THEORETICAL ARTICLE

REVISTA ENFERMAGEM ATUAL IN DERME

ANALYSIS OF THE CONCEPT OF TRANSFUSION REACTION FOR NURSING

ANÁLISIS DEL CONCEPTO DE REACCIÓN TRANSFUSIONAL PARA LA ENFERMERÍA

ANÁLISE DE CONCEITO DE REAÇÃO TRANSFUSIONAL PARA A ENFERMAGEM

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ABSTRACT
Objective: The objective of this study is to analyse in detail the concept of transfusion reaction in the context of nursing. **Methodology:** This is a concept analysis based on the model proposed by Walker and Avant. This method comprises eight stages: selection of the concept; objectives of the conceptual analysis; identification of the possible uses of the concept; determination of the defining attributes; identification of the model case; identification of an additional (opposite) case; identification of antecedents and consequents; and definition of empirical references. **Results and discussion:** Various ways of using the concept of transfusion reaction in the literature were described. In addition, a detailed presentation was made of the concept's defining attributes, as well as the model and counter cases that illustrate and implement the concept. The literature revealed that the concept is often misused, and this study clarifies the concept through its findings and discussion. **Conclusion:** The crucial importance of a clear and precise conceptual definition for improving the use of the transfusion reaction concept in clinical practice is evident.
Keywords: Transfusion Reaction. Blood Safety. Blood Transfusion. Patient Safety.

RESUMEN
Objetivo: El objetivo de este estudio es analizar detalladamente el concepto de la reacción transfusional en el contexto de la enfermería. **Metodología:** Se trata de un análisis de concepto realizado con base en el modelo propuesto por Walker y Avant. Este método comprende ocho etapas, que son: selección del concepto; objetivos del análisis conceptual; identificación de los posibles usos del concepto; determinación de los atributos definitorios; identificación del caso modelo; identificación de caso adicional (contrario); identificación de antecedentes y consecuentes; y definición de referentes empíricos. **Resultados:** Se describieron diversas formas de utilización del concepto de reacción transfusional presentes en la literatura. Además, se realizó una presentación detallada de los atributos definitorios del concepto, así como de los casos modelo y contrario que ilustran cómo se implementa el concepto. La literatura reveló que el concepto es frecuentemente utilizado de manera equivocada, y este estudio aclara el concepto mediante los hallazgos y la discusión realizada. **Conclusión:** Se evidencia la importancia crucial de una definición conceptual clara y precisa para mejorar el uso del concepto de reacción transfusional en la práctica clínica y en los servicios de emergencia.
Palabras clave: Reacción a la Transfusión. Seguridad de la Sangre. Transfusión Sanguínea. Seguridad del Paciente.

RESUMO
Objetivo: O objetivo deste estudo é analisar detalhadamente o conceito de reação transfusional no contexto da enfermagem. **Metodologia:** Trata-se de uma análise de conceito realizada com base no modelo proposto por Walker e Avant. Este método engloba oito etapas, sendo elas: seleção do conceito; objetivos da análise conceitual; identificação dos possíveis usos do conceito; determinação dos atributos definidores; identificação do caso modelo; identificação de caso adicional (contrário); identificação de antecedentes e consequentes; e definição de referenciais empíricos. **Resultados e discussão:** Foram descritas diversas formas de utilização do conceito de reação transfusional presentes na literatura. Além disso, foi realizada uma apresentação detalhada dos atributos definidores do conceito, bem como dos casos modelo e contrário que ilustram e implementam o conceito. A literatura revelou que o conceito é frequentemente utilizado de maneira equivocada, e este estudo clarifica o conceito por meio dos achados e da discussão realizada. **Conclusão:** Evidencia-se a importância crucial de uma definição conceitual clara e precisa para a melhoria da utilização do conceito de reação transfusional na prática clínica e nos serviços de emergência.
Palavras-chave: Reação Transfusional. Segurança Transfusional. Transfusão Sanguínea. Segurança do Paciente.

