



Survey on timely administration of antimicrobials and antimicrobial management programs: nursing performance

Survey sobre administração oportuna de antimicrobianos e programa de gestão de antimicrobianos: atuação da enfermagem

Survey sobre administración oportuna de antimicrobianos y programas de manejo de antimicrobianos: desempeño de enfermería

ABSTRACT

Objective: To identify the role of nursing professionals in the Antimicrobial Management Program (AMP) and the barriers to the timely administration of antimicrobials. **Method:** Survey study, with 158 nursing professionals from hospitals and emergency care units. Data were analyzed using descriptive statistics. **Results:** Of the participants, 151 (96%) agreed that nursing has a relevant role in the AMP; 88 (56%) stated that they had not received training on antimicrobial administration; N = 32 (29%) of nurses and N = 6 (12%) of assistants/technicians reported that the institution does not have protocols for antimicrobial administration. Barriers to the timely administration of antimicrobials were identified as obstruction of venous access, work overload, absence of the patient in bed and delay in dispensing. **Final considerations:** Professionals recognize possibilities for acting in the AMP, in addition to situations that may compromise both the timely administration of antimicrobials and the need for protocols, training and professional dimensioning.

Keywords: Antimicrobial management; Professional competence; Nursing professionals; Knowledge management for health research; Anti-infectives.

RESUMO

Objetivo: Identificar a atuação dos profissionais de enfermagem no Programa de Gestão de Antimicrobianos (PGA) e as barreiras para a administração oportuna dos antimicrobianos. **Método:** Estudo do tipo Survey, com 158 profissionais de enfermagem de hospitais e unidades de pronto atendimento. Os dados foram analisados por estatística descritiva. **Resultados:** Dos participantes, 151 (96%) concordaram que a enfermagem tem uma atuação relevante no PGA; 88 (56%) declararam não ter recebido treinamento sobre administração de antimicrobianos; N = 32 (29%) dos enfermeiros e N = 6 (12%) dos auxiliares/técnicos informaram que a instituição não tem protocolos para administração de antimicrobianos. Foram identificadas como barreiras para a administração oportuna de antimicrobianos a obstrução do acesso venoso, sobrecarga de trabalho, ausência do paciente no leito e atraso na dispensação. **Considerações finais:** Os profissionais reconhecem possibilidades de atuação no PGA, além de situações que podem comprometer tanto a administração oportuna de antimicrobianos quanto a necessidade de protocolos, treinamento e dimensionamento profissional.

Descritores: Gestão de antimicrobianos; Competência profissional; Profissionais de enfermagem; Gestão do conhecimento para a pesquisa em saúde; Anti-infecciosos.

RESUMEN

Objetivo: Identificar la actuación de los profesionales de enfermería en el Programa de Administración de Antimicrobianos (PAA) y las barreras para la administración oportuna de antimicrobianos. **Método:** Estudio tipo encuesta, con 158 profesionales de enfermería de hospitales y unidades de atención de emergencia. Los datos fueron analizados utilizando estadística descriptiva. **Resultados:** 151 (96%) de los participantes están de acuerdo en que la enfermería tiene un papel relevante en la PAA; 88 (56%) de los participantes declararon no haber recibido capacitación sobre la administración de antimicrobianos; N = 32 (29%) de enfermeros y N = 6 (12%) de auxiliares/técnicos que la institución no cuenta con protocolos para la administración de antimicrobianos. La obstrucción del acceso venoso, la sobrecarga de trabajo, la ausencia del paciente en cama y la demora en la dispensación fueron identificadas como barreras para la administración oportuna de antimicrobianos. **Consideraciones finales:** Los profesionales reconocen posibilidades de actuación en la EMP, además de situaciones que pueden comprometer la administración oportuna de antimicrobianos y la necesidad de protocolos, capacitación y dimensionamiento profesional.

Descriptor: Programas de optimización del uso de los antimicrobianos; Competencia profesional; Enfermeras practicantes; Gestión del conocimiento para la investigación en salud; antiinfecciosos.

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INTRODUCTION

Antimicrobial resistance (AMR) is one of the great health challenges of the 21st century. Worldwide, an estimated 700,000 people die each year due to AMR and this number is projected to reach 10 million per year by 2050⁽¹⁾.

