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Impact of peer comparison on carbapenem use among inpatient prescribers at a community hospital

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To the Editor—The Infectious Diseases Society of America (IDSA) guidelines for the implementation of an antimicrobial stewardship program (ASP) recommend using preauthorization, prospective review, and feedback or a combination of these as core strategies for ASPs.[1] Behavioral interventions, such as peer comparison, are included among the Core Elements of Outpatient Antimicrobial Stewardship developed by the Centers for Diseases Control and Prevention (CDC).[2] However, evidence on the use of peer comparison by inpatient ASPs is limited.

To further understand the applicability of a behavioral intervention in this setting, we conducted an intervention consisting of peer comparison of the quantitative and qualitative use of carbapenems among inpatient prescribers. The main outcome of interest was carbapenem days of therapy (DOT) per 1,000 patient days. This study was conducted at a 374-bed hospital and its level 1 trauma center in Des Moines, Iowa. The preintervention period was December 1, 2016, to November 30, 2017, and the postintervention period was December 1, 2017, to November 30, 2018.

The intervention was limited to internal medicine and surgery house staff, and the hospitalists, critical care specialists, and surgeons directly working with house staff. These 5 groups of "peers" were used for direct comparisons. By targeting these groups we estimated that we would reach >80% of the prescribers of carbapenems at our facility.

Each DOT prescribed was reviewed and its appropriateness was determined based on previously published definitions.[3] Each DOT was assigned to the physician considered to be directly responsible for the patient's care that day, which was determined by authorship of progress notes. In cases in which house staff authored the progress note, both attending and trainee were assigned the DOT. The component of the peer comparison report concerning quantitative use was calculated by adding the number of DOTs adjudicated to each physician. The component indicating appropriateness of use was calculated using the following formula:

$$\text{Percentage of appropriate use by physician} = \text{Total no. of appropriate DOT by physician} / \text{Total no. of DOT by physician}$$

A similar calculation was done for each peer group using the following formula:

$$\text{Percentage of appropriate use by peer group} = \text{Total no. of appropriate DOT by peer group} / \text{Total no. of DOT by peer group}$$

Reports on quantity and appropriateness by each individual and in comparison with their peers were sent by e-mail on a monthly basis (Supplemental Material online).

An interrupted time series analysis was preferred to determine changes in the slope of rate of hospital-level carbapenem DOT per 1,000 patient days following onset of intervention. The impact of the intervention was modeled as a gradual change in the trend of carbapenem use, and a Poisson regression model was used. Data were assessed for autocorrelation and none was found. No other interventions targeting carbapenem use were implemented during this study period.

During the 12 months of the intervention, an average of 24 e-mails per month were sent and a total of 91 physicians were contacted. The average carbapenem DOT per 1,000 patient days was 15.6 in the preintervention period and 15.2 in the postintervention period.

Following onset of the intervention, no change in the trend of carbapenem use was observed (incidence rate ratio [IRR], 1.04; 95% confidence interval [CI], 0.98–1.10; $P = .21$) (Fig. 1a). The impact of the intervention was also analyzed by medical and surgical services, and trends of carbapenem use also remained stable. In the medical service the IRR was 0.98 (95% CI, 0.92–1.05; $P = .612$) (Fig. 1b), and in the surgical service, the IRR was 1.05 (95% CI, 0.99–1.13; $P = .11$) (Fig. 1c). The percentage of

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*PREVIOUS PRESENTATION: The results from this study were presented at ID Week 2019, on October 4, 2019, in Washington, DC.

Cite this article: Rosa RM and Bushman AM. (2020). Impact of peer comparison on carbapenem use among inpatient prescribers at a community hospital. *Infection Control & Hospital Epidemiology*, 41: 376–378, https://doi.org/10.1017/ice.2019.377

https://doi.org/10.1017/ice.2019.377 Published online by Cambridge University Press

