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ANTIMICROBIAL STEWARDSHIP IN HIGH-COMPLEXITY UNITS: INTERPROFESSIONAL ROLES, IMPLEMENTATION BARRIERS, AND IMPACTS ON PATIENT SAFETY

STEWARDSHIP ANTIMICROBIANO EM UNIDADES DE ALTA COMPLEXIDADE: PAPÉIS INTERPROFISSIONAIS, BARREIRAS DE IMPLEMENTAÇÃO E IMPACTOS NA SEGURANÇA DO PACIENTE

STEWARDSHIP ANTIMICROBIANO EN UNIDADES DE ALTA COMPLEJIDAD: ROLES INTERPROFESIONALES, BARRERAS DE IMPLEMENTACIÓN E IMPACTOS EN LA SEGURIDAD DEL PACIENTE

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ABSTRACT

Antimicrobial resistance is one of the most pressing challenges for patient safety, especially in high-complexity hospital settings where antimicrobial use is frequent and clinical risk is elevated. Antimicrobial Stewardship Programs (ASPs) have emerged as essential strategies to promote appropriate antimicrobial use, reduce adverse events, and improve clinical outcomes. This narrative review analyzed 12 studies addressing interprofessional roles, organizational barriers, and the clinical impact of ASPs in critical care environments. Findings indicate that program effectiveness is directly linked to the integrated participation of multiple professional categories, highlighting the clinical pharmacist's role in therapeutic optimization, nursing's role in monitoring and patient safety, and the microbiologist's contribution to evidence-based decision-making. Structured communication, interprofessional rounds, and continuous multiprofessional education were identified as key elements for strengthening ASP implementation. Cultural, structural, and communicative barriers, however, remain significant challenges. It is concluded that reinforcing collaborative culture, valuing interprofessional competencies, and investing in educational strategies are essential to ensure the sustainability and positive impact of ASPs in high-complexity units.

Keywords: Antimicrobial Stewardship. Interprofessional Collaboration. Patient Safety. Intensive Care. Rational Use of Antimicrobials.

RESUMO

A resistência antimicrobiana representa um dos maiores desafios contemporâneos para a segurança do paciente, especialmente em unidades de alta complexidade, onde o risco clínico é elevado e o uso de antimicrobianos é frequente. Os Programas de Stewardship Antimicrobiano (PGA) emergem como estratégia essencial para assegurar o uso racional desses medicamentos, reduzir eventos adversos e melhorar desfechos clínicos. Este estudo, conduzido como revisão narrativa, analisou 12 publicações que abordam papéis interprofissionais, barreiras organizacionais e impactos clínicos dos PGAs em ambiente

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hospitalar. Os resultados evidenciaram que a efetividade dos programas está diretamente relacionada à atuação integrada de diferentes categorias profissionais, destacando-se o papel do farmacêutico clínico na otimização terapêutica, da enfermagem na vigilância e segurança assistencial, e do microbiologista na definição de condutas baseadas em evidências. A comunicação estruturada, rounds multiprofissionais e educação interprofissional contínua foram identificados como elementos fundamentais para a consolidação dos PGAs. Observou-se também que barreiras culturais, estruturais e comunicacionais ainda dificultam a implementação plena desses programas. Conclui-se que fortalecer a cultura colaborativa, valorizar competências multiprofissionais e investir em estratégias educativas são medidas essenciais para garantir a sustentabilidade e o impacto positivo dos PGAs em unidades de alta complexidade.

Palavras-chave: Stewardship Antimicrobiano. Equipe Multiprofissional. Segurança do Paciente. UTI. Uso Racional de Antimicrobianos.

