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A GUIDE FOR PREPARATION OF BLOOD TRANSFUSION
Competence for Nursing Students

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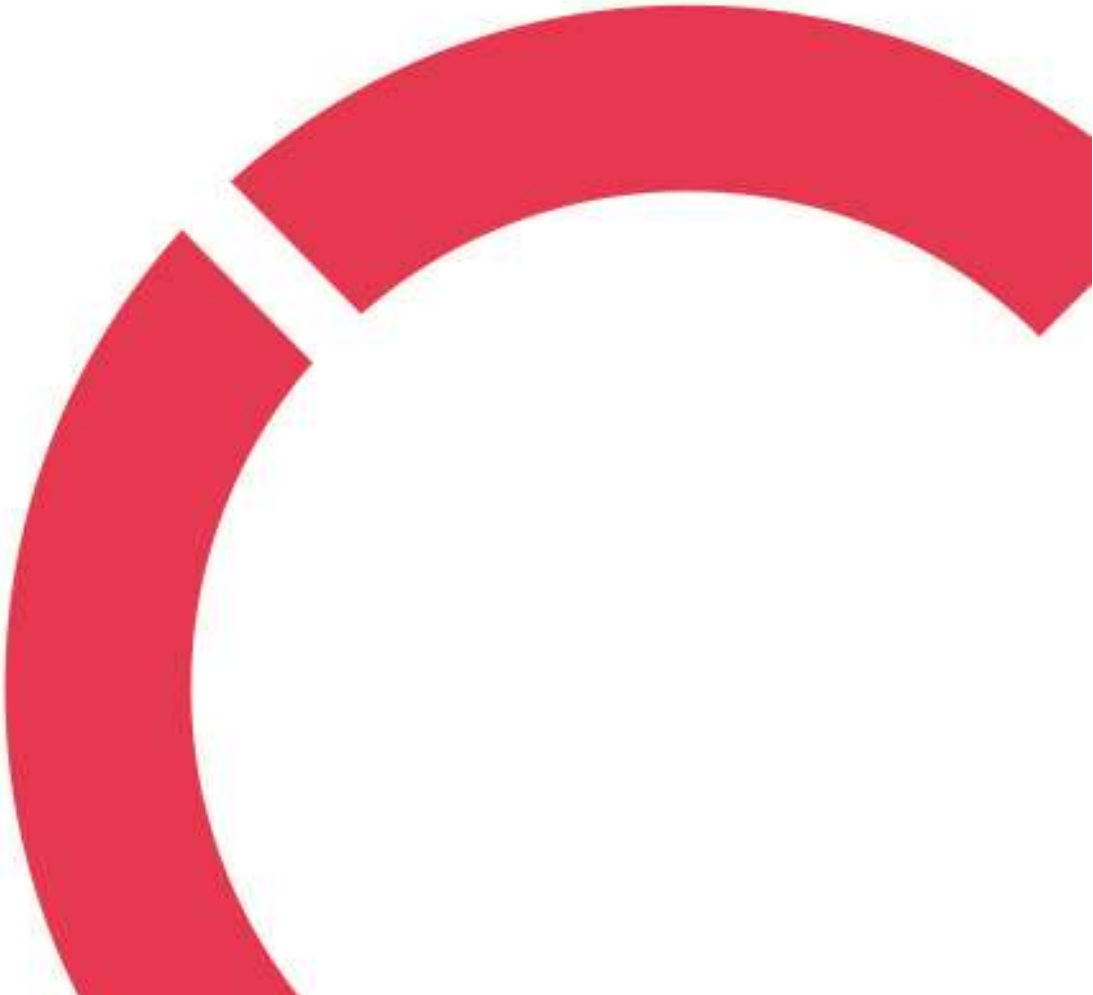

ABSTRACT

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The thesis provides a comprehensive guide that includes all crucial information, from indication to execution, for the safe preparation of blood transfusions. Blood transfusions are essential medical procedures that require close attention to ensure effectiveness and the patient safety. The thesis describes the vital stages of the blood transfusion encompassing the pre-transfusion, during and post-transfusion stages along with continuous monitoring for the patient's safety and addresses any potential adverse reactions.

The purpose of this thesis is to describe the process of blood administration including indications, preparation for blood transfusion, and monitoring of the patients for complications and adverse reactions ensuring patient safety. This thesis helps to guide blood administration and to gain competence and skill in blood transfusion for nursing students of Centria University of Applied Sciences. The educational video is prepared to guide nursing students about the method of safe blood transfusion and recognize the risks associated with blood transfusion to be able to perform and prepare safe blood transfusion.

This thesis and the educational video is prepared based on evidence-based articles, journals and books in cooperation with nursing teacher of Centria University of Applied Sciences. The work was written in English and well explained about the indication, equipment required, process of transfusion and complications that may arise making sure about the safety of the patient, the final project will be handed to the nursing field of Centria UAS.

Key words
Adverse effect, Blood, Blood transfusion, Complication, Patient safety

CONCEPT DEFINITIONS

AHTR

Acute Haemolytic Transfer Reaction

TRALI

Transfusion-Related Acute Lung Injury

TACO

Transfusion-Associated Circulatory Overload

TTI

Transfusion-transmitted Infection

ABSTRACT

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1 INTRODUCTION

Blood transfusion is a common occurrence in a clinical setting. Patients are benefited from the therapeutic advantages of blood and blood products, which are unique and lifesaving. Because blood is a biological substance, it must be handled with caution and a clear understanding of how it should be used. The essential variables in guaranteeing the safety of blood transfusions include accurate patient identification, choosing the proper product, and doing integration testing of blood products ahead of schedule. According to the Finnish Red Cross blood service, each year, 200,000 red cell components, 40,000 thrombocyte components, and 40,000 units of fresh frozen plasma are used in Finland (Blood transfusions 2023).

All blood donations in Finland are blood grouped by the Finnish Red Cross Blood Service, which also functions as a national reference laboratory for patient pre-transfusion testing (Juvonen, Sareneva, Haimila, Korhonen & Sainio 2013). For the blood transfusion procedure, nurses are required to be trained to recognise and manage multiple complications that may arise during the process. Also, it is essential to recognise the indications for blood transfusion, lab values, pre- transfusion care and potential complications. (Lotterman & Sharma 2023.)

