a 21.9% decrease in incident C. difficile cases ($P < 0.001$), while a 30% decrease in PPI use corresponded with a 9.1% reduction ($P < 0.001$) in incident cases. There was no evidence of a synergistic effect between the two interventions ($P = 0.60$). PPI stewardship also decreased length of stay, resulting in a 7% increase in admissions in the simulated ICUs ($P < 0.001$).

**Conclusion.** PPI stewardship might prove a valuable adjunct to existing antibiotic stewardship programs. The reductions in C. difficile transmission were more modest for PPI stewardship as compared with programs targeting fluoroquinolones. PPI stewardship, however, may reach different patient populations, and may represent an additional area for substantial improvement even in facilities that have made substantial gains in reducing fluoroquinolone use.

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516. Implementation of a Probiotic for the Primary Prevention of Hospital-Onset *Clostridium difficile* Infection

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**Background.** Hospital-onset *Clostridium difficile* infection (HO-CDI) affects over 100,000 patients in the United States each year. Due to a rising rate of HO-CDI at Denver Health, a multifaceted CDI prevention plan was implemented which included a probiotic intervention. The purpose of this study was to describe the implementation and uptake of the probiotic intervention.

**Methods.** This is a retrospective study of adult inpatients who received antibiotics considered high-risk for the development of CDI from March 2017 to March 2018. In March 2017, a Best Practice Advisory (BPA) was implemented to advise providers to order Bio-K+ (L. acidophilus, L. casei, and L. rhamnosus) when they signed an order for a high-risk antibiotic. The BPA allowed providers to order or decline the probiotic directly from the BPA. The BPA was suppressed in patients who were pregnant, immunocompromised, unable to take oral medications, or had active CDI. The primary outcome was the proportion of patients for whom Bio-K+ was prescribed in the first year. Secondary outcomes include CDI rates before and after the intervention and adverse events defined as a positive Lactobacillus culture.

**Results.** The BPA fired in 3,840 cases, and Bio-K+ was ordered in 94.8% of these. For patients who received a high-risk antibiotic for at least 24 hours, there were 2,636 courses of Bio-K+ prescribed for 2,324 unique patients for a median duration of 3 days. The HO-CDI rates for 1 year pre- and post-intervention were 0.75 and 0.60 cases per 1,000 patient days, respectively ($P = 0.16$). Lactobacillus was cultured in 11 patients; five patients received Bio-K+ prior to culture. The positive cultures were from abdominal fluid (4) and sputum (4) in patients who received the probiotic.

**Conclusion.** A probiotic intervention for the prevention of CDI implemented via BPA had excellent provider uptake. As part of a multifaceted CDI action plan, a probiotic intervention was well received and had a low risk of serious adverse events.

**Figure 1.**

**Table 1.**

| N = 2,636 courses of Bio-K+ |
|-----------------------------|
| Male, n (%)                  |
| Age, mean                   |
| Length of stay, median days (IQR) |
| Days of Bio-K+, median (IQR) |
| Courses of high-risk antibiotics |
| Ceftriaxone                  |
| Cefepime                     |
| Piperacillin/tazobactam      |
| Amoxillin/subbacam           |
| Clindamycin                  |
| Levofloxacin                 |
| Other                        |

518. Modeling the Potential Impact of Administering Vaccines Against *Clostridium difficile* Infection to Individuals in Healthcare Facilities

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**Background.** As antimicrobial exposure represents a major risk factor in the development of *Clostridium difficile* infection (CDI), optimization of antimicrobial selection is critical. While a number of antibiotics have been associated with increased risk of CDI, doxycycline may be considered protective. The combination of ceftriaxone and doxycycline (CTX-D) is supported by the Infectious Diseases Society of America (IDSA) for the management of community acquired pneumonia (CAP). The primary objective of this study was to evaluate if CTX-D is associated with a reduced incidence of CDI compared with ceftriaxone and azithromycin (CTX-A) among nonintensive care unit (ICU) patients with CAP at Christiana Care Health System.

**Methods.** A retrospective cohort study was conducted to evaluate patients who received CTX-D or CTX-A admitted to Christiana Care between June 1, 2015 and December 31, 2017. Non-ICU patients, aged 18 years or older, receiving at least one dose of CTX-D or CTX-A were included. The primary outcome of our study was the incidence of CDI within 30 days from initial dose of CTX-D or CTX-A. The secondary outcome was the time to onset of CDI from initial dose of CTX-D or CTX-A.

