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PATIENT SAFETY: NURSING PRACTICE IN ANTIBIOTIC ADMINISTRATION

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ABSTRACT

Objective: To observe the nursing practice regarding the management of antibiotic therapy. **Methods:** This is a prospective, longitudinal and observational direct and structured quantitative research of nursing care in patients using antibiotics in a large hospital. Data collection occurred through a structured checklist. The research was approved by the UniEVANGELICA Research Ethics Committee. **Results:** The analysis obtained 2,811 observations of professionals' actions in the process of preparation, preparation and administration of 150 doses of prescribed antibiotics from 150 medical records. There was a predominance of cephalosporin prescription (24%). The errors found were 03 drug interactions, namely, levofloxacin with hydrocortisone (2%) caused by the nurse's schedule, and ciprofloxacin with hydrocortisone (1%). Labeling errors (n: 120/120). Time errors in administration (88/131), among others. **Conclusion:** There is a large number of professionals who are losing their good nursing practices.

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INTRODUCTION

Antibiotics are drugs produced from microorganisms (fungi, bacteria, actinomycetes) capable of destroying and / or extinguishing their multiplication. Thus, the use of antibiotic therapy is a therapeutic form that uses these microorganisms to treat or cure patients with infection (BRASIL, 2001). They are classified as a substance capable of eradicating or preventing the proliferation of bacteria, being used as a treatment for bacterial infections. However, its indiscriminate use results in bacterial resistance, hindering the effectiveness of treatment (SANTOS, 2004). According to the National Health Surveillance Agency (2017), antimicrobials are responsible for 20% to 50% of hospital expenses, in addition to being the second class of most prescribed drugs. Its improper and irrational use predisposes to an increase in bacterial resistance rates, consequently to an increase in hospital costs. In addition, there are risk factors such as: unsubstantiated associations; frequent antimicrobial changes during patient treatment; inadequate dose, dosage and treatment time. It is also noteworthy that there are few studies related to nursing errors in the face of antibiotic therapy.

To reduce the impact of medication errors and to program interventions and tools in customer care, the World Health Organization has launched the Third Global Patient Safety Challenge (WORLD HEALTH ORGANIZATION, 2017). In Brazil, Ordinance MS / GM No. 529/2013 establishes protocols developed with important proposals to reduce errors and adverse events in healthcare practice. It may highlight the Safety Protocol on Prescription, Use and Administration of Medicines, which aims at safe practice in the patient's therapeutic process. It is noteworthy that these protocols are mandatory components in health facilities (MINISTRY OF HEALTH, 2013, 2014). Considering these aspects, it is essential for the proper use, from individual attention to public health, to pay attention to the good practices of selection and prescription of these medications, as well as the assistance of the nursing staff in the administration of the dose and the concentration. and infusion time of an antibiotic in order to prevent subsequent errors, leading to increased days of hospitalization, as well as adverse events, microbial resistance and health system costs (HOEFEL; LAUTERT, 2006). The nurse's knowledge regarding the problem is of great relevance. Thus, the findings of this study may contribute to better rates of patient care and patient safety. This contribution is made by ratifying the importance of the organization of the nursing

service, clarifying doubts both of the patient population, health professionals and the scientific community, regarding the elaboration of antibiotic scheduling and the impact that interactions Medication and adverse events related to antibiotic administration errors may cause patient and public health. From this perspective, the study aims to verify the errors resulting from the preparation and administration of antibiotic therapy in the hospital context.

METHODS

This is a prospective, longitudinal and observational direct and structured quantitative research in nursing care for patients using antibiotics. This research was developed, according to orientations of Gil (2002), Lakatos and Marconi (2010) through observations, quantitative analysis of elements / phenomena in a community that reveals the incidence or prevalence of certain characteristics. The research was carried out in medical-surgical clinics in a large tertiary hospital located in the interior of Goiás, with the population of nurses and nursing technicians working on antibiotic therapy, by means of intentional and non-probabilistic sampling, in March and December. April 2019 in an afternoon shift lasting 20 consecutive days, made available by the participating institution. Included in the research: readable medical records arranged in medical-surgical clinics with prescription of antibiotics; nurses and nursing technicians over eighteen (18) years of age who were prescribing antibiotic-containing prescriptions, preparing and administering antibiotics in patients and who voluntarily agreed to participate, as well as patients admitted to medical-surgical clinics using antibiotics, over eighteen (18) years of age who voluntarily agreed to participate. Medical records, nurses, nursing technicians and patients who did not meet the above requirements were excluded from the study. All research subjects, both nurses, nursing technicians and patients, received information about the proposed investigation and signed the Informed Consent Form (ICF).

