SAFE MEDICATION ADMINISTRATION: ASSESSMENT OF NURSING STUDENTS' COMPETENCE AT A PUBLIC UNIVERSITY IN THE AMAZON

ADMINISTRAÇÃO SEGURA DE MEDICAMENTOS: AVALIAÇÃO DA COMPETÊNCIA DE ACADÊMICOS DE ENFERMAGEM EM UMA UNIVERSIDADE PÚBLICA DO AMAZONAS

ADMINISTRACIÓN SEGURA DE MEDICAMENTOS: EVALUACIÓN DE LA COMPETENCIA DE ESTUDIANTES DE ENFERMERÍA EN UNA UNIVERSIDAD PÚBLICA DEL AMAZONAS

https://doi.org/10.56238/sevened2026.009-069

Lucas Manoel Correia de Oliveira[1], Laura Thais Bitencourt Perdigão[2], Antônio Carvalho Machado[3], Renato Melo da Silva[4], Daniel de Almeida Campos[5], Gabriel de Andrade Bezerra[6], Italo Sicsú de Andrade[7], Márcio Luís Lombardi Martinez[8]

ABSTRACT

This study examined the pharmacological skills of 123 nursing students at the University of the State of Amazonas (UEA). The descriptive, cross-sectional study focused on students enrolled between the 4th and 10th semesters, mostly female, with a mean age of 23 years. Data collection was performed using a structured questionnaire, with descriptive analysis of the results. A high level of theoretical knowledge was observed among participants regarding indications, contraindications, and drug interactions, with superior performance demonstrated by students in more advanced semesters. However, the study revealed significant gaps in the management of adverse reactions and essential practical skills, such as preparation, dose calculation, and safe administration of medications. This discrepancy highlights a mismatch between conceptual mastery and proficiency in clinical application. In view of this, the study concludes that, despite the theoretical advances acquired throughout the training, the consolidation of practical skills still requires a focused curricular improvement. Strengthening active methodologies and clinical simulations is recommended as a priority strategy to ensure patient safety and promote safer and more effective pharmacological practice.

Keywords: Safe Medication Administration. Patient Safety. Pharmacological Competence. Nursing Students.

[1] Nursing Student. Universidade do Estado do Amazonas. E-mail: lcmdo.enf21@uea.edu.br
[2] Nursing Student. Universidade do Estado do Amazonas. E-mail: ltbp.enf22@uea.edu.br
[3] Medical Student. Universidade do Estado do Amazonas. E-mail: acm.med22@uea.edu.br
[4] Medical Student. Universidade do Estado do Amazonas. E-mail: rmds.med21@uea.edu.br
[5] Medical Student. Universidade do Estado do Amazonas. E-mail: ddac.med21@uea.edu.br
[6] Medical Student. Universidade do Estado do Amazonas. E-mail: gdab.med23@uea.edu.br
[7] Dental Student. Universidade do Estado do Amazonas. E-mail: isda.odo22@uea.edu.br
[8] Dr. in Health Sciences. Universidade do Estado do Amazonas. E-mail: mmartinez@uea.edu.br

RESUMO

O presente trabalho dedicou-se a examinar as competências farmacológicas de 123 discentes do curso de Enfermagem da Universidade do Estado do Amazonas (UEA). O estudo, de caráter descritivo e transversal, concentrou-se em estudantes matriculados entre o 4.o e o 10.o período, majoritariamente do sexo feminino, com idade média de 23 anos. A coleta de dados foi realizada mediante a aplicação de questionário estruturado, com análise descritiva dos resultados. Observou-se um alto nível de conhecimento teórico dos participantes sobre indicações, contraindicações e interações medicamentosas, com um desempenho superior demonstrado pelos alunos dos períodos mais avançados. Contudo, o estudo revelou lacunas significativas no manejo de reações adversas e nas habilidades práticas essenciais, como o preparo, o cálculo de dose e a administração segura de medicamentos. Essa discrepância salienta um descompasso entre o domínio conceitual e a proficiência na aplicação clínica. Em vista disso, o estudo conclui que, apesar do avanço teórico adquirido ao longo da formação, a consolidação das competências práticas ainda exige um aprimoramento curricular focado. Recomenda-se o fortalecimento de metodologias ativas e simulações clínicas como estratégia prioritária para garantir a segurança do paciente e promover uma prática farmacológica mais segura e eficaz.

