



# Revista de Epidemiologia e Controle de Infecção

Short Communication

## The culture of communication in the antimicrobial program in Brazilian pediatric intensive care

*A cultura da comunicação no programa de antimicrobianos em terapia intensiva pediátrica brasileira  
La cultura de la comunicación en el programa de antimicrobianos en terapia intensiva pediátrica brasileña*

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### ABSTRACT

**Background and Objectives:** Antimicrobial Stewardship Programs (ASPs) are essential for optimizing the use of antimicrobials and combating bacterial resistance. This study evaluated the effectiveness of ASPs in Brazilian pediatric intensive care units (PICUs). **Methods:** This multicenter study, conducted in 219 Brazilian hospitals, used a validated form to collect information on antimicrobial use shared with healthcare professionals. The characteristics of the services were analyzed according to their location, level of adherence to ASP actions, and the feedback activities offered to PICU staff. **Results:** The overall implementation level of ASPs in hospitals was considered intermediate, with an average score of 72.46 ( $\pm 37.60$ ). PICU behavior varied significantly among states. Some states had more survey responses, some had higher hospital adherence, and some excelled in disseminating ASP results. Some institutions were found to have stronger feedback strategies, with most adopting organized institutional actions and approximately half offering personalized actions for prescribers and other professionals. However, several opportunities for improvement were identified. **Conclusion:** The observed imbalance among the analyzed scenarios reveals the urgent need to strengthen the culture of disseminating results, improve the methods used, and increase adherence to ASPs in Brazilian PICUs.

**Keywords:** Antimicrobial Stewardship. Intensive Care Units Pediatric. Antibiotic Resistance. Feedback. Efficacy. Surveys and Questionnaires.

### RESUMO

**Justificativa e Objetivos:** Os Programas de Gerenciamento de Antimicrobianos (PGA) são fundamentais para otimizar o uso de antimicrobianos e combater a resistência bacteriana. Este estudo avaliou a eficácia dos PGA em unidades de terapia intensiva pediátrica (PED-UCI) no Brasil. **Métodos:** Realizado em 219 hospitais brasileiros, este estudo multicêntrico utilizou um formulário validado para coletar informações sobre o uso de antimicrobianos compartilhadas com os profissionais de saúde. As características dos serviços foram analisadas conforme a localização, o nível de adesão às ações do PGA e as atividades de feedback oferecidas aos colaboradores das PED-UCI. **Resultados:** O nível geral de implementação dos PGA nos hospitais foi considerado intermediário, com uma média de 72,46 ( $\pm 37,60$ ). O comportamento das PED-UCI variou significativamente entre os Estados: alguns apresentaram mais respostas ao inquérito, outros maior adesão dos hospitais, e alguns se destacaram na divulgação dos resultados do PGA. Observou-se que algumas instituições possuíam estratégias de feedback mais robustas, com a maioria adotando ações organizadas de forma institucional e cerca de metade oferecendo ações personalizadas para prescritores e outros profissionais. No entanto, foram identificadas várias oportunidades de melhoria. **Conclusão:** O desequilíbrio observado entre os cenários analisados revela uma necessidade urgente de fortalecer a cultura de divulgação de resultados, aprimorar os métodos utilizados e aumentar a adesão aos PGA nas PED-UCI brasileiras.

**Descriptores:** Gestão de Antimicrobianos. Unidades de Terapia Intensiva Pediátrica. Resistência a Antibióticos. Retroalimentação. Eficácia. Inquéritos e Questionários.

