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## HEALTH CARE IN ACUTE TRANSFUSION REACTIONS

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**Abstract:** Blood and blood product transfusion is a procedure that has been practiced by the medical community with great frequency. This procedure is defined as the introduction of blood components into an individual's circulatory system. It is a practice considered safe, due to the high technology applied to blood bag screening. However, no patient is exempt from the risk of being affected by reactions in the pre-, trans- and post-transfusion process. Therefore, it is extremely important that the healthcare team has the knowledge to promptly identify the signs and symptoms characteristic of an acute transfusion reaction, and the ability to intervene immediately in the transfusion procedure in order to minimize the damage caused to the patient. This work aims to identify the occurrence of acute transfusion reactions and the main care in health care provided in the event of this occurrence. This is a bibliographical research through original articles, reviews, published editorials, books and attention notebooks, starting in July 2023. Through the study we were able to identify that acute transfusion reactions occur in general, due to errors in identification of the blood sample, administration of a blood unit to the wrong patient and poor conservation of blood bags. It is of fundamental importance that when transfusion reactions occur, nursing professionals have the knowledge and professional ability to recognize the specific signs and symptoms of reactions and that the entire team has the competence to act promptly in such a situation.

**Keywords:** 1. Nursing Care 2. Acute Transfusion Reaction, 3. Blood Transfusion

## INTRODUCTION

In recent years, an increasing number of blood transfusions have been carried out around the world. Around 3.5 million transfusions are performed every year. Of the total transfusions, 38% are related to public services, 40% to services accredited by the Unified Health System (SUS) and 22% are exclusively private services. (AGÊNCIA BRASIL, 2022)

Blood transfusion is defined as the transfer of blood or a blood component or blood product from one individual to another. The prescription for a blood transfusion can be made with whole blood, or depending on the reason for the transfusion, only a blood component or blood product such as erythrocytes, platelets, fresh or frozen plasma, blood clotting factors or leukocytes can be transfused. (MEDEIROS, 2022)

The blood transfusion procedure is carried out for various purposes, such as to increase the blood's ability to carry oxygen, to restore the body's blood volume, to improve immunity or even to correct coagulation disorders. Whenever possible, only the blood component that will meet the patient's specific need is transfused, and not whole blood. The transfusion of a specific blood component is safer and avoids wasting the others (IGREJA, 2023).

Today more than at any other time, blood transfusions are considered safe, due to the high technology applied to blood bag screening. However, it is a procedure that is not free from adverse effects. During and after it is performed, complications from immediate or delayed transfusion reactions may occur. (MEDEIROS, 2022)

According to Marini & Wheeler (1997), among the most common complications are acute transfusion reactions related to incompatibility of the ABO system. The most common cause of a transfusion reaction is

due to misidentification of the patient sample or transfusion of blood to the wrong patient.

## **METHODOLOGY**

The methodological option of the research lies in the descriptive method, through bibliographic research, with the purpose of contributing to the understanding of acute transfusion reactions and the role of the nurse in this event. To understand the topic, we will collect secondary data, in a bibliographic survey of original articles, reviews, published editorials, books and attention notebooks, starting in July 2023. To survey the studies, databases were used virtual sites, such as Google Scholar, Scientific Electronic Library Online (Scielo), using the following key words as descriptors for this review: "Nursing Care", "Acute Transfusion Reaction", "Blood Transfusion". All data was entered into the Word program database, using publications between 1997 and 2023.

## **BLOOD TRANSFUSION**

According to the National Congress (2001), through Law 10,205 of March 21, 2001, which regulates the collection, processing, storage, distribution and application of blood, its components and derivatives, blood is defined as the total amount of tissue obtained from the donation. Blood components are products originating from whole blood or plasma, obtained only through physical processing, such as platelet concentrate and washed red blood cell concentrate. Blood products are products originating from whole blood or plasma, obtained through physicochemical or biotechnological processing, such as albumin, prothrombin complex and globulins.

Blood transfusion can also be performed with the patient's own blood. This happens when blood is collected, filtered and reinfused into the body itself. This procedure is called autologous transfusion or autotransfusion. A

transfusion performed with blood donated by another individual is called homologous transfusion (BARTMANN, 2010).

It is essential that the indication for blood transfusion is made by the medical professional, in a printed prescription, containing data regarding the type of hemotherapy, volume, type of transfusion and duration (BRAZIL, 2015).

Currently there is no blood substitute, as only it is capable of transporting oxygen. Furthermore, blood is capable of restoring circulating body volume, as well as helping patients with immunodeficiencies, being able to reverse deficiencies in coagulation proteins or platelets (NUNES, 2010).