In an attempt to address this scenario, the World Health Organization (WHO)⁽²⁾ approved the Global Action Plan on Antimicrobial Resistance, presenting the actions that must be implemented to reduce AMR; and in convergence with the WHO objectives, the Brazilian Ministry of Health adopted several initiatives, including the Antimicrobial Management Program (AMP).

The AMP is a compilation of recommendations, based on evidence and complementary to interventions for the prevention and control of Healthcare-Related Infections (HCRI), which promote the appropriate use of antimicrobials through the choice of drug, dose, duration of therapy, route of administration and appropriate diagnosis, with the objective of maximizing therapeutic efficacy and limiting undesirable consequences, such as the emergence of multidrug-resistant (MR) microorganisms⁽³⁾. Due to the complexity of the theme, it is recommended that the AMP be conducted by an interdisciplinary team, and the nursing professionals are crucial to the success of the program, since they are at the forefront of care and perform activities before, during and after antimicrobial therapy⁽⁴⁾. Nursing practice in AMP is associated with actions that can reduce AMR, involving patient evaluation, culture collection,

implementation of precautions, timely administration of antimicrobials, monitoring after medication, among other activities commonly performed by the nursing team⁽⁵⁾.

Timely administration of antimicrobials is expressed by close monitoring of administration, schedules, dilutions and intervals between doses in order to avoid MR selection due to inadequate plasma levels of the medication. In addition, the administration of antimicrobials is among the nursing competencies in the AMP, according to an international consensus on the subject^(6,7).

In Brazil, ongoing research carried out by the National Health Surveillance Agency⁽⁸⁾ (Anvisa) on the self-assessment of AMP shows that health institutions are advancing in the implementation of their programs. However, national literature review studies show the scarcity of scientific production in the country, both on the timely administration of antimicrobials⁽⁹⁾ and on the role of nurses in AMP⁽¹⁰⁾.

Given the urgency of expanding knowledge on the subject in Brazil, this study aims to identify barriers in the timely administration of antimicrobials and the performance of nursing professionals in the Antimicrobial Management Program.

METHOD

This is an exploratory descriptive survey with a quantitative approach, using the Google forms® platform, and guided by the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) tool⁽¹¹⁾.

The study participants were Brazilian nurses, technicians and nursing assistants, who worked in hospitals and Emergency Care Units (ECU) and in direct patient care. Questionnaires answered more than once were adopted as exclusion criteria.

The data collection instrument was elaborated and discussed by expert researchers in the field and was based on the Global Action Plan on Antimicrobial Resistance⁽²⁾, the National Plan for the Prevention and Control of Microbial Resistance in Health Services⁽¹²⁾ and the international consensus on nursing competencies in the AMP⁽⁷⁾.

The instrument contemplates the topics rational use of antimicrobials; barriers to the timely administration of antimicrobials and the participation of nursing in AMPs and was organized in two parts, the first on socio-professional data, with 13 objective questions; and the second with 15 statements or description of hypothetical situations about the administration process and possible barriers to the timely administration of antimicrobials, with Likert-type questions with five response options: 1. I totally disagree with this. 2. I disagree 3. I neither agree nor disagree 4. I agree. 5. I strongly agree. The self-administered questionnaire, before being used in the study, underwent a pilot test with the members of the research group. Eight people participated in this evaluation, with training ranging from undergraduate student to PhD students.

Data were collected from August 21 to September 28, 2020. In order to enable the access of nursing professio-

nals from all over the country, the dissemination and invitation to participate in the study (link containing the Informed Consent Form (ICF) and the data collection instrument) occurred through social networks (Facebook®, Instagram®, and WhatsApp®). Participants were recruited using the "snowball" technique, when a professional is invited to participate in the study and is asked to pass on the invitation to a colleague.

The data obtained were organized in a spreadsheet in Microsoft Excel® 2019 software. Sociodemographic, professional and institutional data were analyzed using descriptive statistics, being summarized from measures of absolute and relative frequency, measures of central tendency mean and median, and measure of dispersion represented by the standard deviation to assess data variability. The maximum and minimum values to evaluate the extremes in the data set were also considered.

To determine whether there would be a difference between the categories nurses and nursing assistants/technicians regarding the response pattern presented, a Likert scale score was assigned to the response pattern and the analysis model called Generalized Additive Models for Location, Scale and Shape (GAMLSS) was applied, which comprises up to four analysis parameters.

