

## THE KNOWLEDGE OF THE NURSING TEAM ON TRANSFUSION OF HEMOCOMPONENTS: AN INTEGRATED REVIEW

O conhecimento da equipe de enfermagem em transfusão de hemocomponentes: uma revisão integrativa

El conocimiento del equipo de enfermería en transfusión de componentes hematológicos: una revisión integradora

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### ABSTRACT

**Objectives:** Identify studies related to the knowledge of Brazilian nursing team about the transfusion process; observe the degree of teU knowledge regarding blood transfusion; identify actions that promote the improvement of this knowledge. **Method:** integrative review conducted through the search of studies using the controlled descriptors *blood transfusion AND nursing team OR nursing AND knowledge*. The criteria for inclusion were: Brazilian studies, that the object was the knowledge of nursing team about blood transfusion, publish between 2014 and 2018, in Portuguese, English or Spanish language. Validated instrument was used for data collection. **Results:** eight studies met the inclusion criteria, being seven articles and one dissertation. The studies emphasized that there is a need to improve the knowledge of the nursing team in transfusion practice. **Conclusion:** the periodic training was pointed out as a fundamental instrument for the improvement of transfusion safety.

**Descriptors:** Blood transfusion; Nursing; Nursing team; Training; Review.

### RESUMO

**Objetivos:** identificar estudos relativos ao conhecimento da equipe de enfermagem brasileira no processo transfusional; observar qual grau de conhecimento da equipe referente à hemotransfusão; identificar medidas que promovam o aprimoramento desse conhecimento. **Método:** revisão integrativa realizada através de busca de estudos com emprego dos descritores controlados *blood transfusion AND nursing team OR nursing AND knowledge*. Os critérios para inclusão foram: estudos brasileiros, cujo objeto era o conhecimento dos profissionais de enfermagem em transfusão de hemocomponentes, publicados entre 2014 e 2018, nos idiomas português, inglês ou espanhol. Instrumento validado foi utilizado para a coleta dos dados. **Resultados:** oito estudos atenderam aos critérios de inclusão, sendo sete artigos e uma dissertação. Os estudos destacaram que há necessidade de aprimoramento do conhecimento da equipe de enfermagem na prática transfusional. **Conclusão:** os treinamentos periódicos foram apontados como instrumento fundamental para a melhoria da segurança transfusional.

**Descritores:** Transfusão de sangue; Enfermagem; Equipe de enfermagem; Capacitação; Revisão.

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## RESUMÉN

**Objetivos:** identificar los estudios relacionados con el conocimiento del equipo de enfermería brasileño sobre el proceso de transfusión; Ver el grado de conocimiento del equipo acerca de la transfusión de sangre; Identificar acciones que promuevan la mejora de este conocimiento.

**Método:** revisión integradora realizada a través de la búsqueda de estudios que utilizan los descriptores controlados *blood transfusion AND nursing team OR nursing AND knowledge*. Los criterios de inclusión así fueron establecidos: estudios brasileños, cuyo objeto era el conocimiento del equipo de enfermería sobre transfusiones de sangre, publicados entre 2014 y 2018, en Portugués, Inglés o Español. Se utilizó un instrumento validado para la recolección de datos. **Resultados:** ocho estudios cumplieron con los criterios de inclusión, siendo siete artículos y una disertación. Los estudios enfatizaron que existe la necesidad de mejorar el conocimiento del equipo de enfermería en prácticas de transfusión.

**Conclusión:** su capacitación periódica fue señalada como el instrumento fundamental para mejorar la seguridad de las transfusiones.

**Descriptores:** Transfusión sanguínea; Enfermería; Grupo de Enfermería; Capacitación; Revisión.

## INTRODUCTION

Blood transfusion, when correctly prescribed and performed, has potential to save lives, hence a procedure of important therapeutic support in different treatment protocols in medicine. However, it can lead to acute or late complications and may even lead to death. These reactions may be immune, linked to body's mechanisms of response to blood transfusion, or non-immune, associated with human failure.<sup>1-2</sup>

Data published by the National Health Surveillance Agency show that, in Brazil, in 2015 alone, 3,385,651 transfusions were performed, representing an increase by 91,717 procedures compared to 2014.<sup>3</sup> These figures show that measures aiming at hemotherapy safety are necessary in the context of overall patient safety.