RESUMEN

La resistencia antimicrobiana representa uno de los mayores desafíos contemporáneos para la seguridad del paciente, especialmente en unidades de alta complejidad, donde el riesgo clínico es elevado y el uso de antimicrobianos es frecuente. Los Programas de Stewardship Antimicrobiano (PSA) emergen como una estrategia esencial para garantizar el uso racional de estos medicamentos, reducir eventos adversos y mejorar los resultados clínicos. Este estudio, realizado como una revisión narrativa, analizó 12 publicaciones que abordan los roles interprofesionales, las barreras organizacionales y los impactos clínicos de los PSA en el entorno hospitalario. Los resultados evidenciaron que la efectividad de los programas está directamente relacionada con la actuación integrada de diferentes categorías profesionales, destacándose el papel del farmacéutico clínico en la optimización terapéutica, de la enfermería en la vigilancia y la seguridad asistencial, y del microbiólogo en la definición de conductas basadas en la evidencia. La comunicación estructurada, las rondas multiprofesionales y la educación interprofesional continua fueron identificadas como elementos fundamentales para la consolidación de los PSA. Asimismo, se observó que las barreras culturales, estructurales y comunicacionales aún dificultan la implementación plena de estos programas. Se concluye que fortalecer la cultura colaborativa, valorar las competencias multiprofesionales e invertir en estrategias educativas son medidas esenciales para garantizar la sostenibilidad y el impacto positivo de los PSA en unidades de alta complejidad.

Palabras clave: Stewardship Antimicrobiano. Equipo Multiprofesional. Seguridad del Paciente. UCI. Uso Racional de Antimicrobianos.

1 INTRODUCTION

The increasing complexity of care in high-complexity units, such as Intensive Care Units (ICUs), has increased the challenges related to the rational use of antimicrobials and the control of microbial resistance. In recent decades, the advance of multidrug-resistant pathogens, combined with the inappropriate and excessive use of antibiotics, has put patient safety and therapeutic effectiveness at risk, making the adoption of Antimicrobial Stewardship Programs (PGA) indispensable. These programs, according to ANVISA (2023), represent structured strategies to promote the responsible use of antimicrobials, through educational actions, continuous monitoring, and clinical interventions conducted by multiprofessional teams.

In highly complex environments, stewardship cannot be understood as the exclusive responsibility of the prescribing physician. National studies show that its effectiveness depends on the active and integrated participation of nurses, pharmacists, microbiologists, physiotherapists, nutritionists and other professionals who make up the care team (CARVALHO; SILVA, 2022). The role of the clinical pharmacist, for example, has proven to be fundamental for reviewing prescriptions, identifying interactions, and optimizing therapeutic regimens, directly contributing to the reduction of medication errors and inappropriate use of antibiotics (SANTOS et al., 2021). Likewise, nursing plays a central role in clinical surveillance, in the safe administration of antimicrobials and in the early detection of adverse events, reinforcing the interdependent nature of these programs.

The literature also shows that collaborative practices strengthen PGAs and expand their clinical impact. In a multicenter study conducted in Brazilian pediatric ICUs, Rezende et al. (2021) observed that interventions carried out in an integrated manner by the multiprofessional team generated significant improvements in antimicrobial use indicators, such as time to de-escalation and reduction of inappropriate prescriptions. Factors such as structured communication, participation in multiprofessional rounds, and continuous interprofessional education were highlighted as determinants for the success of the interventions. These findings converge with the analyses of Menezes et al. (2022), who state that well-established PGAs reduce mortality, shorten hospital stays, and reduce hospital costs associated with microbial resistance.

However, the implementation of stewardship programs in high-complexity units faces important obstacles. Structural barriers, such as insufficient infrastructure, shortage of microbiologists, and technological limitations, coexist with cultural challenges, such as

resistance of professionals to changes in clinical practice, hierarchization between categories, and low adherence to institutional protocols (TANNURE; BARBOSA, 2021). In addition, the lack of communication between team members and the absence of well-defined processes can compromise the sustainability of actions, making initiatives for the rational use of antimicrobials vulnerable.

Given this scenario, understanding the interprofessional roles, barriers, and impacts related to the implementation of Antimicrobial Stewardship Programs in high-complexity units becomes essential to guide institutional policies, improve clinical conducts, and strengthen patient safety. By investigating these dimensions, this study seeks to contribute to the advancement of knowledge and to the consolidation of collaborative practices capable of addressing the growing challenge of antimicrobial resistance in the hospital environment.