**Results.** One thousand sixty-four unique patients were included in this study. Overall, 778 patients received CTX-D and 286 received CTX-A. Among patients who received CTX-D, 2 patients developed CDI, compared with five patients who received CTX-A (relative risk, 0.15; 95% confidence interval, 0.03–0.75; $P = 0.02$). The mean time to onset of CDI from initiation of CTX-D was 22 days compared with 9.2 days from initiation of CTX-A.

**Conclusion.** In this cohort of non-ICU patients with CAP, CTX-D was associated with a reduced incidence of CDI. Further studies are necessary to confirm these preliminary findings to optimize clinical practice, while minimizing potential adverse outcomes associated with antimicrobial use.

**Disclosures.** All authors: No reported disclosures.
Methods. We designed a simulation model of CDI among patients in a network of 10 short- and long-term acute care hospitals and nursing homes. Model calibration relied on published infection and carriage data and whole genome sequencing studies that estimated the fraction of CDI attributable to transmission from other CDI patients in healthcare settings. The modeled vaccine effectiveness for reducing the rate of progression to CDI among carriers was set at 75% achieved after completing a vaccine course. We then simulated initiation of this vaccine course to a random subset of patients at transfer or live discharge and tallied direct and indirect CDI-reduction effects per vaccinated patient over 5 years.

Results. Model calibration found that data are consistent with higher infectivity of CDI patients over other carriers by a factor of 30–85, depending on assumed rates of initial carriage importation. Vaccine simulations produced an average reduction of 36 CDI cases per 1,000 vaccinated patients, with 25 of those cases prevented among those vaccinated and 11 prevented among unvaccinated patients. These results were robust across transmission and carriage rates supported by data.

Conclusion. Our findings demonstrate potential for a vaccine against CDI to reduce transmissions in healthcare facilities, even if it does not decrease acquisition of carriage per exposure among those receiving it. The finding is robust to the remaining uncertainty around the relative prevalence and infectivity of CDI patients among all carriers. The vaccine will have maximal impact if received by individuals likely to experience future infections in settings where environmental contamination poses risk to disease transmission.

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519. Longer Length of Antibiotic Therapy for Community-Acquired Pneumonia and Risk of Clostridium difficile Infection Sarah H. Yi, PhD, Sajan C. Reddy, MD, Sophia V. Karakazova, MD, MPH, PhD, Kelly M. Hatfield, MSPH, James Baggs, PhD, Alice Y. Gah, MD, MPH, Freeta K. Kuttty, MD, Lauri A. Hicks, DO, Arjun Srinivasan, MD, L. Clifford McDonald, MD and John A. Jernigan, MD, MS, Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, Atlanta, Georgia

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Background. We previously observed a median 9.5 days length of antibiotic therapy (LOT) among patients with community-acquired pneumonia (CAP) requiring hospitalization (Clin Infect Dis. 2018;66:1333–41). Treatment guidelines for CAP, however, suggest LOT >7 days is rarely necessary. In this study, we evaluated the risk of Clostridium difficile infection (CDI) as a potential harm of longer LOT.

Methods. This retrospective cohort study included Medicare beneficiaries with parts A, B, and D coverage hospitalized for uncomplicated CAP in 2012–2015 for 2–10 days, home discharge, and no hospitalizations 30 days before or 3 days after index hospitalization. The main exposure was total LOT, represented by the sum of estimated inpatient and observed outpatient LOT, and defined as “longer” if >9.5 days and “shorter” if ≤9.5 days. The outcome, post-discharge CDI, was defined using ICD-9-CM diagnosis code 008.45 in inpatient, skilled nursing, or outpatient claims within 6 months after index hospitalization. CDI 12 months before or during index hospitalization was excluded. CDI risk was assessed through a multivariable logistic model stratified by outpatient antibiotic class and adjusted for confounders including comorbidities, severity via ICU status, demographics, and hospital characteristics.

Results. The cohort consisted of 99,883 patient encounters. Median total LOT was 9.5 days (IQR: 7.4–11.4). Antibiotics filled at discharge included quinolones (40%), none (20%), multiple (14%), cephalexin (10%), macrolides (7%), and β-lactam/β-lactamase inhibitor combinations (5%). CDI risk was 1.2%. Overall adjusted risk among those with longer LOT was 1.2 (95% CI 1.1–1.4) times that of those with shorter LOT. Increased risk was observed among those prescribed quinolones at discharge, for whom adjusted CDI risk for longer LOT was 1.4 (95% CI: 1.2–1.7) times the risk of those with shorter LOT. We observed no difference in risk between longer and shorter LOTs for other antibiotic categories.

