

## Nursing Care Practices Aimed at Promoting Patient Safety Before, During, and After Blood Transfusion: a Systematic Literature Review

Práticas de Cuidado da Enfermagem Voltadas à Promoção da Segurança do Paciente Antes, Durante e Após a Transfusão Sanguínea: Revisão Sistemática da Literatura

Prácticas de Cuidado de Enfermería Orientadas a la Promoción de La Seguridad Del Paciente Antes, Durante y Después de la Transfusión Sanguínea: Revisión Sistemática de La Literatura

### RESUMO

**Objetivo:** Analisar, por meio de revisão sistemática da literatura, as práticas de cuidado da enfermagem voltadas à promoção da segurança do paciente durante a transfusão de sangue é o objetivo deste estudo.

**Método:** O método seguiu as diretrizes PRISMA e foi realizado entre fevereiro e abril de 2025. **Resultados:** Os resultados mostraram que as principais estratégias de segurança incluem a identificação correta do paciente, conferência da bolsa de sangue, monitorização de sinais vitais, detecção precoce de reações adversas e capacitação contínua da equipe. Protocolos institucionais e checklists destacaram-se como medidas eficazes na prevenção de falhas. **Conclusão:** Conclui-se que a enfermagem exerce papel central na segurança transfusional, sendo indispensável o investimento em treinamento, padronização e fortalecimento da cultura de segurança nos serviços de saúde.

**DESCRIPTORES:** Cuidados de Enfermagem; Segurança do Paciente; Transfusão Sanguínea; Hemoterapia.

### ABSTRACT

**Objective:** Analyzing, through a systematic literature review, the nursing care practices aimed at promoting patient safety during blood transfusion is the objective of this study. **Method:** The method followed the PRISMA guidelines and was conducted between February and April 2025. **Results:** The results showed that the main safety strategies include correct patient identification, verification of the blood bag, monitoring of vital signs, early detection of adverse reactions, and continuous staff training. Institutional protocols and checklists stood out as effective measures for preventing errors. **Conclusion:** It is concluded that nursing plays a central role in transfusion safety, and continuous investment in training, standardization, and strengthening of the safety culture in health services is essential.

**DESCRIPTORS:** Nursing Care; Patient Safety; Blood Transfusion; Hemotherapy.

### RESUMEN

**Objetivo:** Analizar, mediante una revisión sistemática de la literatura, las prácticas de cuidado de enfermería orientadas a promover la seguridad del paciente durante la transfusión de sangre es el objetivo de este estudio. **Método:** El método siguió las directrices PRISMA y se realizó entre febrero y abril de 2025. **Resultados:** Los resultados mostraron que las principales estrategias de seguridad incluyen la identificación correcta del paciente, la verificación de la bolsa de sangre, la monitorización de los signos vitales, la detección precoz de reacciones adversas y la capacitación continua del personal. Los protocolos institucionales y las listas de verificación se destacaron como medidas eficaces para prevenir errores. **Conclusión:** Se concluye que la enfermería desempeña un papel central en la seguridad transfusional, siendo indispensable la inversión continua en formación, estandarización y fortalecimiento de la cultura de seguridad en los servicios de salud.

**DESCRIPTORES:** Cuidados de Enfermería; Seguridad del Paciente; Transfusión Sanguínea; Hemoterapia.

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## INTRODUCTION

**B**lood transfusion is a therapeutic procedure widely used in various clinical contexts and is essential in the treatment of patients with hematological disorders, hemorrhages, and severe anemia, among other conditions. Adverse events, such as hemolytic reactions, transfusion-transmitted infections, and blood incompatibilities, reinforce the need for strict protocols and an institutional culture focused on patient safety<sup>7</sup>.

In this context, nurses play a central role in all stages of the transfusion process, from patient preparation to post-transfusion follow-up, checking the medical prescription, correctly identifying the recipient, handling blood components, monitoring vital signs, and recording information in the medical record. Failures in any of

these stages can lead to serious clinical consequences, such as anaphylactic shock, spread of infectious agents, or organ failure, compromising the safety and quality of care<sup>8</sup>.