Palavras-chave: Administração Segura de Medicamentos. Segurança do Paciente. Competência Farmacológica. Estudantes de Enfermagem.

RESUMEN

El presente trabajo se dedicó a examinar las competencias farmacológicas de 123 estudiantes del curso de Enfermería de la Universidad del Estado de Amazonas (UEA). El estudio, de carácter descriptivo y transversal, se centró en estudiantes matriculados entre el 4.o y el 10.o período, en su mayoría mujeres, con una edad media de 23 años. La recopilación de datos se realizó mediante la aplicación de un cuestionario estructurado, con análisis descriptivo de los resultados. Se observó un alto nivel de conocimientos teóricos de los participantes sobre indicaciones, contraindicaciones e interacciones medicamentosas, con un rendimiento superior demostrado por los estudiantes de los períodos más avanzados. Sin embargo, el estudio reveló lagunas significativas en el manejo de las reacciones adversas y en las habilidades prácticas esenciales, como la preparación, el cálculo de la dosis y la administración segura de medicamentos. Esta discrepancia pone de relieve un desajuste entre el dominio conceptual y la competencia en la aplicación clínica. En vista de ello, el estudio concluye que, a pesar de los avances teóricos adquiridos a lo largo de la formación, la consolidación de las competencias prácticas aún requiere una mejora curricular específica. Se recomienda el fortalecimiento de metodologías activas y simulaciones clínicas como estrategia prioritaria para garantizar la seguridad del paciente y promover una práctica farmacológica más segura y eficaz.

Palabras clave: Administración Segura de Medicamentos. Seguridad del Paciente. Competencia Farmacológica. Estudiantes de Enfermería.

1 INTRODUCTION

The safe administration of medications is a fundamental pillar in health care practice, especially in nursing, whose performance involves direct and continuous contact with the patient, a comprehensive view of care and responsibility for therapeutic safety. The correct use of drugs is essential for the prevention and treatment of diseases, contributing significantly to the promotion of health and well-being of individuals (Farias *et al*., 2022). However, the absence of adequate attention at any stage of this process can result in adverse events, compromising clinical recovery and, in extreme cases, leading to fatal outcomes (Farias *et al*., 2022).

The World Health Organization (WHO) recognizes medication errors as one of the main causes of avoidable damage in health services, which reinforces the need for strategies aimed at promoting pharmacological safety (Santos, 2023; WHO, 2021). This is a complex, multidisciplinary and highly responsible process, ranging from the analysis of the prescription to the monitoring of therapeutic and adverse effects (Oliveira, Santos; 2023; Oliveira *et al*., 2022). In this context, nurses play a central role in the coordination and execution of safe practices, requiring technical-scientific mastery of pharmacology and patient safety (Pereira *et al*., 2022).

The professional's performance in drug therapy constitutes a cycle of continuous responsibility, which begins with the critical analysis of the medical prescription, which configures the first barrier against errors. This is followed by preparation and execution, phases that require technical skill and mathematical precision in the calculation and dilution of doses, ending with post-administration monitoring and the educational and ethical dimension of care, ensuring the full application of the "Nine Rights of Nursing" (Sousa, 2023; Martins, Almeida, 2022). The justification for this study lies in the fact that insufficient mastery of these fundamentals can cause serious harm to the patient, prolonged hospitalization, and increased care costs (Santos *et al*., 2023; Costa *et al*., 2022).

In Brazil, it is estimated that thousands of adverse events annually are associated with failures in drug administration (Cruz *et al*., 2023). In addition, studies show that nursing students often report anxiety and insecurity in pharmacological practice, evidencing a possible gap between academic theory and clinical experience (Lima *et al*., 2023; Ribeiro *et al*., 2023). Understanding these deficiencies is, therefore, essential to propose pedagogical interventions that strengthen professional training (Pereira *et al*., 2023; Araújo *et al*., 2022). In view of the above scenario, the following research question emerges: What is the level of pharmacological competence of nursing students at the University of the State of Amazonas (UEA), covering the domain of indication, contraindication, interactions and management of

adverse reactions, as well as the psychomotor skills of preparation, calculation and safe administration of medications?

Based on this problem, this study aims to evaluate the level of pharmacological competence of nursing students at the State University of Amazonas (UEA), analyzing both theoretical knowledge and practical skills essential for the safe administration of medications. Specifically, it seeks to identify the level of knowledge about pharmacological aspects, measure self-reported safety regarding the preparation and calculation of dosages, and compare academic performance between the different periods of the undergraduate course.