Conclusion. These findings suggest that decreased LOT, which can be achieved with better adherence to current treatment guidelines, could reduce risk of subsequent CDI among patients hospitalized with CAP, particularly among those treated with fluoroquinolones at discharge.

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520. Reducing Inappropriate Clostridium difficile Testing by Empowering Nurses Jennifer LeRose, MPH1; Amar Krishna, MD2; Suganya Chandramohan, MD2; Michelle Bartholomew, BS3; Margaret Turner, ME4, CIC5, RN6; Nancy Baran, MS, CIC7, Thomas Chevalier, RN, BSN, CIC7; Judy Mossos, MT (ASCP), CIC3; Samya Mogalli, MHSA, MT (ASCP)7; Lynn Semproch, MPH, CIC3 and Teena Chopra, MPH, MPHP1; Quality and Safety, Detroit Medical Center, Detroit, Michigan, 2Division of Infection Control and Hospital Epidemiology, Detroit Medical Center, Detroit, Michigan, 3Detroit Medical Center, Detroit, Michigan, 4Infection Prevention and Hospital Epidemiology, Detroit Medical Center, Detroit, Michigan, 5Infection Prevention and Hospital Epidemiology, Detroit Medical Center, Detroit, Michigan, 6Infection Prevention and Hospital Epidemiology, Detroit Medical Center, Detroit, Michigan, 7Infection Prevention and Hospital Epidemiology, Detroit Medical Center, Detroit, Michigan, 8Infectious Diseases, Jefferson Health - New Jersey, Cherry Hill, New Jersey, 9Nursing, Jefferson Health - New Jersey, Cherry Hill, New Jersey, 10Pharmacy, Jefferson Health - New Jersey, Cherry Hill, New Jersey

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Background. Inappropriate testing for Clostridium difficile (CD) can result in over diagnosing, which may lead to overuse of antibiotics, increased length of stay and financial penalties under Center for Medicare and Medicaid’s Value Based Programs. To address unnecessary testing, a nurse-driven algorithm was developed and implemented at a tertiary teaching hospital in Detroit, Michigan. In this study, we evaluate the intervention’s impact on hospital acquired CD infections (HO-CDI) rates.

Methods. An algorithm for CD testing appropriateness was created by leadership and the Infection Prevention team. The algorithm emphasized that CD testing should not be performed on asymptomatic patients or those receiving laxatives and/or stool softeners. Risk of HO-CDI per 10,000 patient days were compared before and after the intervention and statistical significance was determined by an unpaired t-test. The hospital laboratory used PCR to detect CDI throughout the study period.

Results. Before the algorithm was implemented, our hospital had an average of 8.2 HO-CDI per 10,000 patient days. After the intervention was established, the rate decreased to 4.6 HO-CDI per 10,000 patient days. This represents a statistically significant decrease in HO-CDI (P = 0.037). The rate of community-onset CD cases, defined as infection that are identified between calendar day 1 through 3, did not change significantly during the study (P = 0.65).

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521. Clostridium difficile Timeout: A Nurse-Driven Protocol to Optimize Testing Stewardship Cindy Hou, DO, MA, MBA, FACOI1; Nikunj Vyas, PharmD, BCPSc2; Lea Ann Kellum, MSN, RN, CCRN, CEN3; Mary Miller, RN, BSN, CIC4; Ann Marie Flory, MSN, RN, NE-BC5 and Shereef Ali, PharmD, BCPS, BCCCP6; Infectious Diseases, Jefferson Health - New Jersey, Cherry Hill, New Jersey, 2Pharmacy, Jefferson Health - New Jersey, Cherry Hill, New Jersey, 3Medical, Jefferson Health - New Jersey, Cherry Hill, New Jersey, 4Nursing, Jefferson Health - New Jersey, Cherry Hill, New Jersey, 5Pharmacy, Jefferson Health - New Jersey, Cherry Hill, New Jersey

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Background. There remains a challenge in distinguishing colonization vs. infection with Clostridium difficile associated diarrhea. At our institution, despite effective antimicrobial stewardship efforts, C. difficile tests and positive infections remained high identifying a need for C. difficile testing stewardship optimization.

Methods. This was an RRI approved study on a nursing driven algorithm for C. difficile Timeout (CDT). This included the number and shape of stools and absence of laxatives in the last 24 hours. Control and study groups were identified and a nurse