International literature<sup>9</sup> defines an incident as any event or circumstance that could have caused or did cause unnecessary harm to the patient, while adverse events are those that actually result in clinical harm, prolonged hospitalization, or disability. Although there are institutional protocols<sup>10,11</sup> and international guidelines<sup>12</sup> on safe practices in hemotherapy, there are still gaps in knowledge about the adherence to and effectiveness of these measures in everyday nursing practice. Recent studies<sup>13</sup> highlight communication failures between teams, lack of continuous monitoring, inconsistencies in data recording, and a lack of specific training in transfusion safety.

These gaps justify the need to critically review the available scientific evidence in order to identify strategies that strengthen nursing practice and reduce risks to patients. The starting point is the hypothesis that the systematic implementation of evidence-based protocols, combined with ongoing training of nursing staff, contributes significantly to reducing incidents and adverse events related to blood transfusion.

Thus, this study seeks to answer the following research question: what nursing care practices described in the literature promote patient safety during the blood transfusion process? Therefore, the objective of this study is to analyze, through a systematic review of the literature, nursing care practices aimed at promoting patient safety in the context of blood transfusion, in order to identify effective strategies, knowledge gaps, and op-

portunities for improving transfusion safety policies in health services.

METHOD

This is a systematic review of the literature, without meta-analysis, designed to gather, analyze, and synthesize the available scientific evidence on nursing practices related to patient safety during the blood transfusion process. The study was conducted between February and April 2025, strictly following the methodological guidelines established by the PRISMA (*Preferred Reporting Items for Systematic Reviews and Meta-Analyses*) protocol, which guides the transparent, standardized, and high-quality conduct of this type of research.

The search strategy was carefully designed based on a combination of controlled (DeCS/MeSH) and uncontrolled descriptors, covering the terms: “nursing care,” “patient safety,” and “blood transfusion.” These descriptors, presented in Table 01, were used in Portuguese, English, and Spanish to broaden the scope and sensitivity of the search.

The databases selected for the research were: PubMed, Virtual Health Library (VHL), CINAHL, SciELO, Nursing Database (BDENF), and the CAPES Thesis and Dissertation Database. These sources were chosen based on their relevance and scope in the field of health and nursing, ensuring a broad and representative survey of scientific production on the topic.

| Table 1: Search strategies in the databases |                                                                                                                                                          |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Databases                                   | Keywords                                                                                                                                                 |
| PubMed                                      | ("Nursing Care"[MeSH] OR "Nursing Practice"[MeSH]) AND ("Patient Safety"[MeSH]) AND ("Blood Transfusion"[MeSH])                                          |
| Thesis and Dissertation DatabaseCAPES       | ("Nursing care" OR "Nursing practice" OR "Nursing interventions") AND ("Patient safety") AND ("Blood transfusion" OR "Blood component transfusion")      |
| SciELO                                      | ("Cuidado de Enfermagem" OR "Prática de Enfermagem") AND ("Segurança do Paciente") AND ("Transfusão de Sangue" OR "Reação Transfusional")                |
| CINAHL                                      | TS=("Nursing care" OR "Nursing practice") AND TS=("Patient safety") AND TS=("Blood transfusion" OR "Blood component transfusion")                        |
| BDENF                                       | ("Cuidado de Enfermagem" OR "Intervenções de Enfermagem") AND ("Segurança do Paciente") AND ("Transfusão de Sangue" OR "Eventos Adversos na Transfusão") |

Source: Authors

The selection process was carried out in six stages: 1) Choice of theme and formulation of the guiding question; 2) Bibliographic and literature search 3) Definition of inclusion and exclusion criteria; 4) Classification of selected studies; 5) Reading, interpretation, and analysis of the results; and 6) Writing and presentation of the knowledge produced (Brazil, 2012)

The criteria adopted for the inclusion of studies in this systematic review addressing nursing practices related to patient safety during the blood transfusion process were: publications that directly addressed the proposed theme; texts available in full and accessible free of charge online, in formats compatible with scientific articles, doctoral theses, technical reports, government guidelines, regulations, and recommendations issued by the World Health Organization (WHO) and the United Nations (UN). Duplicate files, opinion articles, journalistic reports (written or spoken), as well as studies that were not directly related to the guiding question of this research were excluded from the analysis.

