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Determination of health workers' level of knowledge about blood transfusion and the potential effect on patient safety in Nablus

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Thesis Approval

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Declaration

I declare that this thesis was composed by myself and that the work contained herein is my own, except where it states otherwise by references or acknowledgment, the work presented is entirely my own.

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Dedication

I want to thank everyone who has helped so much from the bottom of my heart, and guided me in my pursuit of scientific knowledge. To those who have mentored and opened doors for me, I am deeply grateful.

Really, I'm grateful to everyone who contributes to the establishment of educational institutions or extends a helping hand to students, whether it be through building schools, universities, or providing essential resources such as school bags. Your contributions have played a vital role in creating opportunities for young learners and fostering their educational development.

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Abstract

Background: Blood transfusion is an important medical intervention that requires precise knowledge and adherence to safety protocols to prevent adverse events. Healthcare workers' knowledge of blood transfusions is critical to patient safety during transfusions.

Methods: The goal of this study was to determine how well-informed medical professionals were about blood transfusion procedures, and to explore potential effects on patient safety. A cross-sectional survey was conducted among various categories of health workers, including doctors, nurses, and laboratory technicians, in Palestine at Al-Najah National University Hospital from October 2022 to Jan 2023.A validated questionnaire comprising Participants were quizzed on their knowledge of safe administration procedures, compatibility testing, transfusion reactions, and indications for blood transfusions using multiple-choice and open-ended questions.

Results: A total of 200 health workers included in the survey. The finding of study indicated varying levels of knowledge across different professional groups. While doctors demonstrated a strong understanding of blood transfusion indications and compatibility testing, nurses exhibited greater awareness of safe administration practices and transfusion reaction management. Laboratory technicians displayed a comprehensive grasp of compatibility testing procedures but showed gaps in understanding transfusion reactions. A concerning finding was that overall knowledge about the expected adverse reactions of blood transfusion on patient safety was suboptimal across all categories of health workers.

Conclusion: The study highlights the importance of addressing knowledge gaps among health workers in the context of blood transfusion to enhance patient safety. Tailored training programs and continuous education initiatives should be implemented to address specific areas of deficiency among different professional groups. Collaborative efforts among healthcare institutions, regulatory bodies, and educational institutions are crucial in improving knowledge and standardizing best practices related to blood transfusion. By enhancing health workers' knowledge, patient safety during blood transfusion procedures can be significantly improved, ultimately leading to better patient outcomes.

Keywords: blood transfusion, health workers, knowledge, patient safety, transfusion reactions, medical education

Table of Contents

List of table

List of abbreviations:

AABB	American Association of Blood Bank
AHF	Antihemophilic factor
COPE	Computerized Physician Order Entry
FDA	Food and Drug Administration
JCI	Joint Commission institution
LPN	Licensed practical nurse
PBM	Patient Blood Management
PRBC	packed red blood
QoL	Quality of life
TACO	Transfusion circulatory overload
TRALI	Transfusion-related acute lung injury
IRB	Institutional Review Board

Chapter One

Introduction

1.1 Background:

Blood transfusion is an essential component of the National Health Service, and there is no substitute for blood and its components. (Rudrappan, 2019). Blood transfusion always has been present in the history of humanity with the notion that it could maintain and preserve lives. (Dolnicar et al., 2015).

Blood and blood components (BCs) for transfusion are achieved from donations made by individuals. (Garraud & Tissot, 2018). To survive, every human need normal blood functioning. Moderate changes may result in sub-physiological functioning, although more serious flaws can be addressed by medicines, blood derivatives (where accessible), or both. (Garraud & Tissot, 2018). Nearly, A blood transfusion is carried out every second, and 80 million units of blood are collected annually.(Kavaklioglu et al., 2017). Many medical conditions can be improved by the use of blood and blood products. (Pehlivanoğlu et al., 2011).

Blood transfusion safety and sustainability are worldwide concerns (Cap et al., 2018). Given the rising demand for blood supplies globally, it is urgent to ensure a safe and sufficient supply of blood products. (Masser et al., 2008).

The blood transfusion process is an aspect of the field, where errors can lead to disastrous outcomes. Some significant failures include issues related to transmitting information, about the request for transfusion accurately identifying patients and samples conducting matching tests administering blood components safely ensuring proper completion and submission of transfusion control documents as well as reporting any reactions, to the transfusion. (Mora et

al., 2019) . There are several attempts trying to prevent transfusion-related mistakes (Davis et al., 2011). Health care professionals' knowledge and skills are critical for establishing and improving the quality of blood transfusion operations. (Beril & Semiha, 2019)

To practice safely health care provider needs to be familiar with the blood transfusion in order. Despite this, little is known about their blood transfusion practice and the information that supports it. The explored literature showed areas for improvement in both knowledge and practice. Until now, no similar study has been found in the Middle East. Studies outline significant diversity between different nation areas, which is caused by variations in health circumstances as well as resource inequities. Comparing Patient Blood Management (PBM) practices as described in this article, enables people from low-, middle-, and high-income countries to constructively learn from one another and work toward implementing new, ideally evidence-based, improvement approaches (Hijji et al., 2013) Eichbaum et al., 2016)

This study aims to measure the level of knowledge about blood transfusion within healthcare providers (laboratory technicians, nurses, physicians) at An-Najah National University Hospital and its impact on patient safety using designed questionnaire .

1.2 Statement of the Problem:

Knowledge of blood transfusion is defined as the ability to answer correctly a set of questions about this medical procedure. Health care workers should be aware that ignorance of this medical procedure may result in incorrect diagnosis and treatment, thus increasing the possibility of hospital-acquired infection or patient death. (Ahmed et al., 2019)

“The problem at hand is the uncertainty surrounding the level of knowledge among health workers regarding blood transfusion practices and the potential effect this lack of knowledge may have on patient safety. Blood transfusions are complex medical procedures that require

precise execution to minimize risks and ensure positive patient outcomes. However, if healthcare professionals involved in blood transfusions do not possess adequate knowledge about the process, it can lead to serious complications, transfusion reactions, and compromised patient safety".

The extent of health workers' knowledge about blood transfusion practices and its impact on patient safety remains unclear. Without a comprehensive understanding of blood typing, compatibility testing, transfusion reactions, proper administration techniques, and post-transfusion monitoring, there is a higher likelihood of errors occurring during the procedure. Such errors may include mismatched blood types, improper administration rates, failure to identify adverse reactions promptly, or inadequate post-transfusion monitoring, all of which can have severe consequences for patients. (Rudrappan, 2019)

Therefore, it is imperative to investigate and determine the current level of knowledge among health workers regarding blood transfusion practices and identify any potential gaps or deficiencies. By doing so, healthcare organizations can develop targeted training programs, educational initiatives, and quality improvement measures to enhance health workers' understanding and competence in performing blood transfusions. Ultimately, this will improve patient safety and reduce the risks of this critical medical procedure.

However, there is a need to assess the current knowledge levels of health workers involved in blood transfusions and evaluate how this knowledge may affect patient safety. This assessment can help identify potential gaps in knowledge and areas where additional training or education is required to improve patient outcomes.

During the National Summit, on Overuse the American Medical Association and The Joint Commission institution (JCI) acknowledged that the transfusion of blood cells (RBC) is, among the five procedures that are excessively utilized in hospitals is required to attain

Haemovigilance (Derzon et al., 2019). It enables transfusion authorities to identify and correct problems while monitoring progress (Shaukat et al., 2021). Most of the errors reported in the risks of blood transfusion report can be attributed to factors. Therefore, it is highly recommended that staff undergo training, on blood transfusion practices. Having an understanding and proper training in blood transfusion management is crucial. To ensure education and patient management it is important to assess the level of knowledge in blood transfusion practice and identify specific areas, for improvement. (Sahmoud et al., 2021).

"The level of knowledge among health workers regarding blood transfusion practices and its potential effect on patient safety needs to be determined to identify any gaps in order to improve the overall quality of care provided during blood transfusion procedures."

1.3 Significance of the Study:

The World Health Organization classifies blood components derived from whole blood donations as essential medicines. According to the World Health Organization, essential blood medications include whole blood, cellular components (such as concentrated red blood cells and platelets), fresh frozen plasma, and various plasma protein derivatives, including clotting factor. (Burnouf, 2019).

The proposed study on the level of knowledge among health workers about blood transfusion practices and its potential effect on patient safety holds several significant implications for healthcare providers, policymakers, and patient outcomes. Our study will enhance patient safety by assessing the knowledge gaps among health workers related to blood transfusion practices; this study can identify areas where improvements are needed to enhance patient safety. Understanding the factors contributing to errors or complications during blood transfusions can help healthcare organizations implement targeted interventions, training

programs, and protocols to mitigate risks and ensure better patient outcomes. Also, the findings of this study can inform the development of quality improvement initiatives aimed at enhancing the competence of health workers involved in blood transfusion procedures. By identifying specific areas of deficiency, healthcare organizations can design targeted educational interventions, training modules, and continuing professional development programs to bridge the knowledge gaps and improve the overall quality of care provided during blood transfusions. On the other hand, the study results can contribute to evidence-based policy development in blood transfusion practices. Regulatory bodies and healthcare policymakers can utilize the findings to establish or revise guidelines, protocols, and standards that healthcare professionals must adhere to during blood transfusion procedures. This can ensure standardized and safe practices across healthcare settings, reducing the occurrence of errors and adverse events. And the study outcomes can guide the development of comprehensive training and educational initiatives aimed at healthcare practitioners engaged in blood transfusion procedures. It can serve as a basis for curriculum development in medical and nursing schools, as well as continuing education programs for practicing health workers. Improved training can equip healthcare professionals with the necessary knowledge and skills, ultimately leading to safer blood transfusions and better patient outcomes.

Finally, ensuring proper knowledge and adherence to best practices during blood transfusion procedures can potentially reduce costs associated with complications, adverse events, and transfusion-related errors. By improving patient safety and minimizing the need for corrective interventions, healthcare organizations can allocate resources more efficiently and redirect 6them toward other critical areas of patient care. One area of medicine where errors can have disastrous effects is blood transfusion procedures. The transmission of information regarding transfusion requests, patient identification, sample identification, cross-matching ordered tests, transfusion of blood components, completion and transmission of the transfusion control

document, and reporting of transfusion reactions were the most significant failures. (Mora et al., 2019). Human safety is critical, which needs a safety blood bank system in addition to blood testing and blood storage there for to prevent poor clinical outcomes and lost resources, it is necessary to select the method of identifying injured patients that is the most effective, efficient, and economical. Hospitals and health administrators in Palestine lack the fundamental data and baseline patient safety evidence needed to form opinions and develop patient safety improvement strategies. (Najjar et al., 2013).

Because blood is a valuable resource, it must be prescribed, handled, stored, and transfused in accordance with protocol to ensure recipient safety. Receivers of transfusions may suffer as a result of clinicians' ignorance of safe transfusion techniques. (Kaur et al., 2014).

In summary, this study's significance lies in its potential to improve patient safety, inform policy and guidelines, drive quality improvement initiatives, enhance healthcare professional training, and ultimately contribute to more effective and safer blood transfusion practices. Therefor our study will describe the current findings on self-reported levels of knowledge among health care workers at An-Najah National university hospital located in Palestine and assesses their potential effect on patient safety. Also, our study will be the baseline for healthcare providers and health care policymaker by determining the impact of blood transfusion gap knowledge on patient safety.

1.4 Aim and Objectives

The purpose of this study was to detect the level of knowledge and practices within health care providers about blood transfusion. To analyze the adverse events reported related to blood transfusion hospital care base services in Palestine, which is related to the knowledge and practices deficit.

The objectives were to discuss and investigate, among blood transfusion to patient safety, and to evaluate knowledge, safety and the impact of healthcare providers' awareness of the blood transfusion listed as the followings:

1. Examine the hospital's healthcare staff's level of knowledge regarding patient safety and blood transfusions.

2. Give suggestions for enhancing patient safety during blood transfusions in medical facilities.

3. Increase the healthcare providers awareness of the most recent risk information and precautions pertaining to blood transfusions.

1.5 Study Question and Hypothesis

What is the level of knowledge among health workers regarding blood transfusion practices, and how does this knowledge impact patient safety?

Hypothesis 1: There are no statistically significant differences in level (a=0.05) for the Nurse respondents between their Gender, Age. and their knowledge about "**Issues related to patient preparation**"

Hypothesis 2 There are no statistically significant differences in level (a=0.05) for the Nurse respondents between their education and their knowledge about "**Issues related to patient preparation**"

Hypothesis 3: There are no statistically significant differences in level (a=0.05) for the Lab Technician respondents between their gender and education and their knowledge

Hypothesis 4 There are no statistically significant differences in level (a=0.05) for the Lab Technician respondents between their age and their knowledge

Hypothesis 5: There is no statistically significant differences in level (a=0.05) for the Physician respondents between their gender, age and education and their knowledge Study Variables

Dependent variable:

Knowledge and practicing knowledge.

Independent variable:

- Age, sex, marital status, and years of experience are sociodemographic factors.
- Factors specific to the individual: level of education, work history, and transfusion frequency.
- Guidelines (protocols) and training are institutional factors.

1.6 Conceptual Definitions:

1.6.1 Blood Component:

Whole blood, which is composed of cells, colloids, and crystalloids, can be separated into various blood components, including plasma, cryoprecipitate, packed red blood cell (PRBC) concentrate, and platelet concentrate. Blood is a bodily fluid that is crucial to maintaining life (Basu & Kulkarni, 2014).