2 LITERATURE REVIEW

2.1 THE GLOBAL EMERGENCE OF ANTIMICROBIAL RESISTANCE AND THE NEED FOR STRUCTURED STRATEGIES

Antimicrobial resistance has become one of the greatest threats to contemporary public health, aggravated by the inappropriate and excessive use of antibiotics in the hospital environment. According to the World Health Organization and ANVISA national documents (2023), the expansion of multidrug-resistant pathogens has increased morbidity and mortality, prolonged hospitalization time, and increased hospital costs. This scenario has driven the development of Antimicrobial Stewardship Programs (PGA), which aim to promote the rational use of these drugs, integrating educational actions, review of prescriptions, and continuous monitoring of care indicators. Rezende et al. (2021) reinforce that, in intensive care units, the adoption of stewardship strategies is essential to reduce the selective pressure caused by the indiscriminate use of antimicrobials.

2.2 THE MULTIPROFESSIONAL NATURE OF ANTIMICROBIAL STEWARDSHIP PROGRAMS

PGAs are, by nature, multiprofessional initiatives. Although historically associated with medical work, recent evidence shows that its effectiveness depends on the articulation between various health categories. Carvalho and Silva (2022) highlight that nurses, clinical pharmacists, microbiologists, and physiotherapists participate in essential stages of the

process, performing functions that include clinical surveillance, evaluation of microbiological parameters, therapeutic optimization, and promotion of safe practices.

The role of the clinical pharmacist is widely recognized. Santos et al. (2021) demonstrate that the active review of prescriptions, the identification of drug interactions, and the recommendation of dosage adjustments contribute significantly to the reduction of medication errors and inappropriate antibiotic therapy. Similarly, international studies indicate that pharmacists integrated into ICU teams are responsible for consistent improvements in indicators such as DDD, DOT, and de-escalation time.

In addition, nursing plays an indispensable role in the PGAs, especially in the safe administration of antimicrobials, in the early recognition of adverse events, and in the communication of relevant clinical changes. Castaneda et al. (2020) demonstrate that nurses trained in stewardship have greater accuracy in identifying signs of toxicity and therapeutic failures.

2.3 INTERPROFESSIONAL COMMUNICATION AS THE FOUNDATION OF STEWARDSHIP

The literature points out that effective communication is the basis of successful implementation of PGAs. The absence of structured communication is cited as one of the main barriers to the rational use of antimicrobials (Tannure; Barbosa, 2021). Interprofessional communication, especially in multidisciplinary rounds, allows for alignment of conducts, joint review of antibiotics, and quick decisions in critical contexts.

Rezende et al. (2021) observed that, in Brazilian pediatric ICUs, the adoption of multiprofessional rounds with the active participation of pharmacists, nurses, and microbiologists significantly increased adherence to prescription protocols and favored early de-escalation. Menezes et al. (2022) reinforce that teams with structured communication have lower therapeutic variability and greater precision in the choice of broad-spectrum antimicrobials.

2.4 INTERPROFESSIONAL EDUCATION AND SKILLS DEVELOPMENT

Multiprofessional training is highlighted as a determining element for the strengthening of PGAs. Documents from ANVISA (2023) and national studies point out that continuing education, when carried out in an interprofessional manner, increases team

engagement, improves understanding of protocols, and reduces resistance associated with changes in practice.

The study by Silva et al. (2021) showed that educational technologies applied to nursing resulted in better adherence to safe antimicrobial administration practices. Rezende et al. (2021) highlight that educational interventions are crucial for the success of PGAs in pediatric ICUs, as they prepare the team to interpret microbiological results, adjust doses, and recognize potential therapeutic failures.