The dependent variable considered was the number of total points in the questionnaire. The model residues were evaluated, considering the normality test (Kolmogorov-Smirnov and

QQ-plot) and heteroscedasticity. After evaluating the data, the Skew Student t distribution of type 4 was considered for the other analyses. For all analyses, a statistical significance of 5% ($p < 0.05$) was considered.

This research was developed according to the Resolution of the National Health Council 466 of December 12, 2012 and approved by the Research Ethics Committee of the Federal University of São Carlos, CAAE Opinion: 26203719.0.0000.5504. All participants received written information about the study and they consented to participate in the study.

RESULTS

From a convenience sample of 200

participants, 42 were excluded for not meeting the inclusion criteria (ten for answering the instrument more than once; four for being students; 26 for not working in a hospital environment and two for not working in direct patient care). Thus, the final study sample consisted of 158 nursing professionals.

Of the 158 participants in this study, 109 (69%) were nurses and 49 (31%) were nursing assistants/technicians. Among the participants, there was a predominance of women (80%), with a mean age of 35.2 years (min = 19, max = 61, Median = 35, SD = 7.922). The socio-professional and institutional data of the study participants are presented in Table 1.

Table 1 – Distribution of participants’ socio-professional and institutional information. São Carlos-SP, Brazil, 2021 (n = 158)

Variable	Nurse (n = 109)	Nursing Assistant/ Technician (N=49)
Region in which it operates		
Southeast	69 (63%)	33 (68%)
South	13 (12%)	7 (14%)
Midwest	17 (16%)	3 (6%)
Northeast	9 (8%)	6 (12%)
North	1 (1%)	-
Type of establishment you work in		
General Hospital	61 (56%)	31 (63%)
Specialized Hospital	25 (23%)	10 (21%)
Emergency care unit	23 (21%)	8 (16%)
Legal-administrative nature of the health facility		
State	28 (26%)	12 (25%)
Private	25 (23%)	12 (25%)
Municipal	27 (25%)	11 (22%)
Philanthropic	21 (19%)	4 (8%)
Federal	8 (7%)	10 (20%)
Time working as a nursing professional		
< 2 years	13 (12%)	12 (25%)
2 to 5 years	31 (29%)	7 (14%)
6 to 10 years	19 (17%)	12 (24%)
11 to 20 years	33 (30%)	16 (33%)
21 to 30 years	11 (10%)	2 (4%)
> 30 years	2 (2%)	-

Current working period		
Daytime	67 (61%)	34 (70%)
Nighttime	24 (22%)	8 (16%)
Both	18 (17%)	7 (14%)
Number of patients under your responsibility per shift		
2 to 5 patients	5 (4%)	27 (55%)
6 to 10 patients	40 (37%)	14 (29%)
11 to 20 patients	26 (24%)	3 (6%)
21 to 30 patients	16 (15%)	-
Over 30 patients	12 (11%)	1 (2%)
Others	10 (9%)	4 (8%)

Source: elaborated by the authors based on the research data (2021)

Most of the professionals participating in the study lived in the southeastern region of Brazil (64%), worked in a General Hospital (60%), of a public nature (60.7%) and the mean time of professional practice was 11 years for nurses (min = 3 months, max = 40 years, Median = 10, SD = 8.06) and 9.4 years for nursing assistants/technicians (min = 1 month, max = 27 years, Median = 9, SD = 6.54). Regarding the work shift, most nurses (61%) and technicians/assistants (70%) worked during the day.

Most professionals claimed to have under their responsibility, per shift, 6 to 10 patients among nurses (37%) and 2 to 5 patients among nursing assistants/technicians (55%). Regarding the level of complexity, respondents consider providing intermediate (30%) and intensive (21%) care.

Regarding participation in training, N = 64 (59%) of nurses and N = 24 (49%) of nursing assistants/technicians stated that they had not participated in training or had received specific guidance on the preparation and administration of antimicrobials. Regarding the existence of institutional protocols on

antimicrobial preparation and administration, N = 32 (29%) of nurses and N = 6 (12%) of nursing assistants/technicians stated that the institution does not have rules and routines on the subject. Most participants N = 156 (99%) agreed that excessive and inappropriate use of antimicrobials can induce antimicrobial resistance. On the other hand, when asked about knowing the term antimicrobial management, N = 58 (53%) of nurses and N = 26 (53%) of nursing assistants/technicians reported having heard about the topic.