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INTRODUCTION

Blood transfusion is characterized as a therapeutic procedure in which hemocomponents (blood components) are used between patients for the treatment of various pathologies [1]. The protocol of Brazilian Blood Centers is to perform a detailed anamnesis with the donor before collection and a suitability test, and after collection, tests are performed before releasing the bags for transfusion. Serologic and molecular tests are performed to check for the presence or possible immunologic window of viruses. Despite all the care taken during and after collection, it is possible that the patient may develop one or more transfusion reactions (TR) during the transfusion process [2].

The TRs are responses of the body triggered by the act of transfusion. These symptoms may manifest during or after the transfusion process, whether it involves whole blood or blood components. The severity of these reactions can range from mild to severe, with the potential to be fatal. In the event that the reaction occurs during the transfusion, it is designated as an acute transfusion reaction. Conversely, if the reaction manifests hours or weeks after the transfusion has been completed, it is classified as a delayed transfusion reaction. The diagnosis of a delayed reaction is challenging due to its capacity to manifest a wide array of atypical symptoms [3].

The occurrence of TR depends on several factors, intrinsic and/or extrinsic. The intrinsic factors that must be assessed prior to the initiation of the transfusion process include patient age, the patient's medical history, including previous transfusion reactions, and the patient's current clinical conditions and immunological status. Extrinsic factors are: errors in patient identification, errors in blood product identification, inadequate bag storage, product contamination, drug administration, speed and quantity of component transfused [4].

The preponderance of TRs is attributed to human error, either in the context of patient safety protocols or during bag storage and transportation procedures [5]. However, the concept of transfusion reaction is not uniform and can be found in the literature with varying information, which can confuse assistance during the provision of care and guidance.

For Nursing, the National Curriculum Guidelines (DCN) develop the connection between theoretical and practical knowledge in a multidisciplinary team, emphasizing the qualifications for the execution, care and safety of the patient and the team. The Federal Nursing Council (COFEN) regulates nursing competencies and attributions during hemotherapy procedures with resolution 709/2022. This resolution establishes that nurses are responsible for planning, executing, coordinating and supervising the process to ensure the quality and efficiency of the procedure for the patient [6].

Some strategies can be used to reduce the risk of TR. To begin with, it is necessary to carry out an anamnesis and a detailed physical

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examination of the patient. Subsequently, it is essential to perform the puncture and collection of material for serology and compatibility tests. It is also important to check the medical prescription and the patient's data, avoiding errors by double-checking with the patient and another professional. It is essential to guarantee the quality and completeness of the product, as well as to install the bag properly. Throughout the transfusion process, nursing care should be aimed at following up and monitoring the patient, identifying them early and intervening immediately in the event of TR. It is important to pay attention to the patient's initial physical examination. The nurse in charge needs to reassess the patient, check vital signs (VAS) and monitor the patient after the procedure has been completed. If TR has occurred, it is important to report it correctly and handle the materials appropriately for the tests [2].

In addition, to ensure patient safety, it is necessary to carry out cross tests, the procedure with sterile materials and aseptic technique, adjust the infusion speed, record in detail the stages of the procedure from patient identification to possible reactions, and carry out regular refresher training with the team. These measures are fundamental to ensuring patient safety during blood transfusion and minimizing the risk of complications related to blood transfusion [4].

In the context of blood transfusions and the prevention of transfusion reactions, the Theory of Human Caring, as proposed by Jean Watson, is a nursing theory that can be applied. Nurses are able to apply the principles of the theory to ensure a care experience that respects the patient's values, individual needs and dignity. It must be understood that transfusion has not only physical, but also emotional and psychological impacts on the patient and their family. Therefore, it is necessary to create a connection of trust between team-patient-family using their scientific knowledge and the most appropriate practices, thus attending to the uniqueness of each patient for precise and efficient care [7].

No studies on this subject were found during the literature searches. Given the interest in the subject and in establishing a clear and unified concept of transfusion reactions, this study aims to analyze the concept of transfusion reaction for nursing.

METHODS

This is a concept analysis of transfusion reactions using the model proposed by Walker and Avant [8]. Concept analysis aims to examine the structure and function of a concept, making it possible to understand phenomena in a specific area of knowledge. The adopted model consists of eight stages. It is important to note that the present study was conducted using a methodology similar to the integrative literature review process. Thus, the selection of the concept was carried out with intense reflection.