During data collection, the researchers followed the patients' medical records according to the professional's practice, identifying the following aspects:

Prescription scheduling - It was observed which professional was performing the scheduling and / or identifying who did it by stamping / signing;

§ Delivery times of the prescription prescribed at the pharmacy;

§ Antibiotic dispensation schedule;

§ Preparation, administration and checking of antibiotic doses prescribed in the afternoon shift (dose observed until check of administered antibiotic).

Data were grouped by categories: scheduling, drug interactions; preparation and administration of antibiotics. For safe interpretation, data were organized at absolute frequency and relative frequency. Absolute frequency records exactly how many times a given performance has occurred, and a comparison analysis is not possible. Therefore, in order to make the data more meaningful, the relative frequency was resorted to, which was done through percentage data, defined as the ratio between the absolute frequency and the total number of observations. These results are expressed in the graphs and tables.

In order to scientifically support the data analysis, the ANVISA protocols were used: Protocol of Safety in Prescription, Use and Administration of Medicines (2013), Institutional Protocol and Resolution RDC No. 45, of March 12, 2003, which provides on the Good Practice Technical Regulation for the Use of Parenteral Solutions (SP) in Health Services. The full articles available on the BIREME and Pubmed Platform on drug interaction were analyzed using the MICROMEDEX 2.0 SOLUTIONS DrugReax® System application. Error was considered any discrepancy between what was prescribed or filed by the institution and what was prepared, prepared and administered and checked by the nursing staff in patient care. The variable Unidentified (ND), in the scheduling, was due to the absence of stamp of the professional who prepared the prescription. Another factor resulting from DN was the time of drug scheduling depending on the hospital routine. According to the routine, the prescription began in the morning shift, together with the schedule, and the researchers performed the investigation in the afternoon shift, thus making it difficult to evaluate the responsible for the schedule, both for the research and for the hospital if there was any. Complications and needed to evaluate the scheduling professional. The variable Not Applicable (NA) refers to the occurrence records whose cases did not need to be registered by the professionals, since there were no complications during the medication process.

The research followed the ethical precepts of the Resolution of the National Health Council No. 466 of 2012. Approved by the Ethics Committee of the University Center of Anapolis-Unievangélica, under official opinion number 04114518.0.0000.5076. Authorized data handling agreement and co-participation institution by the hospital unit. 176 informed consent terms were signed by all participants (nurses, nursing technicians and patients). Of these, two nursing technicians refused to participate and were immediately excluded from observation. Ensuring the confidentiality and privacy of the participants, the institution and the material, the names in the medical records were replaced by codenames (Ex. P1, P2, P3 and room number) and given the name to the institution by letter "A". These data will be stored in a safe place for five (5) years, under the confidentiality of the researchers and then will be incinerated (MINISTERIO DA SAUDE, 2012).

RESULTS AND DISCUSSION

195 antibiotic prescriptions were collected, of which 45 were excluded due to illegibility in the prescription items, finalizing 150 prescriptions. Ministry of Health Ordinance No. 1.820 / 2009 on the Letter of Rights of Health Users states that everyone has the right to information about their health, in a clear, objective, respectful, understandable and, for this, is among other things, legible record in the medical record is necessary to ensure the continuity of safe treatment. Of the 24 professionals observed in the preparation, preparation and administration of antibiotics, 4 were nurses and 20 nursing technicians, given the higher frequency of nursing technicians because they are ahead of drug preparation and administration. Also, 150 medical records of patients aged 18 to 98 years were followed. The analysis consisted of 2,811 observations of the professionals' performance in the process of preparation, preparation and administration of 150 doses of antibiotics prescribed in 150 medical records. Among the antibiotics used, cephalosporins were the most common (24%), followed by

penicillins (20%), quinolone (13%) and carbapenems (7%). These groups accounted for more than 80% of the antimicrobials administered (Table 1). These results were similar to the studies by Santos *et al.* (2016). In this study there was also a predominance of antimicrobial use: cephalosporins were (43.4%), followed by penicillins (16.3%), fluorquinolones (13.0%) and aminoglycosides (9.7%). In another follow-up study it was found that the penicillin class antimicrobial (piperacillin + tazobactam) was the most prescribed antibiotic in 32% (RODRIGUES; BERTOLDI, 2006).