In the second stage of the research, the professionals participating in the study were presented with statements or descriptions of situations regarding the administration process and possible barriers to the timely administration of antimicrobials, divided into three themes: the rational use of antimicrobials; barriers to the timely administration of antimicrobials and the participation of nursing in the AMP; barriers to the timely administration of antimicrobials, as shown in Table 2.

Table 2 – Distribution of responses on the antimicrobial administration process. Brazil, 2021 (n = 158)

Theme: rational use of antimicrobials					
Questions	Response options* N (%)				
	1	2	3	4	5
1. Can excessive and inappropriate use of antibiotics lead to the development of antimicrobial resistance?	1 (1%)	0	1 (1%)	12 (7%)	144 (91%)
2. Does the process related to antimicrobial use (prescribing, dispensing, preparation and administration) in the institution where I currently work, it works better than in most places I have met previously?	10 (6%)	16 (10%)	51 (32%)	52 (33%)	29 (19%)
3. Apply the principles of infection control (standard precaution) to all patients and, in all health services, is it inserted in the context of the rational use of antimicrobials?	4 (3%)	8 (5%)	14 (9%)	32 (20%)	100 (63%)
4. Is it part of the context of rational use of antimicrobials to be aware of and implement contact precautions early whenever necessary?	5 (3%)	3 (2%)	11 (7%)	34 (22%)	105 (66%)
Theme: barriers to the timely administration of antimicrobials and the participation of nursing in the AMP					
Questions	Response options* N (%)				
	1	2	3	4	5
5. Does the nurse have no responsibility for the choice of antimicrobial to be used?	19 (12%)	48 (30%)	20 (13%)	43 (27%)	28 (18%)
6. In order to minimize errors, does nursing seek to control schedules, dilutions and appropriate intervals for the preparation and administration of antimicrobials?	2 (1%)	2 (1%)	2 (1%)	37 (24%)	115 (73%)
7. Are actions such as collection and handling of material for microbiological culture inserted in the context of antimicrobial use management?	3 (2%)	2 (1%)	14 (9%)	29 (18%)	110 (70%)
8. Does the antimicrobial use process begin with the medical prescription and end when the drug is administered to the patient?	41 (26%)	30 (23%)	6 (4%)	45 (28%)	36 (26%)
9. After the administration of antimicrobials, is it necessary to monitor nursing, as changes in vital signs, allergic, systemic reactions and local reactions such as phlebitis can occur?	2 (1%)	1 (1%)	-	16 (10%)	139 (88%)
10. During the visit, the nurse observed the possibility of changing the antimicrobial in use from IV to OR. Did you think about discussing this with the medical team, but did not, as you judged that the choice of antimicrobial was not your responsibility?	76 (48%)	43 (27%)	12 (8%)	19 (12%)	8 (5%)
11. Antimicrobial Management Program (AMP) should be composed of a multidisciplinary team, including nursing, that contributes to patient safety and minimization of errors, through the control of appropriate times, dilutions and intervals?	2 (1%)	2 (1%)	3 (2%)	22 (14%)	129 (82%)

Theme: barriers to the timely administration of antimicrobials					
Questions	Response options* N (%)				
	1	2	3	4	5
12. Patient Luiz Felipe remained on the X-ray, performing examinations from 1:00 p.m. to 3:00 p.m. He was to receive IV Ceftriaxone at 2 p.m., but the drug was not administered until 3:30 p.m., shortly after his return to the inpatient unit. Do situations like this occur with some frequency in my work unit?	20 (13%)	23 (14%)	25 (16%)	60 (38%)	30 (19%)
13. Mr. José uses 6/6 hour IV Vancomycin. At the time of administration, the nursing technician observed that the peripheral venous catheter was obstructed, requiring a new puncture. Due to the difficulty of vascular access of Mr. José, there was a delay in the administration of the drug. Are complications like this common in inpatient units, but do not interfere with the patient's treatment?	34 (21%)	33 (21%)	9 (6%)	53 (34%)	29 (18%)
14. A nursing technician is responsible for five patients on his shift. At 2pm, three of his patients have antimicrobials to be administered. The first patient received medication at the correct time, but the second required a new puncture. Then, the first patient reacted to one of the drugs administered. Only at 3:30 pm, the professional performed the medication of the third patient. Does the burden of the nursing professional interfere with the timely administration of antimicrobials?	4 (2%)	3 (2%)	4 (3%)	24 (15%)	123 (78%)
15. Do I consider that the delay in dispensing by the pharmacy is the biggest obstacle to the administration of antimicrobials in a timely manner (correct dose, at the correct time)?	20 (13%)	46 (29%)	14 (9%)	54 (34%)	24 (15%)

* 1. I completely disagree. 2. I partially disagree. 3. I neither disagree nor agree. 4. I partially agree. 5. I completely agree.
 Source: Prepared by the authors using research data (2021).