## **ACUTE TRANSFUSION REACTIONS**

A transfusion reaction is defined as any and all complications that may occur as a consequence of an infusion of blood collected from a donor, during and after its administration (HOSPITAIS UNIVERSITÁRIOS FEDERAIS, 2020).

Reactions can also be classified as acute, when a reaction occurs within 24 hours after its infusion, and late, which are reactions that occur after 24 hours (SANTA CASA DE PELOTAS, 2021).

Acute reactions may occur during the infusion or within one minute to hours after infusion of the blood component. Furthermore, they can be classified according to their cause (BRAZIL, 2015).

In acute or immediate reactions, acute allergic reactions, non-hemolytic febrile reactions, septic reactions, circulatory overload reactions, and hemolytic reactions may occur (SANTA CASA DE PELOTAS, 2021).

There are several clinical manifestations that are indications that the patient is suffering from an acute transfusion reaction.

Symptoms include dyspnea, headache, hives, facial flushing, chills, fever, anxiety, vomiting, marked changes in blood pressure levels, cough, pain at the puncture site and tachycardia (BRAZIL, 2015).

### **NON-HEMOLYTIC FEBRILE REACTION**

It is a transfusion reaction that occurs not infrequently, with a rate of 0.5 to 1% of the total transfusion reactions of packed red blood cells and 1.0-38% of concentrated platelets. There are also patients who have a certain predisposition to suffer from this reaction. Among them are patients at high risk for the formation of antibodies against non-self antigens, especially those who have already received transfusions more than once and multiparous women (VERÍSSIMO & PEREIRA, 2008).

This reaction is characterized by hypersensitivity to plasma proteins, white blood cells, and thrombocytes contained in the donor's blood. Antigens from the HLA system and granulocyte-specific antigens are the proteins that are generally most involved in this reaction (BRAZIL, 2015).

The most evident clinical manifestation is an increase in body temperature by at least 1°C. However, other symptoms that can characterize this reaction are chills, headache, anxiety, redness of the face. Although these symptoms are unpleasant for the patient, this reaction is most often not life-threatening (TIMBY, 2007).

### **SEPTIC REACTIONS**

It is a factor of considerable importance in the causes of morbidity and mortality among transfusion reactions. Its incidence occurs on a large scale in platelet concentrate, with one reaction occurring for every 200 to 600 transfusions of this blood component. In platelet concentrate, this rate is lower, being

around one reaction for one million infusions of this unit (VERÍSSIMO & PEREIRA, 2008).

Nettina (2021) refers to the septic reaction as a reaction that occurs due to contamination by bacteria present in the blood transfusion process or in some blood component.

There are multiple factors triggering this contamination. It often occurs due to bacterial contamination originating from the patient himself. These bacteria are those present on the skin. When adequate antisepsis is not performed when installing the venous catheter, bacteria can migrate from the skin to the bloodstream. Also, a septic reaction originating from the patient himself may occur due to bacteremia not clinically detected during clinical screening (MARINI & WHELLER, 1997).

Another factor that favors bacterial contamination is the inadequate storage and conservation of blood bags. When the blood unit is stored at room temperature, bacteria multiply frequently and are generally gram-positive microorganisms that reproduce under these temperature conditions. Gram-positive bacteria include Streptococcus, Staphylococcus aureus and Staphylococcus epidermidis. There is also the proliferation of gram-negative bacteria. These multiply when the blood bags are stored at a temperature between 1°C and 6°C. Among these types of bacteria are Escherichia coli, Salmonella, Enterobacter, Klebsiella, Yersinia enterocolitica, Serratia marcescens and Pseudomonas. (LUDWIG & ZILLY, 2007).

The symptoms evident in this condition are the sudden onset of body temperature generally 2°C higher than that seen before the start of the infusion or recurrent fever greater than 39°C, followed by chills, tremors, tachycardia generally with an increase of 40 beats per minute, vomiting and intense hypotension (LUDWIG & ZILLY, 2007).

## **ACUTE ALLERGIC REACTION**

Allergic reactions are the second type of reaction that most affects patients undergoing transfusions. However, those that evolve into a more serious condition of anaphylaxis are not so common. Anaphylaxis has a rate of 1 in every 170,000, in 18,000 transfusions (OLIVEIRA & COZAC, 2007).