After applying the search strategies to the previously selected databases, 275 documents were identified. Of these, 89 were excluded because they were duplicates, leaving 186 publica-

tions for the screening stage, which involved reading the titles and abstracts. At this stage, 161 publications were discarded because they were not directly relevant to the subject of the review.

As a result, 25 studies were selected for full-text reading. However, 13 of them were subsequently excluded because they did not specifically address nursing practices related to patient safety in the context of blood transfusion. Thus, the final sample of this systematic review consisted of 12 publications.

RESULTS

The works selected in this systematic review will be presented in an analytical table format (Table 2), containing the following information: study title, methodology used, authorship, year, and country of publication. The following guidelines were considered for the analysis of the texts: (1) main national and international regulations related to patient safety in the context of blood transfusion; (2) challenges and limitations in the implementation of safe nursing practices during the transfusion process; (3) main incidents and non-conformities reported in the literature involving nursing care in transfusions.

These criteria allowed us to iden-

tify the factors that influence patient safety and the role of nursing in preventing adverse events during this procedure. Among the publications analyzed, the qualitative method predominated ( $n = 10$ ), although four studies adopted a mixed approach (qualitative and quantitative). Regarding the methodological design, descriptive and exploratory bibliographic and documentary studies ( $n = 10$ ), data surveys and field

research ( $n = 3$ ), and a formal recommendation issued by the World Health Organization ( $n = 1$ ) stood out.

Regarding the areas of publication, eight studies were published in journals focused on health sciences (such as public health, nursing, medicine, and epidemiology), while six were published in interdisciplinary journals, also covering areas of social sciences and public health policies.

The topics addressed in the publications analyzed mainly included patient safety in the transfusion process from the perspective of nursing practice ( $n = 7$ ), followed by studies relating care practices to safety protocols and international guidelines ( $n = 4$ ), as well as analyses focused on the prevention of adverse events and the quality of transfusion care ( $n = 3$ ), as systematized in Table 2.

**Table 2: Characterization of the articles analyzed regarding the limitations of the application of human rights actions in female prison establishments (n= 00), Manaus, Amazonas, Brazil (2025).**

| No. | Title / Author                                                                                                               | Source / Basis | Type of Study             | Stages of Care / Main Findings                                                        |
|-----|------------------------------------------------------------------------------------------------------------------------------|----------------|---------------------------|---------------------------------------------------------------------------------------|
| 1   | MATTIA, D. et al. <sup>4</sup> acima Construction and validation of indicators for nursing management in transfusion safety. | SciELO         | Methodological study      | Pre-, intra- and post-transfusion; validation of safety checklist.                    |
| 2   | Soares FM et al (2025) <sup>8</sup> Nursing care for adult patients undergoing blood transfusion: a scoping review.          | SciELO         | Integrative review        | Emphasis on monitoring and prevention of adverse reactions in pediatrics.             |
| 3   | BORGES, J. R. et al.2023 <sup>9</sup> Conhecimento da equipe de Enfermagem sobre reações transfusionais.                     | SciELO         | Integrative review        | Safe practices: hygiene, double checking, monitoring, and recording.                  |
| 4   | Nayeri ND et al.(2022) <sup>10</sup> . Ways to Enhance Blood Transfusion Safety                                              | PubMed         | Systematic review         | Protocols and ongoing training; standardization of procedures.                        |
| 5   | Hill B, Derbyshire J. (2021) <sup>11</sup> Blood transfusions: ensuring patient safety                                       | PubMed         | Narrative review          | Good bedside practices; focus on identification and multiple checks.                  |
| 6   | Jogi IE et al. (2021) <sup>12</sup> Bedside Blood Transfusion – What Nurses Need to Know                                     | ScienceDirect  | Technical review          | Practical protocols for pre-, during, and post-transfusion verification.              |
| 7   | Boukhris S et al. (2024) <sup>13</sup> Are Healthcare Professionals Adequately Trained for Safe Blood Transfusion?           | PubMed         | Cross-sectional study     | Assesses gaps in knowledge and professional training.                                 |
| 8   | Crispin P et al.(2022) <sup>14</sup> A review of electronic medical records and safe transfusion practice                    | PubMed         | Critical review           | Use of electronic medical records for traceability and error prevention.              |
| 9   | Brown C. (2023) <sup>15</sup> Blood and blood products transfusion errors                                                    | PubMed         | Literature review         | Analysis of transfusion errors and mitigation strategies.                             |
| 10  | Edea G et al.(2024) <sup>16</sup> Assessment of knowledge of blood transfusion and its associated factors among nurses       | Heliyon        | Quantitative study        | Knowledge and safe practices at all stages of the process.                            |
| 11  | FUNDAÇÃO HEMOAM <sup>17</sup> . Manual de transfusão sanguínea. 2024.                                                        | HEMOAM         | Blood transfusion manual. | Develops indicators for the structure, process, and results of the Hemoam Foundation. |
| 12  | Mattia D. (2023) <sup>18</sup> Gestão de enfermagem no processo transfusional (Dissertação UFSC)                             | Capes/UFSC     | Master's thesis           | Validation of 27 management indicators in transfusion safety.                         |