Nursing students are required to have the crucial knowledge about the indications of blood transfusion, the vital stages of the procedure that encompasses before transfusion care, during and after transfusion stage and it is essential to closely monitor the patient and ensure patient safety. In a blood transfusion procedure, it is essential to ensure both safety and effectiveness using suitable blood collection techniques for blood and blood components. In the thesis, the indication section provides the information on the criteria used to determine if the patient needs a blood transfusion. The necessary equipment with their optimal sizes and the purpose of use is described in order to help nursing students to recognize the essential instrument important for the successful execution of the procedure. Before transfusion, during the process and after transfusion stages guide and develop the skills and competence for nursing students to evaluate the patient, continuous monitoring of the patient throughout the procedure and observe for any possible adverse reactions and complications. The theoretical part and the instructional video will be helpful for nursing students to use it as a guide and develop their skill for the safe blood transfusion.

2 COMPETENCE FOR NURSING STUDENTS

The nursing students must have basic knowledge about the blood components, indication, transfusion process, complications and patient safety. The nursing students must be aware of the aseptic technique, proper hand hygiene, and the use and cleaning of the equipment for all the procedures to minimize the risk of infections.

The connection of the thesis with the competence goal of nursing students from Centria University of Applied Sciences is that the students know the method of safe blood transfusion and recognize the risks associated with blood transfusion to be able to perform and prepare safe blood transfusion.

2.1 Blood components and blood collection

Blood in the whole body is circulated through the heart and the blood vessels. In the human body, total blood is balanced with about half red blood cells and half the plasma. It is made up of blood cells and plasma, a type of aqueous fluid. The function of the blood in the body is to transport nutrients from the cells or to the cells and provide immunity to fight against different kinds of viruses and bacteria. Bone marrow, found within the bone, produces blood cells. Red blood cells, white blood cells, and platelets are all generated from bone marrow stem cells. Blood is made up of various components. Plasma, red blood cells, white blood cells, as well as platelets are the core elements of blood. Plasma helps in transporting the nutrients to and from the cells, red blood cells act as transporting oxygen and carbon dioxide to the lungs and expelled from the body. With this, white blood cells fight against foreign particles viruses and bacteria whereas platelets play an important role in blood clotting. (Bailey 2020.)

Blood and blood issue transfusions are a vital, and regularly lifesaving, detail of many patients' therapies. It is additionally a probably risky process, with errors ensuing in loss of life or long-time period damage to an affected person who gets the incorrect blood. According to NHS, strict checking approaches must be in place at every stage to confirm that the right affected person gets the right and proper blood (Transfusion Of Blood And Blood Components Policy 2019).

Blood collection is a crucial step inside the blood checking out process. To make certain the accuracy of the results, the right blood collection is essential. There are different blood sample collection methods which include: venepuncture, capillary puncture, and arterial puncture. Venepuncture is the most established technique of blood sample collection is venepuncture. It is the procedure of drawing blood from veins with the use of a needle and syringe. When substantial volumes of blood are needed for testing, consisting of glucose, cholesterol, or uric acid, this method is necessary. Arterial puncture involves the process of collecting blood from the artery to calculate the pH of the blood and total carbon dioxide. When only a little quantity of blood is required, capillary puncture additionally referred to as finger stick or finger puncture is performed commonly from the end of the finger. This method is convenient for elderly patients while carrying out Complete Blood Counts, smears of peripheral blood and malarial smears. (Neoteryx Microsampling 2017.)

2.2 Indications of blood transfusion

Objective confirmation of the need for a blood transfusion can be achieved by laboratory analysis of haemoglobin and haematocrit levels. These measurements can be used with clinical assessment, but they are not the only determinants of the patient's overall oxygen-carrying capacity. Red blood cell transfusion is not recommended until haemoglobin is at 7-8 g/dl. (Carson, Guyatt, Heddle, Grossman, Cohn, Fung, Gernsheimer, Holcomb, Kaplan, Katz, Peterson, Ramsey, Rao, Roback, Shander & Tobian 2016.)

Haemoglobin levels are a pivotal parameter in assessing the need for a blood transfusion. While specific thresholds may vary based on individual patient characteristics and clinical context, a common trigger for red blood cell transfusion is a haemoglobin level below 7-8 g/dL in stable, non-cardiac patients. (Carson, Stanworth, Dennis, Trivella, Roubinian, Fergusson, Triuizi, Doree & Hebert 2021.) However, higher thresholds may be considered in cases of acute bleeding or undergoing surgeries. Clinical symptoms associated with anaemia, such as fatigue, weakness, shortness of breath, and pallor, serve as critical indicators for transfusion of red blood cells if the bleeding is active. (American Society of Hematology 2021.)

Evaluating platelet count is crucial for guiding transfusion decisions, especially for patients undergoing surgery or at risk of bleeding. It is essential to administer transfusions of specific blood components, such as platelets or fresh frozen plasma. (Clinical Indications For Platelets 2023.)

In cases of acute and significant blood loss of greater than 20 percent due to surgery, trauma, or haemorrhage, transfusion may be indicated to restore circulating blood volume and prevent hemodynamic instability rapidly. The decision is guided by the volume of blood loss and the patient's clinical response. Pre-operative or intraoperative transfusion may be necessary for specific surgical procedures, especially those with a significant likelihood of substantial blood loss. (Guidelines on Blood Transfusion 2022.) When haemoglobin levels are less than 8 g/dl or indications of insufficient oxygen supply appear, transfusion is taken into consideration in cardiovascular disease patients that are hemodynamically stable (Yaddanapudi 2014).

Before undergoing a transfusion, it is of utmost importance to verify the compatibility between the recipient and the given blood. To minimize the occurrence of haemolytic reactions, it is essential to verify the compatibility of the transfused blood with the recipient's immune system by cross-matching and determining the ABO and Rh blood type to make sure that the receiver of a transfusion gets compatible blood. (Blood Safety and Matching 2021.)

