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Methods of a study of terminal cleaning of patient rooms

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To the Editor—It is encouraging to see that people have reviewed our article "Increased Time Spent on Terminal Cleaning of Patient Rooms May Not Improve Disinfection of High-Touch Surfaces."[1] However, a related Letter to the Editor raises concerns that some may be misinterpreting both the thrust of our paper and our study methodology.[2]

In our pragmatic report, we aimed to promote better cleaning by presenting research results that suggest that more than adequate time spent on terminal cleaning may not result in additionally lower bioburden on high-touch surfaces. We hope this information will cause practitioners to focus on other important factors such as proper training for environmental services staff (EVS), proper use of appropriate chemicals, and targeting high-touch surfaces that pose the greatest risk for transmission of pathogens to patients. We reiterated that adequate cleaning time is crucial, and we certainly do not advocate taking any shortcuts in the terminal cleaning process. Yet, as in many things, it is the quality of the process not the quantity that counts.

As to methodology, EVS were well-trained and experienced, and they voluntarily collaborated on the project. They were instructed to follow the manufacturer's guidelines for application and contact time. We did not monitor EVS during room cleaning to avoid the Hawthorne effect and to obtain data on unmonitored cleaning.

The 5 high-touch surfaces chosen were the highest-touch surfaces according to published papers at the time of the study.[3] We omitted details on the culture process and instead referenced a prior paper.[4]

Our analysis plan followed best practices for analyzing count data: use a generalized linear model with appropriate choice of family and link function, and avoid log transforming the data.[5] We used Bayesian models and reported uncertainty in our estimates, rather than rely on a p-value. Recent articles highlight the pitfalls of statistical significance, which can be particularly problematic in small observational studies without preregistration.[6] Major journals are now requiring some form of uncertainty interval rather than *P* values.[7] We also chose to include model estimates on the actual outcome scale. This makes interpretation easy for those familiar with the outcome (ABC counts from press plates) but not familiar with statistical terminology like incident rate ratios. Our goal was to apply the best methods of analysis and interpretation.

Finally, we provided a full financial support disclosure statement in our article. The salary support for this study was provided by the authors' employers.

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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