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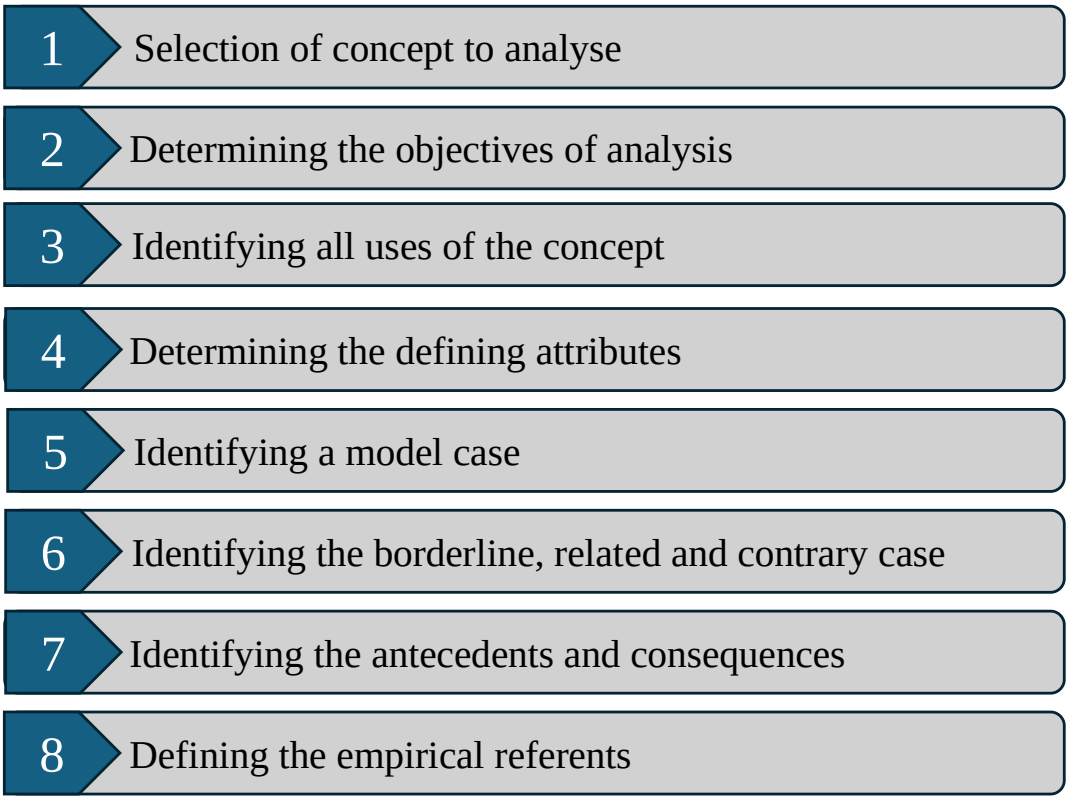
Figure 1. Diagram of Walker and Avant's Conceptual Analysis Model



Source: Adapted by the authors from Walker and Avant

First step: Selection of concept to analyse

The concept chosen was transfusion reactions based on nursing practice in order to clarify its meaning.

Second step: Determining the objectives of analysis

It is essential to define the objectives of the conceptual analysis to properly direct the research. In this study, we chose to clarify the concept mentioned, which will allow it to be updated and used correctly [8].

Moreover, this approach will facilitate its use in the development of academic research and will increase the understanding of nursing students [9].

Third step: Identifying all uses of the concept

At this stage, we opted for a narrative literature review. The steps taken in this stage can be found in the results of the study. For a clearer understanding of the use of the concept, in accordance with the authors' guidelines, the searches were extended beyond specific health literature, using books, dictionaries, manuals and expert opinions [9].

Fourth step: Determining the defining attributes

This stage was crucial for checking the use of attributes associated with the concept. Attributes are terms, expressions or characteristics frequently found in the literature

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to define the concept and, when used correctly, avoid confusion in understanding [7].

Fifth step: Identifying a model case

Identifying a model case consists of a reality-based situation that exemplifies the application of the concept. It also refers to the creation of a case based on literature and the opinion of experts with previous experience and knowledge [7].