Packed red blood cell:

The primary physiological functions of red blood cells (RBCs), also known as erythrocytes, are the transfer of gases (O2, CO2) from the lung to the tissues and the maintenance of the systemic acid/base balance. (Kuhn et al., 2017)

Blood plasma:

Blood plasma is the fluid portion of a unit of whole blood that has been quickly, typically within eight hours, frozen (Khawar et al., 2021).

Platelet:

Platelets are a nucleate discoid-shaped cells that measure 3-5 microns in diameter and circulate at a concentration of 150-400 x 10^9 platelets/l (Hod & Schwartz, 2008). It may be kept for up to 5 days at room temperature (22 2 °C) with constant moderate agitation. Because of the possibility of bacterial contamination, longer platelet storage times have not been advised (Cho et al., 2018)

1.6.2 Cryoprecipitate component:

The US Food and Drug Administration (FDA) only recognized cryoprecipitate antihemophilic factor (cryo AHF) as a fibrinogen source to treat acquired bleeding.(Lu et al., 2022).

1.6.3 Blood Transfusion:

One of the most frequently used medical treatments worldwide, blood transfusions have been a mainstay of anemia treatment for more than a century. Transfusions, though, cannot be regarded as risk-free for the patient. (Bolcato et al., 2020). Blood transfusions treat chronic anemia, avoid bone abnormalities, promote normal development and activity levels, and provide patients with a high quality of life (QoL). (Shah et al., 2019)

1.6.4 Decision for Blood Transfusion:

According to prior study, it has shown that blood transfusion is one of the most regularly performed therapeutic treatments. Moreover, patients with active or severe bleeding, as well as those with anemia-related symptoms, may benefit from transfusion (for example, tachycardia,

weakness, dyspnea on exertion) (Lotterman & Sharma, 2022). Blood requisition forms serve as a means of communication between doctors and blood banks.

Chapter Two

2 Literature Review

blood transfusion guideline:

A thorough assessment of randomized, controlled studies analyzing transfusion thresholds served as the foundation for the most recent AABB (previously known as the American Association of Blood Banks) recommendations.

2.1 Blood transfusion practices

Errors in medicine may be divided into two types: knowledge errors and slip errors. When humans think of as 'problem solvers,' they make knowledge mistakes. These mistakes are caused by a lack of knowledge, insufficient information, or erroneous thinking. In a transfusion, knowledge mistakes lead to incorrect blood administration decisions. Slip mistakes, on the other hand, arise when individuals think "automatically." Distraction, exhaustion, or inattention can contribute to slip mistakes. The labeling of the patient's pre-transfusion sample, the choice to transfuse, and the last bedside check meant to avoid mis-transfusion are three aspects of transfusion that may be improved (Dzik, 2007).

Pre-transfusion nursing responsibilities, blood pack collection, pre-transfusion nursing care, and post-transfusion nursing care are the five interconnected stages of the transfusion process. These four phases are relevant to everyday nursing practice. The management and security of blood product transfusions thus heavily rely on the abilities and expertise of nurses. As a result, nurses must possess the necessary skills and knowledge for transfusing blood and blood products. The healthcare system must make sure that the necessary blood products are

available and that patients are handled well throughout the administration process. (Bediako et al., 2021).

An Indian study evaluated the knowledge of bachelor's in medicine and bachelor's in surgery graduates about blood transfusions after they had participated in a one-day training program to assess their fundamentals knowledge beforethe training program in a descriptive study through a questionnaire included questions categorized blood component question, blood storage, handling, cross match and bedside transfusion practice and management of blood transfusion reaction. The mean score of the pre-training assessment participants was 10.2 (51%), with scores ranging from 5 to 14. The mean post-training assessment score was 17.08 (85.4%), with scores ranging from 12 to 19. In both sessions, no participant received the maximum score of 20. The difference in pre- and post-assessment questionnaire mean scores was statistically significant (Kaur et al., 2014).

2.2 Patient Preparation:

The blood transfusion preparation process involves conducting pre-transfusion testing to ensure compatibility between the recipient's antibodies and the donor's red blood cells. This includes collecting a blood sample from the recipient and sending it for a type and screen test. This test confirms the recipient's blood type and identifies any "unexpected" antibodies (non-ABO) that could potentially trigger a reaction (Lotterman & Sharma, 2022).

A descriptive cross-sectional survey was carried out using an interviewer-administered questionnaire. In a study conducted in United Arab Emirates hospital to measure nurse’s knowledge of blood transfusion, the participant of the study was nurses who had more than 3 months of experience in two hospitals, hospital A and B. Hospital B accepted only national patients while hospital A accepted both nationals and expatriates, survey had different section

included questions about blood transfusion, demographic details and training, blood collection, information prior patient prepare for transfusion and finally section about complication of blood transfusion, The nursing workforce had a diverse background, as nurses from 20 different countries were recruited to work in the United Arab Emirates. In the result there is significant difference in score between hospital A and hospital B also there is a different in knowledge between nurse depending on the basic education country (USA, Australia, Denmark, New Zealand, UK) nurse study in the mention country was have higher knowledge than nurse educated in the middle east, India and Philippines, but in general the final result of the study the score was low and there is a lack of knowledge in the specific area of blood transfusion preparation may be attributed to a deficiency in orientation or training on this particular subject. The individual may not have been adequately educated or informed about the details and processes involved in pre-transfusion testing and the importance of identifying compatibility between recipient antibodies and donor red blood cells. As a result, they might have limited understanding and unfamiliar with the terminology and procedures related to this aspect of healthcare. (Hijji et al., 2013). Before initiating transfusion, nurses must prepare the patient for transfusion therapy such as discuss the procedure with the patient, blood product verification, relay to the patient the characteristics of a transfusion response. If symptoms arise. During the transfusion, the patient is required to inform the nursing staff of their baseline vital signs, lung sounds, urine output, and skin tone (Lotterman & Sharma, 2022).

2.3 Blood transfusion complications:

Global problems include issues of blood safety and sustainability. Utilizing blood components helps blood services remain viable in situations where demand may exceed supply. Utilizing blood components also minimizes hemolytic reactions, supports precision treatment, and enables the best storage conditions for each blood component (Cap et al., 2018).

2.3.1 Infectious hazards and contamination:

The risk of developing a severe infection (HIV / Hepatitis B and C) following blood transfusion is as regarded minimal in high-income nations. However, there are previously undiscovered risks in the infected area, and despite testing, infections transferred via transfusion continue to pose a risk to patients (Bolcato et al., 2020). Bacterial contamination of blood components (particularly platelets) continues to be a significant infectious threat to the blood supply. In high-income nations, substantial research has been conducted to define the danger of bacterial contamination, as well as ways to decrease that risk (Ahmad et al., 2021), Bacterial contamination has caused growing worry over the years due to its potential influence on transfusion services and blood safety (Liu & Wang, 2021)

2.3.2 Non-infectious hazards:

These are divided into immediate and delayed adverse events depending on the timing of the event. The first is further separated into categories for immunological and non-immunological phenomena. Immunological reactions (TRALI) include things like acute hemolytic response, non-hemolytic febrile reaction, allergic reactions, anaphylactic shock, and transfusion-related acute lung injury. circulatory overload caused by blood transfusion (TACO), post-transfusion hypotension and hypertension, non-immunological hemolysis, and calcium and potassium ion imbalances. hypothermia, and other immediate non-immunological mechanism responses (Bolcato et al., 2020) Acute hemolytic incompatibility can result from transfusion-related acute lung injury (TRALI) or a transfusion error, where the wrong blood component is given to the patient. These three scenarios are the most frequent causes of mortality and serious transfusion complications, along with bacterial contamination of the blood component. Clinicians need to be aware of these transfusion risks and prevent underestimating them. Because of a variety of

factors, these risks are particularly important in the medical-legal context. (Bolcato et al., 2020).

Before and after the course on blood product practices, which was used as an intervention in the study, a different study was conducted in Turkey's Izmir to evaluate the nurse to increase their knowledge of blood transfusions and to increase their awareness of them. Eight hours were allotted for teaching, learning, and question and answer sessions. To one group of participants who took the course, pre- and post-tests were administered, the questionnaire used in this study had 35 items, including questions about history of transfusion, blood transfusion complications, and nurse responsibility in terms of hospital quality standards. Of the 25 nurses who completed the questionnaires, 25 completed them completely. Although the study cannot be generalized, it did find a significant difference between the nurses' pre- and post-course mean knowledge scores (Akyol, 2019).

An observational, descriptive study in South Africa in Witwatersrand affiliated academic hospitals was conducted using a questionnaire the study included different area of transfusion medicine to evaluate the level of blood product knowledge. ordered by medical doctor and included the correct ordering patterns, cost, adverse effects, and safe administration the participant in the study is medical doctors the consultant and intern medical doctor, Community Service Doctor, Medical Officer where the consultant achieved the highest score regardless of ordering or usage of blood component the section of plasma product achieved significant result followed by platelet is the second significant result and need attention but the number of questionnaire received is 200 response from 600 distributed thus the sample in the study is not representative of the workforce at the various hospitals (Laher & Patel, 2019).

Another study targeted medical student and resident in Lebanese and Saudi medical institutions Data was gathered for this study using an online survey that included 26 questions, four about

personal information and transfusion experience, 22 about knowledge of transfusion practices in various areas, including blood donation, donor selection, production and storage of blood components, blood requests, transfusion reaction and complications. There were 126 Saudi Arabian students, 84 Lebanese students, 31 Saudi Arabian residents, and 23 Lebanese residents who participated in the survey. Although there were no statistically significant differences between student and resident knowledge, both groups scored between 48% and 46 % of the acceptable limit, which was 60 %, respectively which mean in the result both group need well-structured education and training to improve their knowledge (Farah et al.,2022).

2.4 Blood Transfusion Management:

The American Associated Blood Bank (AABB) has worked with Joint commission institution (JCI) to assist hospitals in reducing RBC transfusion overuse and improving patient outcomes through the implementation of patient blood management systems and optional certification to track progress on transfusion procedures. (Derzon et al., 2019)

High-quality, safe medical services are becoming increasingly important in complex health-care systems. Because blood transfusion has both direct and indirect risks, to ensure the highest level of patient safety, the practice culture of transfusion medicine must change toward a patient blood management approach, with hospitals utilizing it as a crucial tool to lower the risks of blood transfusion. (Bolcato et al., 2020).

The research was cross-sectional and used a self-administered, pilot-tested questionnaire. 26 questions on the survey form were aimed at the six blood transfusion practices that cause the most problems. The participant was invited to participate in the study from 16 African countries Blood facilities, questionnaires were distributed. Country-by-country grouping and descriptive analysis, the aim of that study was to assess the level of education and training held

by laboratory staff employed by African blood facilities, the questionnaire in this study was created by author and validated. The final questionnaire, which was written in English, consisted of 26 questions covering six main topics. The survey was responded to by eight different countries, which included Algeria, Egypt, Ghana, Kenya, Lesotho, and Tanzania are six lower-middle-income nations, while Malawi is one low-income nation and South Africa is one upper-middle-income nation. In total, 55 surveys were completed and received from 12 facilities across these countries. Members of the Global Transfusion Forum Education Subcommittee of the AABB carried out the survey.(10 blood establishments and two blood banks) all of them have the same function of blood collection and storage, grouping and screening, cross match and blood issue for transfusion, the result in this study was show that the transfusion medicine /blood bank training programs of various categories was available in eight respondent counties and the majority of the program was focused on theoretical knowledge and practical skills, in Ghana, Malawi, and Tanzania training program was dependent on funding availability so the absence of training in these country was due to budget limitation The study highlighted several limitations in assessing the state of transfusion medicine education in Africa. One major limitation was the insufficient number of experienced trainers available, which may have hindered the overall quality of training provided. Additionally, the study revealed a significant lack of online learning and assessment opportunities across all respondent countries. Another limitation was that the survey focused on various types of training without evaluating the quality of the training programs. This lack of information on training quality might limit the overall understanding of the effectiveness of education in the surveyed countries. Furthermore, the electronic nature of the survey required internet access, potentially excluding respondents from countries with limited electronic resources. As a result, the respondents may have been biased towards countries with better resources, leading to an incomplete representation of the education status in Africa's transfusing facilities. Moreover, the majority of responses were from blood establishments, with only a few from hospital blood banks. This

skewed distribution may not fully reflect the education levels at the blood bank level in Africa. Considering these limitations, it is challenging to generalize the findings to the entire continent accurately. It is possible that the study underestimated the prevalence of existing transfusion medicine educational gaps in Africa. Consequently, further evaluation and research are needed to gain a comprehensive understanding of the educational needs in transfusion medicine across the region. (Rambiritch et al., 2021).

2.5 Risk management of blood process:

Blood transfusion is a good example of a complicated health care process comprised of a series of interdependent sub-processes involving many experts, where any error occurring at any level can have catastrophic implications on subsequent stages and, ultimately. According to the literature and practical evidence, the fundamental causes of the majority of high severity errors resulting in adverse events in blood transfusion are rooted in logistics flows, from quality point of view FEMA (failure mode and effect analysis) considers all of the major risk sources, as well as the linkages between the criticalities. Another advantage of the proposed technique is that it allows not only for the identification of risk responses, but also for the establishment of Key Performance Indicators (KPIs) to track the actual operational gains that they provide. This feature contributes to filling the current gap in risk response performance assessment by taking into consideration the key parameters that should be addressed in blood management, namely time and temperature. KPIs aid in decision making to reduce waste. (Cagliano et al., 2021).