2 THEORETICAL FRAMEWORK

2.1 PATIENT SAFETY AND DRUG THERAPY

Patient Safety is defined by the World Health Organization (WHO) as the reduction of the risks of unnecessary harm associated with health care to an acceptable minimum (Santos *et al*., 2023; WHO, 2021). In the context of drug therapy, this safety is a global priority, as drug-related errors are among the main causes of preventable adverse events in global health systems (Farias *et al*., 2022; Oliveira *et al*., 2022).

In Brazil, the National Patient Safety Program (PNSP), established by Ordinance No. 529/2013, and RDC No. 36/2013, establish basic protocols for safety in the prescription, use, and administration of medications (Cruz *et al*., 2023). The objective of these protocols is to ensure that the process — which involves selection, storage, prescription, transcription, preparation, and administration — is carried out in a way that mitigates systemic and individual failures, protecting the patient-professional binomial (Pereira *et al*., 2023; Martins, Almeida, 2022).

2.2 MEDICATION ERRORS: DEFINITIONS AND IMPACTS

A medication error is characterized as any avoidable event that may cause or lead to the inappropriate use of drugs under the control of health professionals or consumers (Silva *et al*., 2024; Santos et al., 2023). In nursing, the stages of preparation and administration are considered critical, as they represent the last interception barrier before a failure directly reaches the patient (Farias, Pinto, 2022; Souza *et al*., 2022).

The most frequent errors in care practice include incorrect dosages, omission of doses, inadequate infusion speed, and administration by non-prescribed routes (Araújo *et al.,* 2022; Farias, Pinto, 2022). Such failures generate multidimensional impacts: for the patient, they result in prolonged hospitalization and sequelae; for the institution, they increase care costs and compromise the organizational image; and for the professional, they

entail ethical suffering and legal implications (Silva *et al*., 2024; Cruz *et al*., 2023).

2.3 THE PROTOCOL OF THE "NINE RIGHTS" IN NURSING

As a fundamental strategy for failure prevention, Nursing adopts rigorous checks before the execution of any therapy, and the evolution of safety practices has expanded the old concept of the "Five Rights" to the Nine Rights of Nursing, consolidating a gold standard for safe practice (Sousa *et al*., 2023; Martins; Almeida, 2022). This protocol establishes the need to check the right patient, through at least two indicators such as name and date of birth, and the right medication, by checking the label with the medical prescription. In addition, the right route must be guaranteed, verifying the compatibility of the drug with the access, the right dose, which requires precise calculations and double checking, and the right time, respecting the therapeutic intervals (Sousa *et al*., 2023; Martins; Almeida, 2022).

The safety cycle is completed with the right registration, carried out immediately after administration, the right guidance to the patient and the family to clarify doubts, the right way, certifying the correct presentation of the drug, and the right answer, which consists of continuous clinical monitoring after the intervention. The full application of this protocol requires that nurses have not only motor skills, but also keen critical thinking to question inconsistencies in prescriptions and identify potential risks to the patient early (Sousa *et al*., 2023; Pereira *et al*., 2022).

2.4 ACADEMIC TRAINING AND PHARMACOLOGICAL COMPETENCE

Pharmacological competence in Nursing requires solid integration between theory (pharmacokinetics and pharmacodynamics) and procedural proficiency (Pereira *et al*., 2023; Costa *et al*., 2022). However, the literature points out that the transition from the academic environment to clinical practice generates insecurity and anxiety in students, especially with regard to the calculation of dosages (Lima *et al*., 2023; Ribeiro *et al*., 2023).

Recent studies show that traditional classroom teaching alone may be insufficient for the consolidation of safe behaviors. In this sense, the use of active methodologies, such as High-Fidelity Clinical Simulation, has been shown to be effective in reducing the gap between theory and practice (Saint-Rozas *et al*., 2025; Farias *et al*., 2023). Simulation allows the student to develop clinical reasoning and self-confidence in a controlled environment, where error does not result in real harm, but rather in an opportunity for learning and critical reflection (Elendu *et al*., 2024; Singh *et al*. 2024).