2.5 STRUCTURAL, CULTURAL AND ORGANIZATIONAL BARRIERS TO THE IMPLEMENTATION OF THE PGAS

Despite the advances, the literature shows significant challenges in the implementation of Stewardship Programs. Among the most frequent barriers are the shortage of microbiologists, the absence of full-time clinical pharmacists, work overload, the resistance of professionals to changes in protocols, and the lack of computerized support systems (Tannure; Barbosa, 2021).

Carvalho and Silva (2022) highlight that, in many hospitals, the hierarchy between professional categories limits the full participation of the multiprofessional team, impairing communication and restricting the use of collaborative tools. This problem is aggravated when there is little clarity about responsibilities and the absence of defined care flows.

The international literature adds that, in low- and middle-income countries, PGAs often face financial and structural constraints, although multiprofessional work is able to compensate for some of these limitations through collaborative strategies adapted to the context.

2.6 IMPACTS OF STEWARDSHIP PROGRAMS ON CLINICAL OUTCOMES AND PATIENT SAFETY

When implemented in a structured manner and with active multiprofessional participation, PGAs demonstrate a significant impact on patient safety. Rezende et al. (2021) showed reductions in inappropriate prescriptions and duration of antimicrobial use, as well as improvement in clinical outcomes. Menezes et al. (2022) identified a decrease in mortality, length of hospital stay, and incidence of infections by multidrug-resistant pathogens after the implementation of stewardship.

In addition, Santos et al. (2021) point out that the involvement of the clinical pharmacist contributes to the reduction of adverse reactions, dose optimization, and greater dosage adequacy. These results reinforce that the integrated performance of the multiprofessional team is essential to produce positive and sustainable clinical effects.

3 METHODOLOGY

This study is characterized as a narrative review of the literature, conducted with the objective of analyzing the available scientific evidence about the interprofessional roles, implementation barriers, and clinical impacts of Antimicrobial Stewardship Programs (PGA) in high-complexity units, with emphasis on Intensive Care Units (ICUs) and critical hospital services. This design was selected because it allows a broad, interpretative and in-depth approach, which is fundamental to understand complex phenomena that involve interactions between multiple professional categories, organizational aspects and care outcomes.

3.1 SEARCH STRATEGIES

The bibliographic search was carried out between January and February 2025 in the VHL, LILACS, SciELO, PubMed and ANVISA institutional repositories, due to the relevance of these sources for studies on antimicrobial resistance and stewardship policies in the Brazilian and international context. Descriptors in Portuguese and English combined by the Boolean operators AND and OR were used, including:

"antimicrobial stewardship", "rational use of antimicrobials", "antimicrobial stewardship", "intensive care unit", "ICU", "multiprofessional team", "nursing", "clinical pharmacist", "microbial resistance".

The search strategy favored studies that discussed the collaborative action between physicians, nurses, pharmacists, microbiologists, physiotherapists, and other professionals in the context of antimicrobial stewardship, considering both clinical and organizational approaches.

3.2 INCLUSION AND EXCLUSION CRITERIA

The following were included in the study:

1. Articles published between 2018 and 2025;

2. Studies available in full text;
3. Publications that addressed antimicrobial stewardship in a hospital environment;
4. Research that analyzed multiprofessional performance, clinical impacts, or barriers to the implementation of PGAs;
5. National and international studies with clear methodology and thematic relevance.

The following were excluded:

1. Articles exclusively focused on primary or veterinary care;
2. Publications without identifiable methodological rigor;
3. Studies that dealt only with antimicrobial resistance unrelated to PGAs;

4 OPINION WORKS WITHOUT A CONSOLIDATED SCIENTIFIC BASIS

4.1 SELECTION PROCESS

After the initial search, 79 publications were identified. Titles and abstracts were then read, resulting in the selection of 28 potentially eligible studies. These articles were read in full, and, after evaluating the inclusion and exclusion criteria, 12 studies were considered adequate to compose the final analysis of this article. Among them, studies that address multiprofessional participation in stewardship stand out (CARVALHO; SILVA, 2022), clinical impacts on ICUs (REZENDE et al., 2021), clinical pharmacist performance (SANTOS et al., 2021), interprofessional communication (TANNURE; BARBOSA, 2021) and educational interventions in nursing (SILVA et al., 2021).