### RESUMEN

**Justificación y Objetivos:** Los Programas de Optimización del Uso de Antimicrobianos (PROA) son fundamentales para optimizar el uso de antimicrobianos y combatir la resistencia bacteriana. Este estudio evaluó la eficacia de los PROA en unidades de cuidados intensivos pediátricos (PED-UCI) en Brasil. **Métodos:** Realizado en 219 hospitales brasileños, este estudio multicéntrico utilizó un formulario validado para recopilar información sobre el uso de antimicrobianos compartida con los profesionales de la salud. Las características de los servicios fueron analizadas según la ubicación, el nivel de adhesión a las acciones del PGA y las actividades de retroalimentación ofrecidas a los colaboradores de las PED-UCI. **Resultados:** El nivel general de implementación de los PGA en los hospitales se consideró intermedio, con un promedio de 72,46 ( $\pm 37,60$ ). El comportamiento de las PED-UCI varió significativamente entre los Estados: algunos presentaron más respuestas a la encuesta, otros una mayor adhesión de los hospitales, y algunos se destacaron en la divulgación de los resultados del PGA. Se observó que algunas instituciones tenían estrategias de retroalimentación más sólidas, con la mayoría adoptando acciones organizadas de manera institucional y alrededor de la mitad ofreciendo acciones personalizadas para prescriptores y otros profesionales. Sin embargo, se identificaron varias oportunidades de mejora. **Conclusión:** El desequilibrio observado entre los escenarios analizados revela una necesidad urgente de fortalecer la cultura de divulgación de resultados, mejorar los métodos utilizados y aumentar la adhesión a los PGA en las PED-UCI brasileñas.

**Palabras Clave:** Programas de Optimización del Uso de los Antimicrobianos. Unidades de Cuidados Intensivos Pediátricos. Resistencia a Antibióticos. Retroalimentación. Eficacia. Encuestas y Cuestionarios.

## INTRODUCTION

Antimicrobial resistance is a growing threat to public health, compromising the effectiveness of infection prevention and treatment. In response, various health organizations, including the World Health Organization, have launched global action plans since 2015 to monitor and prevent infections, identify resistant microorganisms, and manage the use of antimicrobials.<sup>1-2</sup>

Antimicrobial Stewardship Programs (ASPs) are essential initiatives to optimize the use of antimicrobials, protect patients, and combat microbial resistance, especially in pediatric intensive care units (PICUs). According to the Brazilian guideline for implementing ASPs, these programs should include six fundamental components: institutional commitment, which involves management support and the definition of responsibilities; actions to improve the use of antimicrobials, including strategies for optimizing prescriptions; monitoring the use of antimicrobials and microbial resistance, allowing for the analysis of patterns and trends; continuing education and training, ensuring the training of health professionals; integration with the microbiology laboratory, ensuring support for therapeutic decisions based on microbiological data; and measurement of results and feedback of information, promoting continuous communication of data to professionals and managers for strategic adjustments.<sup>3-5</sup>

These programs aim to ensure the appropriate prescription of antibiotics and improve health outcomes, although there are still gaps to be addressed, such as antimicrobial use measures and outcome indicators. Among the essential components of ASPs, measuring results and providing feedback (component 6) play a crucial role in the continuous improvement of prescribing practices and in combating antimicrobial resistance. This component ensures the systematic dissemination of data on antimicrobial use and resistance patterns to professionals and managers, allowing for strategic adjustments and informing clinical decisions. Thus, the ASP should provide regular updates on processes and results, promoting a continuous cycle of evaluation and improvement of care practices.<sup>2-8</sup>

In this context, the “culture of communication” refers to the regularity, systematization, and quality of the dissemination of this information within healthcare institutions. Effective communication not only promotes transparency and alignment among teams, but also influences clinical decision-making and contributes to improving patient safety. Strengthening this process within ASPs can be a determining factor for the success of antimicrobial resistance control strategies.<sup>4</sup>

The objective of this study was to evaluate the regularity of the dissemination of ASP results on

antimicrobial use and microbial resistance to professionals and leaders of institutions.

## METHODS

A prospective, cross-sectional national survey was conducted. This is an excerpt from the study that evaluated the implementation of the ASP in adult and pediatric intensive care units and general hospitals in Brazil. Participants were recruited through the communication channels of the Brazilian National Health Surveillance Agency (ANVISA), including institutional emails from ANVISA and state health departments, through which they were asked to fill out the form. Participating hospitals voluntarily completed an electronic form (Google Forms®). A total of 662 hospitals with PED-ICUs participated in the study, and 219 (33.08%) had the ASP implemented and comprised the sample of the present study.