New technology for transfusion safety

Combining portable devices that read bar-coded patient identification from the patient's wristband with portable printers that create specimen labels at the patient's bedside using information directly extracted from the wristband is a natural method for better sample

labeling, this technique can improve error happened due to miss labeling specimen, another technique work on decision of transfusion called Computerized Physician Order Entry (CPOE) this technique according to study could reduce critical error by 50 % and all error by 80% because it provide more structured , legible, and traceable communication between physicians and the blood transfusion service it could be more helpful when it used in addition to computer-assisted decision support system ,but transfusion safety will not be increased by new technologies alone. In the end, committed professionals working with state-of-the-art technology and supporting error-reduction strategies are essential to providing better patient care. To choose the best technology, hospitals will require adequate staffing, transfusion safety officers, and wise administrative leadership. (Dzik, 2007).

From January to October 2014, blood transfusion documentation was audited using a manual paper system. To expedite transfusion safety checks and automate documentation, an electronic barcode scanning system was created. This system was installed between October and December 2014 in 58 operating rooms, and compliance checks continued through December 2015. After the implementation of the barcoding system, 98 % of transfusions were carried out using the new electronic technique, which led researchers to investigate the relationship between the installation of barcode scanners and the compliance with transfusion documentation. (15,997 transfusions) occurred over the two years under study, a Thanks to the electronic system, which found 45 potential transfusion errors in 27 different patients, the transfusion of 36 mismatched blood products into 20 different patients was prevented. The electronic system enhanced patient safety, the blood transfusion procedure, and transfusion documentation, according to 69 percent, 86 percent, and 88 percent of healthcare professionals, respectively. when medical professionals scanned barcodes with a scanner, no transfusion errors or reactions were noted. without changing workflows or retraining employees. At

Massachusetts General Hospital, the Institutional Review Board gave its approval to this study. (Vanneman et al., 2020)

A personal interview with 190 doctors who practice in the Suez Canal Area was conducted as part of a study in Egypt's Suez Canal University Area. All pediatricians who had been in practice for at least the previous six months were enrolled from the pediatrics departments at the Suez Canal University hospital and the four general hospitals in the three governorates. Nearly two thirds of them had previously received training on general patient safety. The majority of them were female, had more than 8 years of experience in the field of pediatrics, and were mostly female, while none of them had any training on transfusion safety in the result the participant were able to correctly identified medical error except of near miss after education half of them can correctly identified, but for correct usage of blood component 78.9 % correct answer for red blood cell,63.2 % for fresh frozen plasma and 60% correctly identified transfusion for platelet (Sahmoud et al., 2021).

In another side the internal review board at the University of California, San Francisco approved the study and survey. Over the course of three months, knowledge assessment questions were sent to 60 medical schools in 31 nations across four continents (Africa, North America, Asia, and Europe) and 60 medical schools in low, medium, and high countries, the purpose of this study was to assist the quality and effective of medical education on physician knowledge about blood transfusion and to identify gap in transfusion medicine. According to this study, transfusion medicine is received to varying degrees by medical students in extremely high and medium countries (Al-Riyami et al., 2021).

Another survey study specified into hospital medicine provider’s transfusion knowledge across the unite state the participant was doctors of family and internal medicine as well as other advanced practitioners work in hospitals. all of them complete 3 years of residency ,from 264

survey there is response on 183 survey completed , the participant knowledge was rated into beginner ,intermediate and advanced 13.6 %,57.4% ,25.14% respectively three reported with no knowledge and four reported as expert ,the 20 question on the survey was related to knowledge transfusion topics it was validated exam in the conclusion of this study hospital medicine provider have a gap knowledge mainly on transfusion reaction question ,further education and training need to improve their knowledge (Halford et al., 2021).

In a multicenter analysis a retrospective study performed in new York for patient incidence reporting system occurring during blood administration for There were 1902 reports for 1 point 1 million transfusions from January 2010 through September 2017; 358 of these reports came from pediatric hospitals and 1544 from adult hospitals. The study's findings demonstrate the ongoing significance of transfusion safety practices. In the adult and pediatric settings, different incident report categories were used (Vossoughi et al., 2019).

In US and after an HPS (human patient simulation) experience, a quasi-experimental approach It was a two-day mid-semester skills camp held in lab rooms connected to a nursing school housed in a public university in the Midwest of the United States. Pre/posttests were used to compare a lecture group with a no lecture group of nurses. Participants were either in the traditional Bachelor of Science in nursing (BSN) or the licensed practical nurse (LPN). Age, gender, race/ethnicity, education, and prior transfusion experience were all gathered using a demographic questionnaire The researchers created a 10-item multiple-choice pre/posttest to evaluate cognitive knowledge. Students who attended a lecture before taking the HPS scored significantly higher on the pretest and posttest than those who did not hear the presentation. The questions were created to test students' understanding of the blood transfusion method, safe monitoring, and identifying adverse reactions. Students with prior college degrees found that education level was also a factor in both pre and post scores. (Associates, Bachelors, and Masters), Students who were also pursuing practical nursing licenses performed much better.

Before and after test scores were significantly higher for students who had previously drawn blood (Flood & Higbie, 2016).

In French 14 hospitals in Aquitaine (one university and 13 general hospitals) participated in the survey. In order to describe the nurses' attitudes, knowledge, and reported practice of blood transfusion in Aquitaine hospitals and to estimate the potential risk that inadequate transfusion-related knowledge and practice pose to patient safety; and to identify characteristics associated with poor knowledge and practice. The questionnaire focused on blood transfusion regulatory knowledge and practice questions. Data was collected by trained investigator made individual interview with a total of 1090 nurse, in the result there is gap between knowledge and practices other factor investigated in the study associated with the reason of gap was the frequency of blood transfusion and nurse training. Training is thought to play a significant part in enhancing knowledge and safety procedures. (Saillour-Glénisson et al., 2002).

Chapter Three

3 Methodology

3.1 Study design

The study design of this research is quantitative descriptive cross-sectional study. The cross-sectional design of the study allows for the collection of data at a single point in time, providing a snapshot of the participants' KAP (knowledge, attitude and practices) levels.

3.2 Setting of the Study:

The An-Najah National University Hospital (NNUH) in Nablus served as the study's site. An-_Najah National University Hospital (NNUH) was established in 2013 and serves as a secondary and tertiary facility as well as one of the primary ANNU training locations for medical residents and students of medicine. Patients come to NNUH for specialized care from all over Palestine, including the West Bank and Gaza Strip. It is a nonprofit hospital with 135 beds and ambitions to grow to almost 500. Surgery, Internal Medicine, Pediatrics, Anesthesia, and Radiology are the five main departments of NNUH. In addition to offering both inpatient and outpatient care, NNUH also has a quality department with a reporting system when compared to the other hospital facilities. The municipality is also a significant hub for health, education, and research.

The total number of employees at An-Najah National University Hospital (NNUH) is 750, the total number of healthcare providers is 374 and 270 of them are nurses, 60 physicians and 25 lab technicians , 10 radiologist and 9 pharmacist.

The study period was conducted from October 2022 to January 2023.

3.3 Methods of Data Analysis

Statistical Tests: descriptive statistics used to present the demographic characteristics of the participants in the study. These statistics also used to show the frequencies of personnel with sufficient and insufficient knowledge about blood transfusion. ANOVA test and t-test were used to test the knowledge difference according to demographic variables with alpha = 0.05 as the level of significance

3.4 Population, Sample and Sampling:

Healthcare providers are the targeted group in total there are (30 laboratory technicians, 270 nurses and 55 physicians) working in Al-Najah National University Hospital (NNUH) used as a source of population.

The sampling method used a convenient sample and targeted the healthcare providers at the hospital who are at day shift during the study period. The sample size of the study was calculated by using the Raosoft calculator website; the questionnaire will be distributed to 200 Healthcare providers in NNUH. The total number of participants was 200, the non-response rate was 16.5%. The main characteristics of the sample's members, of (135) nurses and (18) physician and (15) lab technicians .The total number of physicians who completed the questionnaire was 18 , 15 of lab technicians answer the question with one missing response on the age and gender and 135 participant answer on nurse question with missing of 2 answers on gender, 12 missing answers on age and 3 missing answers on years of experience, 2 missing answers on **academic qualifications** Response rate was 83.5%

Inclusion Criteria: All healthcare providers who are involved in the care process related to blood transfusion with the patients (Nurses, Lab Technicians, and Physicians) were included in the study.

Exclusion Criteria: health workers whose employment three months or less and daily paid healthcare providers are excluded, and specialist physicians are excluded too.

1. Data Collection Tool

The study used an internationally validated questionnaire to ensure the reliability and validity of the data collected. The questionnaire has been reviewed by specialists on blood transfusions. This study collected data on the socio-demographic characteristics and levels of KAP (knowledge, attitude, and practice) of participants related to blood banks using an internationally validated questionnaire comprising four parts, and 55 questions Appendix 1.The sociodemographic information about the survey's participants was collected in the first section. The remaining sections tested the knowledge and attitude of the participants towards blood banks, with specific sections designed for nurses, laboratory technologists, and physicians. The questionnaire also included a general information part that all participants had to answer related to the complications associated with a blood transfusion that must be familiar to all participants and its effects on patient safety.

An altered form of the Blood Transfusion Knowledge Questionnaire was used in the study. considered four parts and general information, **part one** for all participants is about demographic details, **part two** for nurses (Hijji et al., 2013) items in this part were divided into five categories. categorized as follows:

Section A: Issues about nurse training, education on the blood transfusion mechanism and the frequency of using this technique.

Section B: Issues Relating to Patient Preparation which include five questions.

Section C: Blood Pack Collection which includes three questions.

Section D: Pre-Transfusion Initiation Nursing Activities which include six questions.

Section E: Post Transfusion Nursing Activities and Issues which include ten questions.

Second part was related to the complications associated with a blood transfusion

Part three for laboratory technologists consists of 11 questions for laboratory technician knowledge assessment (Shrivastava et al., 2022).

Part four was indicated the physician knowledge about transfusion transmitted disease, medication error and blood transfusion reaction

Part four of the questionnaire for physicians consists of 9 questions.

The last section was a general information section: Complications Related to Blood Transfusion, this section for all healthcare providers to answer which included 8 questions

The final part the general information part consists of 8 questions related to blood transfusion complication and must be answered by all participants (Sahmoud et al., 2021),

The questionnaire was modified by the researcher and summed together to get the final questionnaire as described before.

2. Pilot Study

A pilot study was conducted to guarantee the accuracy and relevance of the data collection. methods employed in the thesis, The pilot study specifically targeted a sample of 30 in total (15nurse, 6 physicians, 9 laboratory technician) working across different departments within the hospital. This sample size was chosen to provide a representative overview of the nursing staff in the hospital setting.The main purpose of the pilot study is to assess the feasibility and usability of the research tool. The researcher's goal is to determine whether the chosen data

collection method (for example, survey, interview, or observation) is suitable and effective for collecting the necessary information from relatives.

During the pilot study, researchers closely monitored the data collection process and actively sought feedback from participating caregivers. This feedback allowed them to identify potential problems or issues with the research tool and its implementation. The tool was modified based on these insights to improve its clarity and relevance to the research objectives. In addition, data from the experimental study were analyzed and evaluated to determine their quality and utility. This analysis provides valuable insight into the feasibility and effectiveness of data collection methods to obtain the intended information from caregivers. The researchers reviewed the data to identify areas that needed adaptation or improvement to ensure a more rigorous and comprehensive approach to the study itself.

The questionnaire used in this study to assess the level of knowledge of healthcare professionals about blood transfusion practices was found to be comprehensible, applicable, and reliable. The questionnaire consisted of clear and precise questions covering the basic aspects of blood transfusion knowledge. It is designed to assess participants' understanding of blood grouping, cross-matching, transfusion reactions, drug administration methods, and post-transfusion monitoring. The questions are in a multiple-choice format, which makes it easier to choose the answers. Furthermore, the utility of this tool is evident as it is directly aligned with the research objectives of assessing the knowledge of healthcare workers about blood transfusion practices.

To determine the reliability of the tool, Cronbach's alpha coefficient of 0.7 was calculated using a pilot study sample. A Cronbach's alpha value of 0.7 indicates a high level of internal consistency among the tool's items, suggesting that they measure the same underlying construct of knowledge about blood transfusion practices. This demonstrates that the tool is

reliable in capturing participants' knowledge accurately and consistently. Overall, the tool's clarity, relevance, and satisfactory reliability make it a suitable instrument for assessing health workers' knowledge about blood transfusion practices in subsequent research endeavors.

3. Ethical considerations

A university affiliated with the Arab American (AAUP) community granted ethical approval for the study. and the hospital ethical review committee with a supporting letter was taken to conduct the study. The voluntary participation by participants was guaranteed, and the choice to withdraw. from the study was assured. Data stored and kept private access only to the researcher. Names of participants were not included. An explanation was given to the participants about the purpose of the study and got verbal consent from them for their approval to participate. appendix 2 and appendix 3.

Chapter Four

4 Results

4.1 Introduction

This chapter provides an overview of the study's sample, including details about the participants involved. It also describes the research tool used in the study, explaining its purpose and characteristics. The chapter outlines the procedures followed during the implementation of the study, including data collection methods and any specific protocols. Additionally, it highlights the statistical methods employed for analyzing the gathered results.

The total number of participants was 200, the non-response rate was 16.5%. The main characteristics of the sample's members, of (135) nurses and (18) physician and (15) lab technicians are shown in the below Tables (1) and The total number of physicians who completed the questionnaire was 18 , 15 of lab technicians answer the question with one missing response on the age and gender and 135 participant answer on nurse question with missing of 2 answers on gender, 12 missing answers on age and 3 missing answers on years of experience, 2 missing answers on **academic qualifications**.

