infection was revealed to be associated with life-threatening conditions such as, bone marrow transplantation and leukemia, prolonged hospitalization and higher cost. Appropriate infection control measures are necessary to prevent the spread of the infection.

References

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Note: Authors have no disclosure to disclose.