Sixth step: Identifying the borderline, related and contrary case

The opposite case consists of a situation in which the concepts are not applied correctly. In this study, the opposite case was created by the author to determine the inapplicability of the concept or its incorrect application [7].

Seventh step: Identifying the antecedents and consequences

Events that precede the concept are called antecedents and cannot be considered defining attributes of the concept. The consequents, on the other hand, are events that result from the emergence of the concept [7].

Eighth step: Defining the empirical referents

This refers to the selection of references used and applied to the concept. Through the narrative review and literature search, the concept studied can be assimilated and clarified.

To conduct this study, a narrative review was carried out in the Biblioteca Virtual de Saúde (BVS), in the Literatura Latino-americana e do Caribe em Ciências da Saúde (LILACS), in the National Library of Medicine and National Institutes of Health (Pubmed/Medline), SCIELO, using the following keywords: “Reação transfusional” OR “Transfusion Reaction” AND “Enfermagem” OR “Nursing” AND “Incidentes transfusionais” AND “Transfusão de Sangue” OR “Blood Transfusion”. There was no limitation on the year of publication, in order to increase the scope of the studies. Data from editorials and the artificial intelligence base were included, as this information is more accessible to all audiences, as well as questioning targeted and lay audiences as to their understanding. The search was carried out between January and May 2025.

Ethical aspects

The data was extracted by means of a literature search, so the study did not involve the participation of human beings, and was therefore exempt from consideration by a Research Ethics Committee.

RESULTS

The composition of this analysis allows the concept to be identified and used in different situations. The diversity of the concepts found shows that there is no clear concept of “transfusion reactions” in the literature. Below, in Table 1, are the possible definitions of the concept.

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Table 1 - Expressions used by the selected studies to define transfusion reactions. Imperatriz, 2025.

Soutar, 2023.[3]	They are mediated by the interaction of the recipient's antibodies with the foreign antigens contained in any allogeneic blood product. Immunologically mediated acute transfusion reactions occur immediately or within 24 hours of transfusion. They include acute hemolytic, febrile non-hemolytic, allergic reactions (with or without anaphylaxis) and transfusion-related acute lung injury (TRALI). Immunologically mediated late transfusion reactions occur within days or weeks of transfusion and include late hemolytic transfusion reaction, graft-versus-host disease and post-transfusion purpura.
Almeida, 2019.[10]	It is any complication that occurs during or after a blood transfusion and is related to it. TR occurs in around 1-3% of transfused patients.
Ministério da Saúde, 2015.[11]	A transfusion reaction is, therefore, any complication that occurs as a result of blood transfusion, during or after its administration.
Sáude; SES-DF, 2019.[12]	Transfusion reactions (TR) are TT-related events that occur during or after transfusion and are pathophysiologically classified as immune or non-immune; and immediate, whose onset occurs during transfusion or up to 24 hours after the start of therapy, or delayed, which occur after 24 hours from the start of transfusion.
Nexxto, 2021.[13]	Transfusion reactions are adverse events associated with the transfusion of whole blood or one of its components. Their severity ranges from mild to life-threatening and they can occur during a transfusion, called acute transfusion reactions, or days to weeks later, called late transfusion reactions. These can be difficult to diagnose, as they can manifest with non-specific, often overlapping symptoms. The most common signs and symptoms include fever, chills, hives and itching.
Instituto Estadual de Hematologia Arthur de Siqueira Cavalcanti, 2014. [14]	Transfusion incidents are injuries that occur during or after a blood transfusion, and are related to it. Immediate transfusion incident - occurs during the transfusion or within 24 hours of it. Late transfusion incident - occurs 24 hours after the transfusion.
Lecturio, 2022.[15]	Complications associated with transfusion occur during or after the administration of a blood product. These complications can be classified as immunological or non-immunological, and as acute or delayed. Non-immunological reactions are caused by the transmission of diseases through blood products and immunological reactions are antigen-antibody mediated. Symptoms can include mild itching, chills and hives, to high fever, severe dyspnea, jaundice, hypotension or hemoglobinuria. Severe reactions can be fatal.
Ribeiro, 2016.[16]	Transfusion reactions are therefore any complications that occur as a result of blood transfusion, during or after its administration. Transfusion is an irreversible event that brings potential benefits and risks to the recipient. Despite precise indication and correct administration, reactions to