2.3 Equipment

Using the right tools is essential to ensure the effectiveness and safety of the patient. There are many parts to the transfusion method, each designed to work at a particular stage. Filter-equipped intravenous tubing is used to transfuse blood products. Peripheral intravenous catheters or different central venous access devices may be used to deliver whole blood or blood components. The sizes should be 20-22 gauge for adults undergoing normal transfusion, 16-18 gauge for adults undergoing rapid transfusion and 22-25 gauge for paediatric patients. Sets for administration are used to move blood from the blood bag to the person who needs it. There are tubes, a flow control, and a drip chamber in the kits. These gadgets are made to manage the speed of the transfer, making sure it is done at a safe and steady rate. (Step-by-Step Guide to Blood Transfusions 2023.)

Administration sets may differ but generally sets for blood components are equipped with a blood filter. This filter makes sure that clots, cellular debris, and coagulated proteins are removed. Its pore diameters normally range from 170 to 260 microns. For the administration of platelet-poor plasma, the equipment set usually differs from products and brands. A blood warmer is required to warm the blood to 37 degrees Celsius. Infusion devices including infusion pumps, rapid transfers, and pressure devices

are essential for controlling the speed and mode of blood component transfusion. The infusion pump is used for the controlled speed of transfusion, rapid infusers are required for emergencies and pressure devices are required for the rapid blood administration process. (Step-by-Step Guide to Blood Transfusions 2023.)

TABLE 1. Equipment required for blood transfusion. (Step-by-Step Guide to Blood Transfusions 2023).

Equipment	Purpose of use by nurses
IV catheter 20-22 G	Nurses generally use this size of IV cannula for routine transfusion in adults but it may vary according to the age of patients.
Blood product administration set	Nurses use administration set for transfusing the blood product to patient.
Blood or blood product	For the transfusion to the patient.
Blood warmer	Nurses warm the blood product to 37 degrees Celsius to transfuse to the patient.
IV pole	Nurses hang the blood bag and normal saline bag in IV pole or stand.
Normal saline solution	It is used to flush the administration set for left blood
Alcohol pads	Nurses disinfect the site of transfusion before procedure.
Vital signs monitoring devices: blood pressure measuring, pulse oximeter, thermometer	To measure the blood pressure, pulse, saturation, and temperature nurses use the monitoring devices.
Non-sterile gloves	Nurses are required to wear non-sterile gloves to prevent infection.

2.4 Before transfusion

Before giving a blood transfusion, it is essential to look at the recipient's medical background and general health. This includes looking at vital signs, checking for problems with blood clots or low red blood cell counts according to the laboratory parameters, and getting a complete medical history. Pay close attention to previous experiences with blood transfusions or underlying health problems that could affect the transfusion process. It is essential to inform the patient about the procedure and educate them about the monitoring of the vital signs and reactions. Before commencing the transfusion, many assessments are conducted to ensure compatibility. Methods like blood typing and cross-matching are used for pre-transfusion tests. Before a blood transfer, it is essential to ensure that the donor's and recipient's blood types are compatible the tests involve matching the ABO and Rh blood types of the donor with the recipient's blood, as well as verifying the recipient's identity and confirming information on the blood components. (Step-by-Step Guide to Blood Transfusions 2023).

The patient or their legal guardian must give full permission before the transfusion can begin. An essential part of this method is ensuring people have complete information about the process, possible risks, and other options. It is crucial to keep detailed records of all the essential details, like the permission form, the medical background of the receiver, and specifics about the blood components. At first, verifying the doctor’s order for the prescription of the blood or blood product using two nurses is crucial. Product type, amount, date and time, rate and duration of infusion should be checked beforehand. Any pre- or post-transfusion medication prescribed should be noticed. It is important to check that the patient has an IV cannula without complication. Identification of the patient is a crucial step that includes checking the patient's name, identification number, and blood band with the blood unit. Right blood product for the right patient with the right amount need to be ensured. Monitoring the patient’s pre-transfusion vital signs: blood pressure, pulse, respiratory rate, saturation, and temperature before transfusion is essential. (McCutcheon 2015.)

Perform hand hygiene before proceeding further and take care of the patient's privacy. Take the normal saline, close the clamp, spike the normal saline bag and hang it on the IV stand. Open the clamp and fill the drip chamber until the saline is over the filter. Close the normal saline clamp. Take the blood product administration set and blood product bag, spike the bag, open the roller clamp and fill the tubing. Connect the IV tubing to the patient’s IV access and set the pump to deliver the blood at the rate of 2ml per

minute for 15 minutes. Measure the patient’s vital signs: Blood pressure, saturation, pulse, and temperature before transfusion, after 15 minutes and every hour for the period of transfusion. (McCutcheon 2015.)

2.5 During a blood transfusion

During a blood transfusion, proper preparation is necessary for assuring both the patient's safety and the procedure's efficiency. When administering a blood transfusion, it is essential to monitor the vital signs and lung sounds, excretion of urine, and skin colour should be documented as a baseline. It is crucial to consistently monitor the patient's vital signs during the transfusion operation. This involves regularly monitoring the temperature, heart rate, breathing rate, and blood pressure. To ensure the receiver's safety, any significant deviations from the normal state should be promptly addressed. Communicate with the patient about the signs and symptoms of a transfusion response. If any of these symptoms present themselves during the transfusion, the patient must notify the nursing staff. Vital signs, lung sounds, excretion of urine, and skin colour should be documented as a baseline.
During the first fifteen minutes, the blood should be withdrawn at a moderate rate; for example, 2 millilitres per minute, or 120 millilitres per hour. (Lotterman & Sharma 2023.)

Because adverse responses to transfusions occur most often in the first fifteen minutes after the procedure, medical personnel should keep a close eye on the patient during this time. After this time, the transfusion rate may be raised if the patient is stable and shows no evidence of a transfusion response. After fifteen minutes, then once every hour, and then ultimately at the conclusion of the transfusion, vital signs should be documented. (Blood safety and availability 2023.)

During the procedure, observe for any symptoms that might indicate a transfusion response. The transfer must be stopped right away if a reaction is thought to be happening. Disconnect the blood tubing from the patient, inform the physician, and continue to monitor the patient's condition and stay with patient. Ensure that you have everything documented. (Lotterman & Sharma 2023.)