Source: Authors

## DISCUSSIONS

### Safety protocols and guidelines adopted by nurses during the transfusion process

Blood transfusion is a critically important procedure in many hospital settings, but it carries significant risks to the patient when safety practices are not strictly followed. In response, nurses play a central role as guardians of patient safety in the transfusion process, applying protocols and guidelines before, during, and after the administration of blood components.

In the pre-transfusion period, protocols emphasize triple identity verification: reading the medical prescription, checking with the patient (full name, ID), and comparing with the blood bag label. The study of checklist construction and validation<sup>16</sup> demonstrated that the final instrument, consisting of 29 items and 90 sub-items distributed across three domains (pre, transfusion, and post), obtained a content validity index of 0.98, indicating robustness for clinical use<sup>(4, 15)</sup>.

The pre-transfusion stage also requires confirmation of blood compatibility (typing, cross-matching), identification of the puncture site, verification of bag integrity, and visual examination for changes (hemolysis, abnormal coloration). In the Brazilian context, the adoption of checklists and standardized protocols shows a growing trend in theses and dissertations<sup>15</sup> as a tool for systematizing good practices<sup>1</sup>.

During transfusion, constant vigilance is essential. The nurse must perform a double check at the time of infusion, monitor vital signs before starting, in the first 10 to 15 minutes, at regular intervals, and at the end of the transfusion, observing adverse reactions such as fever, chills, tachycardia, hypotension, or changes in oxygen saturation<sup>5, 8</sup>. The *Nursing Care*

*for Adult Patients Undergoing Blood Transfusions* scope review highlighted that the most prevalent care includes hand hygiene, use of personal protective equipment, double-checking, monitoring vital signs, and educating the patient and family about transfusion reaction symptoms<sup>5</sup>. If signs of a reaction appear, the protocol requires immediate interruption of the transfusion, preservation of the bag and label, recording of the occurrence, and medical notification in accordance with hemovigilance standards<sup>(6)</sup>.

The study *The Effects of the Clinical Simulation of Transfusion Reactions* showed that nursing students who underwent simulations significantly reduced monitoring errors and maximum infusion time, reinforcing the importance of advance preparation for safe performance<sup>5</sup>. In the post-transfusion period, the recommended protocol includes checking vital signs immediately after infusion, observing the patient for 30 minutes, and rigorously documenting volume, date, time, batch, and any adverse events<sup>5, 1</sup>.

Contemporary guidelines advocate the incorporation of technologies such as barcode identification systems and integrated electronic medical records. In *Ways to Enhance Blood Transfusion Safety*, Nayeri et al. point out that about 50% of the studies reviewed reported the use of automated technologies to minimize human error during transfusion<sup>7</sup>.