4.2 Methodology

Three sections of the questionnaire mainly were designed to collect the data. First one for nurses, second one for lab technicians and third one for doctors. Then, to obtain the results and discuss them, the data was processed and examined.

4.2.1 The Nursing Section

The results showed that the males represent 57.1% of the sample and females represent 41.4%. And the **Age** of most of them is between 26-31, where 23.6% of them are between 18-25 years, while 16.3 % are more than 31 years. For **academic qualifications,** 88% of respondents have a Bachelor's degree and 7.5% of them have Master's degree, only 4.5% of them have a Diploma's degree. Furthermore, most nurses in the sample of experience, 27.3% of them have 1-3 years' experience and the same percentage for nurses with more than 6 years of experience. This is clear in Table below (Table 1).

Table No. 1.: Characteristics of Nurses' respondents

Variable	Classifications	Frequency	Percentage (%)	Missing Data
Gender	Male	76	57.1%	2
	Female	55	41.4%	
Total		**133**	**100.0%**	
Age	18-25	29	23.6%	12
	26 - 31 years	74	60.2%	
	32 -36 years	20	16.3%	
Total		**123**	**100.0%**	
Academic qualifications	Diploma degree in general	6	4.5%	02
	Bachelor's degree	117	88%	
	Master degree	10	7.5%	
Total		**133**	**100.0%**	
Years of Experience	Less than one year	10	7.6%	3
	1-3 years	36	27.3%	
	4-6 years	50	37.9%	
	7 years or more	36	27.3%	
Total		**132**	**100.0%**	

4.2.2 The Physician Section

68.4% of respondents are males and 31.6% are females. And their age is mostly 26 - 31 years. For their years of experience, 57.9% of them have an experience of 1-3 years, and others experience 4-6 years. For **academic qualifications,** 89.5% of the doctors in the sample have Bachelor degree and 10.5% of them have master degree. This is clear in the below table (Table 2).

Table No. 2: Characteristics of Doctors' respondents

Variable	Classifications	Frequency	Percentage (%)	Missing Data
Gender	Male	13	68.4%	0
	Female	6	31.6%	
Total		**19**	**100.0%**	
Age	18-25	3	15.8%	0
	26 - 31 years	16	84.2%	
Total		**19**	**100.0%**	
Academic qualifications	Bachelor's degree	17	89.5%	0
	Master's degree	2	10.5%	
Total		**19**	**100.0%**	
Years of Experience	Less than one year	3	15.8%	0
	1-3 years	11	57.9%	
	4-6 years	5	26.3%	
Total		**19**	**100.0%**	

4.2.2 The Lab Technician Section

The results noted that 64.3% of the respondents in the sample are females and 35.7% of them are males, and most of them at 26 - 31 years' level with 57.1%. Other respondents are on the both levels of age 18-25 years and 32-36 years old. For **academic qualifications**, most of the respondents have bachelor degrees and only one of them has a master degree. For years of experience, 33.3% of the technicians in the sample have 1-6 years' experience. This is clear in the below table (Table 3).

Table No. 3.: Characteristics of Lab Technicians Respondents

Variable	Classifications	Frequency	Percentage (%)	Missing Data
Gender	Male	5	35.7%	1
	Female	9	64.3%	
Total		**14**	**100.0%**	
Age	18-25	3	21.4%	1
	26 - 31 years	8	57.1%	
	32 -36 years	3	21.4%	
Total		**14**	**100.0%**	
Academic qualifications	Bachelor's degree	14	93.3%	0
	Master degree	1	6.7%	
Total		**15**	**100.0%**	
Years of Experience	Less than one year	3	20%	0
	1-3 years	5	33.3%	
	4-6 years	5	33.3%	
	7 years or more	2	13.3%	
Total		**15**	**100.0%**	

Section one: Nurses' knowledge:

This section describes the knowledge of nurses in the sample; a test was done to examine their knowledge, the test contains 2 parts, the first part has a question with different possible answers, and the second part has a question with standard answers. Results are shown in the tables below.

1.1: First part:

Nurses were asked if they were involved in any training program focused on blood transfusion, and results showed that 89.68% of nurses have never participated within the period they have worked for the department. For the first question about the approximate number to perform a blood transfusion, table 4 showed that the most nurses respondents answered 1-4 times to perform blood transfusion with a percentage of 38.4% of the sample. In comparison 28.6% of them completed 5-8 times blood transfusions in the last 6 months, and 20.3% answered to perform the transfusions More than 12 times. Noting that only 3.76% didn't perform any. This is clear in table 4

For the third question for the nurses in the sample, nurses would like at the most a need further training or education about each of 5 main aspects: the collection of blood bags, the occurrence of adverse reactions, the identification of serious hazards related to blood transfusion (please write the others aspects) are most transfusion practice, 23.70% of them prefer for administration field, 19.26% ask for sampling and only 8.89% of nurse participants didn't feel in need for any transfusion practice training. This is clear in the table number 4

Table No. 4.: Nurses' Practices Related to Blood Bag Collection And Patient Preparation

Questions	Classifications	Frequency	Percentage
Over the past 6 months, what was the approximate number of times you performed a blood transfusion?	None at all	5	3.8%
	1-4 times	51	38.4%
	5-8 times	38	28.6%
	9-12 times	12	9.0%
	More than 12 times	27	20.3%
Have you ever participated in any in-service training program in relation to blood transfusion within the period you have worked in the ward, in which blood transfusion is performed?	Yes	13	10.32%
	No	113	89.68%
What specific area(s) relating to transfusion practice do you feel you would like further training/education?	Sampling	26	19.26%
	Collection of blood bag	42	31.11%
	Administration	32	23.70%
	Adverse reactions	43	31.85%
	Serious	42	31.11%

	hazards		
	None	12	8.89%
Years of Experience			
	Less than 4	5	33.3%
	4-6 years	5	33.3%
	7 years or more	2	13.3%

1.2: Second part:

The tables below showed the results for the testing the nurses knowledge about different topics which are: blood bag collection and patient preparation, the extent of nurses' understanding regarding nursing responsibilities before initiating a transfusion, and the extent of nurses' understanding regarding nursing responsibilities following transfusion initiation.

Table 5 presents an analysis of nurses' proficiency regarding various aspects of blood bag collection and patient preparation. Generally, it reveals a concerning low level of accuracy, particularly in making decisions when faced with incomplete orders, where the accuracy rate stands at merely 25.38%. Additionally, the table indicates a moderate understanding of the correct methods for transporting blood bags, with a knowledge rate of 64.34%. It also highlights a slightly higher familiarity with the procedures for securing the appropriate blood from the blood bank, evidenced by a 66.41% knowledge rate. Notably, the highest proficiency is observed in the recording of baseline vital signs, where nurses achieved a commendable score of 75.57%.

Table No. 5.: Nurses' knowledge related to blood bag collection and patient preparation

Item and correct answer	Correct	
	NFrequency	Percentage%
Checking patency of IV after blood bag collection. (False)	54	41.86%
Collecting of the blood pack from blood bank should take place before the administration of any prescribed pre-medication. (False)	56	43.41%
Decisions to be taken by the nurse with incomplete order (refuse to collect and administer the blood)	33	25.38%
Information to ensure collecting the right blood from blood bank. (Patient's identification details are identical to the blood bag and blood request form)	87	66.41%
Blood bag transport method. (Validated special box)	83	64.34%
Knowledge of basic ABO terminology. (Check details with another nurse then transfuse the unit).	57	44.19%
Three aspects of information giving to the patient. (Reasons for blood transfusion, risk of blood transfusion, and reaction symptoms).	60	45.45%
Baseline vital signs recording. (Within ½ hour before transfusion)	99	75.57%

Table 6 presents data on nurses' knowledge levels concerning their responsibilities prior to initiating blood transfusions. The findings indicate a significant deficiency in understanding, particularly in areas such as the clinical indications for blood warming, where only 16.15% demonstrated knowledge, and the procedures for patient identification, with a slightly higher percentage at 16.67%. Conversely, there is a notable improvement in knowledge regarding the management of blood upon its arrival at the ward, evidenced by 46.21% of respondents, and the most critical nursing actions to be taken before commencing a transfusion, where 50.38% showed proficiency. This trend of increasing knowledge peaks at 69.23% when addressing the optimal timing for initiating a transfusion if the blood is delivered to the ward at 4 PM.

Table No. 6: Nurses' knowledge level regarding pre-transfusion initiation nursing responsibilities

Item and correct answer	Correct	
	Frequency	Percentage
Most important nursing action before starting the transfusion. (Patient identification).	66	50.38%
Clinical indications for blood warming. (Exchange transfusion for infant, rapid transfusion, patient with cold agglutinins)	21	16.15%
Best time to start the transfusion if delivered to the ward at 4 PM. (4:10 PM)	90	69.23%
Blood handling after delivery to ward. (Start	61	46.21%

immediately).		
Steps for patient identification. (Ask the patient to state name and DOB, patient's identification details are identical to ID band, and blood request form)	22	16.67%
Suitable filter size of transfusion set. (170-200 micron)	43	32.58%

In Tables 7, The study examined the nurses' knowledge concerning the activities that they should routinely perform after initiating a blood transfusion. Time of vital signs recording, via electronic pump and Indications for slow blood transfusion is weak and doesn't exceed 20%. In addition to the knowledge of the rate to initiate a transfusion on an infant which only 35.9% of nurses could answer correctly. On the other hand, nurses in the sample have a fair bit of knowledge about the regulation of the transfusion flow rate. 3 Manual, duration of using a blood administration set for continuous multiple transfusions and duration for completing a unit of blood.

Table No. 7: Nurses' Knowledge Level Regarding Nursing Responsibilities After Transfusion Initiation

Item and correct answer	Correct	
	Frequency	Percentage
Three activities for nurses to perform routinely after starting the blood transfusion. (Setting up the flow rate, documentation of relevant information, and observation for transfusion reaction).	22	16.67%
Complication of central venous route terminating (Cardiac arrhythmia)	75	56.82%
The rate to initiate a transfusion in an adult patient . (Not more than 120 ml/hour)	74	57.36%
Regulation of transfusion flow rate.3 Manual	104	79.39%
Via electronic pump	25	19.08%
Maximum duration of using a blood administration set for continuous multiple transfusions. (4 hours)	96	74.42%
The rate to initiate a transfusion at on an infant4 . (Not more than 0.5 mL/ kg/ hour)	32	35.96%
maximum duration for completing a unit of blood. (4 hours)	85	70.83%

Indications for slow blood transfusion. (Patients with heart disease, severe anemia)	25	20.83%
Vital signs recording after starting a transfusion at 2:00 PM. (2:05 and 2:15, at 3:15, at 4:15, and at 5:00).	17	15.04%
Timing and duration when it is essential to physically observe a patient for possible transfusion reaction. (First 10-15 minutes)	77	64.71%

Section Two: Lab Technicians' Knowledge

In this section we have 11 questions that were asked to lab technicians, and table (8) shows sample respondents as frequencies and percentages.

The Table below shows that most lab technicians have a close level of knowledge since they have standard answers for most of the questions. For respondents, they confirmed that It is incorrect to only attach a special number to be assigned to bold donation to all secondary collection bags and specimen tubes used. It should be "The primary, all secondary collection bags, all specimen tubes used and donation record".

Also, the percentage of wrong answers is more than the right one for the following:

- Patient identification should be performed before administering a blood transfusion.
- The blood bank must have well-documented procedures in place for recalling blood components when necessary.

- When a product is recalled, it should initiate a comprehensive process, including maintaining records of all crucial activities, starting from the receipt of the product and extending to its disposal or return.
- The following components of the blood cold chain are **NOT** necessary:

According to the question of identification of a patient receiving a transfusion, respondents' answers differ about what should be carried out, 71.4% of them answered the right one "At the nurses' station before transfusion" and 28.6% answered wrongly. Same for other questions, respondents have different answers which indicate the differentiation of knowledge skills for lab technicians in some topics.

Table No.8: Lab Technicians' Knowledge level as frequencies and percentages.

Question	TRUE		FALSE		Missing Data
	Frequency	Percentage	Frequency	Percentage	
A unique number must be assigned to each donation of blood. To which of the following should this number be attached? **(**The primary, all secondary collection bags, all specimen tubes used and donation record)	0	0%	15	100%	0
The following applies to storage areas for blood and blood components: (Tested (available) units should be stored separately from partially tested or untested (quarantined) blood components)	15	100%	0	0%	0
Quality monitoring of processed blood components is performed to (Ensure that the final product meets specifications and that the process is "in control")	15	100%	0	0%	0
The identification of a patient receiving transfusion should be carried out:	4	28.60%	10	71.40 %	1

(By the patient's bedside immediately before transfusion)					
The documentation required in the preparation of blood components includes (Approved SOPs and records of all key activities ranging from the receipt of whole blood to the distribution of released components to hospitals and blood banks for compatibility testing)	15	100%	0	0%	0
Documented procedures for the recall of blood components must enable (Recall of the initial component that caused the adverse reaction)	3	21.40%	11	78.60 %	1
Recall of a product should lead to (Notification of the components preparation staff)	3	21.40%	11	78.60 %	2
A "blood cold chain" is (A system for storing and transporting blood and plasma in an appropriate way to maintain all its functions)	15	100%	0	0%	0
The following are NOT essential parts of the blood cold chain: (People who manage the storage and transportation of blood)	5	35.70%	9	64.30 %	1

Haemovigilance programme is concerned with (Investigation of transfusion-related incidents)	10	71.40%	4	28.60 %	1
The customers of the BTS at the clinical interface are (Patients and clinicians)	9	64.30%	5	35.70 %	1

Section Three: Physicians' knowledge

In this section we study physician knowledge through 2 parts, the first part has five statements with (T/F) answers, and the second part has four questions with multiple choices, tables below show the results.