The data were collected between October 2022 and January 2023, using a validated instrument for a previous survey and adapted for the PICUs as requested by ANVISA.<sup>9</sup> The data allowed us to evaluate the implementation of the ASP for all components and establish, according to a score, a classification that was considered: inadequate, basic, intermediate, or advanced (each answer had a point value, with some questions allowing multiple answers, requiring all options selected within the same component to be counted).<sup>9</sup>

For the purposes of this study, we chose to extract the data obtained and analyze only the hospitals that had implemented the ASP and investigate the behavior of component 6: dissemination of ASP results regarding the regularity of information on the use of antimicrobials and microbial resistance to antimicrobials to professionals and leaders of the institution.

The statistical analysis included descriptive statistics, with the calculation of absolute and relative frequencies to describe the distribution of the variables investigated. In addition, the classification of the implementation of the ASP in relation to the dissemination of results was categorized into four levels: Inadequate, Basic, Intermediate, and Advanced, as represented in the graphical distribution of the responding hospitals.

To characterize the distribution of states and levels of ASP implementation, a geographical representation was developed, indicating the proportion of hospitals that responded to the survey and their classification in each federal unit. The analysis allowed for the evaluation of the regional distribution of program implementation and the different levels of engagement of hospitals in the monitoring and dissemination of information on antimicrobials.

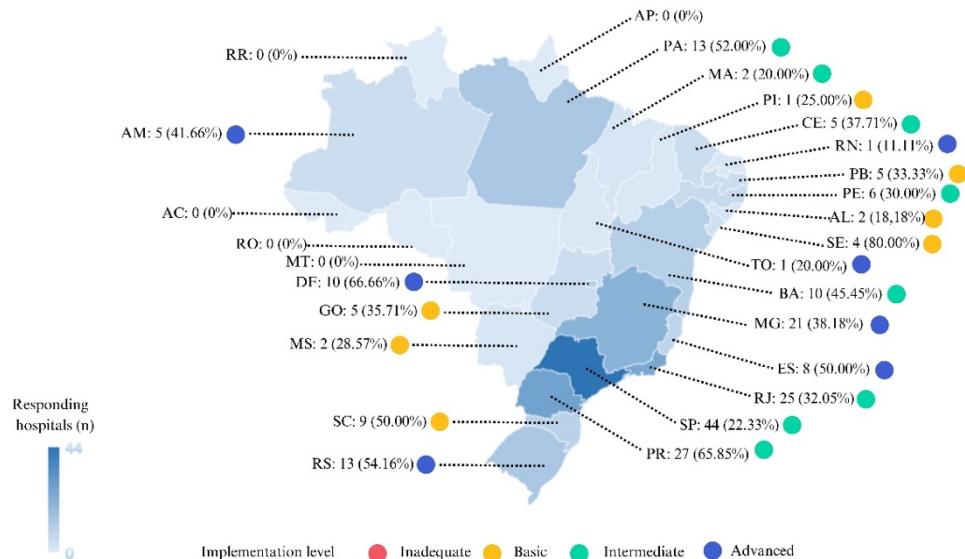
All analyses were conducted using the Statistical Package for the Social Sciences (SPSS, v. 23, IBM,

Armonk, NY). The variables analyzed were the frequency of disclosure of the antimicrobial susceptibility profile to hospital prescribers, the existence of direct and personalized communication on strategies for improving antimicrobial prescribing, the frequency of disclosure of ASP results to all hospital professionals, the availability and regularity of specific reports on antimicrobial use directed at prescribers, the dissemination of information on microbial resistance and antimicrobial use to relevant hospital sectors, the communication of AMR program objectives, goals, and results to senior management, and the dissemination of this information to all sectors involved in the program. The study was approved on April 5, 2022, by the human research ethics committee of the University of Santa Cruz do Sul with CAAE: 57231722.3.1001.5343, with opinion number: 5.332.386.

This is an observational, cross-sectional, descriptive study with a quantitative approach, carried out from September 20 to October 20, 2023, at the institution's Operating Room (OR). The study was carried out in a teaching hospital, located in the state of Paraná, which has 330 beds, according to the Brazilian National Registry of Health Establishments.