Table 1. Relative frequency of most prescribed antibiotics in a hospital in the interior of Goiás

Antibióticos	%
Amicacina	1
Amoxicilina + Clavulanato	7
Ampicilina + Sulbactam	2
Cefalotina	2
Cefepima	2
Ceftriaxona	20
Cefuroxima	1
Ciprofloxacino	10
Clarithromicina	5
Clindamicina	9
Levofloxacino	3
Meropenem	7
Metronidazol	2
Piperacilina + Tazobactam	21
Vancomicina	8
Total	100

Source: Prepared by the authors. Research data, 2019.
Note: Total of 150 antibiotic doses.

The errors found were classified by the basis of the thirteen certain determined by the National Health Surveillance Agency and institutional protocol that determines for the safe administration of medicines. Every healthcare professional when administering a medication should always check the thirteen certain:

Correta Correct Prescription: Indicate patient's full name, date of birth, care number, prescription number, updated date.

Certo Right patient: Confirmation about the patient by identification with name and date of birth, for example.

Certo Right medication: Check prescription with medication name.

Certa Right Validity: Observe expiration date before administering the medicine.

Certa Right form / presentation: Check if the medicine is in the correct presentation form, such as 0.9% sodium chloride or 20% sodium chloride.

Certa Right compatibility: Check if the medication administered is compatible with another one the patient already receives, as there are some drugs that cannot be given together.

Right route: Check the prescribed route of administration.

Certa Right time: administer the medicine at the prescribed times.

Certa Right dose: correctly interpret the prescribed dosage, paying careful attention to numbers, zeros and commas.

Certo Correct administration record: Describe correctly about the dosage, the patient's reaction, and everything that occurred regarding the administration of the medication.

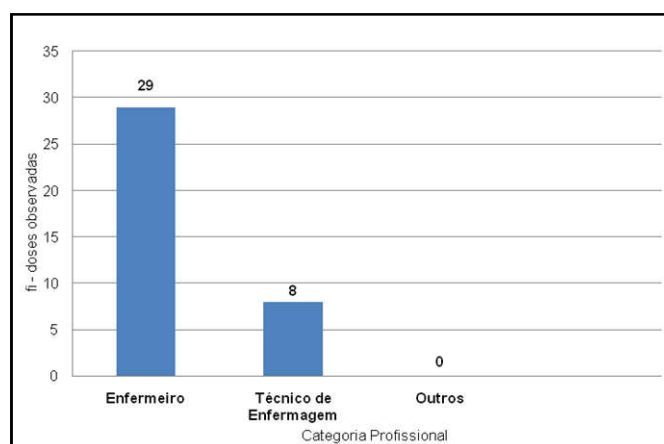
Correta Correct guidance: inform the patient correctly which medication is being administered, reason, dosage, among others.

Certa Right form: Check if the medication to be administered has a prescribed pharmaceutical form and route of administration.

Certa Right answer: Observe the patient to identify if the medication had the desired effect.

Scheduling Errors

Of the 150 doses evaluated, direct observation was made during the scheduling in 37, which occurred on admission of the patient in the afternoon shift. No prescription analyzed had a stamp of the professional responsible for scheduling. 113 prescriptions were not identified due to the absence of stamp of the professional who made the prescription. Another factor that corroborated the difficulty of identification was the medication scheduling time depending on the hospital routine, in which the prescription began in the morning shift and the researchers performed the investigation in the afternoon shift, thus making it difficult to evaluate the scheduler. both for the research and for the hospital if there were complications and needed to evaluate the professional responsible for the scheduling. Of the 35 records in which it was possible to observe the professionals performing the antibiotic schedule, the categories of professionals observed were: Nurses (n: 29), followed by nursing technicians (n: 8) (Graph 1). A study conducted in a hospital in Rio de Janeiro shows the same time adopted for pleasure, emphasizing the benefits of standardizing and facilitating the routine of professionals (SILVA *et al.*, 2008). Also, there are studies that advocate, in the practice of nursing, the need to define administration schedules and intervals between drugs, in order to prevent drug interactions (SECOLI, 2001).



frequência absoluta de doses observadas.