2.6 After transfusion

During Post-Transfusion Surveillance it is essential to maintain vigilant observation of the recipient following the completion of the Transfusion. It is essential to regularly monitor vital signs and promptly address any issues or delayed reactions. Continuous surveillance enables timely detection of necessary corrective measures. (Aggarwal, Tiwari, Pabbi, Bhardwaj, Khurana, Rawat, & Joseph 2023.)

When documenting the procedure the transfusion technique must be thoroughly recorded due to legal and medical factors. This includes documenting the start and finish times of the Transfusion, monitoring vital signs, noting any adverse reactions, and recording the patient's response to the Transfusion. Thorough documentation ensures a complete and detailed record of the procedure and helps to maintain service consistency. The nurse ensures the secure and effective administration of blood transfusions, thereby enhancing the patient's health and well-being, by adhering to these comprehensive preparation procedures. (Hill & Derbyshire 2021.)

2.7 Implementation of the Transfusion

The Execution part of the transfusion is very important. This is when all the meticulous planning turns into the actual administering of blood or its components. For this step to be completed successfully, the person must fully understand the complicated bodily aspects of the transfer process and have the technical skills to carry it out perfectly. When setting up the conditions for a blood transfusion it is important to make sure that the donation process takes place in a good environment. This includes organizing the space in a planned way, making sure there is enough light, and keeping the workplace clean and organized. To maintain productivity, it is essential to have access to essential supplies and equipment, including antiseptic agents, infusion sets, and blood component bags. Providing focused treatment necessitates an atmosphere that is controlled and free from distractions. (Hill & Derbyshire 2021.)

A blood warmer and intravenous (IV) access are crucial for a successful blood transfusion. Establishing stable IV access before blood transfusion is critical to guarantee a steady flow of blood products. For quick transfusion, a large-bore catheter (usually 18-20 gauge) is advised. Both the medical condition of the patient and the kind of blood product that is being administered have a role in determining whether peripheral or central access will be carried out. Using a blood warmer to pre-warm blood

products can help prevent hypothermia and minimize the risk of adverse reactions in the recipient. The ideal temperature for blood warming is typically around 37°C (98.6°F). (Lotterman & Sharma 2023.)

On the transfusion administration guidelines and rate an essential consideration is the infusion rate at which the blood is administered. The initial rate is often set conservatively, ranging from 2 to 4 milliliters per minute. During the initial stages, it is crucial to constantly be vigilant to detect any adverse reactions rapidly. It is feasible to increase the pace by the recipient's tolerance incrementally. By employing a systematic strategy, the effectiveness of the Transfusion is optimized, and the patient's safety is ensured (Lotterman & Sharma 2023.) Continuous surveillance of critical indicators, such as body temperature, pulse rate, blood pressure, and breathing rate, allows for immediate adjustments and is a crucial element of vigilant healthcare.

While managing concurrent medications, deliberate consideration must be given to the simultaneous delivery of existing medicines during a transfusion. It may be imperative to discontinue or adjust some medications to accommodate the Transfusion temporarily. To avoid any conflicts or negative consequences, it is crucial to do compatibility testing between the given blood component and any existing medications. (Goodnough,Shander & Riou 2012.)

Receiving a transfusion can be an intimidating experience for many individuals. To alleviate anxiety, the transfusion practitioner must offer comfort, transparent communication, and a hospitable environment. Promoting patients' participation in their treatment by allowing them to express inquiries and apprehensions helps cultivate a spirit of collaboration. An essential element of a holistic patient-centered approach recognizes the emotional ramifications of the transfusion procedure. Surveillance for Adverse Reactions: It is essential to persistently observe any signs of unfavorable reactions throughout the administration of transfusions. This entails continually monitoring essential parameters such as blood pressure, heart rate, respiratory rate, and temperature. To prevent further complications, any deviations from the established standard should be promptly addressed. (Tolich, Deborah, Blackmur, Stahorsky, & Wabeke 2013, 40-47.)

It is important to address any adverse reactions promptly and correctly. Possible interventions include temporary cessation of the transfusion, administration of medication (such as antihistamines), provision of supportive care, and notification of the medical team for further guidance, contingent upon the kind and magnitude of the reaction. (Sahu, Hemlata & Verma 2014, 543-551.)

2.8 Complications

An unfavourable response or impact in a patient that is temporally related to the delivery of blood, or a blood component is known as an adverse reaction to blood transfusion. Every transfusion has the possibility of an adverse reaction, and many of these occurrences are the result of errors made during the preparation, collection, or administration of blood. The severity of the symptoms, whether mild or severe, as well as the timing of onset, whether acute or delayed, can all be evaluated to categorize adverse reactions. Blood transfusions can lead to a range of potential outcomes, even when accurately planned and executed. Understanding the underlying causes of these problems, identifying the most effective treatment methods, and implementing measures to safeguard the well-being of transfusion recipients are of utmost importance. (Step-by-Step Guide to Blood Transfusions 2023.)

The transfusion is ceased if a significant adverse effect is detected. Normal saline is used to maintain intravenous access (0,9 %). The baseline observations of the patient are observed and documented. The doctor must be notified, and additional instructions must be followed. Apart from resuscitation preparation, all severe reactions are treated in the same way. Adverse effects must be documented in the patient's file (Guidelines for the administration of blood products 2019.)

AHTR (Acute Haemolytic Transfer Reaction) can happen up to 24 hours after a transfusion, however, it usually happens within the first 15 minutes. Transfusion reactions occur when the blood type of the receiver is incompatible with the transfused blood, resulting in rapid degradation of the transfused red blood cells. (Monica & Pagano 2020, 1614-1623). Febrile non-hemolytic reactions can cause fever either during or after a transfusion. Recipient antibodies often result in reactions against donor platelets, plasma proteins, or white blood cells. Although these reactions are mostly benign, the recipient may suffer discomfort and concern. The use of antipyretics and, in severe cases, leukocyte-reduced blood products can mitigate these effects. (Febrile non-haemolytic transfusion reactions 2023.)