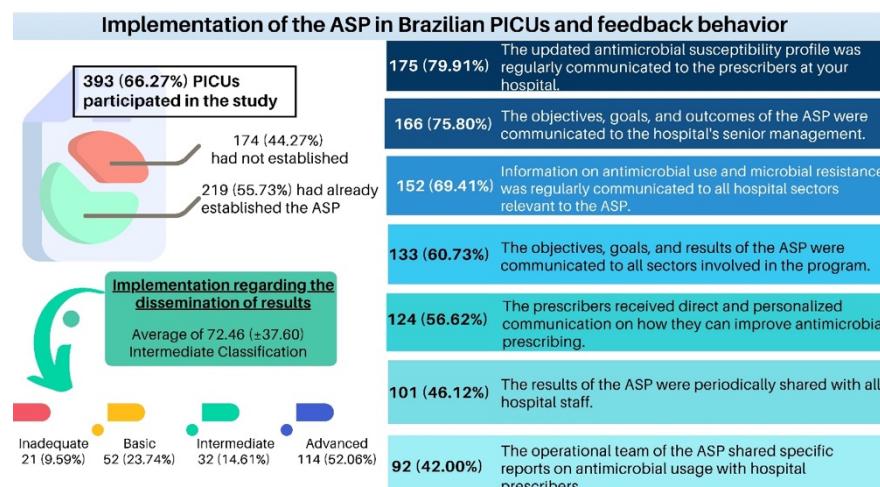
## RESULTS

Of the 662 hospitals with PICUs in Brazil, 393 (66.27%) participated in the study. Of these, 219 (33.08%) had the ASP implemented. This also shows the percentage of hospitals with PICUs that responded to the survey by state, as well as the level of adherence to component 6, that is, dissemination of ASP results (Figure 1).



**Figure 1.** Number (n) of hospitals that responded to the survey on the ASP in PICUs implemented by state, by percentage (%) of respondents and level of adherence to component 6 (dissemination of ASP results).

The results were based on a classification table in a preliminary study. The overall level of implementation of the ASP in Brazil regarding the dissemination of results (component 6) obtained an average of 72.46 ( $\pm 37.60$ ), that is, an intermediate classification, but with most hospitals at an advanced level (52.06%), followed by intermediate 32 (14.61%). Regarding the participants, the level of implementation of the ASP and the responses to the questions in component 6 were compiled and categorized (Figure 2). The main finding reveals that most participating hospitals had a level of implementation classified as advanced, indicating greater dissemination of information about the ASP within the institutions (Figure 2).



**Figure 2.** Implementation of the ASP in PICUs and the level of adherence to component 6 (dissemination of ASP results - regularity of information on the use of antimicrobials and microbial resistance to professionals and leaders of the institution).

## DISCUSSION

The behavior observed in the PICUs in this study is variable, with the highest number of respondents from São Paulo, Paraná, and Rio de Janeiro. The highest adherence of hospitals to completing the survey among those that had an ASP was in the states of Sergipe, the Federal District, and Paraná, although with a smaller number of PICUs. Regarding the advanced level of implementation of component 6, Minas Gerais, Rio Grande do Sul, the Federal District, Amazonas, Espírito Santo, Tocantins, and Rio Grande do Norte stood out.

It was found that some feedback strategies are stronger among institutions, with the majority presenting organized, institutional actions and approximately half of the services complying with personalized actions for prescribers and other professionals. This finding reflects the results of a study of ASPs in Latin America, which strongly highlighted the numerous barriers to program development, with particular emphasis on the critical failure of information feedback, revealing a significant obstacle to the effective advancement of these initiatives.<sup>8</sup>

In addition, the study highlighted the need to consider Brazil's continental dimensions and regional diversity, which result in different realities and challenges for the implementation of the ASP. The data corroborate findings from other studies, highlighting the importance of expanding and strengthening the program's reach in all types of establishments.<sup>7,8</sup>

This study showed that the dissemination of ASP results on antimicrobials and microbial resistance is still insufficient and needs improvement. Despite the existence of communication mechanisms, the dissemination of information does not occur systematically and effectively. Therefore, the need to strengthen the culture of dissemination by improving communication and data sharing methods at the local and national levels is reinforced. The findings indicate

significant challenges for PICUs in consolidating effective practices, which are essential for team education and the rational use of antimicrobials.