3 METHODOLOGY

This research is characterized by a quantitative approach, with a descriptive and exploratory cross-sectional design, developed at the School of Health Sciences of the University of the State of Amazonas (ESA/UEA). The choice of this institution, located in Manaus, is justified by its relevance as a reference center in the training of health professionals in the Amazon region. The study population was composed of students regularly enrolled in the undergraduate nursing course. Although the sample planning considered a confidence level of 95% and a maximum acceptable error of 5%, the final sample was selected for convenience due to accessibility and logistics criteria. The inclusion criteria included students from the fourth academic period, a curricular framework in which the theoretical contents of pharmacology and the clinical practices of drug administration are formally introduced. On the other hand, students on academic leave, absent during the collection period or who did not agree to the Informed Consent Form (ICF) were excluded.

The study variables were structured in two distinct blocks: the independent ones, covering sociodemographic data such as age, gender, and academic period; and the dependent ones, focused on pharmacological competence, segmented between theoretical domain (indications, contraindications, interactions and adverse reactions) and psychomotor skills (preparation, calculation of doses and administration technique).

Data collection took place between August 2024 and September 2025, through a structured questionnaire, prepared with objective questions directed to students. The use of an electronic tool made it possible to reach the sample, ensuring the confidentiality of information and the standardization of responses regarding pharmacological competencies and the safe administration of medications.

After the collection stage, the data were tabulated in Microsoft Excel software and submitted to analysis by means of descriptive statistics, with the calculation of absolute (n) and relative (%) frequencies. The results were organized in tables to enable the interpretation of the sample profile and the level of pharmacological proficiency of the students. Finally, the project fully complied with the ethical precepts established by Resolution No. 466/2012 of the National Health Council (CNS), and was approved by the Research Ethics Committee (CEP) of the University of the State of Amazonas under the CAAE registration number: 79453324.0.0000.5016. The voluntary adherence of all participants was formalized via the ICF, ensuring strict anonymity and confidentiality of the information collected.

4 RESULTS AND DISCUSSIONS

The sample of this study consisted of 123 nursing students, with a predominance of

women (73%) and a mean age of 23 years. The distribution between the academic periods was balanced, including students from the 4th to the 10th period (Table 1), which allowed an evolutionary analysis of pharmacological competence throughout the undergraduate course.

Table 1

Distribution of participants according to academic period

Variable	Category	N	%
Period	4th and 5th periods	41	33,3
	6th and 7th periods	39	31,7
	8th to 10th period	43	35
Total		123	100

Source: The authors.

The findings revealed a high level of theoretical knowledge about the indications, contraindications, and drug interactions, with success rates that reached 100% in the final periods (Table 2). This performance suggests that cognitive content is largely consolidated in the institution's curriculum. However, when analyzing the management of adverse reactions, the self-reported safety rates were lower (74% to 77%), showing that, although the topic is known, there are still gaps in the transposition of this knowledge into clinical reasoning. This phenomenon corroborates the literature by signaling that training with less emphasis on simulated decision-making situations impairs student readiness in the face of adverse events (Elendu *et al*., 2024; Singh *et al*., 2024).

Table 2

Students' knowledge of indications and contraindications, dosage regimens, drug interactions and management of adverse drug reactions

Variables	Yes (n %)	No (n %)
Indications and contraindications		
4th and 5th periods	41 (93%)	3 (7%)
6th and 7th periods	39 (98%)	1 (2%)
8th to 10th period	43 (100%)	0
Dosage regimens		
4th and 5th periods	38 (86%)	6 (14%)
6th and 7th periods	37 (93%)	3 (7%)
8th to 10th period	40 (93%)	3 (7%)
Drug Interactions		
4th and 5th periods	44 (100%)	0
6th and 7th periods	40 (100%)	0
8th to 10th period	42 (98%)	1 (2%)
Adverse Reactions		
4th and 5th periods	34 (77%)	10 (23%)
6th and 7th periods	31 (77%)	9 (23%)
8th to 10th period	32 (74%)	1 (26%)

Source: The authors.

Regarding psychomotor skills, a dualistic profile was observed. While the perception of safety in the administration of medications showed progressive improvement — jumping from 36% in the initial periods to 65% in the final periods (Table 3) — confidence in the preparation and, specifically, in the calculation of dosages showed critical weaknesses. Interestingly, insecurity in the calculation of doses was greater among students from the 8th to the 10th period (19%) than among freshmen (5%).