Fonte: Elaborado pelas autoras. Dados da pesquisa, 2019.

Gráfico 1. Frequência de doses aprazadas e a categoria profissional em um hospital no interior de Goiás- 37 doses de antibióticos

Table 3. Frequency of errors during antibiotic preparation in a hospital in the interior of Goiás

Actions observed in the preparation of antibiotics	Variables	Yes	NO	n
Was medication prepared the same as prescribed?		133	0	133
Antibiotic within the expiration date?		135	0	135
Did you identify the antibiotic along with the prescription?		132	0	132
Is the antibiotic dose the same as the prescribed or protocol dose?		132	0	132
Antibiotic prepared in time for administration?		78	56	134
Did you identify the labels according to protocol / prescription?		0	120	120
Total				807

n: absolute frequency of observed doses. Source: Prepared by the authors. Research data, 2019.

Preparation Errors: Regarding time errors during antibiotic preparation, 78 of 134 analyzed antibiotic doses were not prepared at the time of administration (Table 3), considering a time limit of 10min between preparation and administration. Brazilian studies, such as those by Mendes *et al.* (2018) identified worrying data, such as: 57.2% of medications were prepared more than one hour prior to administration. Drug preparation usually occurs at an erroneous time due to the practice of anticipating activities, which should be demystified, as medications may lose or decrease in effectiveness when diluted too early and unmanaged, and are exposed. contamination, light, heat and humidity. Another reason is the time and duration of action of medications, which, when not administered at the correct time, may be compromised as to the stability and physicochemical properties, contributing to the impairment in patient improvement (COREN, 2017; MINISTERIO DA HEALTH, 2013; MENDES *et al.*, 2018).

Conclusion

Scheduling, preparation and administration of medications are among the most commonly performed actions in a hospital unit, errors related to this activity are becoming increasingly frequent. Despite widespread dissemination and adoption of policies, protocols and standards regarding nursing care, there is still a large number of professionals who are not following good nursing practices. According to the nursing team's attributions, The research enabled an institutional diagnosis, sensitizing nurses about disability in routine practices, emphasizing that every health professional contributes significantly to the safety of patients, especially when they are under their care. It is concluded that the technical training of professionals is necessary to ensure safe performance and records. It was also verified the need for the implementation of easy compliance strategies by the nursing professionals, enabling the Systematized Nursing Care (Resolution COFEN 358 of 2009) to identify and intervene in the processes in which there are more medication errors, seeking to prevent serious consequences for the professional, the institution and, especially, the patient. These measures were considered essential for quality of care, patient safety, and essential for the autonomy and visibility of nursing professionals.