The nursing team, when responsible for the transfusion, occupies a strategic position in detecting errors that may have occurred in the previous phases of the blood cycle, as well as in pre, intra and post-transfusion monitoring, and may prevent the occurrence of adverse events related to transfusion or minimize damage.

Importantly, the performance of the nursing team in hemotherapy is regulated by Resolution of the Federal Nursing Council (COFEN) No. 0511/2016, which establishes "guidelines for the performance of Nurses and Nursing Technicians during Hemotherapy, in order to ensure competent, resolute and safe nursing care".<sup>4:3</sup>

Thus, the actions of the nursing team during the transfusion process are fundamental to patient safety and can minimize health risks to the recipients. Therefore, it is essential that the knowledge of team is up to date, based on evidence, in addition to awareness of the current applicable legislation.

The participation of the nurse and the team in the transfusion care requires multiple skills, such as knowledge of indications; data verification to prevent errors; guidance to the recipients of transfusion; detection, communication and action in response to transfusion reactions (RT) and

documentation of the procedure.<sup>5</sup> Thus, it is possible to observe that nursing knowledge in the area is broad and necessary for the performance.

However, we observed that the theme is little addressed in undergraduate and technical courses, a fact that may be the reason for the low number of specialist nurses in the field (only 244 certified in Brazil by the Brazilian Association of Hematology, Hemotherapy and Cell Therapy<sup>6</sup>). It can also lead to insecurity while performing the transfusion.

Given this context, the guiding question of this study is as follows: What is the knowledge of the Brazilian nursing team on transfusion of hemo-components?

The objectives of this work are: to identify studies related to the knowledge of the Brazilian nursing team on the transfusion process; observe the depth of knowledge of the team regarding blood transfusion; identify measures that promote the improvement of this knowledge.

## METHODS

We chose to perform an integrative review, which is the broadest methodological approach to the reviews, systematically and rigorously gathering findings from studies elaborated using different methodologies, seeking a complete understanding of the phenomenon analyzed.<sup>7-8</sup>

The search was performed using the controlled keywords blood transfusion AND nursing team OR nursing AND knowledge in the following databases: Virtual Health Library (VHL), National Library of Medicine (PubMed), Cumulative Index of Nursing and Allied Health Literature (CINAHL), Brazilian Digital Library of Higher Education Personnel Improvement Coordination (CAPES) in January 2019.

Inclusion criteria were: Brazilian studies, whose object was the knowledge of blood transfusion among nursing professionals, published between 2014 and 2018, in Portuguese, English or Spanish. Studies related to the blood donation process and / or whose population / sample consisted of students or other professionals were excluded. The time frame aimed to include studies with current references, since in 2016 two important milestones for national hemotherapy nursing occurred: Ordinance No. 158, which redefined technical regulations of hemotherapy procedures, currently included in Consolidation Ordinance No. 59, and Resolution COFEN 0511 / 2016.<sup>4</sup>

For data collection, an instrument developed by Ursi<sup>10</sup> was adapted, with the author's authorization. For adaptation, the questions related to the surgery area were substituted by referenced to hemotherapy and hematology.

Regarding the evaluation of the evidence from the selected studies, we chose the classification proposed by Stetler and collaborators, namely: Level I - Meta-analysis of multiple controlled studies; Level II - Studies of experimental design; Level III - Studies of quasi-experimental design; Level IV - Non-experimental or qualitative design studies, as well as case studies; Level V - Experience reports or case reports; Level VI - Opinion of respected authorities based on their clinical experience or opinion of a committee of experts.<sup>11</sup>

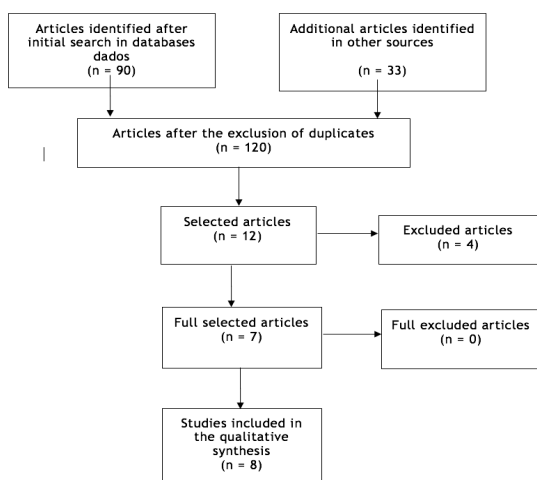
## RESULTS

Preliminary search resulted in 40 publications in the VHL, 43 in PubMed, 7 in CINAHL and 33 studies in the Brazilian Digital Library of CAPES Theses and Dissertations.