4.2 DATA ANALYSIS

The analysis of the studies was conducted based on the method of interpretative thematic analysis, which allows synthesizing and organizing the content into relevant conceptual axes. The selected articles were read in full, and their data were extracted and grouped into previously defined analytical categories:

1. interprofessional roles;
2. Communication and integration of the team;
3. interprofessional education;
4. barriers and facilitators;
5. Clinical and patient safety impacts.

The analysis followed a hermeneutic approach, seeking to integrate empirical evidence, professional perceptions and institutional recommendations, in order to build a broad and critical understanding of stewardship in highly complex environments.

4.3 ETHICAL CONSIDERATIONS

As this is a literature review, without direct involvement of human beings or primary data collection, this study did not require evaluation by a Research Ethics Committee, as provided for by CNS Resolution No. 510/2016. All publications used were duly cited in accordance with current scientific standards.

5 RESULTS

The analysis of the 12 selected studies showed that Antimicrobial Stewardship Programs (PGA) exert a significant influence on patient safety, quality of care, and the rationalization of antimicrobial use in high-complexity units. The findings were organized into four central axes: interprofessional roles, communication, continuing education, and clinical impacts.

5.1 INTERPROFESSIONAL ROLES IN THE IMPLEMENTATION OF THE AMPS

The studies analyzed pointed out that the effectiveness of stewardship depends directly on the integrated performance of different professionals. The presence of the clinical pharmacist, as reported by Santos et al. (2021), was associated with reduced medication errors, dose optimization, and greater accuracy in therapeutic escalation and de-escalation decisions. Likewise, Carvalho and Silva (2022) highlight that nursing plays an essential role in the safe administration of antimicrobials, in the surveillance of clinical signs, and in the communication of adverse events, contributing to the continuity and safety of care.

Rezende et al. (2021) observed that, in pediatric ICUs, the integration between physicians, nurses, pharmacists, and microbiologists favored more accurate decision-making, especially in the adjustment of broad-spectrum antimicrobials and in the interpretation of microbiological results. These findings demonstrate that stewardship, when supported by interprofessional practices, transcends medical prescription and becomes a collective process.

5.2 COMMUNICATION AS A DETERMINANT FOR THE SUCCESS OF PGAS

It was found that structured communication is crucial for the effectiveness of the programs. Tannure and Barbosa (2021) identified that communication failures between team members can compromise adherence to stewardship protocols, favor therapeutic duplicity, and delay antimicrobial adjustments. On the other hand, Rezende et al. (2021) reported that multiprofessional rounds increased the accuracy of clinical interventions, reducing inappropriate prescriptions and strengthening the alignment of conducts.

5.3 INTERPROFESSIONAL EDUCATION AS A TOOL FOR STRENGTHENING

The literature has shown that collaborative educational interventions are directly associated with improved safety and rational use of antimicrobials. Silva et al. (2021) observed that nursing-oriented educational technologies improved adherence to safe practices and expanded the recognition of situations that require therapy review. Multidisciplinary continuing training programs were also described as essential to standardize technical knowledge and reduce professionals' resistance to change (ANVISA, 2023).

5.4 CLINICAL AND ORGANIZATIONAL IMPACTS OF PGAS

The results showed significant impacts of the PGAs on safety indicators and care effectiveness. Rezende et al. (2021) demonstrated a reduction in the time of antimicrobial use and a higher frequency of early de-escalation. Studies such as that of Menezes et al. (2022) reinforce that consolidated PGAs can reduce mortality, reduce the duration of hospitalization, and contain the spread of multidrug-resistant pathogens in ICUs.

In summary, the studies converge in showing that multiprofessional action, combined with communication strategies and continuous education, is decisive for the consolidation of PGAs and for the improvement of clinical outcomes in high complexity units.

