The Impact of a Single Ward for Cohorting Patients with Infection due to Multidrug-Resistant Organisms

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Multidrug-resistant organisms (MDROs) are emerging and disseminating around the globe.[1,2] The guidelines for the management of MDROs support the use of various interventions to reduce the burden of MDROs.[3] We conducted a study to assess the impact of the creation of a unit for cohorting of patients with infection due to MDROs.

Hospital de Clínicas de Porto Alegre, a 795-bed university, public hospital, is located in the city of Porto Alegre in southern Brazil. In a quasi-experimental study, we assessed the impact of the creation of an MDRO unit for patient cohorting on the overall hospital incidence of infection due to MDROs.

The 34 beds of the unit were located in 16 rooms for adult MDRO-infected patients and 2 additional rooms for respiratory isolation. Patients were transferred to the unit when they were identified as infected or colonized with MDROs. The unit staff was trained for MDRO-infected patient care; unit staff, patients, and families attended weekly meetings for education about MDROs with a multidisciplinary team (doctors, nurses, pharmacists, and social assistants).

A time series segmented regression analysis was used to identify significant changes in MDRO incidence.[4] The study period comprised March 2010 to February 2011 (the preintervention period) and March 2011 to February 2012 (the postintervention period).

For normally distributed variables, a one-way ANOVA with a Tukey multiple comparisons adjustment was performed to compare mean differences among periods. For the nonparametric variables, the median differences between the 2 time periods were assessed by the Kruskal–Wallis test.

Throughout the entire hospital, from March 2010 through February 2012, 1,050 adult patients were identified with MDRO. Before the intervention, 193 patients (48.4%) were in the unit, and 206 MDRO-infected patients (51.6%) were in the general ward. After the intervention, 451 patients (69.3%) were in the unit, and 200 MDRO-infected patients (30.7%) were in the general ward ($P < .01$).

After the intervention, of the 289 patients with vancomycin-resistant enterococci (VRE) infection identified, 246 (85.1%) were transferred to the unit and 43 (14.9%) were in the general ward; of the 75 patients with *Acinetobacter baumanii* infection identified, 60 (80.0%) were in the unit and 15 (20.0%) were in the general ward; of the 101 patients with methicillin-resistant *Staphylococcus aureus* (MRSA) infections identified, 70 (69.3%) were in the unit and 31 (30.7%) were in the general ward; of the 39 patients with *Pseudomonas aeruginosa* infection identified, 24 (61.5%) were in the unit and 15 (38.5%) were in the general ward; of the 273 patients with infections due to extended-spectrum β-lactamase (ESBL)–producing organisms, 163 (59.7%) were in the general ward and 110 (40.3%) were in the unit.

Using a segmented regression model (Figure 1), MDRO-infected patient cohorting was shown to result in an immediate increase in the incidence rate of resistant bacteria (level change from 0.65 to 1.05; $P < .01$). However, there was a significant decrease in the trend of MDRO after the unit was created (trend change from 0.65 to −1.04; $P < .01$). Most of the observed reduction was related to the reduction of infections due to VRE (trend change from 0.69 to −1.04; $P < .01$) and carbapenem-resistant *P. aeruginosa* (trend change from 1.35 to −1.45; $P < .01$). For ESBL-producing organisms, MRSA, and carbapenem-resistant *A. baumanii*, there was no change before or after the intervention.

Hand hygiene was observed in the unit from January 2011 to February 2012. During this period, 2,515 opportunities for hand hygiene were observed. The mean (95% confidence interval [CI]) overall compliance with hand hygiene was 61.89% (58.58%–65.20%) during the first 7 months and 71.06% (65.15%–76.95%) during the last 7 months of observation ($P < .01$).

The mean (95% CI) rate of falls in the unit was 1.74 (1.53–1.96) falls per 1,000 patient-days compared with 1.71 (1.51–1.92) falls per 1,000 patient-days in the other hospital clinical and surgical wards ($P = .77$). The median (interquartile range) rate of pressure sores in the unit was zero after the intervention compared with 0.40 (0.25–0.57) per 1,000 patient-days in the other clinical and surgical wards ($P < .01$).

The transformation of the area for strictly MDRO-infected patients resulted in a significant trend in the reduction of the MDRO infection incidence. Moreover, this unit, which was staffed with well-trained professionals, improved MDRO-infected patient care.

Most of the reduction observed in the rate of MDRO infections was related to VRE. Others have demonstrated the

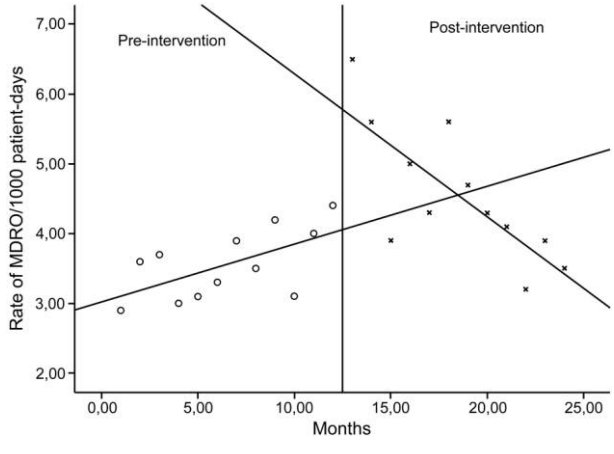

FIGURE 1. Overall hospital rate of infection due to multidrug-resistant organisms (MDROs) per 1,000 patient-days before and after intervention, by a segmented regression analysis.

benefits of patient and staff cohorting in reducing VRE rates in hospitals despite contact isolation measures.[5] Patients with ESBL-producing organisms were sent for cohorting the least often. Tschudin-Sutter et al[6] have reported that the transmission of ESBL-producing Enterobacteriaceae is very low (1.5%), particularly in settings with high levels of adherence to infection control standards. Indications for isolation must consider the specific setting, institutional resources, and bacterial epidemiology. Therefore, guidelines should go beyond specific pathogen recommendations and also address issues such as the risk of transmission and infection.

One study has demonstrated that hand hygiene is the most important measure to reduce the incidence of MDRO infection and colonization. The authors emphasized that even modest improvements in compliance with hand hygiene could lead to substantial decreases in colonization by MDROs.[7] We found a significant increase in hand hygiene during the postintervention period.

Some studies have documented the adverse events associated with the use of contact precautions.[8,9] Isolated patients were more likely to experience falls, ulcers, and fluid and electrolyte abnormalities.[10] We evaluated falls and pressure ulcers as surrogate markers of quality of care. Although we used aggregated data when comparing different units, the isolated patients had at least the same quality of care as other patients with respect to these 2 indicators.

In conclusion, the implementation of MDRO-infected patient cohorting in a specific unit improved patient care and contributed to the reduction of the burden of MDROs in the institution.

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Utility of an Adenosine Triphosphate Bioluminescence Assay to Evaluate Disinfection of *Clostridium difficile* Isolation Rooms

Effective disinfection of hospital rooms after discharge of patients with *Clostridium difficile* infection (CDI) is necessary to prevent transmission. Unfortunately, several studies have demonstrated that it is not uncommon for environmental cultures to remain positive for *C. difficile* after cleaning and disinfection of rooms in which a patient with CDI has been