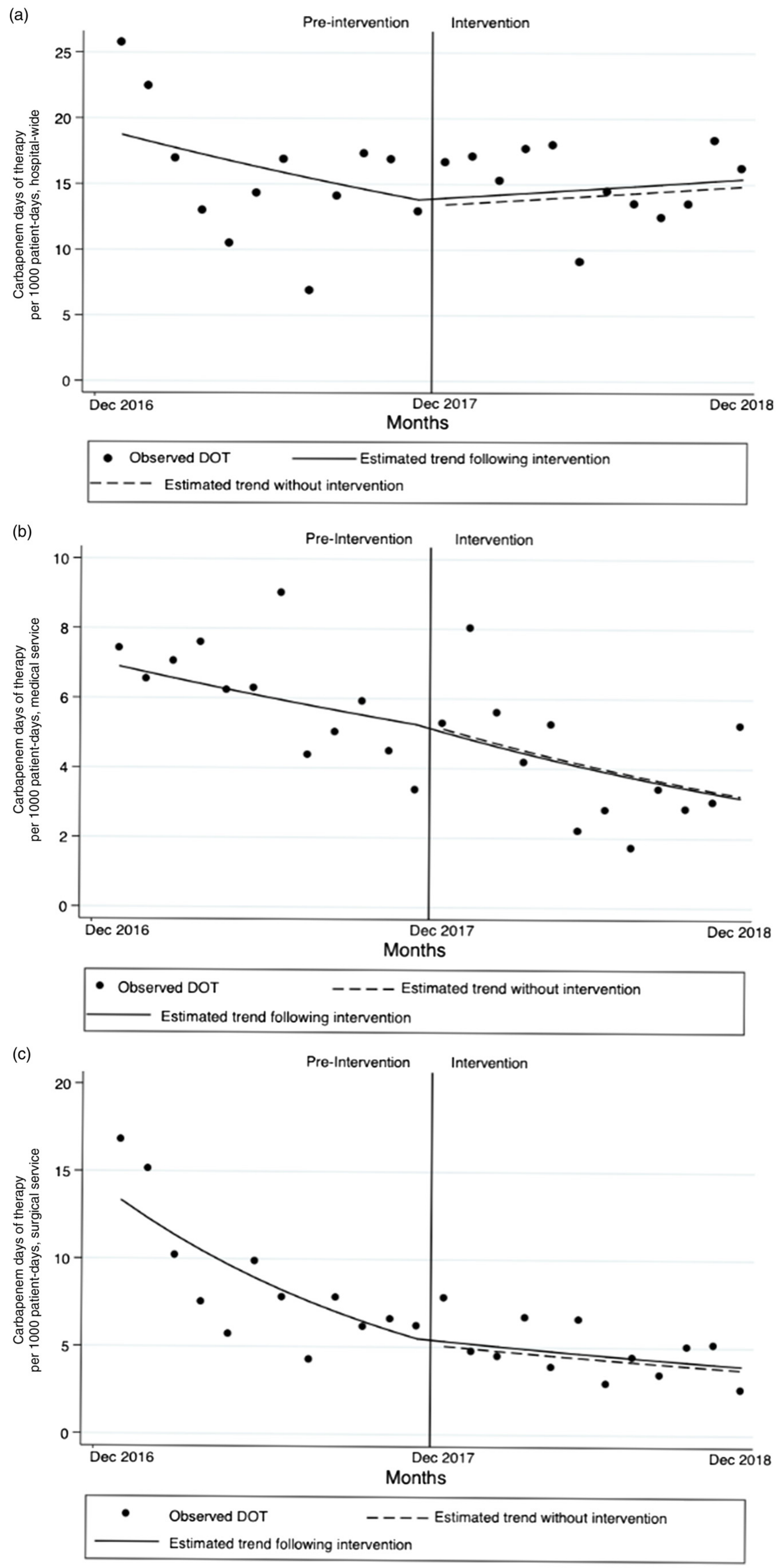

Fig. 1. (a) Monthly trends in carbapenem use measured in days of therapy per 1,000 patient days, hospitalwide (December 1, 2017 to November 30, 2018). (b) Monthly trends in carbapenem use measured in days of therapy per 1,000 patient days, medical service (December 1, 2017 to November 30, 2018). (c) Monthly trends in carbapenem use measured in days of therapy per 1,000 patient days, surgical service (December 1, 2017, to November 30, 2018).

appropriate use remained constant across the different prescribing groups during the study period (Supplementary Fig. 1 online).

In this study, implementing peer comparison had no impact on the appropriateness or overall rates of carbapenem use among hospitalized patients. Our study highlights the complexities of implementing this strategy on inpatient settings. The use of peer comparison has been shown to decrease antibiotic prescribing in outpatient settings[4,5]; however, prescribing dynamics are different in inpatient settings, where the physician who initially prescribes an antibiotic may not be responsible for patient care in subsequent days and >1 medical service may be involved in management. This setting poses a challenge from accountability and logistic perspectives.

The baseline use of the antibiotic class targeted could influence the results of this type of intervention. Allen et al.[6] conducted a quasiexperimental before-and-after study targeting high-volume fluoroquinolone prescribers across 16 community hospitals in Florida. All hospitals had ASPs. Individuals belonging to 3 cohorts (ie, internal medicine, family medicine, and hospitalists; intensivists; and infectious diseases specialists) were provided with individual and facility-specific peer cohort percentage of total antibiotic days of therapy attributable to fluoroquinolones, as well as education on decreasing fluoroquinolone use. Fluoroquinolone use declined by 29% in the postintervention period, with larger changes seen in facilities with the highest baseline use. In contrast to this study, our intervention targeted a different antibiotic class with low baseline use.

The limitations of our study include its observational design and that it was conducted at a single center. Furthermore, our intervention did not include all hospital providers prescribing carbapenems. However, we included the physician groups responsible for the majority of carbapenem DOTs at our institution.

In conclusion, we found no impact on trends of carbapenem use following the addition of peer comparison to a well-established inpatient ASP using prospective review and feedback as its main strategy. Future studies can help determine whether this strategy could be applied to other antibiotics classes or specific syndromes among hospitalized patients.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/ice.2019.377

Acknowledgments. None.

Financial support. No financial support was provided relevant to this article.

Conflicts of interest. All authors report no conflicts of interest relevant to this article.

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Detection of the emergence of *mcr-1*–mediated colistin-resistant *Escherichia coli* and *Klebsiella pneumoniae* through a hospital-based surveillance in an oncology center in eastern India

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Cite this article: Roy S, *et al.* (2020). Detection of the emergence of *mcr-1*–mediated colistin-resistant *Escherichia coli* and *Klebsiella pneumoniae* through a hospital-based surveillance in an oncology center in eastern India. *Infection Control & Hospital Epidemiology*, 41: 378–380, https://doi.org/10.1017/ice.2019.363

To the Editor—The global emergence of colistin-resistant *Enterobacteriaceae* through the plasmid-mediated *mcr* gene has raised concerns with regard to spread of antimicrobial resistance and infection control.[1] There are several mechanisms of colistin resistance.[2] However, the molecular epidemiology of colistin resistance in clinically relevant gram-negative isolates is poorly defined in India, a country that is large and populous and is also a major