issues including governance and ownership, for which interdepartmental communication was efficient within the UHS. Specifically, the tracking system expanded the healthcare informatics system that pharmacists were familiar with, and its user-friendly interfaces for PPE providers and consumers helped expedite distribution processes.[5] The UHS and the TCDC have also promoted the system to increase the distribution channels, within which government offices may also allot masks to lessen the burden on healthcare providers.

Because masks alone are not effective without combining infection-control measures,[7] we recommend this integrative platform for the maintenance of more PPE stockpiles, including critical infection-control equipment to reduce iatrogenic SARS-CoV-2 exposure.

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Impact of early carbapenemase notification on infection control management and antimicrobial stewardship

Leandro Reus Rodrigues Perez PhD[1], Gabriel Narvaez MD[2] and Cícero Dias PhD[1]

[1]Federal University of Health Sciences of Porto Alegre, Porto Alegre, Brazil and [2]Mãe de Deus Hospital, Porto Alegre, Brazil

To the Editor—The worldwide spreading of carbapenemase-producing Enterobacterales (CPE) is a matter of concern due to the limited therapeutic options available.[1] In severe cases of infection, an early carbapenemase detection and notification is crucially important for the adequacy of antimicrobial treatment, for the management of patients, and to establish infection control practices.[2] Some microbiology laboratories have used blue-carba, a colorimetric test, because it is fast, easy to read, and inexpensive.[3] However, the impact for the infection control practices and the turnaround time of its use on previous carbapenemase detection among Enterobacterales has been poorly evaluated.

We aimed to determine the turnaround time until CPE notification in comparison with the time to report a final microbiology result (bacterial identification plus antimicrobial susceptibility testing). We also aimed to evaluate the importance of this notification for the infection control measures and antimicrobial resistance predictability.

During a follow-up survey from August 2017 to August 2018, we performed an observational study in patients at a tertiary-care hospital from Porto Alegre, Brazil. Enterobacterales isolates recovered from any clinical specimen were submitted to blue-carba test (BCT) for phenotypic carbapenemase detection.[3] Isolates were identified using Vitek 2 (bioMérieux, Marcy l'Etoile, France) or MALDI-TOF/MS (Bruker Daltonics, Germany), if necessary. Antimicrobial susceptibility testing was determined by disc diffusion (Oxoid, for amikacin, gentamycin, meropenem; Etest (bioMérieux, Marc l´Étoile, France) for fosfomycin (when isolates were recovered from urine) and broth microdilution for polymyxin B and tigecycline. Carbapenemase characterization was conducted using phenotypic tests using specific inhibitors, as described elsewhere.[4]

The work flow required the microbiology laboratory to notify the infection control staff or clinician of a positive BCT result for early carbapenemase notification after bacterial isolation from each clinical specimen analyzed.

During the period of the study, 300 CPE notifications were made, including 155 distinct patients. The average time was 1.19 days for CPE notification versus 2.38 days for the final report (Fig. 1). KPC-producing *Klebsiella pneumoniae* was the most prevalent agent (291 of 300, 97%) and no other gene carbapenemase than bla_{KPC-2} was detected during this period. Antimicrobial resistance was observed as follows: meropenem 97.7%, gentamicin 77.6%, fosfomycin 31.6%, polymyxin B 29.0%, amikacin 7.3% and tigecycline 5%.