Table 3

Students' practical ability to prepare, calculate dosage, and administer medications

Variables	Unsafe (n %)	Not very safe (n %)	Safe/ Very insurance (n %)
Preparation of Medicines			
4th and 5th periods	3 (7%)	20 (45%)	21 (48%)
6th and 7th periods	4 (10%)	14 (35%)	22 (55%)
8th to 10th period	5 (11%)	17 (40%)	21 (49%)
Dosage Calculation Medicines			
4th and 5th periods	2 (5%)	22 (50%)	20 (45%)
6th and 7th periods	3 (7%)	17 (43%)	20 (50%)
8th to 10th period	8 (19%)	16 (37%)	19 (44%)
Administration of Medications			
4th and 5th periods	1 (3%)	27 (61%)	16 (36%)
6th and 7th periods	1 (3%)	12 (30%)	27 (67%)
8th to 10th period	3 (7%)	12 (28%)	28 (65%)

Source: The authors.

This mismatch between conceptual mastery and proficiency in clinical application characterizes the gap between theory and practice widely documented in Nursing (Elendu *et al*., 2024; Triantafyllou *et al*., 2023). The persistence of difficulties in applied mathematical calculations, even in the final stages of the course, reinforces the urgency of targeted and repetitive interventions, since systematic reviews point to high failure rates in calculation tests as predictors of errors in clinical stages (Elendu *et al*., 2024; Triantafyllou *et al*., 2023).

The comparative analysis indicates that curricular advancement, by itself, increases the theoretical accumulation, but does not ensure a linear evolution of procedural competences. Organizational factors, such as overload in internship fields and the lack of a dedicated preceptorship with *immediate feedback*, can prevent students from consolidating safe behaviors in the actual administration of drugs (Elendu *et al*., 2024; Singh *et al*., 2024). In light of this, recent literature emphasizes that high-fidelity clinical simulation strategies and *screen-based* methods are essential to reduce these gaps, promoting significant gains in

self-confidence and reducing avoidable harm (Saint-Rozas *et al.,* 2025; Elendu *et al*., 2024).

Therefore, the data support the need to restructure pedagogical practices, incorporating mandatory simulation modules focused on calculation and preparation, accompanied by objective structured performance assessments (OSCE) (Ribeiro *et al*., 2024). The implementation of *standardized checklists* in UEA's internship fields emerges as a pragmatic recommendation to reduce variability in the execution of the "right nine" and ensure that academic training results in a professional practice ethically committed to patient safety (Saint-Rozas *et al*., 2025).

5 CONCLUSION

The present study allowed us to conclude that nursing students at the University of the State of Amazonas (UEA) have a solid theoretical mastery of drug therapy, with increasing performance throughout the academic periods. However, this scenario contrasts with procedural weaknesses and self-reported insecurities, especially with regard to the management of adverse reactions and the calculation of pharmacological dosages.

The evidence of a "dualistic profile" — high cognitive performance versus psychomotor fragility — highlights that curricular advancement alone does not guarantee the practical proficiency necessary for patient safety. Thus, the strengthening of practical pharmacological education should be consolidated as a priority and transversal axis in nursing education, aiming at reducing adverse events and promoting harm-free care.

Although the results offer relevant supports, the interpretation of the data must consider methodological limitations, such as the self-reported nature of the responses and the sample size restricted to a single institution, factors that can introduce social desirability bias. However, the convergence between the findings of this research and the recent scientific literature reinforces the external validity of the conclusions: the gap between knowing and doing is a persistent challenge that demands structured solutions.

As recommendations, this study supports the systematic incorporation of high-fidelity clinical simulation and structured practical assessments (OSCE) into the nursing curriculum. Such strategies, when articulated with a preceptorship active in the internship fields, constitute strategic priorities to increase professional autonomy and ensure the quality and safety of health care in the Amazon region.

REFERENCES

Araújo, P. S., et al. (2022). A segurança do paciente na formação em enfermagem: Uma revisão integrativa. Revista Eletrônica Acervo Saúde, 15(8), e10848.

Costa, V., et al. (2022). A segurança do paciente no contexto da assistência de enfermagem: Uma revisão sistemática. Revista Brasileira de Enfermagem, 75(5), e20210206.

Cruz, E. S., et al. (2023). A aplicação dos nove certos da administração de medicamentos no cuidado de enfermagem. Revista de Enfermagem e Saúde Coletiva, 7(2), 1–10.