The abstracts were read and then the full texts were selected to read as follows: in the VHL eight articles were selected, in PubMed two, but one repeated from the VHL base, in CINAHL two articles, but already selected in the VHL, and in the Brazilian Digital Library of CAPES Theses and Dissertations, three studies were selected.

After reading the full texts, three studies that did not meet the inclusion criteria were discarded: an article in the VHL that assessed undergraduates' perception of transfusion safety, one in PubMed, as it examined the effectiveness of an educational program focused on several categories of health professionals, as well as a dissertation that analyzed transfusion safety in several aspects, yet did not include the analysis of the knowledge of the nursing team in the transfusion of blood components. A second dissertation was discarded, as three articles produced from its findings were selected. Figure 1 shows the selection of articles.

**Figure 1** - Selection of studies for integrative review. Juiz de Fora, MG, Brazil, 2011



Source: adapted from Moher et al., 2009<sup>12</sup>

Chart 1 shows the studies that met the inclusion criteria, while Chart 2 shows the identification of the studies and the objectives described.

**Chart 1** - Selected publications and general characteristics. Juiz de Fora, MG, Brazil, 2019

TITLE	YEAR	TYPE OF STUDY	JOURNAL/ INSTITUTION
Transfusion therapy process in a neonatal intensive care unit: nurses' knowledge	2018	Qualitative	Texto & contexto Enfermagem
Blood Transfusion in Intensive Care Units: Knowledge of the Nursing Team	2017	Quantitative	Avancés em Enfermeria
Hemotherapy and immediate transfusion reactions: performance and knowledge of a nursing team	2017	Quantitative	Revista Mineira de Enfermagem
Knowledge about blood transfusion in a critical unit of a teaching hospital	2017	Quantitative	Bioscience Journal
Nurses' knowledge for care in the transfusion process in newborns	2017	Qualitative	Revista Gaúcha de Enfermagem
Post-transfusion care in the neonatal intensive care unit	2016	Qualitative	Revista Baiana de Enfermagem
Factors associated with the knowledge of the nursing staff of a teaching hospital on blood transfusion	2015	Quantitative	Revista Latino-Americana de Enfermagem
Evaluation of the transfusion safety knowledge level of nursing professionals of the hospital network of the state of Roraima	2016	Quantitative	Federal University of Roraima

Source: authors

**Chart 2** - The identification of the studies, titles and the objectives described. Juiz de Fora, MG, Brasil, 2019

IDENTIFICATION	TITLE	OBJECTIVE
Article 1	Transfusion therapy process in a neonatal intensive care unit: nurses' knowledge	To analyze the knowledge of the nurses of the Neonatal Intensive Care Unit on the transfusion therapy process.
Article 2	Blood Transfusion in Intensive Care Units: Knowledge of the Nursing Team	To evaluate the knowledge of intensive care unit nursing team professionals on blood transfusion and associated factors.
Article 3	Hemotherapy and immediate transfusion reactions: performance and knowledge of a nursing team	Verify the knowledge of the nursing team on hemotherapy, immediate transfusion reactions and care indicated in these cases.
Article 4	Knowledge on blood transfusion in a critical unit of a teaching hospital	To evaluate the knowledge of intensive care unit nursing team professionals on blood transfusion and to identify the factors associated with such knowledge.
Article 5	Nurses' knowledge for care in the transfusion process in newborns	To analyze nurses' knowledge on the transfusion process for newborn care in the neonatal intensive care unit.
Article 6	Post-transfusion care in the neonatal intensive care unit	To identify nurses' knowledge about nursing care in the post-transfusion process in the neonatal intensive care unit.
Article 7	Factors associated with the knowledge of the nursing staff of a teaching hospital on blood transfusion	To verify if there is an association between the knowledge of the nursing team professionals on blood transfusion and the variables related to the professional aspects.
Dissertation 1	Evaluation of the transfusion safety knowledge level of nursing professionals of the hospital network of the state of Roraima	To evaluate the level of transfusion safety knowledge of nursing professionals in the hospital network of the state of Roraima.

Source: the authors

Regarding authorship, all selected studies were written by nurses as the main author.