Table shows that the respondents replied the true answers for most of the items asked with percentages reaching approximately 70% which indicates good knowledge of physicians. On the other hand, most of the physicians' respondents replied wrong about the item "Defined as a NEAR MISS if it caused harm. "Where only 38.9% of them replied the right answer, also only 33.3% replied right the the item of "In severe chronic anemia, fast blood transfusion is allowed.

3.1: First Part:

Table No 9: Physicians' knowledge level on the first part of questionnaire

Item	True		False	
	Frequency	Percentage	Frequency	Percentage
Failure of a planned action to be completed as intended	13	72.2%	4	22.2%
Using a wrong plan to achieve an aim.	11	61.1%	6	33.3%
Errors that only result in adverse patient outcomes.	8	44.4%	9	50.0%
Errors that expose patients to risk but do not necessarily result in injury or harm	13	72.2%	4	22.2%
Defined as a NEAR MISSS if it caused harm.	7	38.9%	10	55.6%
Packed red cell transfusion in acute hemolytic anemia.	13	72.2%	5	27.8%
Fresh frozen plasma in factor V deficiency.	12	66.7%	6	33.3%
Cryoprecipitate in factor IX deficiency.	14	77.8%	4	22.2%
Platelet concentrates in immune thrombocytopenia.	12	66.7%	6	33.3%
Packed red cell in iron deficiency anemia	12	66.7%	6	33.3%
The blood transfusion should be slow (2ml/kg/hour) during the first 10-15 minutes.	16	88.9%	2	11.1%
In severe chronic anemia, fast blood transfusion is allowed.	6	33.3%	12	66.7%
Transfusion should be completed with a maximum of	12	66.7%	6	33.3%

four hours.				
Generally, IV fluids and drugs could be easily co-administered.	8	44.4%	10	55.6%
If adverse reaction is noticed blood could be continued in a slower rate with administration of antihistamine.	17	94.4%	1	5.6%
Indication of blood component transfusion.	15	83.3%	3	16.7%
Other relevant treatment options	14	77.8%	4	22.2%
Benefits of blood transfusion.	15	83.3%	3	16.7%
Risks of blood transfusion.	9	50.0%	8	44.4%
The blood component preparation steps.	17	94.4%	1	5.6%
Patient full name, sex, and date of birth.	15	83.3%	3	16.7%
Indications of blood transfusions.	17	94.4%	1	5.6%
If it is an emergency or standard request	14	77.8%	3	16.7%
The need for patient's serum to be screened and held.	16	88.9%	2	11.1%
Number of units.	16	88.9%	2	11.1%

3.1: Second Part:

In this part, respondents of physicians showed their weak knowledge by answering wrong at the most of the T/F questions, since 94.9% of them answered wrong about the required steps of for proper patient identification and 38.9% of physicians answered wrong about infections are routinely screened before blood transfusion in Palestine and the most probable cause of the mentioned complication. This is clear in Table (10).

Table No 10: Physicians' knowledge level on the second part of questionnaire

Question	TRUE		FALSE	
	Frequency	Percentage	Frequency	Percentage
Which of the following infections are routinely screened before blood transfusion in Palestine? (HBV, HCV, HIV, and syphilis)	11	61.10%	7	38.90%
For proper patient identification which of these steps are required (Should be both upon admission and prior to administration of care)	1	5.60%	17	94.40%
After the first hour of blood transfusion, your patient experienced respiratory distress, positive fluid balance and tachycardia. What is the most probable cause of this complication? (Transfusion related acute lung injury (TRALI).)	11	61.1	6	38.90%

General Information Section

In this section, all respondents were asked some general information to check their general knowledge, the questions were in T/F form, and the average of non-response is approximately 14%.

The questions are 2 parts, the first part has 3 questions with multiple correct answers, and the second part has 4 questions with one specific correct answer

Results show that the Lab Technicians answered the first part correctly with percentage of 90%, and physicians with percentage of 60% While most of the answers for Nurses (8.1%) are wrong.

For the second part of the general question, the highest percentages for the correct answers are for Nurses. Lab Technicians and Physicians show their weakness on general information questions since most of them have wrong answers. This is clear in the table below.

Table No. 11: healthcare provider knowledge level on general information section regarding complications and policies and procedures of blood transfusion

Items	**Answers**	**Respondents**		
		Nurse	Lab Technician	Physician
What interventions could minimize the risk of the patient experiencing an acute transfusion reaction?	True	8.1%	90.0%	60.0%
	False	91.9%	10.0%	40.0%
What signs and symptoms indicate that the patient is developing an acute hemolytic transfusion reaction?	True	17.7%	90.9%	80.0%
	False	82.3%	9.1%	20.0%
What should be done immediately when signs and symptoms of acute hemolytic transfusion reaction are seen?	True	17.5%	90.9%	80.0%
	False	82.5%	9.1%	20.0%

What is the commonest cause of the most fatal transfusion reactions?	True	84.0%	11.7%	4.3%
	False	98.0%	.0%	2.0%
A patient has sustained a mild allergic transfusion reaction. What is the usual presenting complaint?	True	73.2%	17.9%	8.9%
	False	98.9%	1.1%	.0%
What is the first action that the nurse should take to handle the patient's condition in question 52?	True	82.0%	12.4%	5.6%
	False	100.0 %	.0%	.0%
What is the commonest cause of the most fatal transfusion reactions?	True	71.7%	19.6%	8.7%
	False	97.1%	2.0%	1.0%
Before administering blood, when it is not acceptable to check patient’s details at the bedside?	True	85.3%	9.8%	4.9%
	False	97.5%	2.5%	.0%

4.3 Testing Hypothesis:

Hypothesis 1: There are no statistically significant differences in level (a=0.05) for the Nurse respondents between their Gender, Age. and their knowledge about "**Issues related to patient preparation**"

There are statistically significant differences in level (a=0.05) for the nurse respondents between their knowledge about "**Issues related to patient preparation**" and their Education. To test the hypothesis, an Independent Sample t-test is used to test the gender of nurses, and a one way ANOVA test for education and age as Table 12.

Table No. 12: Univariate Analysis Result for Issues related to patient preparation related to Gender and Age.

Dependent variable	**Independent Variable**	**Test**	**Sig. (P-value)**	**Decision**
Issues related to patient preparation	Gender	Independent Sample t-test	0.955	Reject Hypothesis
	Age	ANOVA	0.265	Reject Hypothesis

Hypothesis 2 There are no statistically significant differences in level (a=0.05) for the Nurse respondents between their education and their knowledge about "**Issues related to patient preparation**"

Table No. 13: Univariate Analysis Result for Issues related to patient preparation related to Education.

Dependent variable	Independent Variable	Test	Sig. (P-value)	Decision
Issues related to patient preparation	Education	ANOVA	0.012	Accept Hypothesis

According to Table 13, results indicate that the knowledge of nurses' respondents about Issues related to patient preparation has significant relationship with their education since the p-value is less than the level of significance which is 0.05, and no significant relationship with their gender and age since the p-value is greater than the level of significance which is 0.05

Hypothesis 3: There are no statistically significant differences in level (a=0.05) for the Lab Technician respondents between their gender and education and their knowledge

To test the hypothesis, Independent Sample t-test is used to test with the gender of technicians, and one-way ANOVA test for education and age

Table No.14: Univariate Analysis Result for Lab Technicians knowledge related to Gender and Education.

Dependent variable	Independent Variable	Test	Sig. (P-value)	Decision
Lab Technicians knowledge	Gender	Independent Sample t-test	0.253	Reject Hypothesis
	Education	ANOVA	0.873	Reject Hypothesis

According to Table 14, results indicate that the knowledge of Lab technician respondents has no significant relationship with their Gender and education and age since the p-value is more than the level of significance which is 0.05.

Hypothesis 4 There are no statistically significant differences in level (a=0.05) for the Lab Technician respondents between their age and their knowledge

Table No.15: Univariate Analysis Result for Lab Technicians knowledge related to Age.

Dependent variable	Independent Variable	Test	Sig. (P-value)	Decision
Lab Technicians knowledge	Age	ANOVA	0.026	Accept Hypothesis

Table 15 shows ANOVA results showing that age, p-value is less than the significance level which indicates the differences of their knowledge due to age.

Hypothesis 5: There is no statistically significant differences in level (a=0.05) for the Physician respondents between their gender, age and education and their knowledge Study Variables

To test the hypothesis, Independent Sample t-test is used to test with the gender of physicians, and one-way ANOVA test for education and age

Table No.16: Univariate Analysis Result for Physicians Knowledge related to Gender, Education and Age.

Dependent variable	Independent Variables	Test	Sig. (P-value)	Decision
Physicians Knowledge	Gender	Independent Sample t-test	0.389	Reject Hypothesis
	Education	ANOVA	0.599	Reject Hypothesis
	Age	ANOVA	0.067	Reject Hypothesis

According to the table above, results indicate that the knowledge of physician respondents has no significant relationship with their Gender, education and age since the p-value is more than the level of significance which is 0.05.

Chapter Five

Discussion:

Errors in medicine can be divided into two types: knowledge errors and slip errors. When humans think 'problem solvers,' they make knowledge errors. a lack of knowledge, insufficient information, or faulty reasoning cause these error . In a transfusion, knowledge errors lead to incorrect blood administration decisions. (Rothschild et al., 2005) . Providing safe patient care is significantly impacted by the level of knowledge and attitude that nurses have toward patient safety. When nurses possess adequate knowledge about patient safety practices and have a positive attitude towards patient safety, The length of work experience can contribute to nurses' knowledge regarding patient safety by providing them with exposure to different situations, challenges, and best practices (Dzik, 2007). With more experience, the combination of knowledge and attitude towards patient safety among nurses is vital for ensuring the provision of safe patient care. By continuously enhancing their knowledge, skills, and attitudes in this domain, nurses can actively contribute to creating a culture of safety and minimizing preventable harm to patients. (Biresaw et al., 2020). Nurses are considered essential part in blood transfusion, so they must be educated in all transfusion processes in order to keep patients safe (Iqbal et al., 2021). A descriptive research design employing the convenience sampling technique was used to collect data from the 60 staff nurses working at the Sher-I-Kashmir Institute of Medical Sciences who had at least six months of experience, there is no significant association between the nurse's knowledge and demographic variables such as gender. but there is a significant association between knowledge score and other variables such as age , professional qualification , the approximate number of blood transfusions and clinical experience (Iqbal et al., 2021). To determine the strength and direction of the

relationship between nurses' level of expertise and the highest degree they have earned, researchers conducted a cross-sectional analysis of data from 8,611 registered nurses in Pennsylvania. They looked at how expertise was distributed across different levels of nursing education. The findings suggest that there is a weak but significant correlation between a nurse's highest degree and their level of. This implies that nurses with higher levels of education, such as bachelor's or master's degrees, tend to have slightly higher levels of expertise compared to those with lower levels of education continued professional development the relationship between education and knowledge underscores the importance of continuous professional development for nurses. Ongoing education, training programs, and higher academic qualifications can enhance nurses' knowledge base and keep them up-to-date with the latest evidence-based practices and guidelines (McHugh & Lake, 2010).While higher education levels are generally associated with a broader knowledge base and increased critical thinking skills, it is important to consider that other factors, including experience, also contribute significantly to patient outcomes. therefore, Education and clinical judgment are logically related, but more investigation is needed to determine how nurses' education specifically affects patient outcomes (Aiken et al., 2003). When analyzing our results, they indicate a significant relationship between nurses' knowledge of issues related to patient preparation and their education as a predictor of knowledge the finding suggests that nurses' level of education has an impact on their knowledge regarding patient preparation. Future research needs to assess that higher level of knowledge among nurses in this area can contribute to improved patient safety and satisfaction.

A cross sectional study, observational type of study conducted in six blood banks in Delhi National Capital Region for 6-month period, one month in each blood bank during this time, data on adverse transfusion reactions and their reporting were gathered using a specially designed data collection form and a validated questionnaire from each of the six blood banks.

The aim of this study was to identify and document the potential causes of under reporting and the impact on the quality of blood transfusion reactions submitted under the Hemovigilance program (Hemovigilance has become one of the important quality check systems of blood transfusion process) of India.in the result it was discovered that each blood bank faces some difficulties in identifying and reporting adverse transfusion reactions.(Bhat et al., 2023).

The mention study above related to assessment of blood transfusion reaction a few studies founded related to blood bank or laboratory technicians, in our study, the analysis indicates that the knowledge of lab technician respondents has no significant relationship with their gender and education. This conclusion is drawn because the p-values for gender and education are greater than the chosen level of significance (0.05). When the p-value is above the significance level, it suggests that any observed differences in knowledge based on gender or education are likely due to chance and not a true association. These findings highlight the variability in knowledge and skills among lab technicians regarding essential aspects of blood transfusion procedures. It underscores the importance of continuous training and education to ensure a consistent and accurate understanding of critical procedures in the field. To address these knowledge gaps and discrepancies, further training and continuous professional development programs could be implemented to enhance the overall competency of lab technicians. Ensuring that they have a standardized understanding of essential procedures will ultimately contribute to the safety and effectiveness of blood transfusion processes.

However, the statement also mentions that the p-value for age is less than the significance level. This suggests that there is a significant relationship between the knowledge of lab technicians and their age. In other words, there are statistically significant differences in knowledge levels among different age groups of lab technicians. To further interpret this finding, it would be helpful to examine the direction and magnitude of the relationship between age and knowledge. For example, does knowledge tend to increase or decrease with age? Are

the differences substantial or minimal? Additionally, the sample size and methodology used in the study would be important factors to consider in understanding the significance of the results. It's also worth noting that while the statistical significance provides evidence of a relationship, it does not necessarily imply practical significance or causality. Further research and analysis may be needed to understand the underlying factors contributing to the differences in knowledge among different age groups of lab technicians.