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## REFERENCES

1. Antimicrobial Resistance Collaborators. Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis. Lancet. 2022;399(10325):629-655. Erratum in: Lancet. 2022;400(10358):1102 [https://doi.org/10.1016/s0140-6736\(21\)02724-0](https://doi.org/10.1016/s0140-6736(21)02724-0)
2. World Health Organization. Antimicrobial resistance. [Internet]. 2024. Available from: <https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance>
3. ANVISA. Plano de Ação da Vigilância Sanitária em Resistência aos Antimicrobianos. 2017. ANVISA website. [Internet]. 2024. Available from: <https://www.gov.br/anvisa/pt-br/assuntos/noticias-anvisa/2017/acesse-plano-de-acao-para-controle-da-resistencia-microbiana>
4. ANVISA. Diretriz Nacional para Elaboração de Programa de Gerenciamento do Uso de Antimicrobianos em Serviços de Saúde. Revisão 2023. ANVISA website. [Internet]. 2024. Available from: <https://www.gov.br/anvisa/pt-br/centraisdeconteudo/publicacoes/servicosdesaude/publicacoes/DiretrizGerenciamentoAntimicrobianosANVISA2023FINAL.pdf>

5. ANVISA. Projeto Stewardship Brasil. Avaliação Nacional dos Programas de Gerenciamento do Uso de Antimicrobianos em Unidade de Terapia Intensiva Adulto dos Hospitais Brasileiros. 2019. ANVISA website. [Internet]. 2024. Available from: <https://antigo.anvisa.gov.br/documents/33852/271855/Projeto+Stewardship+Brasil/435012dc-4709-4796-ba78-a0235895d901?version=1.0>
6. McMullan B, Bryant PA, Duffy E, et al. Multinational consensus antimicrobial stewardship recommendations for children managed in hospital settings. *Lancet Infect Dis.* 2023;23(6):e199-e207. [https://doi.org/10.1016/s1473-3099\(22\)00726-5](https://doi.org/10.1016/s1473-3099(22)00726-5)
7. Yock-Corrales A, Naranjo-Zuñiga G. Regional Perspective of Antimicrobial Stewardship Programs in Latin American Pediatric Emergency Departments. *Antibiotics (Basel).* 2023; 16;12(5):916. <https://doi.org/10.3390/antibiotics12050916>
8. Fabre V, Secaira C, Cosgrove SE, et al. Deep Dive Into Gaps and Barriers to Implementation of Antimicrobial Stewardship Programs in Hospitals in Latin America. *Clin Infect Dis.* 2023; 5;77(Suppl 1):S53-S61. <https://doi.org/10.1093/cid/ciad184>
9. Menezes RM, Carneiro M, Gonçalves MRS, et al. Desenvolvimento e validação de questionário para autoavaliação dos programas de gerenciamento de antimicrobianos em unidade de terapia intensiva adulto. *Revista Científica Multidisciplinar Núcleo do Conhecimento* 2022; 05:175-215. ISSN: 2448-0959, website. [Internet]. 2024. Available from: <https://www.nucleodoconhecimento.com.br/saude/questionario-para-autoavaliacao>

## AUTHORS' CONTRIBUTIONS

**Eliane Carlosso Krummenauer** contributed to project management, bibliographic research, writing the abstract, introduction, methodology, discussion, interpretation and description of results, preparation of figures, conclusion, review, and statistics. **Mariana Portela de Assis** contributed to project management, review, and statistics. **Mara Rubia Santos Gonçalves** contributed to project management, fundraising, review, and statistics. **Magda Machado de Miranda Costa** contributed to project management, fundraising, review, and statistics. **Rochele Mosmann Menezes** contributed to project management, review, and statistics. **Jane Dagmar Pollo Renner** contributed to project management, fundraising, literature review, editing, and statistics. **Marcelo Carneiro** contributed to project management, fundraising, literature review, writing the abstract, introduction, methodology, discussion, interpretation and description of results, conclusions, review, and statistics.

All authors approved the final version to be published and are responsible for all aspects of the work, including ensuring its accuracy and integrity.

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