Articles 2 and 4 were published in English, with 2 of them in a Colombian journal, representing the only international publication. None of the articles were published in journals specialized in hemotherapy.

All studies were conducted in hospitals. Data collection sectors described included: Intensive Care Unit (neonatal, adult and specialty ICU) and emergency care unit. Two studies evaluated professionals from all sectors. Articles 1, 2, 5 and 6 and dissertation 1 represent multicentric research.

Most studies (62.5%) used quantitative methodology for data analysis, all with descriptive and non-experimental characteristics. The others employed qualitative methods. Therefore, the results have evidence level IV.

Article 1 included 35 NICU nurse specialists who provide direct care to patients.<sup>13</sup>

Deficiencies identified included the verification of the transfusion request, observations religious beliefs and full analysis of the recipient's blood sample for pre-transfusion testing.<sup>13</sup>

Aspects related to peripheral venous access, the impossibility of administering blood with medications and the initial monitoring of vital signs were categories where the participants demonstrated satisfactory knowledge.<sup>13</sup>

The authors indicate that the transfusion equipment was not mentioned by any of the participants and the need to keep the transfusion card until the end of the procedure was mentioned by only one. The verification of card data was another shortcoming, as not all items that should be checked were mentioned in the professionals' statements.<sup>13</sup>

The conclusion was that nurses do not have full knowledge of transfusion procedure, generating situations of insecurity for the patients and indicating the need for better training on the subject.<sup>13</sup>

Article 2 included 104 ICU staff members as participants.<sup>14</sup>

The average knowledge of the nursing staff of the three hospitals analyzed was 50.4%, with a minimum of 20.0% and a maximum of 77.1%. The pre-transfusion stage presented the lowest average (50 points) and the highest was post-transfusion stage (66.7). A total of 92.3% of professionals said they felt safe to perform the transfusion process. However, the study detected errors in transfusion medication administration in 46% of responses, patient and venous device observation errors in 30% of responses, and 8% presented errors in comparing transfusion card with the data in medical records.<sup>14</sup>

The best average score obtained in the post-transfusion stage demonstrates that the knowledge on identifying signs and symptoms related to the immediate RT reaction is better.<sup>14</sup>

Self-confidence, use of transfusion protocols and guidelines, participation in training programs and having only one job represented factors associated with better knowledge.<sup>14</sup>

The authors conclude that there was a considerable lack of knowledge on the transfusion process among ICU nursing professionals. Given this, they emphasize the need for frequent transfusion training in health institutions.<sup>14</sup>

Article 3 included 29 professionals. 62% declared that they were prepared to conduct a transfusion and 66% to conduct transfusion when facing transfusion reaction (RT). It is interesting to note that 3.73% reported not to be worried about RT, as they believe it is a rare event. Those who claimed



to be unprepared argued that the lack of training is the main reason.<sup>15</sup>

Only 28% of participants responded correctly when asked about the period of symptom onset in an immediate RT. When listing the signs and symptoms of an RT, the average response per participant was 3.89, a fact that, according to the authors, indicates that the nursing staff has limited knowledge on this topic.<sup>15</sup>

During RT, the most cited conducts were: interrupting the transfusion (93.10%), informing the doctor (86.21%), and reporting the blood bank (48.28%). Only one participant mentioned checking vital signs and none mentioned comparing the identification of the bag with patient data.<sup>15</sup>

All participants mentioned the importance of training and 97% affirmed the need to formulate a protocol for conduct in relation to RT.<sup>15</sup>

The authors concluded that participants had little preparation for the transfusion process, but were interested in participating in training, suggesting that the institutions should implement measures that facilitate learning.<sup>15</sup>

Article 4 included 64 nursing professionals. All reported having confidence to conduct the transfusion. However, the overall point average was 52.8 of 100. The lowest average achieved was related to the transfusion itself and the highest mean to the post-transfusion period.<sup>16</sup>

Factors that were statistically significant were: professional category, participation in specific blood transfusion training (for questions related to the post-transfusion period), participation in a specific improvement course, postgraduate education, and being a permanent employee (for pre-transfusion issues).<sup>16</sup>

Article 5 included 15 NICU nurse specialists. Their interviews showed that nurses have knowledge of the process, but neglect important legally defined steps, such as the complete verification of transfusion card data, recognition of the signs and symptoms of an RT and the conduct to be taken, as well as filing the notification of RT. Intensive follow-up of patients in the first 10 minutes of transfusion was a point on which they demonstrated accurate knowledge.<sup>17</sup>