In summary, the results suggest that there is no significant relationship between knowledge and gender or education among lab technicians. However, there is a significant relationship between knowledge and age. Further investigation and interpretation of the findings, considering additional factors and context, would provide a more comprehensive understanding of the relationship between these variables.

Hospital services are built on the work of residents and interns. They actively take part in the blood component ordering process (Ray et al., 2022), For patient safety, medical knowledge is crucial. Risks associated with blood transfusion include both infectious and non-infectious complications, which are a constant worry (Wasiluk et al., 2023).

The online survey in an exploratory cross-sectional study conducted in India from February 2019 to December 2020 was based on three self-administered questionnaires: Demography, Knowledge, Attitude, and Practice. The participants were also divided into four groups, according to the years of experience, which categorized into four different groups: category 1: one year of experience in blood transfusion; category 2: two to three years; category 3: four to five years; and category 4: more than five years. As a result of this KAP study, a statistician found that the difference between knowledge and practice scores was greater for specialists than for residents. Senior and junior residents both had higher knowledge scores than interns. (Ray et al., 2022). In this study the targeted physician was only the resident the results indicate

that the knowledge of physician respondents has no significant relationship with their gender and education, as the p-values associated with these factors are greater than the chosen significance level (usually set at 0.05 or 0.01). This suggests that gender and education do not have a statistically significant impact on doctors' knowledge of the study population's blood transfusion practices. The findings also demonstrated a significant correlation between physicians' age and their level of knowledge, as indicated by a p-value that was below the threshold for significance. This implies that there are differences in knowledge among physicians based on their age. To further interpret this finding, It is crucial to take into account the situation and potential causes of the observed relationship. Age can be associated with various factors that may influence knowledge, such as years of experience, exposure to advancements in transfusion practices, and continuous education opportunities. Older physicians may have accumulated more experience over time, which could contribute to a deeper understanding of blood transfusion practices. On the other hand, younger physicians might benefit from more recent education and training programs that incorporate updated transfusion guidelines. It is worth noting that while the relationship between knowledge and age is statistically significant, it does not necessarily imply causation. Other variables or factors not included in the study may also influence the observed differences in knowledge based on age.

These findings have implications for targeted interventions and educational programs aimed at improving knowledge about blood transfusion practices among physicians. Efforts can be made to address the specific knowledge gaps identified among different age groups, tailoring training and educational initiatives to the needs and preferences of physicians at various stages of their careers. Further research and analysis may be warranted to explore the underlying reasons for the observed differences in knowledge among physicians based on age and to

determine how these differences can be effectively addressed to improve patient outcomes and ensure standardized transfusion practices.

Chapter six

6.0 Conclusion:

The findings of the study indicate a significant correlation between physician's age and their knowledge of transfusion practices. While older physicians may benefit from accumulated experience younger physicians may leverage recent educational and training programs. While age seems to be a contributing factor causation can't be inferred solely based on statistical significance. Targeted interventions and education programs tailored to different age groups can address specific knowledge gaps eventually improving patient outcomes and ensuring standardized transfusion practices. Further research is needed to understand the underlying reasons for these differences and develop effective strategies to address them holistically.

6.1 Limitation of the study:

Time restrictions and meeting doctors: Meeting doctors to collect data for the study is difficult because of their busy schedules and little free time. The number of questions in the data collection tool was felt to take a long time by the participants, especially during their busy shifts.

Job pressure of interviewees: All interviewees are staff members performing their respective tasks and are busy with clinical work. Participants are multiprofessional: participants from different medical specialties.

The study was conducted in a single hospital and the results may not be representative of a particular specialty or may have limited generalizability.

When interpreting study results, it is important to recognize these limitations and consider strategies to mitigate their impact, such as improving participant comfort, ensuring clear

communication of the study's importance, and carefully selecting the sample to account for multiple aspects of the specialty.

6.2 Recommendations:

Based on the study findings and the importance of increasing healthcare providers' awareness and attitude about blood transfusion to enhance patient safety and healthcare quality, here are some recommendations

1. Develop a comprehensive educational plan for hospital staff on basic transfusion topics such as transfusion indications, blood grouping and cross-matching, proper drug administration technique, recognition and management of transfusion reactions, documentation requirements, and patient preparation. Ensure curriculum is evidence-based and aligned with national guidelines and best practices.

2. Continuing education and reinforcement. Implement an ongoing education program to ensure healthcare providers are abreast of the latest advances and guidelines in transfusion practice. Offer regular refresher courses, seminars, or webinars to increase knowledge and address new topics or changes in transfusion protocols.

3.Quality improvement measures. Incorporate quality improvement measures into training programs that emphasize monitoring transfusion practices, identifying and eliminating errors or deviations, and implementing strategies to increase patient safety. Healthcare providers are encouraged to participate in quality improvement projects and use data-driven approaches to improve the transfusion process.

4.Conduct additional research to evaluate the effectiveness of the training program. Studies to evaluate best blood transfusion practices in healthcare settings. Investigate organizational factors, resource availability and cultural aspects that influence the transfer of knowledge into

practice. Cost-Effectiveness Analysis: Conduct a cost-effectiveness analysis to assess the economic impact of a transfusion education intervention or quality improvement measure. Evaluate the cost-effectiveness of investing in education and training programs to improve patient safety, reduce transfusion-related errors, and improve quality of care.

5. Introduce barcode technology as a popular, reliable and inexpensive method of machine-readable identification. The audit documented the adoption of new technology and improvements in the conduct of bedside safety check.

6.3 Future study:

1 Multidisciplinary Approach: Expand studies to include physician, resident and specialist other healthcare professionals worried within the transfusion system. This approach can pick out understanding gaps across unique roles and facilitate collaboration in imposing standardized practices.

2 Role-particular Training Needs: Investigate the particular education desires of various healthcare companies involved in transfusion care. For instance, nurses might also require training on bedside transfusion tracking techniques, whilst laboratory technologists can also need updates on blood product practice and managing.

3 Inter professional Education: Develop and examine interprofessional schooling applications that convey collectively physicians, nurses, and laboratory workforce to decorate their collective information of transfusion practices and sell teamwork and communication.

4 Contextual Factors: Explore how organizational factors, including health facility policies, resource availability, and interdisciplinary conversation protocols, have an impact on healthcare carriers' expertise and adherence to transfusion suggestions.

5 Simulation-based Training: Assess the effectiveness of simulation-based totally education programs in enhancing healthcare companies' skills and self-assurance in dealing with transfusion-related eventualities, inclusive of acute transfusion reactions or blood product management errors.

6 Quality Improvement Initiatives: Collaborate with healthcare institutions to put into effect quality improvement tasks aimed toward standardizing transfusion practices and ensuring steady schooling and schooling for all healthcare vendors worried.

7 Patient Safety Culture: Investigate the function of organizational lifestyle and management in promoting a affected person safety tradition that prioritizes proof-based totally transfusion practices and encourages non-stop studying and development amongst healthcare companies.

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Appendices 1

Blood Transfusion Knowledge Questionnaire

Dear Colleague

We are working on a research entitled knowledge, attitude, and practice and associated factors towards patient safety. You have been selected to participate in this study. The finding of the study will be used for better planning and up on intervention towards patient safety concerning the awareness, perception and practice.

We are delighted to ask you to fill this questionnaire by yourself. There is no right or wrong answer. Your responses are completely confidential. No need to write your name and will never be used in a connection with any of the information you will give.

Please answer every question and may stop filling at any time if you want to do so. However, your honest answers to these questions will help us better to improve patient safety and increase quality of blood transfusion services. The survey will take about 15 minutes to fill this questionnaire.

All participants will answer part one and the General Information section. Nurses will answer part 2 Lab Technician will answer Part 3, and Physicians will answer part 4.

Please read each questions carefully and show your answer by circling the number and writing your response on blank spaces.

Part 1: Demographic details and training (for all healthcare provider in general nurse, lab tech, physician)

Please Circle the Response(S) You Are Selecting:

1. What type of hospital department you are working in?..... Your specialty_____

2. What qualification(s) do you hold?

a. Diploma in general b. Bachelor c. Master degree

3. Age: ……. years.

4. Gender a. Male b. Female

5. How long have you been working on ward(s) where blood transfusion is performed?

---------years ---------- months

Part 2: Section A: If you are a nurse answer on this part:

1. Over the past 6 months, what was the approximate number of times you performed a blood transfusion?(Choose ONE answer only)

a. None at all

b. 1-4 times

c. 5-8 times

d. 9-12 times

e. More than 12 times

2. Have you ever participated in any in-service training program in relation to blood transfusion within theperiod you have worked for the ward, in which blood transfusion is performed?

a. Yes. If yes, how many programs have you participated in during the last year?

_____When? (list month and year)_____Where? _____

b. Never

3. What specific area(s) relating to transfusion practice do you feel you would like furthertraining/education? (You may choose more than one)

a. Sampling

b. Collection of blood bag

c. Administration

d. Adverse reactions

e. Serious hazards

f. None

Section B: Issues Relating to Patient Preparation:

Read the following statements. If a statement is true, draw a circle around T. Otherwise, circle the letter F.

4. The nurse assigned to a patient in need for a blood transfusion should check the availability and patency ofan intravenous access line after bringing the blood to the ward. **T F**

5. Blood collection from blood bank should take place before the administration of any prescribed pre-medication(s). **T F**

6. The nurse read the physician's order of "Give one unit of packed cells IV". What should be the nurse's immediate decision? (Choose ONE answer only).

a. Collect the blood and clarify the order with the physician prior to administration

b. Seek assistance from the head nurse/ nursing supervisor

c. Collect the blood and transfuse the patient

d. Refuse to collect and administer the blood

7. On what issues should the patient be informed before each blood transfusion episode? (Choose THREEanswers only).

a. Reasons for the blood transfusion

b. Management of acute transfusion reaction

c. Risks of blood transfusion

d. Reaction symptoms

e. Possible consequences of rejecting to have the transfusion

8. When should the baseline vital signs be recorded before initiating the blood transfusion? (Choose ONEanswer only)

a. Within 2 hours

b. Within 1 and ½ hours

c. Within 1 hour

d. Within 45 minutes

e. Within 30 minutes

Section C: Blood Pack Collection:

9. What information should a nurse have to ensure collecting the right blood for the right patient providedthat the nurse has the patient's full name, date of birth and hospital number? (Choose ONE answer only).

a. The patient's identification details are identical on the blood bag and blood request form.

b. The patient's full name is identical on drug chart and blood request form.

c. The patient's full name is identical on the blood bag label and blood request form.

d. The patient's identification details are identical on the drug chart and request form.

10. Which method should the nurse use to transport blood from blood bank to ward? (Choose ONE answeronly).

a. A validated blood transport box

b. A clean stainless steel ward tray with cover

c. A clean kidney basin with cover

d. A clean plastic bag or a plastic tray

e. A super-cooled cubed ice

11. When collecting a unit of blood from blood bank for a patient whose blood group is A positive, the nurse noted that the unit is A negative. IF THE COLLECTED BLOOD IS COMPATIBLE WITH THE PATIENT BLOOD, what action should the nurse take first? (Choose ONE answer only).

a. Inform the doctor and obtain his advice

b. Transfuse the unit after checking details

c. Check details with another nurse- then transfuse the unit

d. Refuse to transfuse the unit

e. Initiate the transfusion, but observe and monitor the patient closely

Section D: Pre-Transfusion Initiation Nursing Activities:

12. On the ward after obtaining the blood pack but before starting the transfusion, what is the most importantnursing action that the nurse must do with regards to patient? (Choose ONE answer only).

a. Document baseline vital signs

b. Check the doctor's order with another nurse

c. Identify the right patient

d. Provide information to the patient (or family)

e. Report high temperature to the doctor

13. When is blood warming prior to administration clinically indicated? (Choose THREE answers only)

a. Each time a unit of blood is to be transfused

b. In exchange transfusion in infants

c. In rapid transfusion

d. In patients with cold agglutinins

e. In patients with hypothermia

14. A unit of blood was delivered to the ward at 4.00 PM. What is the best time by which the transfusionshould start? (Choose ONE answer only).

a. 4:10 PM b. 4:20 PM c. 4:30 PM

d. 4: 40 PM e. 4:50 PM

15. In the ward after obtaining a blood bag, how would you handle the blood? (Choose ONE answer only).

a. Wrap the unit with a blanket or bedsheet

b. Allow blood to wait in room temperature

c. Immerse the unit in hot water

d. Start the transfusion immediately

e. Warm in a microwave

16. Select THREE most important steps that a nurse has to follow in order to properly identify the right patient prior to initiating the transfusion

a. Ask patient to state his/ her name when possible

b. Call patient name when possible

c. Check room and bed number

d. Ensure that patient identification details match on blood bag, ID band and request form

e. Ask patient to state his/ her date of birth when possible

f. Compare ID band with blood bag

17. What is the suitable size of blood transfusion set? (choose ONE answer only).

a. 90-120 micron

b. 130-160 micron

c. 170-200 micron

d. 210-250 micron

Section E: Post Transfusion Nursing care services:

18. Select THREE ROUTINE nursing care servises a nurse has to perform just after starting the bloodtransfusion until it ends.