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	transfusions can occur. It is therefore important that all professionals involved in the prescription and administration of blood components are able to promptly identify and use appropriate strategies to resolve and prevent new episodes of transfusion reaction.
Leite, 2023.[17]	Transfusion reactions are the most common adverse effects of blood transfusion. They can be classified as immediate (with clinical or laboratory signs appearing during the transfusion or up to 24 hours after) or delayed, with clinical or laboratory signs occurring after this period, which can be attributed to the course of the infusion, procedural errors or not, or even inherent in the transfusion safety policy.
Amaral, 2016.[18]	Transfusion reactions are classified as immediate or delayed. An immediate transfusion reaction is one that occurs during or up to 24 hours after the end of the transfusion. A delayed transfusion reaction is one that occurs 24 hours after the transfusion, and can take days or even months to manifest itself.
Esplendori, 2017.[19]	An adverse reaction is an unintentional response by the donor associated with the collection of a unit of blood, blood component or hematopoietic progenitor cells.
Soares, 2024.[4]	Transfusion reactions are classified according to their severity. They are categorized as immediate if they manifest within the first 24 hours after the start of the transfusion, or delayed if they manifest after this period.
Moncharmont, 2019.[20]	An adverse reaction to transfusion is an undesirable response or effect in a patient that is temporarily associated with the administration of blood or blood components.
Pessoa leiga no assunto.	The body's reaction to a blood transfusion. Whether unexpected or not.
Estudante de enfermagem, primeiro período.	I think it's an allergic reaction to the blood transfusion, caused by blood incompatibility or something else.
Estudante de enfermagem, décimo período.	It's the reaction our body has when it receives someone else's blood. It can be a reaction both at the time you receive the blood and afterwards. Because sometimes, even if I'm compatible, my body can refuse that blood.
Profissional de enfermagem.	This is any adverse reaction in the body caused by a blood transfusion. It can be during the transfusion or after it has been completed.

Source: Authors, 2025.

The definitions of transfusion reactions are not well-defined, although some terms are similar. In order to make their use clear and specific, standardization is needed.

Attributes are important points associated with concepts. These are the most frequent expressions found in the concepts researched, which characterize the concept and allow for a better understanding of the subject. They can

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also be changed or adapted according to the concept presented. The main attributes found are: Transfusion reactions, complications associated to blood transfusion, adverse effects of blood transfusion, blood transfusion safety policy, adverse reaction to blood transfusion, transfusion incidents and body reaction to blood transfusion.

CLINICAL CASES

Model case: Patient F.G.B., 45 years old, male, hypertensive, diabetic, diagnosed with repeated urinary infection and profound anemia. The patient received two bags of packed red blood cells (PRBC). No history of previous transfusions.

VAS before the transfusions: BP: 140X80 mmHg, TAX 36ºC, pulse 87 bpm, RR 18 rpm. 30 minutes after the end of the transfusion, the patient began to present vomiting, headache, fever and chills.

VAS after transfusion: BP: 180X100 mmHg, TAX 40ºC, pulse 105 bpm, RR 25 rpm. The examination of the bags revealed no evidence of contamination or hemolysis. The diagnosis was non-hemolytic febrile transfusion reaction.

Opposite case: Patient H.P.R., 32 years old, female, diagnosed with dengue fever. She received 5 platelet concentrates (PC) for thrombocytopenia and hemorrhage. No previous history of transfusions. The patient had been admitted to the emergency department with headaches, fever and prostration for 3 days. He had thrombocytopenia (55,000) and bleeding gums. After the platelet transfusion, the patient presented asthenia, headache, fever, tachypnea and tachycardia. On physical examination: presence of crackling rales.

Hours after the transfusion, the patient presented with severe respiratory failure and was diagnosed with alveolar hemorrhage. After investigating the bags, it was confirmed that there had been no transfusion reaction.