Of the 155 patients enrolled in this survey, in 73 patients (47.1%) an adjustment of antimicrobial therapy was promoted after the early BCT notification. These adjustments were due to the inclusion of polymyxin B (65.7%, 48 patients), amikacin (28.8%, 21 patients), or fosfomycin (5.5%, 4 patients). For 25 patients (16.1%), no change in initial therapy was verified. In these

Author for correspondence: Leandro Reus Rodrigues Perez, E-mail: leandro.reus@gmail.com

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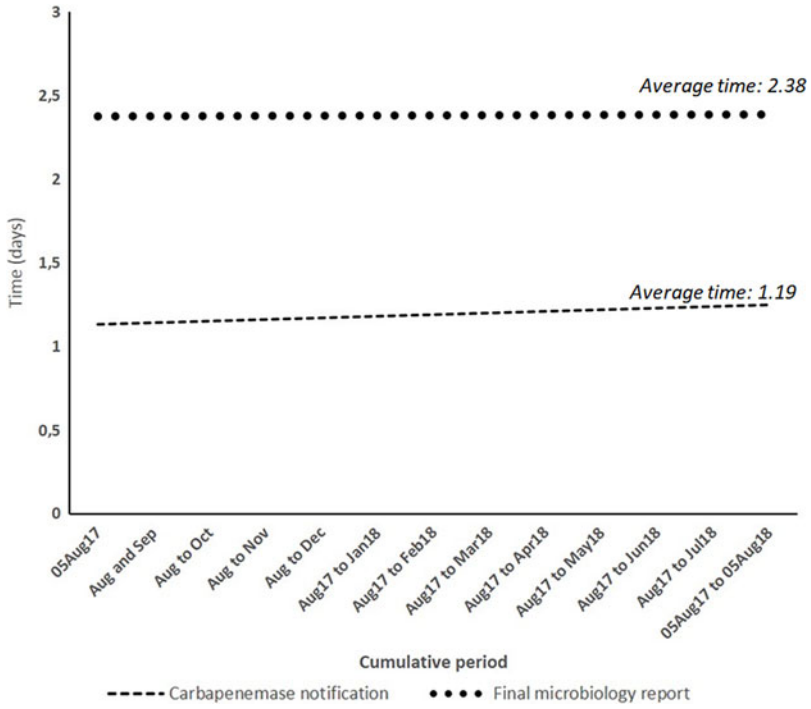

Fig. 1. Average times from an early carbapenemase notification by blue-carba test and from a final microbiology report during the study period.

cases, an inadequate therapy was considered because the antimicrobial agent administered did not present an in vitro susceptibility or was not directed toward the presence of a carbapenemase-producing organism even without susceptibility later detected. Also, 48 patients (31.0%) were considered be colonized by CPE and for these, the therapeutic approaches after BCT notification was not evaluated. The remaining 9 patients (5.8%) were from ambulatory origin, were discharged or died and, therefore, it was not possible to assess the therapeutic follow-up and impact of early carbapenemase notification.

Considering that early appropriate antimicrobial therapy can be the most important modifiable factor able to gain better patient's outcomes, BCT results may play a crucial role in decision making regarding therapy in infections in which CPEs occurred.[5,6] Concordantly, we have shown the importance of an early BCT result when applied in infections caused by *Pseudomonas aeruginosa* isolates.[7]

For the infection control point of view, in our study, for 25 patients (16%) and 121 patients (78%) anticipated the installation of standard and contact precaution, respectively, based on an early BCT notification. On the other hand, from a clinical point of view, this fact means that an active antimicrobial agent (mostly polymyxin B in our study) should be initiated or included for adequacy of therapy.

The potential limitations of this study are related to the lack of control over variables related to the illness and patient outcome to determine the efficacy of an earlier intervention on the initial inadequacy of antimicrobial chemotherapy. Importantly, a BCT negative result may provide a better turnaround time for de-escalation practice, with a more strict and selective use of key antimicrobial agents, such as polymyxin B or ceftazidime/avibactam, according to the best practices of antimicrobial stewardship.[8]

In conclusion, CPE notification allows a shorter turnaround time for an earlier intervention (at least 24 hours, see Fig. 1) when compared with the final report. For 47.1% of patients, an early adjustment of therapy was done according to knowledge of the local epidemiological profile, particularly by use of an antimicrobial agent with in vitro activity. Active communication between laboratory and clinical services is mandatory to better explore this notification, significantly reducing the time to a first intervention.

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