REFERENCES

- ATHANASAKIS E. Uma meta-síntese de como enfermeiras registradas dão sentido a suas experiências vividas de erros de medicação. *J Clin Nurs*, 2019.
- AGÊNCIA NACIONAL DE VIGILÂNCIA SANITÁRIA. Diretriz Nacional para Elaboração de Programa de Gerenciamento do Uso de Antimicrobianos em Serviços de Saúde. Ministério da Saúde. Brasília, 2017.
- BARKER KN, Mikeal RL, PEARSON RE. Illig NA, Morse ML. Medication errors in nursing homes and small hospitals. *Am J Hosp Pharm* 1982 Jun; 39:987-91.
- BRASIL. Consenso sobre o uso racional de antimicrobianos. Ministério da Saúde. Agência Nacional de Vigilância Sanitária. Brasília, 2001.
- BRASIL. Protocolo de segurança na prescrição, uso e administração de medicamentos. Agência Nacional de Vigilância Sanitária. Brasília, 2013.
- CAMERINI FG, SILVA LD. Segurança do paciente: análise do preparo de medicação intravenosa no hospital da rede sentinela. *Enferm*, 2011; v. 20, n. 1, p. 41-49.
- COREN. Uso seguro de medicamentos: guia para preparo, administração e monitoramento. Conselho Regional de Enfermagem de São Paulo, 2017; 124p.
- GIL AC. Como elaborar projetos de pesquisa- 1946. 4. ed. São Paulo: Atlas, 2002; 171p.
- HOEFEL HHK, LAUTERT L. Administração endovenosa de antibióticos e resistência bacteriana: responsabilidade da enfermagem. *Revista Eletrônica de Enfermagem*, 2006; v. 08, n. 03, p. 441 – 449.
- IBM CORPORATION. 2019. In: micromedex solutions. Disponível em: <https://www.micromedexsolutions.com/home/dispatch>. Acesso em: 29 abri. 2019
- LAKATOS EM, MARCONI MA. Fundamentos de metodologia científica. 5. Ed. São Paulo: Atlas, 2003; 305p.
- MACVANE SH, *et al.* Prolongamento da infusão de β -lactâmicos: uma revisão dos fundamentos e evidências e orientação para implementação. *Jornal Internacional de Agentes Antimicrobianos*, 2014; Vol. 43, N 2.
- MENDES JR, *et al.* Tipos e frequência de erros no preparo e na administração de medicamentos endovenosos. *Einstein (São Paulo)*, 2018; 16(3): eA04146.
- MINISTÉRIO DA SAUDE. Diretrizes e normas regulamentadoras de pesquisas envolvendo seres humanos. RESOLUÇÃO N° 466, DE 12 DE DEZEMBRO DE 2012. Brasil.
- MINISTÉRIO DA SAÚDE. Programa Nacional de Segurança do Paciente (PNSP). PORTARIA N° 529, DE 1° DE ABRIL DE 2013. Brasil.
- MINISTÉRIO DA SAÚDE. Regulamento técnico de boas práticas de utilização das soluções parenterais (sp) em serviços de saúde. RESOLUÇÃO RDC N.º 45, DE 12 DE MARÇO DE 2003. Brasil.
- OPITZ SP. Sistema de medicação: análise dos erros nos processos de preparo e administração de medicamentos em um hospital de ensino. Tese (Doutorado em Enfermagem Fundamental) - Escola de Enfermagem de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, 2006.
- ROBERTS JA, *et al.* Infusão contínua-intermitente de β -lactâmico na sepse severa. uma meta-análise de dados individuais de pacientes de ensaios aleatórios. *Revista*

- America de Medicina Respiratória e Crítica*, 2016; Vol. 194, n 6.
- RODRIGUES FD, BERTOLDI, AD. Perfil da utilização de antimicrobianos em um hospital privado. *ciênc. saúde coletiva* [online], 2010; vol.15, suppl.1, pp.1239-1247. ISSN 1413-8123.
- RODRIGUEZ EOL, *et al.* Assistência segura ao paciente no preparo e administração de medicamentos. *Rev. Gaúcha Enferm*, 2017; v. 38, n. 4, e2017-0029.
- SANTOS NQA. Resistência Bacteriana no Contexto da Infecção Hospitalar. *Texto Contexto Enfermagem*, 2004; v. 13, n. Especial, p. 64-70.
- SANTOS RG, *et al.* Prescrições de antimicrobianos de uso restrito de pacientes internados em um hospital de ensino. *Rev. Bras*, 2016; v.7 n.1 8-12.
- SECOLI SR. Interações medicamentosas: fundamentos para a prática clínica da enfermagem. *Rev Esc Enf USP*, 2001; v.35, n. 1, p. 28-34.
- SILVA LP, *et al.* Aprazamento de medicamentos por enfermeiros em prescrições de hospital sentinela. *Texto Contexto Enferm*, 2013; 22(3): 722-30.
- SILVA MAS. Erros de prescrição médica de pacientes hospitalizados. *Einstein*, 2009; 7(3 Pt 1):290-4.
- 13 CERTOS: administração de medicamentos. Disponível em: <https://conhecendoaenfermagem.com.br/2019/08/03/13-certos-administracao-de-medicamentos/>. Acesso em: 14 nov. 2019.
- WORLD HEALTH ORGANIZATION. *MEDICATION WITHOUT HARM - Global Patient Safety Challenge on Medication Safety*. Geneva, 2017.