The case described is a suitable example of the opposite, because although symptoms occurred after the transfusion, the investigation proved that these symptoms were not related to a transfusion reaction. This demonstrates the importance of differentiating between adverse events actually caused by transfusions and those that coincidentally occur after transfusion but have other underlying causes.

Comparing the cases presented, it was possible to identify that the use of transfusion reactions is not used correctly. It is important to emphasize that transfusion reactions are important markers in emergencies and must be identified correctly.

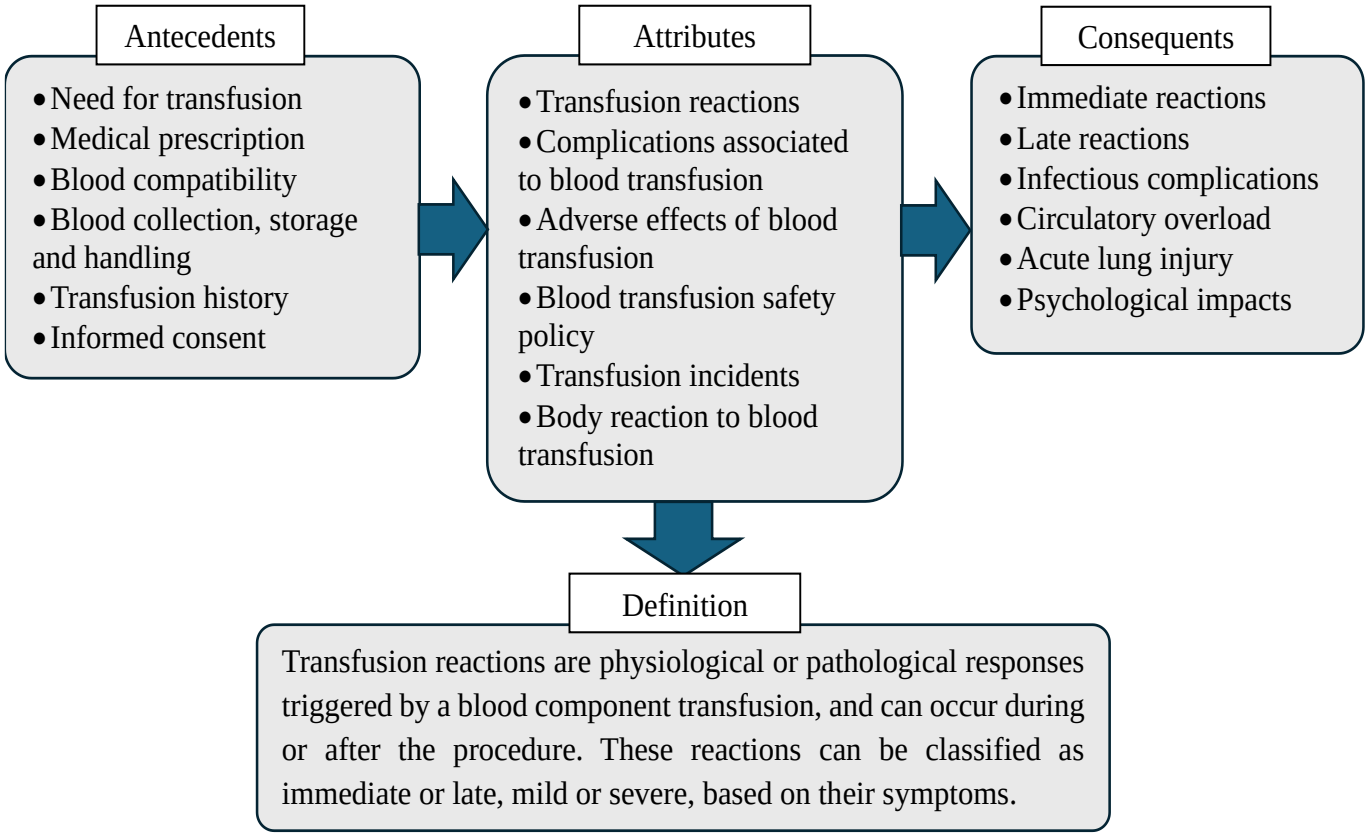
This opposite case, fictitious and based on a clinical situation, contradicts the concept of transfusion reaction.

