HOSPITAL-ONSET (HO) CLOSTRIDIUM DIFFICILE INFECTION (CDI) NOT A PREDICTOR OF INCREASED ANTIBIOTIC USE IN SMALL HOSPITALS: An Evaluation of 54 Hospitals

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BACKGROUND

Clostridium difficile infection (CDI) is one of the leading healthcare-associated infections in the United States. Antimicrobial pressure has been linked to increased incidence, severity and recurrences of CDI. Ascension Health is the largest non-profit healthcare system in the United States covering 21 States. In addition, Ascension Health is one of 26 hospital engagement networks (HEN) working with the Centers for Medicare and Medicaid Services (CMS) “Partnership for Patients” to reduce hospital acquired conditions. Evaluating antimicrobial use and its relation to CDI, accounting for hospital size may provide essential information on the important areas to address. As the initial step for development of a system-wide antimicrobial stewardship program for a large health system, we evaluated the relationship between antimicrobial use and hospital-onset (HO) CDI standard infection ratio (SIR).

METHOD

We evaluated systemic antimicrobial acquisition cost of 54 hospitals for 2013. Measures collected included daily defined dose (DDD) per day for specific classes of penicillin, cephalosporin, carbapenem, quinolone, clindamycin, tigecycline, and total antimicrobials (defined daily dose/1000 patient days). We also obtained data on HO CDI from the respective hospitals. Antimicrobial use and HO CDI SIR were compared factoring yearly patient-days (≤25,000; 25,001-50,000; 50,001-75,000; >75,000) categories. One way ANOVA was used to compare means.

RESULT

54 hospitals were evaluated with 8 (≤25,000 patient-days per year), 18 (25,001-50,000 patient-days per year), 8 (50,001-75,000 patient-days per year), and 18 (>75,000 patient-days per year), accounting for a total of 2,904,906 patient-days. Quinolones represented the most commonly used class, followed by extended spectrum penicillins and 3rd generation cephalosporins. Hospitals with ≤25,000 patient-days per year tended to use more 3rd generation cephalosporins, extended spectrum penicillins and quinolones than others. However, HO CDI SIR did not correlate with increased antimicrobial use, and was associated with hospitals with patient-days >50,000 per year (Table 1). When groups based on SIR, there were no associations seen with increased antimicrobial use and CDI SIR, with those with lower SIR having lower patient-days (Table 2).

DISCUSSION

We evaluated the association between antimicrobial use and CDI for 54 hospitals from one healthcare system. Hospitals with lower patient-days per year were associated with the highest antimicrobial use (using DDD), but this did not correlate with a higher HO CDI SIR. A few possibilities may explain our findings. First, we have not looked at community-onset CDI and whether larger hospitals have a higher proportion of patients admitted with CDI compared to smaller hospitals. Colonization pressure may play a role in acquisition of CDI. Second, we have not examined the environmental cleaning processes in all our institutions, and whether there is any variation between the different size hospitals. Third, we have used the CDI SIR (not CDI rate) so we would account for the type of test used for detecting CDI. Although SIR adjusts for the type of test, this adjustment may not be optimal. Finally, new CDI tests (especially those that use molecular techniques) are very sensitive and may detect colonization (thus more false positives) if the specimens are sent without good clinical suspicion of CDI.

Still, our findings elucidate the importance of supporting small hospitals to build antimicrobial stewardship programs to reduce unnecessary antimicrobial use. This may be through partnering with other hospitals with established successful programs. On the other hand, reducing CDI requires a multipronged approach (antimicrobial stewardship, environmental cleaning, and healthcare worker compliance with measures to reduce transmission).

CONCLUSION

Hospitals with lower patient days had the highest use of antimicrobial agents, and represent an important opportunity to target the antimicrobial stewardship efforts. On the other hand, CDI SIR may not be a good surrogate to evaluate their antimicrobial stewardship outcomes.

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