The degree of allergic reactions to blood constituents can range from mild pruritus and urticaria to more severe manifestations such as anaphylaxis. The primary cause of these reactions is recipient antibodies reacting to allergenic proteins in the transfused blood. (Blood Transfusion 2023). Prompt recognition and implementation are crucial. Antihistamines are effective for managing moderate reactions. However, severe reactions necessitate immediate administration of epinephrine and discontinuation of

the transfusion. Transfusion-Related Acute Lung Injury (TRALI) is a rare, yet potentially lethal adverse reaction characterized by non-cardiogenic pulmonary oedema and acute respiratory distress following a blood transfusion. The condition is believed to be triggered by the interaction between recipient leukocytes and donor plasma antibodies, leading to a cascade of inflammatory responses in the lungs. It is imperative to halt the transfusion and implement steps to assist breathing promptly. Since TRALI is a diagnosis of exclusion, it necessitates a thorough evaluation to exclude other respiratory problems. (Blood Transfusions 2023.)

Transfusion-Associated Circulatory Overload (TACO) occurs when the blood volume during a transfusion exceeds the recipient's circulatory capacity, leading to congestive heart failure. Individuals who are advanced in age and those with cardiac conditions are more prone to experiencing this issue. To prevent TACO, it is necessary to monitor vital signs and transfusion rates closely. If there is any suspicion, it is recommended to immediately halt or reduce the speed of the Transfusion and take the appropriate supportive measures. (Intructions for safe blood transfusion 2023.)

Among infections and transfusion-transmitted diseases, TTI (transfusion-transmitted infection) is a dangerous but uncommon side effect of blood transfusion. A bacterial infection of a blood component is the cause of TTI (Blood Safety-Diseases and Organisms 2022). When infection was not present prior to the transfusion and all other plausible sources of infection have been ruled out, the infection is assumed to be the result of the transfusion. The potential for transfusion-transmitted infections persists despite rigorous screening protocols. Septicemia may arise from bacterial contamination, but it is seldom. Specifically, infectious illnesses such as H.I.V. and hepatitis are worrisome. (Vallejo & Mintz 2021, 40-47.)

Adhering to rigorous aseptic protocols and conducting comprehensive testing and screening of blood products and donors are crucial to minimize these risks. Iron overload can occur in individuals with certain hematologic diseases or those who get regular transfusions (Porter & Garbowski 2013, 447-456). This is caused by iron buildup in the red blood cells following a transfusion. To address this potential outcome, it is crucial to regularly check the levels of serum ferritin and carefully evaluate the use of iron-chelation therapy. Delayed hemolytic responses occur when the recipient's immune system produces antibodies against the transfused red blood cells, leading to the destruction of the recipient's red blood cells. These reactions often occur several days to a few weeks after the Transfusion. It is essential to be vigilant for signs of hemoglobinuria, jaundice, and anemia. Further investigation, such as antibody testing, may be necessary. Knowledge about the source, symptoms, and appropriate treatment

of potential issues in blood transfusion is crucial for navigating this intricate domain. Vigilance, timely identification, and prompt intervention are crucial for ensuring the safety and well-being of transfusion recipients. (Porter & Garbowski 2013, 447-456.)

3 PATIENT SAFETY

Every year, almost 120 million units of blood are donated (WHO 2020). Anaemia, complications during pregnancy and childbirth, severe injuries from accidents, and surgical operations all require blood transfusions. Patients with sickle cell disease and thalassemia, as well as products to treat haemophilia are frequently treated with them. A patient must be well-informed about their illness, the patient should have the opportunity to ask questions and express any concerns they may have regarding the procedure. The patient may then make an informed decision about whether to get the transfusion. Patient safety is described as "the absence of harm to a patient that could have been prevented and the reduction of unnecessary harm associated with health care to an acceptable minimum"(Blood safety and availability 2023.)

Nursing science emphasizes patient safety by standardizing treatment using evidence-based clinical standards and practices. It recognizes that healthcare delivery is complicated and that differences in care may cause blunders and negative consequences. Standardized care delivery reduces these hazards by being organized and scientifically validated. Standardized care procedures result in reduced practice variance, better adoption of best practices, and enhanced patient safety. The use of standardized procedures and processes has been demonstrated to lower the incidence of mistakes, negative consequences, and patient damage, giving solid scientific support for treatment standardization. Nurses should conform to established standards and procedures to ensure that patients get care that is consistent, safe, and in line with the most current scientific knowledge. (Crossing the Quality Chasm: A New Health System for the 21st Century 2001.)

In the medical domain, ensuring patient safety is of utmost importance, and this holds for blood transfusion as well. Due to the potential problems and risks associated with transfusions, it is crucial to adopt a cautious approach to guarantee the safety of recipients. This section delves into the crucial aspects of patient safety in blood transfusions, such as identification verification, documentation, and measures to prevent adverse events. (WHO 2009.)

Confirming the recipient's identity is a crucial and obligatory step in the blood transfusion. It is the foundation of safety, ensuring that the correct blood components are administered to the correct pa-

tient. Part of the verification procedure involves cross-referencing several identifiers, such as the recipient's full name, date of birth, and distinct medical record or identifying number. Additionally, it is necessary to do a concordance check between the recipient's identifying band and the blood unit label. (Dzik, Corwin, Goodnough, Higgins, Murphy & Yomtovian 2003, 169-180.)

Implementing a two-factor authentication process enhances security measures to a greater extent. This procedure involves verifying the recipient's identity and the blood component by two medical specialists acting independently (Klein, Arnoid, Bingham, Brohi, Clark, Collis, Gill, McSporran, Moor, Baikaady, Richards, Shinde, Stanworth & Walsh 2016). Both individuals authenticate the recipient's particulars and cross-reference them with the information on the blood component's label. By implementing an additional layer of scrutiny, this dual-check methodology diminishes the likelihood of error. To foster a collaborative and well-informed approach to transfusion, it is imperative to provide comprehensive patient education. Having a thorough understanding of the approach, its potential risks, and expected benefits enables individuals to take control and make informed decisions. Providing recipients, the opportunity to seek clarification and pose inquiries ensures their active engagement in the transfusion process. Moreover, obtaining informed consent ensures that the recipient is aware of and consents to the transfusion, as mandated by legal and ethical standards. Documentation and traceability are crucial in ensuring patient safety during blood transfusions. Thorough and detailed documentation is a beneficial resource that provides a detailed account of the transfusion technique sequentially. This record comprises the recipient's identity verification, blood component details, initiation and completion times of the transfusion, vital signs, and any adverse events or interventions. To enhance transparency and accountability, the documentation trail also encompasses the signatures of all medical experts involved in the transfusion. Despite stringent safety standards, it is crucial to be prepared for bad events (Rajbhandary, Shmookler, Cohn, Nunes, Karafin, Stubbs & Pagano 2021.)