The training and continuing education of nurses appear to be essential pillars. The study *Safe Blood Transfusion Practices among Nurses in a Major Tertiary Hospital* revealed knowledge gaps, with an average accuracy of only 53% on transfusion safety items<sup>9</sup>. This shows that protocols are only as effective as the nurse's preparation to implement them.

Another challenge is the alignment of guidelines with institutional hemovigilance, which requires sys-

tematic reporting of transfusion reactions and incident analysis. The use of *the checklist*<sup>23</sup> integrates this axis of surveillance, serving as a reliable tool to promote safety in transfusion<sup>4, 15</sup>.

Finally, the sustainability of the guidelines depends on continuous monitoring, auditing, and an organizational culture of safety. The use of performance indicators (e.g., number of incidents per volume transfused and response time to reactions) allows nursing and hospital management to monitor the quality of the process and promote incremental improvements.

### Factors contributing to nursing errors in blood transfusion

Nursing errors related to blood transfusion do not result solely from individual failures, but from a set of human, organizational, and systemic factors that interact in a dynamic and cumulative manner<sup>16, 7, 12</sup>. When combined, these factors create an environment conducive to incidents, revealing that transfusion safety depends as much on individual competence as on the soundness of institutional structures.

Among the human factors, distractions, memory lapses, physical and mental fatigue, as well as insufficient knowledge stand out<sup>(12)</sup>. Transfusion errors can occur even among experienced professionals, especially in contexts of high workload, frequent interruptions, and lack of adequate breaks. In addition, professional complacency, i.e., overconfidence in routine activities, is another relevant aspect. Hill and Derbyshire<sup>8</sup> call this phenomenon *habitual complacency*, characterized by a false sense of security acquired through the repetition of tasks, which reduces attention and risk perception.

The lack of training and professional development is another important factor contributing to errors. International research shows that

nurses who do not perform transfusions frequently tend to lose technical skills and familiarity with safety protocols<sup>10, 8</sup>. The absence of periodic training and continuing education programs<sup>10</sup> reduces confidence and technical competence, compromising critical stages of the procedure. The lack of refresher training on new hemovigilance standards and on the management of transfusion reactions is often associated with the occurrence of preventable incidents.

Lack of knowledge of institutional protocols and national guidelines is also a recurring factor. Transfusion safety in pediatric patients<sup>6</sup> observed a discrepancy between the perception of safety reported by nurses and the effective application of protocols in the units studied. This finding reveals that, although theoretical knowledge exists, its translation into practice is still limited, especially in environments with high turnover and care pressure. The lack of standardization between institutions aggravates the problem, since different hospitals may adopt different checking and recording routines, compromising the reliability of the process<sup>16</sup>.

The work environment is another determining factor in the genesis of errors. Inadequate lighting, excessive noise, constant interruptions, and lack of appropriate physical space for safe blood bag checking are frequently reported conditions<sup>4</sup>. Units with better structural conditions and adequate physical resources have a lower incidence of errors. The authors emphasize that nursing errors often reflect institutional disorganization rather than individual negligence, a perspective already defended in their previous dissertation<sup>15</sup>.

Finally, psychosocial aspects such as stress, fatigue, and emotional overload also negatively influence team performance. Individual accountability, without proper analysis of systemic causes, generates fear and under-

reporting, hindering organizational learning and the prevention of new incidents<sup>11</sup>.

Thus, addressing nursing errors in blood transfusion requires a comprehensive approach that simultaneously considers human, institutional, and cultural factors, promoting the consolidation of a safety culture that values continuous learning and systemic improvement of care processes

### **Impact of nursing interventions on reducing adverse events related to transfusion**

Structured interprofessional communication is identified as one of the main factors associated with the reduction of adverse events in the transfusion process<sup>7</sup>. Evidence shows that failures in the transmission of information between medical, nursing, and hemotherapy teams are among the most recurrent causes of incidents during transfusions. In this sense, the adoption of formal shift handover protocols and joint audits have proven to be effective interventions for strengthening continuity of care, minimizing incompatibilities, and avoiding unnecessary transfusions<sup>7, 8</sup>.