The main cause is hypersensitivity to some protein in the donor's plasma or a reaction between the donor's antibody and the recipient's antigen. (NETTINA, 2021)

Among the clinical manifestations, the majority are cutaneous, including facial flushing, papules, itching, laryngeal edema, and anaphylaxis may also occur. When the condition progresses to anaphylaxis, the signs are more serious. In this case, there is a sudden onset of gastrointestinal symptoms, transient hypertension followed by severe hypotension (OLIVEIRA & COZAC, 2007, ARONE & PHILLIPI, 2008).

## **ACUTE HEMOLYTIC REACTION**

According to Oliveira & Cozac (2007), this reaction is the most serious and feared in transfusion practice due to its severity and high mortality rate. One case may occur every 38,000 and 70,000 transfusions.

According to PADILHA et al (2010), its high rate occurs due to errors in identifying the recipient patient or the samples collected for pre-transfusion tests.

The acute hemolytic reaction most commonly occurs due to incompatibility in the ABO system, where hemolysis occurs due to the junction of the donor's antibodies to the recipient's red blood cells (NETTINA, 2021).

The antibodies involved in this process are often the immunoglobulins IgM, IgG1 and IgG3. These proteins interact with antibodies present on red blood cell membranes. There is then an immune complex formation in the erythrocyte membrane, which results

in the intravascular destruction of the red blood cell. This triggers neuroendocrine responses, release of cytokines, effects on blood clotting that generate the symptoms of the acute hemolytic reaction. There are also other proteins that do not belong to the ABO system group that also react with erythrocyte cells, however, the most serious symptoms and conditions are related to the infusion of a blood unit of a blood group that is not compatible according to the ABO system (PADILHA et al 2010).

According to Padilha et al (2010) and Arone & Phillipi (2008), the clinical manifestations of this reaction are pain in the chest region, pain at the infusion site, hemorrhages, tachycardia, increased respiratory cycles, headache, increased body temperature, hypotension, presence of free hemoglobin in the blood in the urine, facial flushing and low back pain. The condition may also progress to acute renal failure and may have complications such as disseminated intravascular coagulation (DIC).

This reaction generally begins between 5 and 15 minutes after the infusion of the blood unit, but can occur at any time throughout the transfusion process (NETTINA, 2021).

## **CIRCULATORY OVERLOAD REACTION**

It occurs when the infusion of liquids is done at a speed or in quantities above what the circulatory system can handle. Largely, due to underreporting of this reaction to blood banks, there is no known incidence regarding the number of cases occurring (VERÍSSIMO & PEREIRA, 2008).

Among its clinical manifestations are dilation of the cervical veins, increased venous pressure, difficulty breathing, adventitious rales heard at the base of the lung, and coughing. As a consequence of this reaction, Congestive Heart Failure (CHF) and acute

lung edema occur (NETTINA, 2021).

The recommended infusion rate for most patients is between 150 and 200 ml/hour. However, for some patients this speed is excessive (PADILHA et al, 2010).

Any patient is subject to being affected by this reaction, however, patients with a history of heart disease and who presented hypervolemia before the start of the infusion are more predisposed to presenting this condition. Children and elderly people over 60 are also more susceptible (NETTINA, 2021).

## **NURSING CARE IN ACUTE TRANSFUSION REACTIONS**

Nursing care, in addition to the care given directly to the patient, refers to the care provided by the nursing team even before the initiation of a procedure directed at the client, therefore, it can be divided into preventive and curative. Prevention is related to the care provided before the blood infusion, and curative refers to the assistance given while a transfusion reaction is occurring or has already occurred.

### **PREVENTIVE**

Nursing is the team responsible for procedures related to hemotherapy. Therefore, it is necessary that everyone involved has theoretical knowledge about the transfusion process, skill and technical competence at the time of its execution (BRAZIL, 2015).

According to the Federal Nursing Council (2006), in its Resolution No. 306 of 2006, which regulates the role of nurses in Hemotherapy, the nurse is responsible for planning, executing, coordinating, supervising and evaluating the procedures carried out in the hemotherapy service, in order to ensure the quality of blood, blood components and blood products.

Preventive measures for transfusion

reactions are measures taken to prevent transfusion reactions from occurring. The first begins with an interview carried out with the patient to investigate previous illnesses, history of allergic reactions or anaphylaxis. It is up to the nurse to carry out the nursing consultation and guide the patient regarding the procedure that will be performed, aiming to minimize the risks of adverse reactions and ensure clarification and comfort for the patient (FEDERAL NURSING COUNCIL, 2006; BRAZIL, 2015).