During post-transfusion monitoring ensuring patient safety is an ongoing procedure beyond the actual transfusion. Post-transfusion monitoring is essential for identifying post-procedural complications or delayed adverse reactions (Blood safety and availability 2023). This involves regularly monitoring vital signs and extensively examining for any evidence of hemolysis, allergic responses, or other potential adverse effects. Close monitoring of the immediate post-transfusion phase is essential to provide timely intervention. Regular audits of transfusion papers are a quality control method to ensure compliance with established standards and regulations. Throughout these audits, a comprehensive examination is conducted on all transfusion records, encompassing recipient identification, blood component

information, vital signs, and any documented adverse events. The promotion of a culture that consistently strives for improvement and prioritizes the safety of patients is achieved by recognizing and rectifying any deviations or deviations from established protocols. (Davis, Murphy, Sud, Noel, Moss, Asgheddi, Abdur-Rahman & Vincent 2012.)

Ongoing education and training are essential for healthcare personnel to uphold a rigorous level of patient safety in the context of blood transfusions. This encompasses the latest updates on research progress, optimal methods, and developments in transfusion technology. Moreover, the upkeep of skill and readiness in transfusion procedures is enhanced by regular assessments of competence and simulated training scenarios. (WHO 2009.)

In the context of blood transfusion, patient safety entails an unwavering commitment to the well-being and protection of the individuals receiving the Transfusion. The essence of this undertaking is integrating meticulous authentication, comprehensive documentation, and preparedness for adverse circumstances. Healthcare personnel provide optimal safety by strictly following established protocols, delivering continuous education, and executing each Transfusion with meticulous attention and unwavering commitment. (Davis, Murphy, Sud, Noel, Moss, Asgheddi, Abdur-Rahman & Vincent 2012.)

4 PURPOSE AND OBJECTIVES

The purpose of this practice-based thesis is to describe the process of blood administration. The objective of this thesis is to guide nursing students on blood administration and to gain competence and skill in blood transfusion.

The final thesis work is given to Centria University of Applied Sciences generally for the students with a video about blood transfusion. This study will be good for self-study and classroom teaching. The video about blood transfusion will be helpful for nursing students to develop nursing competence on safe blood transfusion.

5 PROJECT IMPLEMENTATION

This is a practice-based thesis that involves a practical guide about the preparation of safe blood transfusion and aims to create a video. All the provided information was gathered from a scientific literature review with Centria UAS. The scientific literature and the WHO guideline of Blood transfusion and Finish Red Cross Guidelines of Blood transfusion and previous evidence-based scientific studies to answer the research problems. A video will be beneficial about how to process blood transfusions practically in an emergency. It will be mainly focused on practical guidelines, and procedures of blood transfusion that should be filled by nurses.

The nursing programmes at Centria are highly hands-on, with students exploring deeply into several nursing specialties as early as their first year of study. The delivery of theory courses includes online learning, independent study, and contact teaching. Because nurses need to be knowledgeable about a variety of treatments and procedures, workshops and simulations play a part in the educational process. Nursing students will be able to utilize this thesis as a reference to prepare and perform safe blood transfusion. As it is required to have the ability to work independently in the nursing field, nursing students will be able to develop their competence and skills with the use of this thesis. (Centria UAS 2023.)

In this thesis, the theoretical part about the indication of blood transfusion, procedure, complications and patient safety was completed with evidence-based latest information with the guidance of the thesis supervisor. The making of the video included scriptwriting, analysing the length of the video and approving the script from the supervisor. Before shooting the video we booked the time for simulation space. For the video, we asked our two friends, one person to shoot the video and the other to be a patient because in our case we needed two nurses. The video-making process was done with our smartphones and the Capcut application was used to edit the video. We did our best to have proper lighting and sounds that is why we added the subtitles in English and a voice-over later to the video with our voice for clear sound effects. The video after editing, was sent to the supervisor for feedback and to finalize. After the supervisor's feedback, the video was again filmed for some parts. Initially, in the process of filling the blood administration set tubing, the tubing was on the metallic table which was later corrected using a drip tray. The bar codes in the blood bag were clearly visible which could lead to interpreting someone's data, which was corrected with the blur effect to the bar codes. The drip chamber was filled so that the filter inside was completely covered with blood according to the feedback. The video was finalized

under the guidance of supervising teacher. The risks in the process was controlled with knowledge, cooperation with each other and guidance.

During the thesis writing process, all the written chapters was submitted to the supervising teacher and the feedback from the supervisor was taken into account. In the video-making process, the written script and the whole plan for the video was submitted to the supervisor and the correction was done as required. After the completion of the video, the video was submitted to the supervisor for feedback. After collecting all the feedback from the supervisor, the mistakes and flaws was corrected before the final submission.

5.1 Initiation and planning phase

The first step in the project is the initiation phase in which the goal and objectives of the project are made clear. This includes different activities to begin the formal planning procedure. (Overgaard 2010). The idea behind this thesis planning started from Centria UAS. The senior lecturer of nursing provided us with the topics to choose to plan the thesis and we found the topic about a guide for the preparation of blood transfusion interesting to initiate. The planning phase of our thesis included theory writing, a plan for making a video, writing a script for the video, collecting the materials and editing the video and finalizing the thesis and video.