Nurses, acting as a link between the blood bank and the care team, must ensure that all patient information, including transfusion history, typing results, and allergies, is up to date and verified before infusion, ensuring the safety and traceability of the process<sup>8</sup>.

Interventions based on quality indicators and process audits are also becoming established as fundamental strategies in transfusion nursing<sup>4</sup>. Recent research has structured nursing management indicators into three dimensions: structure, process, and outcome, demonstrating that units with high adherence to measures such as double-checking rates, reported reaction rates, and average response time to adverse events showed a significant reduction in transfusion complications. The systematic use of

these indicators not only allows safety to be measured, but also encourages a culture of permanent vigilance and continuous learning, strengthening evidence-based management<sup>4</sup>.

The positive impact of nursing interventions is also widely documented in pediatric settings<sup>6</sup>. Studies show that the implementation of double-checking protocols and specific training on transfusion in children reduces the incidence of infusion-related adverse reactions by up to 45%. These interventions have proven particularly effective in preventing dosing and infusion errors in low-weight patients, in whom small variations in volume can have significant clinical repercussions<sup>6</sup>. These results reinforce the importance of adapting nursing practices to the particularities of the population served, which is essential for the success of interventions.

Complementarily, strengthening *bedside nursing* practices is considered essential for transfusion safety<sup>9</sup>. This approach involves direct visual identification of the patient, cross-checking the medical prescription, constant observation during infusion, and immediate communication of any adverse symptoms. Evidence indicates that when nursing staff are trained to recognize physiological changes such as fever, chills, and dyspnea early on, the average time of intervention in response to hemolytic reactions can be reduced from 15 to 4 minutes, reflecting a significant improvement in clinical outcomes<sup>9</sup>.

In addition, preventive nursing interventions have been shown to be more effective than corrective ones, as they anticipate risk and prevent the progression of adverse events<sup>12</sup>. This perspective reinforces the central role of nurses as safety agents in the transfusion process, whose proactive and communicative actions constitute the backbone of good practices in hemotherapy.

# Literature Review

Lima MFAL, Rezende KCP, Aguiar DP, Guedes BA, Neves DM, Praia RR, Carneiro FCF, Nunez SVD  
Nursing Care Practices Aimed at Promoting Patient Safety Before, During, and After Blood Transfusion: a Systematic Literature Review

## CONCLUSION

The results of this systematic review confirmed that the proposed objectives were fully achieved and that the research question, "What are the nursing care practices aimed at promoting patient safety during blood transfusion?", was adequately answered. The analysis of scientific evidence from different national and international contexts demonstrated that transfusion safety depends directly on the technical competence, continuous vigilance, and ethical commitment of the nursing team at all stages of the process.

It was found that correct patient identification, thorough verification of compatibility between sample and blood component, rigorous monitoring of vital signs, and early recognition of adverse reactions are key

interventions in the prevention of transfusion events. In addition, the literature reinforces that standardization of institutional protocols, the use of validated *checklists*, and continuing education are high-impact measures for mitigating human and systemic errors.

Thus, it is reaffirmed that nursing plays a decisive role in promoting patient safety during transfusion, acting as a link between technical and scientific knowledge, care practice, and organizational safety culture. The study also shows that the consolidation of a safety culture depends on continuous investment in professional training, systematic internal audits, and the integration of technology and human care.

Considering the gaps identified in the literature, we propose as a derivative study the conduct of a multicenter

applied research project focused on the implementation and evaluation of a national nursing transfusion safety protocol, with validation of structure, process, and outcome indicators. Such research could objectively measure the impact of standardized practices on reducing adverse events and improving clinical outcomes, contributing to the strengthening of patient safety policies within the Unified Health System.

Thus, it is concluded that this study not only achieved its objectives and answered the guiding question, but also offers theoretical and practical subsidies for the improvement of nursing care, reaffirming its essential role in the prevention of transfusion risks and in the promotion of safe, ethical, and quality patient care.

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