After analyzing the concepts, identifying the attributes and constructing the model and contrary cases related to the applicability of the concept of transfusion reactions, a definition was drawn up covering the results of the conceptual analysis.

The conceptual definition constructed was: Transfusion reactions are physiological or pathological responses triggered by a blood component transfusion, and can occur during or after the procedure. These reactions can be classified as immediate or delayed, mild or severe, based on their symptoms.

Finally, the events that precede the occurrence of the concept are called antecedents and are considered risk factors. After the concept is established, we have the consequents, which arise from the occurrence of the concept. The relationship between antecedents, attributes, consequents and conceptual definition is depicted in Figure 2.

Figure 2 - Antecedents, Attributes, Consequents and Definition. Imperatriz, 2025.



Source: Authors, 2025.

DISCUSSION

The analysis included a search of the literature, books, dictionaries, manuals and expert opinions in order to provide a broad view of the subject. In this context, the divergence between the definitions found shows the need to standardize the concepts of transfusion reactions, which significantly impairs health care and makes it difficult for professionals responsible for monitoring blood transfusions to identify, understand and report cases of TR.

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From this perspective, studies indicate that the quality of care is hampered by the lack of training in blood transfusion, since professionals' knowledge of the signs and symptoms of RT is precarious, leading to a series of consequences such as underreporting of cases [21,22]. In addition, knowing the concepts is crucial to increasing the quality of the service provided and disseminating the safety culture in order to promote efficient information exchange among the team and improve their skills in identifying and differentiating transfusion reactions from other clinical cases [23].

It was observed that the gap in the nursing team's understanding of transfusion reactions makes it difficult to differentiate the two clinical cases cited in the results due to confusion related to the non-specific symptoms of RT, the time for signs and symptoms to appear (immediate or delayed) and the lack of continuing education in institutions, an important process to guide the conduct of professionals in the pre-, trans- and post-transfusion periods [24].

The standardization of the transfusion reaction concept and the creation of protocols governing health practices stand out as an effective strategy to promote the notification of complications through the correct identification of RT and to avoid failures on the part of professionals in the blood transfusion process. Thus, training staff based on an established concept enables nurses and technicians to recognize the signs and symptoms presented by patients before, during and after blood transfusion in order to increase patient safety and the quality of the service provided [25].

CONSIDERAÇÕES FINAIS

Using Walker and Avant's method, it was possible to determine the aspects for instrumentalizing the concept of transfusion reactions in nursing. Through its application, it was possible to understand and construct the attributes, cases, antecedents and consequents, as well as the conceptual definition, achieving the proposed objective.

This study, which analyzed the concept of transfusion reactions in the context of nursing, revealed a significant variation in the definitions and uses of the concept, which can lead to confusion and negatively impact the quality of care provided.

This shows that a unified and precise understanding of transfusion reactions is crucial for improving hemotherapy procedures, especially with regard to patient safety, due to early identification, proper management and prevention of complications. In addition, the proper application of the concept can enhance the training of nursing professionals, with continuing education and strengthening of the theoretical and practical basis of nursing in the field of hemotherapy.

In conclusion, the conceptual clarification provided by this study contributes significantly to the standardization and improvement of practices related to transfusion reactions, reinforcing the importance of clear

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guidelines and continuous training for healthcare professionals.

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Authorship criteria (authors' contributions)

Calliandra Cristina Marques de Oliveira: conception and/or planning of the study, obtaining, analyzing and/or interpreting the data, writing and/or critical review, and final approval of the published version. Arthur Feitosa Jacinto: obtaining, analyzing and/or interpreting the data, writing and/or critical review, and final approval of the published version. Hellen Pereira Brasileiro Neves: obtaining, analyzing and/or interpreting the data, writing and/or critical review, and final approval of the published version. Ana Beatriz Frota Lima Rodrigues: conception and/or planning of the study, obtaining, analyzing and/or interpreting the data, writing and/or critical review, and final approval of the published version. Francisco Alves Lima Junior: conception

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