6 DISCUSSION

The findings of this study demonstrate that Antimicrobial Stewardship Programs essentially depend on interprofessional collaboration to achieve significant results in patient safety and quality of care. Although traditionally attributed to the prescribing physician, antimicrobial stewardship has been revealed, in the light of the literature analyzed, to be an

intrinsically collective process, which incorporates complementary competencies of different team members.

The presence of the clinical pharmacist, for example, was consistently associated with improvements in important outcomes, such as dosage optimization, reduction of errors, and identification of inappropriate therapies (SANTOS et al., 2021). This action not only strengthens patient safety, but also increases clinical efficiency, demonstrating that therapeutic decision-making is more robust when it includes multiple professional perspectives. Likewise, nursing plays a decisive role in clinical surveillance, safe administration and monitoring of adverse effects, reinforcing that its participation in the PGAs is not ancillary, but fundamental (CARVALHO; SILVA, 2022).

The discussion on interprofessional communication emerges as a critical element to consolidate effective stewardship practices. The literature reinforces that the mere existence of protocols does not guarantee success; Implementation depends on the team's ability to dialogue, share responsibilities and adjust behaviors collaboratively. Tannure and Barbosa (2021) highlight that communication failures are responsible for a large part of the therapeutic inadequacies observed in ICUs, while Rezende et al. (2021) demonstrate that multiprofessional rounds provide an ideal environment for safer and evidence-based decisions.

Interprofessional education, another central axis in the results, appears in the literature as a driving force for behavior change and improvement of clinical practice. Silva et al. (2021) showed that continued training and educational technologies contribute to standardizing conducts, reducing resistance to new protocols, and strengthening the team's critical thinking — indispensable elements for the sustainability of PGAs. ANVISA (2023) reinforces that, in complex contexts such as ICUs, only teams trained in an integrated manner can ensure adherence to rational use practices.

Finally, the discussion on the clinical impacts of PGAs reveals that stewardship is not only a policy to control antimicrobial resistance, but a strategy for broadly improving care. The reductions in mortality, length of hospital stay, and infections by multidrug-resistant pathogens found by Menezes et al. (2022) show that multiprofessional stewardship has transformative potential in the hospital panorama, especially in high-complexity units where clinical risk is high.

Therefore, the results of this study indicate that the consolidation of effective PGAs requires not only well-defined protocols, but a robust collaborative culture, supported by

efficient communication, permanent education and appreciation of interprofessional skills. Well-structured programs are capable of transforming care routines, strengthening patient safety, and consistently addressing the growing challenge of antimicrobial resistance.

7 CONCLUSION

The literature analysis shows that Antimicrobial Stewardship Programs (AGPs) are an essential strategy to address the growing antimicrobial resistance in high-complexity units, especially in Intensive Care Units. The results indicate that the success of these programs depends fundamentally on an articulated interprofessional action, in which each category plays a decisive role in ensuring the rational use of antimicrobials and patient safety.

The integrated performance of clinical pharmacists, nurses, physicians, microbiologists, and other professionals proved to be decisive for therapeutic optimization, reduction of medication errors, and improvement of clinical surveillance. When supported by effective communication, multiprofessional rounds, and shared decision-making processes, PGAs have greater solidity and responsiveness in the face of complex care demands.

In addition, the literature shows that continuous interprofessional education strengthens adherence to protocols, reduces resistance to change, and improves the clinical performance of teams. These elements, added to the institutional commitment, are essential to consolidate sustainable stewardship practices, capable of positively impacting indicators such as time of antimicrobial use, incidence of infections by multidrug-resistant pathogens, length of hospital stay, and mortality.

It is concluded, therefore, that the PGAs represent an indispensable tool to qualify care in critical environments. However, its effectiveness depends on the construction of a robust collaborative culture, supported by the valorization of multiprofessional skills, the strengthening of communication and the systematic application of evidence-based practices. Only through this expanded integration will it be possible to mitigate the risks associated with antimicrobial resistance and promote safe, efficient, and humanized care.

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