Most participants N = 151 (96%) agreed that nursing plays a relevant role in the program. Nursing activities in the AMP were considered: monitoring of allergic reactions after antimicrobial administration N = 155 (98%); control of times, dilutions and intervals in the preparation and administration of antimicrobials N = 152 (96%); adequate adoption of standard precautions N = 132 (83%) and contact N = 139 (88%); collection and handling of material for microbiological culture N = 139 (88%); choice of route of administration of antimicrobial N = 119 (75%) and choice of antimicrobial to be used N = 75 (45%).

Regarding barriers to timely administration of antimicrobials, N = 147 (93%) of participants agreed that delays in antimicrobial administration occur due to

nursing professional overload, N = 90 (57%) due to the fact that the patient is out of the unit, performing tests at the time of medication, N = 82 (52%) due to vascular access obstruction, and N = 78 (49%) due to delayed dispensing of medication by the pharmacy.

As for the professional categories nurses and nursing assistants/technicians, the statistical model used showed that the professional category was not associated with the distribution of total points in the knowledge questionnaire (Table 3). In addition, the residue analyses showed evidence of heteroscedasticity (dispersion) and a statistically significant similarity with the normal curve, confirmed by the Kolmogorov-Smirnov test (D = 0.06; p-value = 0.45) and Q-Q plot.

Table 3 – Explanatory model of association between professional category and total score in the questionnaire. São Carlos-SP, Brazil, 2021 (n = 158; nurses N = 109, technicians/assistants N = 49)

Model parameter	Coefficient	p-value
Mean (μ)	1.101	0.21
Variance (σ)	-0.019	0.91
Asymmetry	-0.181	0.79
Flattening	9.101	0.98

Source: elaborated by the authors based on the research data (2021).

DISCUSSION

The demographic and professional characteristics of the participants in our study are similar to other national studies, which demonstrate that the nursing team is predominantly composed of women in the age group of 35 years, working in public hospitals^(5,13,14) and with more than 8 years of professional experience. Our findings also reveal the lack of institutional protocols on antimicrobial preparation and administration, as well as the lack of training on the subject.

Although no Brazilian studies were found that evaluated the knowledge or perception of nursing professionals about the AMP⁽¹⁰⁾, half of the respondents in our study stated that they had already had occasional contact with the topic and recognized, almost unanimously, that the excessive and inappropriate use of antibiotics can lead to AMRs, a finding corroborated by the literature^(1,7). However, the provision of training on the subject and the existence of protocols constituted fragile aspects, in line with the international literature⁽¹⁵⁻¹⁶⁾, which can result in inadequate practices and compromise the effective participation of nursing in the AMP⁽¹⁷⁾.

Training should address topics focused on the development and improvement of AMP competencies in the following do-

mains: infection prevention and control, antimicrobials and antimicrobial resistance, diagnosis of infection and use of antimicrobials, prescription of antimicrobials, patient-centered care and interprofessional collaborative practice⁽¹⁷⁾. With specific educational interventions, nurses will be better prepared to obtain information, share it with the health team and contribute to care planning.

In addition to training, institutional protocols are important tools for patient safety, as the standardization of activities reduces the possibility of failures, allowing to be interrupted before they cause harm to the patients. In this sense, a study carried out in Chile on the preparation and administration of antimicrobials in neonates revealed that, in addition to institutional protocols on medications in general, the elaboration and improvement of specific protocols on antimicrobials is necessary, including the post-use monitoring stage⁽¹⁶⁾.

Similar to other publications, actions such as the monitoring of allergic reactions, the control of times, the collection of samples for culture, the use of standard precautions and the institution of specific precautions, participation in the route of administration and choice of antimicrobials were recognized by the study participants as attributions of nurses in

the AMP^(4,5). This finding is interesting because it reveals activities that are already part of the daily work and only need greater engagement of nurses.