Article 6 included 35 participating neonatologist nurses. The study proposal encompassed post-transfusion care, and, in this sense, participants demonstrated a lack of knowledge regarding the correct disposal of used transfusion bags. Other legal requirements, such as recording, checking vital signs at the end of transfusion, and maintaining venous access were identified by the authors as little known.<sup>18</sup>

Article 7 included 209 professionals. Most respondents (73.2%) use the Operating Procedure Manual as the theoretical reference for transfusion, while 13.4% reported not using or being aware of any reference for their transfusion practice.<sup>19</sup>

The average overall score was 52.7. The highest score was achieved in questions related to the post-transfusion stage and the lowest in those regarding the transfusion itself. Despite the average only slightly higher than 50.0, most professionals (92.8%) said they felt confident in conducting a transfusion.<sup>19</sup>

The following variables were statistically significant for higher scores: receiving training related to the transfusion process, participation in specific training on the subject, having postgraduate degree, knowing of and / or adopting some standard to guide their transfusion practice, frequent administration of blood transfusions.<sup>19</sup>

Dissertation 1 included 120 participants. Some important findings are as follows: 66 professionals (55%) were unable to identify the length of time that red blood cell (CH) concentrate can remain at room temperature before the beginning of transfusion; 47 (39%) did not know that the only solution that can be infused simultaneously with transfusion is saline; 86 (72%) incorrectly answered the question regarding the signs and symptoms of RT; no statistical significance was found between the mean points in different professional categories and at different levels of education.<sup>19</sup> The author reflects that the deficiencies found are possibly related to the absence of continuous training programs.<sup>20</sup>

The work alerts that the data found indicate that transfusion safety is highly compromised in the institutions in question and suggests implementing educational activities on an ongoing basis.<sup>20</sup>

## DISCUSSION

Considering that the theme is related to nursing, the fact that all the main authors and most other authors are nurses is not a surprise. Importantly, of the eight selected studies, the same group of authors is responsible for three articles, apparently using a similar data collection instrument, and another group, with variations in authorship, is responsible for three other articles, also with apparent use of the same data collection instrument.

Six out of the eight works are from the institutions in the Southeast region of Brazil, only one in the Midwest and one in the North.

These facts indicate the need for more researchers, with different methodological proposals and from different regions of Brazil, to undertake this object of study to broaden the findings.

Only two studies evaluated all hospital sectors, with a predominance of data related to ICUs, where most transfusions occur due to anemia, present in approximately 77% of critically ill patients, with transfusion required in more than one third of them.<sup>21</sup> However, transfusions can occur in all departments with a healthcare institution. A study conducted in a medium-sized hospital in Minas Gerais state demonstrated that, over a period of one year, 24.4% of transfusions were performed in adult and pediatric clinics, representing the second highest transfusion rate among the sectors.<sup>2</sup> In this context, it is important to foster studies that evaluate nursing team knowledge in different sectors where transfusions occur.

Although the papers addressed in this review are classified as level IV in terms of evidence, it is important to note that the initial focus of this classification is on the effectiveness

of therapies rather than on broader issues. The current trend suggests that the classification of evidence depends on the type of question addressed in the study.<sup>22</sup> Thus, according to the hierarchical pyramid proposed by Polit and Beck, the studies included here can be classified as level II (individual cross-sectional study and individual qualitative study).<sup>22</sup>

Regarding care in the pre-transfusion stage, the following gaps were identified: transfusion request verification; complete identification of the sample for pre-transfusion tests; maximum time the CH can remain at room temperature before starting the transfusion; infusion equipment, verification of identification on the transfusion bag and confirmation of consent.

A study conducted in Costa Rica<sup>23</sup> showed that only 30% of professionals cited the verification of the transfusion request. Although the request is a medical act, it is important for the nurse to conduct her own verification to ensure that the procedure is performed on the correct patient, and any questions regarding identification should be remedied prior to transfusion.

Sample identification for pre-transfusion tests is another point of weakness identified. The sample should be labeled at the time of collection, including the following data: receiver's full name without abbreviations, identification number, collector name and date, and identification by bar code or printed label is recommended.<sup>24</sup> Study in the South of Brazil<sup>24</sup> revealed that 63% of nursing professionals said they made this identification at the nursing station and not at bedside, as recommended.