a. Setting up the flow rate

b. Documentation of relevant information including vital signs

c. Flush line using normal saline

d. Inform the doctor of any transfusion reaction

e. Observation for transfusion reaction

f. Carry out emergency treatment in case of transfusion reaction as ordered

g. Check patient's identity

19. What may happen to a patient if rapid administration of cold blood is performed through a central venousroute terminating in or near the right atrium? (Choose ONE answer only)

a. Post transfusion purpura

b. Cardiac arrhythmia

c. Acute intravascular hemolytic reaction

d. Transfusion associated acute lung injury

If you are not working with adult patients, please skip the next question (question number 20)

20. The doctor has prescribed a unit of blood to an adult patient. At what rate would you start thistransfusion? (Choose ONE answer only).

a. Not more than 60 mL/ hour

b. Not more than 120 mL/ hour

c. Not more than 150 mL/ hour

d. Not more than 200 mL/ hour

21. In your ward, how do you regulate blood flow rate? (Choose ONE answer)

a. Manually b. Via an electronic pump

22. For continuous multiple blood transfusions, what is the maximum duration each blood administration setcould be used? (Choose ONE answer only).

a. 4 hours

b. 6 hours

c. 8 hours

d. 10 hours

e. 12 hours

If you are not working with pediatric patients, skip the next question. (question number 23)

23. In order to initiate a blood transfusion SLOWLY on a 4 month-old infant, at what rate would you startthis transfusion during the FIRST 15 minutes? (Choose ONE answer only)

a. Not more than 0.5 mL/kg/hour

b. Not more than 1.00 mL/kg/hour

c. Not more than 2.00 mL/kg/hour

d. Not more than 3.00 mL/kg/hour

24. A unit of blood intended for an adult patient was removed from blood bank at 4.00 PM. What is the maximum duration when the unit should be totally consumed by the patient? (Choose ONE answer only)

a. 2 hours

b. 3 hours

c. 4 hours

d. 5 hours

25. Slow blood transfusion should be considered for which of the following patients? (Choose TWO answer only)

a. Patients with heart disease

b. Patients with renal stones

c. Patients with bronchial asthma

d. Patients with severe anemia

e. Patients with CVA

26. A unit of blood was initiated at 2.00 PM and is expected to be completed at 5.00 PM. When should the patient vital signs be recorded after initiation until completion? (Choose FOUR answers only)

- First hour at: a. 2:05 and 2:15 PM b. 2:20 and 2:40 PM c. 2:45 and 3.00 PM
- Second hour at: a. 3:15 PM b. 3:30 PM c. 3:45 PM d. 4:00 PM
- Third hour at: a. 4:15 PM b. 4:30 PM c. 4:45 PM d. 5:00 PM

27. When and for how long it is essential to physically observe the patient for a possible transfusion reaction?(Choose ONE answer only)

a. For the first hour

b. For the first 10-15 minutes

c. Throughout the transfusion

d. Throughout the shift

Part 3: If you are a Laboratory technician answer on this part:

28. A unique number must be assigned to each donation of blood. To which of the following should this number be attached?

a. The primary collection bag only

b. The primary and all secondary collection bags only

c .The primary, all secondary collection bags and all specimen tubes used only

d. The primary, all secondary collection bags, all specimen tubes used and donation record

29. The following applies to storage areas for blood and blood components:

a. Quarantined components should be stored with non-conforming blood components

b. Tested (available) units should be stored separately from partially tested or untested (quarantined) blood components

c. Quarantined components should be stored with expired blood components

30. Quality monitoring of processed blood components is performed to:

a. Find reasons not to make blood components

b. Research new techniques for making blood components

c. Ensure that the final product meets specifications and that the process is "in control"

d. Keep the quality manager happy

31. The identification of a patient receiving transfusion should be carried out:

a. By the patient's bedside immediately before transfusion

b. At the nurses' station before transfusion

c. During the transfusion

d. After the transfusion

32. The documentation required in the preparation of blood components includes:

a. Approved SOPs and records of all key activities ranging from the receipt of whole blood to the distribution of released components to hospitals and blood banks for compatibility testing

b. Validation protocol for testing for transfusion-transmissible infections

c. Cross matching results

d. Training records for staff working in the Quality Department

33. Documented procedures for the recall of blood components must enable:

a .Recall of all components/component pool related to the donation that caused an adverse reaction

b . Recall of the initial component that caused the adverse reaction

c .Awareness that the component caused an adverse reaction

34. Recall of a product should lead to:

a. Notification of the donor staff

b. No further action

c. An investigation, with corrective action to prevent recurrence

d. Notification of the components preparation staff

35. A "blood cold chain" is:

a. A metal link that is kept in the refrigerator

b. The storage of products in a refrigerator and/or freezer

c. A system for storing and transporting blood and plasma in an appropriate way to maintain all its functions

d A cold climate

36. The following are NOT essential parts of the blood cold chain:

a. Equipment for the storage and transportation of blood

b. People who manage the storage and transportation of blood

c. People and equipment, resulting in an adequate blood cold chain

d. Maintenance of blood storage equipment

e. Control of the stock of blood available for use

37. A Haemovigilance programme is concerned with:

a. Investigation of transfusion-related incidents

b. Hemoglobin level of a donor

c. Hemoglobin test

d. Efficiency of staff

38. The customers of the BTS at the clinical interface are:

a. Patients

b. Clinicians

c. Patients and clinicians

d. Donors

Part 4: If you are a Physician answer on this part:

Respond by True [T] OR False [F] to each of the following:

39. Medical error is:

a. Failure of a planned action to be completed as intended. [T] [F]

b. Using a wrong plan to achieve an aim. [T] [F]

c. Errors that only result in adverse patient outcomes. [T] [F]

d. Errors that expose patients to risk but do not necessarily result in injury or harm. [T] [F]

e. Defined as a NEAR MISSS if it caused harm. [T] [F]

40. From the conditions that necessitate blood component transfusion:

a. Packed red cell transfusion in acute hemolytic anemia. [T] [F]

b. Fresh frozen plasma in factor V deficiency. [T] [F]

c. Cryoprecipitate in factor IX deficiency. [T] [F]

d. Platelet concentrate in immune thrombocytopenia. [T] [F]

e. Packed red cell in iron deficiency anemia. [T] [F]

41. During the process of blood transfusion:

a. The blood transfusion should be slow (2ml/kg/hour) during the first 10-15 minutes. [T] [F]

b. In severe chronic anemia, fast blood transfusion is allowed. [T] [F]

c. Transfusion should be completed with a maximum of four hours. [T] [F]

d. Generally, IV fluids and drugs could be easily co-administered. [T] [F]

e. If adverse reaction is noticed blood could be continued in a slower rate with administration of antihistaminic. [T] [F]

42. Patient consent before blood transfusion should contain:

a. Indication of blood component transfusion. [T] [F]

b. Other relevant treatment options. [T] [F]

c. Benefits of blood transfusion. [T] [F]

d. Risks of blood transfusion. [T] [F]

e. The blood component preparation steps. [T] [F]

43. Blood request form should ideally contain:

a. Patient full name, sex, and date of birth. [T] [F]

b. Indications of blood transfusions. [T] [F]

c. If it is an emergency or standard request. [T] [F]

d. The need for patient's serum to be screened and held. [T] [F]

e. Number of units. [T] [F]

Please choose the correct answer:

44. Which of the following infections are routinely screened before blood transfusion in Palestine?

a. HBV, HCV, HIV, and syphilis

b. HBV, HCV, and HIV

c. HBV, HCV, HIV, Syphilis, and CMV

d. HBV, HCV, HIIV, and CMV

e. HBV, HCV, HIV, Syphilis, and TORCH

45. For proper patient identification which of these steps are required:

a. Should be both upon admission and prior to administration of care.

b. Patient should be involved in the process.

c. The approach to patient identification (example: ID bands) should be standardized.

d. a + b.

e. a+b+c.

46. After the first hour of blood transfusion your patient experienced respiratory distress, positive fluid balance and tachycardia. What is the most probable cause of this complication?

a. Transfusion related acute lung injury (TRALI).

b. Anaphylactic / severe allergic reaction.

c. Acute hemolytic transfusion reaction.

d. Transfusion associated circulatory overload (TACO).

e. Delayed hemolytic transfusion reaction.

47. What is the best description of your attitude towards reporting transfusion medical error events:

a. You do report transfusion medical events

b. You are seriously considering reporting transfusion medical events within the next 6 months.

c. You are planning to start reporting transfusion medical events in the next 30 days

d. You have reported transfusion medical events during the last 6 months.

e. You think that it isn't important for pediatricians to report transfusion medical errors.

General information section: Complications Related to Blood Transfusion:

48. What interventions could minimize the risk of the patient experiencing acute transfusion reaction?(Choose FOUR answers only)

a. Administration of blood that is compatible with that of the recipient

b. Starting the transfusion within 20 minutes after collection from blood bank

c. Starting the transfusion within 40 minutes after collection from blood bank

d. Administering a unit of blood to the patient within 4 hours after collection

e. Taking history from the patient

f. Not transfusing together drugs or solutions that are incompatible with blood

g. Stopping blood if there are signs and symptoms of transfusion reaction

49. What signs and symptoms indicate that the patient is developing an acute hemolytic transfusion reaction? (Choose FOUR answers only).

a. Tachycardia

b. Productive cough

c. Chest pain

d. Bradycardia

e. Hypotension

f. Shallow slow respiration

g. Nausea/ vomiting

h. Neck pain

50. What should be done immediately when signs and symptoms of acute hemolytic transfusion reaction are seen? (Choose FOUR answers only)

a. Stop blood transfusion

b. Notify the blood bank

c. Keep vein open with 0.9% normal saline

d. Inform nursing supervisor

e. Check patient's vital signs

f. Write an incident report

g. Notify the doctor and begin emergency treatment according to medical order

51. Due to an emergency situation, a unit of blood collected at 8.00 PM was kept in the nurse's station until 9:30 PM. What should the nurse do with the blood? (Choose ONE answer only)

a. Start the transfusion immediately and complete within 2 1/2 hours

b. Start the transfusion immediately and complete within 4 hours

c. Don't start the transfusion, notify the blood bank and return the blood

d. Start the transfusion and observe the patient closely for any reaction

52. A patient has sustained a mild allergic transfusion reaction. What is the usual presenting complaint?(Choose ONE answer only)

a. Pain in the arm

b. Loin pain

c. Urticarial rash

d. Drop in BP

e. Mild dyspnea

53. What is the first action that the nurse should take to handle the patient's condition in question 52?(Choose ONE answer only)

a. Stop the transfusion and notify the doctor

b. Notify the doctor and slow the transfusion rate

c. Slow the transfusion rate and notify the doctor

d. Check the patient's vital signs and notify the doctor

e. Notify a senior nurse

54. What is the commonest cause of the most fatal transfusion reactions? (Choose ONE answer only)

a. Warming blood to more than 37°C

b. Error in blood bank testing

c. Antibodies in Rh system

d. Identification error of patient

55. Before administering blood, when it is not acceptable to check patient's details at the bedside? (Choose ONE answer only)

a. Nurse clearly knows patient

b. Patient is unconscious

c. Never

d. Patient is barrier nursed

Thank you

Appendices 2

Arab American University
Scientific Research Deanship
Ethical Review Committee

الجامعة العربية الأمريكية
عمادة البحث العلمي
لجنة اخلاقيات البحث العلمي

PARTICIPANT INFORMATION SHEET

AAUP-IRB Code No.: .....
AAUP-IRB Date: .....

Study Title: Determination of health workers' level of knowledge about blood transfusion and the potential effect on patient safety.

We would like to invite you to take part in a research study. Before you decide whether to participate, you need to understand why the research is being done and what it would involve. Please take time to read the following information carefully; talk to others about the study if you wish.

Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

1. **What is the purpose of this study?**

This research aimed at analyzing the adverse events reported related to blood transfusion in one of the large teaching hospital in Palestine, we have many objectives that we need to discuss and investigate, among blood transfusion and related to patient safety in Nablus district, Palestine, and to evaluate knowledge, safety and impact of healthcare providers' awareness of the blood transfusion on patient safety. this research also will

2. **Why is this study important?**

1. Conduct further researches in the relation to knowledge and patient safety related to blood transfusion among to healthcare providers.

2. This study will provide recommendations that may help health care providers to have some effort to gain knowledge and improve their competencies.

3. The research will provide new data about the values of the importance of blood transfusion knowledge in improving patient safety, which will increase quality in healthcare sector in Palestine.

3. **What is the procedure that is being tested?** *(If applicable)*

there is no testing there is an assessing the awareness level among healthcare provider to the blood and blood component blood transfusion

Why have I been invited to participate in this study?

A Results and recommendations will be submitted regarding the impact of blood transfusion gap knowledge within healthcare providers on patient safety and how this will have a direct effect on the quality of healthcare and how to train and educate healthcare providers with sufficient knowledge about blood transfusion.

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4. **Who should not participate in the study?**

healthcare provider that are not involved in patient services related to blood transfusion such as x ray technician

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INFORMED CONSENT

AAUP-IRB Code No.: .....
AAUP-IRB Date: .....

I, ... *(Name of Participant / optional)* hereby agree to take part in the research (questionnaire study) specified below:

Title of Study: Determination of health workers' level of knowledge about blood transfusion and the potential effect on patient safety.

Fulfillment of .....master ... degree, in ... Quality management in health institutions ....., in AAUP.
(Name of program)

The nature and purpose of which has been explained to me by ....., and interpreted by ..... to the best of his/her ability in English.

I have been told about the nature of the research in terms of the research topic purpose significant of the study and the methodology
After knowing and understanding all the possible advantages of this research, I voluntarily consent of my own free will to participate in the clinical research specified above.