Elendu, C., et al. (2024). The impact of simulation-based training in medical education: A review. Medicine, 103(27), e38813. https://doi.org/10.1097/MD.0000000000038813

Farias, C. A., et al. (2023). Segurança do paciente e a atuação do enfermeiro: Análise de protocolos e estratégias de prevenção de eventos adversos. RECISATEC – Revista Científica Saúde e Tecnologia, 3(7), e37299.

Farias, C., et al. (2022). A importância do enfermeiro na administração segura de medicamentos: Uma revisão integrativa. Revista Enfermagem Atual In Derme, 1(4), 1–10.

Farias, D. N., & Pinto, P. A. (2022). Nível de conhecimento de estudantes de enfermagem sobre administração de medicamentos. Revista de Enfermagem da UERJ, 30(1), e65457.

Lima, S., et al. (2023). A importância da educação continuada para a segurança do paciente em terapia medicamentosa. Revista Enfermagem Atual In Derme, 1(4), 1–10.

Martins, M., & Almeida, L. (2022). Prevalência de ansiedade em estudantes de enfermagem em uma instituição de ensino superior. Research, Society and Development, 11(3), e16911326338.

Oliveira, D., & Santos, P. (2023). A importância da enfermagem na segurança do paciente no setor de urgência e emergência: Uma revisão integrativa. RECISATEC – Revista Científica Saúde e Tecnologia, 3(7), e37299.

Oliveira, F. G., et al. (2022). Protocolo de segurança na administração de medicamentos em ambiente hospitalar: Uma revisão de literatura. Revista Eletrônica Acervo Saúde, 15(8), e10848.

Pereira, A., et al. (2022). A segurança do paciente na administração de medicamentos: Uma revisão narrativa. Revista de Enfermagem UFPE Online, 16(1), e250320.

Pereira, L., et al. (2023). Inovação tecnológica e segurança do paciente na prática de enfermagem. Revista de Enfermagem do Centro-Oeste Mineiro, 13, e5215.

Pereira, R. M., et al. (2023). Conhecimento de acadêmicos de enfermagem sobre administração de medicamentos. Revista Científica Multidisciplinar Núcleo do Conhecimento, 8(9), 1–15.

Ribeiro, C. B., et al. (2024). Realistic simulation in the preparation and administration of medications: A systematic review. Cuadernos de Educación y Desarrollo, 16(4), 1–24.

Ribeiro, T. F., et al. (2023). Metodologias ativas como estratégia para o ensino da farmacologia na graduação em enfermagem. Revista de Enfermagem UFPE Online, 17(2), e250320.

Sainz-Rozas, P. B., et al. (2025). Evaluation of paediatric nursing students' medication calculation competence: An observational study using a gamified contest. Nursing Open, 12(9), e70295. https://doi.org/10.1002/nop2.70295

Santos, L. R., et al. (2023). O uso racional de medicamentos e o papel do enfermeiro na orientação ao paciente. Revista Científica Multidisciplinar Núcleo do Conhecimento, 8(9), 1–15.

Santos, S. J., et al. (2023). Eventos adversos decorrentes de erros de medicação na assistência de enfermagem. Revista de Enfermagem e Saúde Coletiva, 7(2), 1–15.

Silva, D. R., et al. (2024). Impacto financeiro dos erros de medicação em hospitais brasileiros. Journal of Health Informatics, 16(1), 1–8.

Singh, K., et al. (2024). Barriers and solutions to the gap between theory and practice in nursing services: A systematic review of qualitative evidence. Nursing Forum, 59, e7522900. https://doi.org/10.1155/2024/7522900

Sousa, C. L., et al. (2023). Erros de medicação e suas implicações no cenário hospitalar brasileiro. Revista de Enfermagem e Saúde Coletiva, 7(2), 1–15.

Souza, V. S., et al. (2022). Prevalência de erros de medicação em hospitais do Brasil: Uma revisão integrativa. Revista de Enfermagem UFPE Online, 16(1), e250320.

Triantafyllou, C., et al. (2023). Frequency of nursing student medication errors: A systematic review. Health & Research Journal, 9(4), 237–242. https://doi.org/10.12681/healthresj.33669

World Health Organization. (2021). Global patient safety action plan 2021–2030: Towards eliminating avoidable harm in health care. Organização Mundial da Saúde.