Among the numerous attributions of nurses in the AMP, the most cited was the monitoring after the administration of the antimicrobial and the least mentioned was the participation of nurses in the choice of antimicrobial. The monitoring of the patients after medication allows the identification of complications associated with the medication, be it an allergic reaction, toxicity, phlogistic signs in the catheter region, or the non-effectiveness of the medication⁽⁷⁾, when the nurses must pay attention to the time of treatment, adverse events, clinical response, possibility of transition from intravenous to oral route⁽¹⁸⁾. Regarding the participation of nurses in the choice of antimicrobials, it is noted that this practice is uncommon in Brazil; however, considering that the AMP proposal states that decision-making on antimicrobials should be carried out through interdisciplinary discussion^(10,19), nurses can contribute with decisive information in this process, such as history of allergies, recent use of antimicrobials, venous network conditions, swallowing capacity, among others⁽²⁰⁾.

Although nurses are essential in the AMP^(10,21,22), their performance presupposes competencies and skills that are not always addressed in academic training and professional practice^(15,22). Thus, strategies to increase knowledge of the subject and its insertion in the AMP are essential for a full performance of nurses.

Regarding barriers to timely administration of antimicrobials, work overload was reported by the majority of study

participants. The literature recognizes that work overload can interfere with the quality of care and even contribute to errors in the execution of nursing actions⁽¹⁰⁾. Thus, adequate working conditions should be provided to promote the engagement and effective performance of nurses in the AMP⁽⁵⁾.

The fact that the patient was out of the unit, at the time of administration of the antimicrobials, and also the obstruction of vascular access were cited as obstacles to timely administration. A similar result was found in a previous study that aimed to identify the medication interactions induced by scheduling and errors in the preparation of administered antibacterials, which revealed that the preparation time greater than 30 minutes is a factor that can cause delay and compromise the success of the treatment⁽⁶⁾. A study carried out with 110 patients admitted to the medical clinic of a Portuguese hospital found a cumulative incidence of obstructions of 50% of peripheral catheters; the authors highlight that vascular access obstruction is a factor that causes delay in medication administration, since it involves the insertion of a new catheter, which is not always a fast process⁽²³⁾. Considering that vascular catheter obstruction has a negative impact on the assistance provided, it is recommended flushing with 0.9% saline before and after each intravenous medication administered, in order to ensure catheter permeability and prevent obstruction of the route⁽²⁴⁾. A Brazilian study⁽²⁵⁾ shows weaknesses in flushing the peripheral catheter. The authors also point out that, in the observed opportunities, flushing was performed only 10.7% of the time in the

pre-administration of medications; 2.4% between administrations and 4.8% post-administration.

The delay in dispensing the medication by the pharmacy was also pointed out as an obstacle to timely administration. This finding is important because it shows how the organization of the work process, and the integration between services, can facilitate or not the timely administration of the antimicrobial. A study carried out in a large hospital, in a city in the countryside of São Paulo, identified that the inputs necessary for flushing, such as saline, were not dispensed by the pharmacy automatically along with the medication by the computerized system. This entailed the need to manually request these items, generating extra time consumption or even not performing the procedure⁽²⁵⁾.

As limitations of this study, it should be mentioned that, due to the covid-19 pandemic, data were collected only through an electronic questionnaire, which is susceptible to social desirability bias, and it is not possible to carry out the observation stage, in loco, of the administration of antimicrobials, originally provided for in the study. These results may also have been influenced by specificities of the pandemic period. Despite the limitations, the results indicate that practices that have already obtained consensus in the literature as attributions of nurses in the AMP were recognized by the participants of our study. On the other hand, barriers were identified in the antimicrobial administration process, which require the mobilization of organizational efforts for the nursing team to play its role in the AMP effectively.

FINAL CONSIDERATIONS

The study identified that nursing recognizes as barriers to the timely administration of antimicrobials: the delay in administration due to obstructed vascular access and verified only at the time of medication administration, professional overload, the absence of the patient in the unit, as well as the delay in dispensing by the pharmacy.

It also shows that nursing has little access to courses and training on the subject and little proximity to AMPs, although they already perform isolated actions contemplated in the program strategy – such as handling materials and microbiological culture results, control of schedules, dilutions and adequate intervals of antimicrobials – and recognize the importance of nursing in this process.

It is believed that deepening the training of professionals in the subject is fundamental to encourage the full exercise of their role and contribute more effectively to the reduction of AMR. In addition, it is recommended that institutions reassess the dimensioning of nursing professionals, as well as care processes, in order to provide adequate conditions for safer care.

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