5.2 Implementation phase

In the execution of video making process, we planned what things and information the video need to carry and the tasks in the process was equally divided and both of us equally participated in every steps of thesis writing and video making process. We wrote the script for our video and approved it from the supervisor. The video was filmed on the Centria UAS simulation room and we asked for permission to shoot the video. In the process of filming the video, we considered the external factors that may affect the quality of the video such as audio, lighting, position and surrounding. To make the video, two of us acted as a nurse and one friend helped to film the video and another friend acted as a patient. We prepare the theoretical chapters with all the evidence-based research. In the process, confidentiality was maintained and the acting person's identity was protected as well as the information in the blood product bag was protected. During the execution of the theoretical and video-making process, problems that raised

such as misunderstandings, unequal work division, absences, lack of information and many more. Every problem in every step of the thesis process was managed through communication, equal work division, determination towards the goal and understanding.

5.3 Closure phase

The closure phase of the project guarantees the completion and sustainability of a project's achievements (Overgaard & Morgan 2010). The video-making process and theoretical part of the thesis was completed with both of us taking equal initiative. All the risks and problems was managed to accomplish the goal and objectives of the thesis. The copyright issues was taken into consideration and the whole thesis was be revised again to correct the possible flaws. For evaluation of the product, it was forwarded to the supervisor and advised mistakes was corrected.

5.4 Project organization

In a project, the organisation helps structure, implement the project activities, and accomplish the goals and objectives. Project organization include the project manager and supervisor. The guide for the need and criteria of blood transfusion will be done in collaboration with Centria UAS. The head of the nursing degree programme Timo Kinnunen as a supervisor will be directing the implementation of the process and guidance to accomplish the goal and objectives of the thesis. The project managers Rashmi Timalsina and Kamala Pathak will be responsible for completing the thesis with all the evidence-based research, following the guidance and achieve the thesis goal and objectives.

5.5 Educational video

Educational video is now a crucial component of learning in higher education becoming an indispensable element for information delivery in many global, activated, and mixed learning environments. Instructors use videos as instructional tools more effectively: controlling the cognitive burden of the video, increasing engagement among learners, and encouraging active learning through the video. (Brame 2016.)

Maximum benefit can be obtained from the educational videos, if the videos are short, focused on the objectives of learning and emphasise key concepts or ideas, use a signalling and highlighting the crucial ideas. The videos used as an instructional medium tends to create a lot more interest and pleasure than the more conventional printed products. The educational videos can be more effective if it is kept short, clear and focused on important information as it helps for the active learning for the students. Every student does not have the same learning capacity that is why the educational videos created can be used several times as per the students' learning capacity. Also, it is important to assist students in processing and self-evaluation through the educational videos guided by the questions or tasks. (Brame 2016.)

6 ETHICAL CONSIDERATIONS

Ethical issues play a significant role in research in terms of properly compensating for the study outcomes by preserving their original meaning and producing reliable and accurate results. Ethical issues will be respected in this study. In this thesis process, confidentiality will be maintained with keeping sensitive information private. Acting person's identity will be protected. In the process of thesis writing and video making, physical, social and any other types of harm will be kept to an absolute minimum. Research misconduct, plagiarism and misappropriation will be strictly avoided and the work will be accurately represented. (Yip, Han & Sng 2016, 684-688.)

It is vital to do research in a fair and honest manner. It is not enough to just locate the correct data; proper methodology is also required. Therefore, we must exercise caution while collecting information and be transparent about its sources. Being truthful includes acknowledging others' contributions. It is important to provide proper citations when using the work of others, whether it be ideas or facts. This is more than simply a regulation; it is a method to honour those who have researched and ensure that everyone's contributions are acknowledged. It is also essential to be forthright regarding how we conducted our project, in addition to simply giving proper attribution. The information collection process has to be transparent, and need to be honest about sharing the findings. Comparable to storytelling, it is essential to ensure that the narratives are inclusive and respectful of all individuals, regardless of their views or backgrounds (Pietilä, Nurmi, Halkoaho & Kyngäs 2019).

The guidelines from Centria UAS and Finnish Advisory Board on Research Integrity (TENK) was followed. In the process of writing and making a video, pictures was not taken from internet and they were taken ourselves and consent was taken in making video. After examining the location for the research in Finland, Finnish Red Cross Blood Service videos and instructions were selected to use since they correspond to Finland's standards. The permission was received from the Centria UAS and the supervisor prior to filming and delivering an educational video. Throughout the thesis work, confidentiality was maintained and avoided any kind of research misconduct, such as cheating or utilizing someone else's work without permission. Demonstration of blood transfusion procedure was made to

one of our friend being a patient to make it more realistic with his permission and other member involve in filming the video and being nurses. Consent was obtained from individuals involved in the video production to uphold ethical considerations.

7 REFLECTION ON THE PROJECT

Thesis is a long process and requires a significant amount of time and work since writers must do significant research and study therefore, when evaluating the end result it is essential to consider whether the purpose and goal of the thesis is achieved or not and to consider what was the target of the thesis, why and how the whole process has been carried out. Accurate and evidence based sources have been used when producing the instructional video and theoretical part to develop competence on different aspects of blood transfusion and benefit the nursing students from Centria University of Applied Sciences.

7.1 Discussion

A proper process has been followed in the process of thesis writing and producing an educational video using evidence-based resources to ensure that the outcome is reliable and trustworthy. The authors learned a lot through the process of the project, theoretical part and preparing an educational video as the authors also had no experience of either observing or performing the preparation on safe blood transfusion in practice placements. The process of the project and studying several evidence-based sources taught a lot from understanding the indication of blood transfusion, the equipment required for the process, preparation of the transfusion and managing the adverse reactions considering the patient safety. The provided information was relevant as several sources were studied and consulted to ensure that all the information on the project is accurate and based on the latest evidence. The authors realized that is was a good learning process where they gained the competence on the preparation of blood transfusion to apply on nursing career and it built confidence as well.

Patient safety and realization of adverse reactions of blood transfusion is crucial in the prevention of blood transfusion complications and to ensure that the patient is safe. There may be the biggest errors in cross matching of the blood and patient identification which may lead to an unexpected complication on the health of the patient. Further research can be done on the management of the patient in occurrence of the adverse reactions. The further development of this theory might include sampling, focusing on certain groups, such as children, or emergency blood transfusions. Addressing the challenges, the ongoing efforts should be contributed to enhance the safety of the patient and safe blood transfusion to improve patient care.

