2388. High-risk antibiotics associated with *Clostridioides difficile* infection: a national, multicenter analysis

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Background. Historically, antibiotics with the highest Clostridioides difficile infection (CDI) risk included clindamycin, advanced-spectrum penicillins, and cephalosporins; however, a recent CDI epidemic involving fluoroquinolone (FQ)-resistant ribotype 027-added FQs as a high-risk class. Now that the ribotype 027 strain is part of an endemic population of *C. difficile* strains, no contemporary analysis of high-risk antibiotics and CDI risk has been conducted. The primary objective of this study was to identify the strongest antibiotic predictors for CDI.

Methods. This was a case–control study in the national United States Veterans Health Administration (VHA). The study included patients 18–89 years old with an ICD-9-CM code for CDI (008.45), a positive stool test, and active CDI therapy between 2002 and 2014. A random sample of VHA patients without a CDI ICD-9-CM code served as the control cohort. Antibiotic use was defined as any use in the 90 days prior to inclusion. Antibiotic risk factors for CDI were evaluated in a multivariable logistic regression model that included 33 covariates. Results were validated in non-VA patients at a quaternary care medical center in Houston, TX.

Results. A total of 85,451 VHA patients were included (26,149 CDI patients and 59,302 controls). FQs were most commonly prescribed: 24.9% (CDI group) and 7.3% (controls). Strongest predictors of CDI included carbapenems (OR 54.39, 95% CI 25.42–116.36), advanced-spectrum penicillins (OR 41.54; 95% CI 31.49–54.78), third/fourth-generation cephalosporins (OR 17.35; 95% CI 14.49–20.77), clindamycin (OR 3.63; 95% CI 3.26–4.02), and FQs (OR 1.48; 95% CI 1.40–1.57). Macrolides (OR 0.83; 95% CI 0.77–0.91) and tetracyclines (OR 0.58; 95 CI 0.51–0.66) were negatively associated with CDI risk. In a validation cohort of 68,795 patients, carbapenems (OR 2.19; 95% CI 1.86–2.57), third/fourth-generation cephalosporins (OR 1.70; 95% CI 1.50–1.93), and advanced-spectrum penicillins (OR 1.64; 95% CI 1.42–1.89) were also the strongest predictors for CDI. FQs were not significantly associated with CDI.

Conclusion. Although FQs were the most prescribed antibiotic class, carbapenems were the strongest predictor of CDI development in a national cohort of veterans and a validation cohort.

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2389. Assessing the Time Course of Proton Pump Inhibitor Use and *Clostridioides difficile* Infection

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Background. Proton pump inhibitors (PPIs) are a known risk factor for *Clostridioides difficile* infection (CDI) and recurrence, even in the absence of antibiotic use. No studies have specifically assessed the increased risk for CDI based on PPI duration, given that PPIs are frequently newly prescribed during hospitalizations and infrequently discontinued, even when CDI has occurred. The aim of this project was to assess the time course of PPI utilization and risk of CDI.

Methods. We conducted a retrospective matched case–control study comparing patients who developed CDI (cases) with patients who did not develop CDI (controls, matched on age, gender, date of admission and hospital location) from a cohort of patients with a *C.difficile* PCR test order from an academic medical center. Patient charts were reviewed for PPI use prior to the date of the positive test and whether the PPI was started in the hospital or as a home medication (>30d, 30–90d, 90–180d, >180d). The primary comparison was odds of PPI use between cases and controls using conditional logistic regression adjusted for antibiotic exposure (SAS 9.4, Cary, NC).

Results. A total of 348 patients were included in the study, 174 cases and 174 matched controls. 65% of patients in the study received a PPI, 85% a PPI or H2 blocker and 95% of patients received antibiotics during their admission. Patients on PPIs as home medications were not at an increased risk of CDI (OR = 1.08 (95% CI 0.60–1.93)) compared with those not on PPIs. Patients whose PPIs were initiated in the hospital were at increased risk of CDI compared with those not on PPIs (OR = 1.4 (95% CI 0.81–2.41)). No significant difference was observed across time periods of PPI use prior to admission and development of CDI.