According to Padilha et al (2010), an essential precaution is to confirm that the transfusion procedure has been carried out using a printed medical prescription. When performing the procedure, the professional must check the patient's data, and data regarding the type of blood unit and quantity to be infused, making sure that the appropriate hemotherapy will be administered to the correct patient.

Nettina (2021) describes that before starting the blood transfusion, the nursing professional must monitor the results of the complete blood count and confirm the recipient's blood type. These precautions, together with the confirmation of data from the blood unit and the recipient, contribute to the prevention of reactions due to blood incompatibility.

Vital signs must be checked before starting the hemotherapy infusion and the data must be recorded in the medical record for comparison purposes, in case the patient develops a transfusion reaction. The vital signs to be checked are: body temperature, pulse, breathing and blood pressure (TIMBY, 2007).

When removing the hemotherapy from the blood bank, the professional must inspect the blood for the presence of air bubbles, clots or abnormal color before transfusion. Furthermore, the blood bag must not be

exposed to room temperature for more than 30 minutes before starting its use (NETTINA, 2021; SOARES et al 2010).

For Nettina (2021), an important precaution for preventing a non-hemolytic febrile reaction is administering antipyretics before the transfusion. However, it must only be administered if there is a medical indication.

According to Soares et al (2010), the nursing professional must perform the correct antisepsis technique with an appropriate antiseptic when inserting the venous catheter. Pay attention to starting the transfusion no later than half an hour after removing the hemotherapy from the blood bank, together with carrying out adequate antisepsis to avoid reactions due to bacterial contamination.

At the beginning of the transfusion, the professional must always have emergency medications such as antihistamines and adrenaline on hand and remain at the patient's bedside for the first 30 minutes of infusion. These precautions are essential if the patient develops a moderate to severe allergic reaction (VERÍSSIMO & PEREIRA 2008; NETTINA 2021).

For Nettina (2021), Padilha et al (2010), Soares et al (2010) and Timby (2007), the infusion must be carried out at an initially slow speed. Its speed must not exceed 50ml/hour in the first 15 minutes. The speed must still be in accordance with the patient's circulatory reserve.

## CUREATION

Every patient is susceptible to an acute transfusion reaction. Therefore, the nursing professional must be able and prepared to identify these reactions and thus promptly intervene appropriately (BRAZIL, 2015).

Since these reactions directly threaten the life of the transfusion recipient, nurses must act quickly and effectively to ensure the

maintenance of the patient's life (NETTINA, 2021).

Transfusion reactions differ in their origin and clinical manifestations. However, since it is not always possible to specifically identify the type of reaction the patient is experiencing, basic care will be described for rapid intervention by the nursing professional at the slightest sign of clinical manifestation of a transfusion reaction (NETTINA, 2021).

The general procedures for immediate intervention when any sign of transfusion reaction is identified can be described in the order of: Interrupt the transfusion immediately, maintain venous access with 0.9% saline solution, check the identification of the blood bag and the patient, check and record the patient's vital signs, communicate to the responsible doctor and the blood bank, administer medication in case of emergency, send blood samples from the patient and the hemotherapy service to the hemotherapy service together with the team, when indicated, collect urine samples when indicated, notify the reaction to the hemotherapy service and record what happened in the medical record (NETTINA, 2007; BRAZIL, 2015).

## CONCLUSION

Through this study we were able to conclude that transfusion therapy is a complex procedure, but extremely important for the patient who presents the need to obtain it.

The members of the nursing team are professionals who work directly in procedures related to hemotherapy. Therefore, there is a need for everyone on the team to have the common objective of meeting the client's needs, carrying out nursing procedures, offering the patient harm-free assistance.

Acute transfusion reactions generally occur due to errors in identifying the blood sample, administering a unit of blood to the wrong patient and poor conservation of blood bags.

These errors are iatrogenic errors that can be avoided with simple habits that the nursing team can adopt in their daily lives.

It is the nurse's role to plan the activities inherent to blood transfusion procedures. Good team management is essential so that nursing professionals can carry out their daily work, avoiding risks related to blood infusion. In addition to the managerial role, the nurse is also responsible for providing direct assistance to the patient, applying the systematization of nursing care. This involves everything from interviewing the patient before carrying out the procedure to post-transfusion care.

The risks of an acute transfusion reaction go beyond errors made due to lack of attention on the part of professionals. As it is a biological material, there may be blood group incompatibility as well as an unexpected reaction on the part of the recipient's body.

Therefore, when transfusion reactions occur, it is necessary that nursing professionals have knowledge and professional skills in knowing how to recognize the specific signs and symptoms of reactions and that the entire team has the competence to act promptly in such a situation.

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