The Serious Hazards of Transfusion (SHOT) annual report showed that most of the near misses that could result in incompatible ABO transfusion were related to sample problems.<sup>25</sup> Therefore, this point should be seriously observed to prevent possible catastrophic patient damage such as an incompatible ABO transfusion.

For the quality of the blood component to be preserved, it is necessary to comply with rules for its preservation. Red blood cell concentrate should only be left at room temperature before the start of transfusion for up to 30 minutes. Dissertation 1 showed that 55% of the participants answered this question incorrectly.<sup>20</sup> A study that evaluated the transfusion monitoring records of a teaching hospital<sup>2</sup> showed that 4.9% of the bags remained for more than 30 minutes without adequate refrigeration before being transfused, 1.1% were improperly packaged and 6.8% had no record of the time of receipt of the bag and the beginning of the transfusion.

Regarding the verification of transfusion card data, a study conducted in the United Arab Emirates<sup>26</sup> revealed that only 43% of nurses correctly answered this item. In Brazil, Consolidation Ordinance No. 59 states that the identification of the patient should be confirmed with the patient him/herself or, if this is not possible, with the healthcare professional responsible for the care of the recipient and, if there is any discrepancy, the procedure on the patient should be suspended until the fact is clarified.

Although Brazilian legislation on hemotherapy does not require confirmation of consent, it is important

because of the religious restrictions that must be observed, representing an important ethical issue. COFEN Resolution No. 564/2017<sup>27</sup> defines that nursing professional must

respect the right to exercise the autonomy of the person or his/her legal representative in free and informed decision-making about their health, safety, treatment, comfort, well-being (...) <sup>27:6</sup>

It is interesting to note that this topic was addressed in only one of the analyzed studies<sup>13</sup>, demonstrating that, even in the academic context, it seems to be an issue of little value.

During the transfusion, we observed, that professionals may not pay attention to the need to keep the transfusion card attached to the bag until the end of the procedure. This is a legal requirement described in Consolidation Ordinance No. 59 because, in case of RT, one of the measures to be taken is to check the card to verify whether there was any misidentification.

Another point is that 0.9% isotonic saline is the only solution that can be infused with the blood.

An international study<sup>26</sup> showed that only 17% of the participating nurses correctly answered which medications could be administered through the same venous line as the transfusion. Concomitant infusion is not recommended as it may cause confusion as to whether an RT or a drug effect is present.<sup>13</sup> Besides that, some solutions cause severe effects if infused in this manner, such as Ringer lactate, which can trigger blood clotting; and hypo or hypertonic saline and glycoside, which result in hemolysis.<sup>28</sup>

We noted that nursing professionals are able to identify few signs and symptoms related to RT and that their actions in case of this complication are limited. An international study<sup>26</sup> also found failures in this field of nursing, in which only 20% correctly answered the signs and symptoms of an acute hemolytic reaction and only 56% knew how to manage this complication.

It is important to note that although some of the studies addressed in this article have assessed the knowledge of all nursing professionals (nurses, technicians and assistants), Resolution 0511/2016 prohibits assistants to perform actions related to blood component transfusion.<sup>4</sup>

All studies point out that continuing education on blood transfusion is key to making this procedure as safe as possible. The standard operating procedures of each institution should be shared and kept in easily accessible places, as this was the main consultation tool pointed out by professionals.

## CONCLUSION

We found 8 studies that dealt with the knowledge of the nursing team on blood transfusion, which showed that, although many declare confidence in performing blood transfusion, the level of knowledge of nursing professionals on the pre-, intra- and post- stages of transfusion, falls short of the desired level, which can pose serious risks to the transfusion recipient.

These results alert to the need to expand the teaching of hemotherapy in the technical and undergraduate nursing courses and suggest the need for in-service training to periodically update staff and alert of important actions, such as verification of request for blood transfusion, that should not be overlooked. Notably, training was identified in this review as a great tool in reducing knowledge gaps and a fundamental instrument for improving transfusion safety.

This study was limited since it analyzed studies that evaluated the knowledge of the nursing staff through questionnaires applied to the participants, and none of them observed the professional at the time of the procedure, a fact that may mask some results.

The authors suggest that research evaluating the practice with non-participating observers should be designed and conducted in order to better understand this phenomenon.

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