Conclusion. Patients who started PPIs during inpatient stays were at a higher risk of developing CDI than patients not exposed to PPIs. However, PPI use was not found to be significantly associated with CDI in this analysis, regardless of the time or duration of PPI prescription. The results may be confounded by the high frequency of PPI use and concomitant antibiotic use in both cases and controls. Further study is needed to evaluate the impact of short-course PPI prescriptions in inpatient settings on CDI.

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2390. Acquisition of *Clostridium difficile* Infection Following Exposure from Roommate Defined by Concordance on Genotyping

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Background. Observational studies have identified same room occupancy with a hospital-onset Clostridium difficile infection (HO-CDI) case as a risk factor for subsequent CDI diagnosis. Despite this, the risk remains poorly characterized in endemic settings. Furthermore, genotyping techniques have not been applied to examine concordance between infecting strains in index patients and exposed roommates who eventually develop CDI. The study seeks to quantify transmission of *C. difficile* from an index case to their roommates and identify if concordance was present among strain types by the application of multi-locus sequence typing (MLST).

Methods. Laboratory-identified cases of hospital onset *C. difficile* infection (CDI) from October 1, 2017 through March 31, 2018, were included in the study. Patients with HO-CDI are placed in private room once diagnosis is established. Roommates who were in the same room as cases for at least 24 hours prior to diagnosis, regardless of duration of overlap, were identified through of the hospital patient tracking database to establish spatial link. Next, all exposed roommates who developed CDI within 3 months after exposure (defined as date of CDI diagnosis of index case) were identified. Strain types of linked cases was examined by MLST.

Results. During the 6-month period, 279 cases of CDI were diagnosed. Of these cases, 156 were hospitalized at the time of diagnosis including 83 (53%) in a room with shared occupancy. These 83 patients had 109 roommates that met exposure criteria. Four (3.7%) roommates developed CDI over a 90-day follow-up period. None of the examined pairs were genetically concordant.

Conclusion. Indirect patient to patient transmission of *C. difficile* from newly diagnosed CDI cases to roommates is not common despite the spatial proximity with shared occupancy.

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2391. Increased Risk of Systemic Infections with Multidrug-Resistant Organisms in Patients with Severe Clostridioides difficile Infection

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Background. The gut microbiota is a defense mechanism against colonization of multidrug-resistant organisms (MDROs), including carbapenem-resistant *Enterobacteriacae* (CRE). Gut dysbiosis caused by broad-spectrum antibiotics favors MDRO colonization and increased susceptibility of intestinal infections, including *C. difficile* infection (CDI). Increased CDI severity may increase the risk of bacterial translocation due to damage to colonic epithelial layer. The aim of this study was to assess CDI disease severity and subsequent risk for MDRO systemic infection.

Methods. This was a prospective, observational study of adult hospitalized patients tested for CDI at a large, university-affiliated tertiary care hospital. Patients with a history of systemic MDRO infection in the past 90-days of stool testing were excluded. Patients were stratified by test positivity (CDI vs. antibiotic-associated diarrhea (AAD)), as well as, CDI disease severity and followed for 30-days for subsequent MDRO infections defined as presence of MDRO cultures from systemic, normally sterile sites (blood, urine, cerebrospinal fluid). Stool samples were collected and grown for MDRO colonization.

Results. A total of 335 CDI-positive and 135 antibiotic-associated diarrhea (AAD) hospitalized patients were included. No differences were found in rates of MDRO colonization by test positivity or disease severity (overall 68% VRE, 53% *Candida* spp., 30.4% MRSA, and 1.8% CRE). Significantly more patients with severe CDI had higher rates of developing systemic MDROs compared with mild-moderate CDI and AAD (23.2%, $n = 112$ vs. 8.1%, $n = 223$ $P < 0.001$; vs. 11.9%, $p = 0.018$). Severe CDI was found to be an independent risk factor for subsequent systemic MDRO infection via logistic regression.

Conclusion. Severe CDI disease is associated with an increased risk of systemic MDRO infections.

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