7.2 Project methodology and limitations

The practical-based thesis was chosen as the way to carry out the thesis to make something useful that could be implemented as study material. Various theoretical frameworks were considered, with a particular emphasis on healthcare standards in Finland. The educational video was created with the hope that nursing students in Centria UAS will one day use our video and thesis as teaching tools. Our research shows that instructional videos are an effective tool for keeping students' attention and fostering their learning. It is important to note that the video is only available in English which may make Finnish nursing students less inclined to use it.

Comprehensive theoretical knowledge was used to create the instructional video script. The thesis's result was instructional materials and current, evidence-based information on blood transfusion. All of these aspects were combined in the thesis and the resulting video. Many different sources were used in the thesis because many different types of evidence were analyzed. The objectives were satisfied, and the thesis was a success. The subject was clearly defined, and appropriate resources have been identified for completion. The thesis's content was comprehensive and constructed in a coherent manner. It was easier to make the video work because the project was clearly defined, and the script was well-written. The writers were able to contribute their unique areas of expertise to the table, which allowed them to gather every piece of information required for the project.

7.3 Project management

Writing thesis was an excellent way for both authors to learn new things. It provided invaluable insights into effectively structuring resources and understanding the necessary requirements for written work and video creation to ensure project success. At the start of the thesis, both authors were not sure how to divide the work evenly or what materials they needed to look into to make sure the project could succeed with a good, evidence-based instructional video. The writers divided up the tasks, created an outline, divided up the materials, and set off to write. The theory, being the most crucial component, was their starting point. Throughout the writing process, they maintained communication to discuss their content and resolve any issues that arose. Collaboration was vitally essential for the success of the entire project.

It was a pleasant and worthwhile experience to shoot and edit the film and create and mix the music for the project. The authors were able to meet their needs despite their unfamiliarity with shooting on many devices at once and editing. Even though the authors tried their best to make the video brief, the authors discovered that keeping the video's duration reasonable made it more significant and kept the viewer's attention. The writers likely were motivated by the possibility to learn new things while filming the videos since it was a whole new experience for authors, since the subject of blood transfusion was something they had no previous experience with. To ensure a safe and effective blood transfusion and to assist during the whole filming process, the authors scheduled an appointment with supervisor. The film was shot at Centria University of Applied Sciences' Nursing Laboratory in under three hours. However, to get a satisfactory outcome, the writers had to start again and reshoot the video again. The institution provided all the instruments and supplies required for blood transfusion procedure. To fix certain technological concerns, the authors had to shoot several sequences again. The authors had to figure out how to use editing tools on their own, as they had no background in the field. A couple more hours were needed for these edits. The recording was successful, and the writers were able to smoothly include it in the video. Ultimately, the authors are delighted with the results and aim that the educational video will be useful to a large number of aspiring nurses.

7.4 Implication in nursing education

This thesis is intended to provide a description of the blood administration procedure. This thesis aims to help nursing students learn how to properly provide blood transfusions and become competent healthcare providers. A nurse's proficiency in blood transfusion is critical for the safe and effective treatment of patients, as well as for the promotion of aseptic procedures to prevent the spread of infection. The educational video is designed to not only educate technical skills but also to offer a comprehensive understanding of patient care guidelines, which is critical for nurses engaging in this regular hospital operation.

It is possible to immediately use the findings of the thesis both in the context of academic instruction at the university and in the context of a student getting clinical experience in the hospital ward. The guide will be beneficial in providing guidance to the staff members in guiding the student throughout the process of blood transfusions. When carrying out the procedure, it is essential to keep in mind the need to maintain an aseptic environment and patient safety. The video clearly demonstrated the importance

of patient identification, adverse reactions and patient safety during blood transfusion, which is an essential procedure in the process of safe blood transfusion.

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APPENDICES

SCRIPT FOR THE VIDEO

Hi, we are nursing students from Centria. In this video, we are going to demonstrate how to perform blood transfusion. In this video, we are going to show the necessary equipment, technique for blood transfusion and patient monitoring. First of all, hand disinfection is important before proceeding.
Then put the non-sterile gloves on. Prepare the surface by disinfecting the table with 80% alcohol disinfectant.
Assemble all the required equipment.
Equipment required for the transfusion.

IV catheter 20-22G
Blood product administration set
Infusion pump
Blood or blood product
Blood warmer
IV pole
Normal saline solution
Vital signs monitoring: blood pressure monitoring, thermometer, pulse oximetry
Alcohol pads
Non-sterile gloves

Blood warmers are used to warm up the blood and the required temperature is 37-37.5 degree Celsius.
Verify the doctor's order. Check the bag is intact, right colour and temperature.
Use two nurses for patient identification. Compare the patient's name, identification number, blood band with blood unit and blood product.
Double check the blood with patient's identification band. Assure the IV line is without complication.
Before starting the transfusion, monitor the blood pressure, pulse, saturation and temperature.
Disinfect the hand, use gloves and open the blood administration set.
Hang the blood bag on IV pole.
Close the roller clamp.
Open the tip of the blood and spike the bag.
Fill the blood tubing filter completely.

Close the clamp before proceeding further.

Then disinfect the bionector of the cannula with 80% alcohol disinfectant. Flush the IV line with at least 10 ml of 0.9% NaCl. Connect the blood tubing with IV cannula.

Set up the blood administration rate to 2 ml per minute for the first 15 minutes and increase the rate as per the hospital's policy. And the blood transfusion should be completed in between 2 to 4 hours. Be with the patient and monitor the reactions and vital signs for 15 minutes.

Check the vital signs after 15 minutes.

Educate the patient about the possible adverse reactions.

After completing the transfusion, disconnect the tube. Flush IV line with 10 ml 0.9% NaCl. If the doctor has prescribed then administer 500 ml normal saline.

Check again the blood pressure, pulse, saturation and temperature hourly during the process and at the end of the procedure.

In case of any reactions, stop the transfusion and notify the doctor.

Perform hand hygiene at the end of the procedure. (5 minutes 54 seconds)