Date: ..... **Signature:** .....
(Participant)

IN THE PRESENCE OF:

Name: .....

Designation: ..... **Signature:** .....

(Witness for Signature of Participant)

I confirm that I have explained to the participant the nature and purpose of the above-mentioned research.

Date: ..... **Signature:** .....DALAL QARIAB

(Attending Investigator)

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AAUP-IRB APPLICATION FORM *(Electronic)*

Applicant Information	
Name of Applicant(s):	**Dalal Ghassan Hamdan Alqariab**
University ID No.:	**202020357**
Faculty:	**graduate study**
Department:	**administrative and financial sciences**
Program:	**quality management in health institutions**
Name of main supervisor:	**Dr.atef hasan husein khatib**
Name of co-supervisor(s):	**not available**
Name of external supervisor:	**not available**

General Information	
Study title:	Determination of health workers' level of knowledge about blood transfusion and the potential effect on patient safety. The study will be conducted in hospitals that have blood bank services, the analysis will be conducted with the participant that are healthcare providers that contact with blood bank services and patients.
Study summary:	This project is also aimed to investigate the adequacy if knowledge among health care provider in attempt for a post or under graduate training in blood bank knowledge and to improve that this knowledge is important in decision making.
Type of the study:	1. Experimental (interventional) study.

2. Non-experimental (non-interventional) study.

Has this study been conducted at AAUP in the past?	☐ Yes ☐ No
If yes, give details:	
Has this study been conducted **in Palestine in the past?**	☐ Yes ☐ No
If yes, give details:	
Is this research funded?	☐ Yes ☐ No
If yes, give details:	

Research Details

Study introduction and background:	Blood transfusion is an essential component of the National Health Service, and there is no substitute for blood and its components. (Rudrappan, 2019).it always has been present in the history of humanity with the notion that it could maintain and preserve lives (Dolnicar et al., 2015) Blood and blood components (BCs) for transfusion achieved from donations made by individual. (Olivier Garraud & Tissot, 2018) .To survive, every human needs virtually normal blood functioning. Moderate changes may result in sub-physiological functioning, although more serious flaws can be addressed by medicines, blood derivatives (where accessible), or both (Olivier Garraud & Tissot, 2018). 80 million units of blood are collected every year, and a blood transfusion is performed every second (Kavaklioglu et al., 2017) Many medical conditions can be improved by

the use of blood and blood products (Pehlivanoğlu et al., 2011)

Technological advancements in blood collection, separation, anticoagulation, and preservation have resulted in component preparation of red blood cells, platelets, white blood cells, and plasma that is superior to the usage of whole blood in the past.(Fasano & Luban, 2008)

.Millions of units of blood products are transfused to patients in the United States each year. In patients with or at high risk of developing symptomatic anemia, red blood cells are transfused to increase oxygen-carrying ability. Plasma transfusion corrects clinically severe coagulopathy in individuals who have or are at high risk of bleeding. Platelets transfused to individuals suffering from thrombocytopenia or platelet dysfunction help prevent or treat bleeding. To treat hypofibrinogenemia , cryoprecipitate is transfused. Many adverse responses can develop during or after the administration of blood products (Raval et al., 2020).

Blood safety and sustainability are worldwide concerns.(Cap et al., 2018).With a growing demand for blood supplies throughout the world, there is an urgent need to assure a safe and sufficient supply of blood products. (Masser et al., 2008)

The blood transfusion process is one of the medical fields in which mistakes can have catastrophic results. The most important failures were those regarding, transmitting information about the transfusion request, patient

identification, sample identification, cross-matching ordered tests, transfusing blood components, completing and sending the transfusion control document, and reporting of transfusion reactions.(Mora et al., 2019) . There are several attempts trying to prevent transfusion-related mistakes.(Davis et al., 2011). knowledge and skills of health care professionals are important for establishing and improving the quality of blood transfusion operations. (Beril & Semiha, 2019)

The health care provider needs to be familiar with the blood transfusion in order to practice safely. Despite this, little is known about their blood transfusion practice and the information that supports it. The explored literature showed shortcomings in both knowledge and practice. Until now, no similar study has been found in the Middle East. Studies outline significant diversity between different nation areas, which is caused by variations in health circumstances as well as resource inequities. Comparing Patient Blood Management (PBM) practices from low-, middle-, and high-income nations, as outlined in this article, enables them to learn directionally from one another and strive toward implementing novel, ideally evidence-based, improvement approaches((Hijji et al., 2013)and Eichbaum et al., 2016)

This study we will measure the level of knowledge about blood transfusion within healthcare provider (laboratory technicians and nurses, physicians) at Al-Najah National

	University Hospital and its impact on patient safety using designed questionnaire for that purpose.
Why it is important to conduct this study?	A Results and recommendations will be submitted regarding the impact of blood transfusion gap knowledge within healthcare providers on patient safety and how this will have a direct effect on the quality of healthcare and how to train and educate healthcare providers with sufficient knowledge about blood transfusion.
Study objectives:	1. Conduct further researches in the relation to knowledge and patient safety. 2. This study will provide recommendations that may help health care providers to have some effort to gain knowledge and improve their competencies. 3. The research will provide new data about the values of the importance of blood transfusion knowledge in improving patient safety, which will increase quality in healthcare sector in Palestine.

Methodology	
Study design:	3. Case Study design 4. Case-control design 5. Cohort (Longitudinal) design 6. Cross-Sectional design 7. Descriptive design

	8. Observational design
	9. Randomized controlled trials (RCTs)
	10. Quasi experiments; non-randomized, (non-controlled / one group)
	11. Quasi experiments; non-randomized, (controlled / two groups)
	12. Retrospective designs
	13. Prospective designs
	14. Others
Method of data collection:	15. Quantitative method
	16. Qualitative method
	17. Mixed method
Sampling method:	18. Simple random sampling
	19. Systematic sampling
	20. Stratified sampling
	21. Clustered sampling
	22. Convenience sampling
	23. Quota sampling
	24. Judgement (or Purposive) Sampling
	25. Snowball sampling
	26. Universal sampling
Study population (sample size and target group):	200 of healthcare provider in a najah national university hospital
How will the data be collected?	A validated survey will be used to collect data

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Who will collect the data?	The student herself (principal investigator)
How long will the study be?	

Ethical Issues

Are the patients file or medical records needed?	□ Yes □ No
Are human subjects involved?	□ Yes □ No
Does the study involve people from a vulnerable groups?	□ Yes □ No
How long is each participant going to be involved in the study?	

For experimental (interventional) study.

What is the intervention (educational program, drugs, therapy, treatment, medical device, …etc.) of this study?	1. Educational program, 2. Drugs 3. Therapy 4. Treatment 5. Medical device 6. Other
Who will give the intervention?	No intervention
Is the intervention of the study New?	□ Yes □ No
.If yes, is the new intervention tested before?	□ Yes □ No □ Not applicable
.If yes, has the new intervention granted license?	□ Yes □ No □ Not applicable
.If yes, Who gave the licenses?	
How much is the intervention cost?	

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Jenin - P.O. Box: 240 Tel: 970-4-2418888 Fax: 970-4-2510813 E-mail: src@aaup.eduWebsite: www.aaup.edu

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Who will pay?	
Is there any continuity of treatment provided after **the study is completed?**	□ Yes □ No
Does this study involve any clinical procedure?	□ Yes □ No □ Not applicable
Does this study include taking blood, tissue, biological sample from human subjects?	□ Yes □ No □ Not applicable
What is the language of the questionnaires?	4. English 5. Arabic 6. Both
Did you translate the questionnaires from the original language?	□ Yes □ No
Will the questionnaires / interview include sensitive, embarrassment, upsetting topics?	□ Yes □ No □ Not applicable
What are the benefits for the participants?	
Is there any potential harm for the participants?	□ Yes □ No □ Not applicable
If yes, please specify?	
If yes, how are you going to minimize it?	
Is there an insurance coverage for the study?	□ Yes □ No □ Not applicable
Is there any payment for the participants?	□ Yes □ No
Is there any payment for the persons who will be recruited for the study?	□ Yes □ No
How will the data / records (e.g. questionnaires) of the participants be kept?	It will be kept on the researchers computer herself which controlled and securit with a password that no one know it except the researcher

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How will you keep the anonymity of the participants?

Who will have an access to the research data? Only researcher herself

For how long will you keep the research data? As the low of the university

Are you going to provide a Participant Information Sheet, and Informed Consent? ☐ Yes ☐ No

Does any researcher have a conflict of interest? ☐ Yes ☐ No

To ensure **participant's confidentiality, I agree to comply to the Caldicott Principles** as follows:

1. I will not use identifiable information unless it is necessary.
2. I will only use the minimum necessary patient-identifiable information.
3. I will ensure that the access to patient identifiable information will be on a strictly need-to-know basis.
4. I will ensure that everyone with access to patient identifiable information is aware of their responsibilities.
5. I understand and will comply with the law.
6. I understand that the duty to share information can be as important as the duty to protect patient confidentiality.

Other Information?

The required Documents:

1. Approval of passing of proposal defense (for Master & PhD degree).
2. The research proposal.
3. AAUP-IRB Participants Information Sheet.
4. AAUP-IRB Informed Consent.
5. Study Questionnaires.

Note:

6. The applicant will submit the AAUP-IRB application for the Deanship of Scientific Research (src@aaup.edu).
7. After submission, every application will be given an (application No.) by the system.

Appendices 3

Arab American University- Palestine
Deanship of Scientific Research
IRB committee
Tel: 04-241-8888, ext 1196
E-mail: irb.aaup@aaup.edu

الجامعة العربية الامريكية- فلسطين
عمادة البحث العلمي
لجنة أخلاقيات البحث العلمي
تلفون: 1196 ext 04-241-8888
البريد الالكتروني: irb.aaup@aaup.edu

IRB Approval Letter

Study Title: Determination of health workers' level of knowledge about blood transfusion and the potential effect on patient safety

Submitted by: Ms. Dalal Ghassan Hamdan Alqariab

Date received: 21 September 2022

Date reviewed: 28 September 2022

Date,approved: 28 September 2022

Your Study titled "Determination of health workers' level of knowledge about blood transfusion and the potential effect on patient safety" with archived number 2022/A/16/N was reviewed by the Arab American University IRB committee and was approved on 28 September 2022.

Reham Khalaf-Nazzal, MD, PhD
IRB committee chairman
Arab American University of Palestine

General Conditions:

1. Valid for 6 months (28 March 2023) from the date of approval.
2. It is important to inform the committee with any modification of the approved study protocol.
3. The committee appreciates a copy of the research when accomplished.

لجنة أخلاقيات البحث العلمي في الجامعة العربية الامريكية

IRB at Arab American University

الملخص

الخلفية: نقل الدم ىو تدخل طبي مهم يتطلب معرفة دقيقة والالتزام ببروتوكولات السلامة لمنع الأحداث السلبية. تعد معرفة العاملين في .مجال الرعاية الصحية بعمليات نقل الدم أمًرا بالغ الأهمية لسلامة المرضى أثناء عمليات نقل الدم الطرق: كان الهدف من ىذه الدراسة ىو تحديد مدى اطلاع عاملي المهن الصحية على إجراءات نقل الدم، واستكشاف التأثيرات المحتملة على سلامة المرضى. تم إجراء دراسة مقطعية بين فئات مختلفة من العاملين الصحيين، بما في ذلك الأطباء والممرضين وفنيي المختبرات، في فلسطين في مستشفى النجاح الجامعي الوطني في الفترة من أكتوبر 2022إلى يناير 2023.وتم اختبار استبيان تم التحقق منو يضم المشاركين حول معرفتهم بـــ إجراءات الإدارة الآمنة، واختبار التوافق، وتفاعلات نقل الدم، ومؤشرات عمليات نقل .الدم باستخدام أسئلة متعددة الخيارات وأسئلة مفتوحة

النتائج: شمل المسح ما مجموعه 200عامل صحي. أشارت نتائج الدراسة إلى مستويات متفاوتة من المعرفة عبر المجموعات المهنية المختلفة. في حين أظهر الأطباء فهًما قويًا لمؤشرات نقل الدم واختبار التوافق، أظهرت الممرضات وعيًا أكبر بممارسات الإدارة الآمنة وإدارة تفاعلات نقل الدم. أظهر فنيو المختبرات فهًما شاملاً لإجراءات اختبار التوافق، لكنهم أظهروا فجوات في فهم تفاعلات نقل الدم. ومن بين النتائج المثيرة للقلق أن المعرفة الشاملة حول التفاعلات الضارة المتوقعة لنقل الدم على سلامة المرضى كانت دون المستوى الأمثل في جميع فئات العاملين الصحيين

الاستنتاج: تسلط الدراسة الضوء على أهمية معالجة الفجوات المعرفية بين العاملين الصحيين في سياق نقل الدم لتعزيز سلامة المرضى، وينبغي تنفيذ برامج التدريب المصممة ومبادرات التعليم المستمر لمعالجة مجالات النقص المحددة بين المجموعات المهنية المختلفة. تعد الجهود التعاونية بين مؤسسات الرعاية الصحية والهيئات التنظيمية والمؤسسات التعليمية حاسمة في تحسين المعرفة وتوحيد أفضل

الممارسات المتعلقة بنقل الدم. ومن خلال تعزيز معارف العاملين الصحيين، يمكن تحسين سلامة المرضى أثناء إجراءات نقل الدم .بشكل كبير، مما يؤدي في النهاية إلى نتائج أفضل للمرضى

الكلمات المفتاحية: نقل الدم، العاملون الصحيون، المعرفة، سلامة المرضى، تفاعلات نقل الدم، التعليم الطبي